

Practice Test 1: how to take it

Take the five sections in this order, each timed on its own, in one sitting with short breaks. If your JATC uses the six-section version (Columbus, Fresno, Minneapolis and Lincoln list Problem Solving), add section 6.

#	Section	Questions	Practice time
1	Numerical Computation	30	30 min
2	Reading	42	25 min
3	Mechanical Reasoning	45	30 min
4	Numerical Reasoning	20	22 min
5	Paper Folding	30	30 min
6	Problem Solving (6-section version only)	35	35 min

GAN publishes no item counts or time limits per section. The counts and times here follow figures published by test-prep vendors, not by GAN; Boston lists the whole test as 3 hours and Los Angeles as 2 hours 20 minutes. Practice working fast and accurately rather than to an exact clock.

Practice Test 1: Numerical Computation answer sheet

Mark one answer for every item. GAN does not publish whether wrong answers cost points. Answer the ones you know first, then rule out choices before you guess.

1 A ☐ B ☐ C ☐ D ☐ E ☐	2 A ☐ B ☐ C ☐ D ☐ E ☐	3 A ☐ B ☐ C ☐ D ☐ E ☐	4 A ☐ B ☐ C ☐ D ☐ E ☐
5 A ☐ B ☐ C ☐ D ☐ E ☐	6 A ☐ B ☐ C ☐ D ☐ E ☐	7 A ☐ B ☐ C ☐ D ☐ E ☐	8 A ☐ B ☐ C ☐ D ☐ E ☐
9 A ☐ B ☐ C ☐ D ☐ E ☐	10 A ☐ B ☐ C ☐ D ☐ E ☐	11 A ☐ B ☐ C ☐ D ☐ E ☐	12 A ☐ B ☐ C ☐ D ☐ E ☐
13 A ☐ B ☐ C ☐ D ☐ E ☐	14 A ☐ B ☐ C ☐ D ☐ E ☐	15 A ☐ B ☐ C ☐ D ☐ E ☐	16 A ☐ B ☐ C ☐ D ☐ E ☐
17 A ☐ B ☐ C ☐ D ☐ E ☐	18 A ☐ B ☐ C ☐ D ☐ E ☐	19 A ☐ B ☐ C ☐ D ☐ E ☐	20 A ☐ B ☐ C ☐ D ☐ E ☐
21 A ☐ B ☐ C ☐ D ☐ E ☐	22 A ☐ B ☐ C ☐ D ☐ E ☐	23 A ☐ B ☐ C ☐ D ☐ E ☐	24 A ☐ B ☐ C ☐ D ☐ E ☐
25 A ☐ B ☐ C ☐ D ☐ E ☐	26 A ☐ B ☐ C ☐ D ☐ E ☐	27 A ☐ B ☐ C ☐ D ☐ E ☐	28 A ☐ B ☐ C ☐ D ☐ E ☐
29 A ☐ B ☐ C ☐ D ☐ E ☐	30 A ☐ B ☐ C ☐ D ☐ E ☐		

Practice Test 1: Numerical Computation

Practice time: 30 minutes for 30 questions. No calculator. Scrap paper is fine.

Directions. Work each problem exactly and choose the correct answer. Answers are exact, not rounded (unless the item asks you to round), and fractions are in lowest terms.

1. $9,058 + 474 = ?$

- A. 13,798 B. 9,422 C. 9,532 D. 8,584 E. 9,522

2. $1.9 \times 0.2 = ?$

- A. 0.38 B. 2.1 C. 0.038 D. 38 E. 3.8

3. $647 \times 7 = ?$

- A. 4,489 B. 7,769 C. 4,289 D. 4,529 E. 529

4. Write 78% as a fraction in lowest terms.

- A. $39/100$ B. $1 \frac{11}{39}$ C. $7 \frac{4}{5}$ D. $39/50$ E. $39/500$

5. Round 84.577 to the nearest hundredth.

- A. 84.577 B. 84.6 C. 84.58 D. 85 E. 84.57

6. $1/5 + 1/4 = ?$

- A. $3/10$ B. $9/20$ C. $1/10$ D. $2/9$ E. $1/4$

7. $(-9) \times (-2) = ?$

- A. -7 B. -11 C. 18 D. -18 E. 11

8. What is 60% of 60?

- A. 96 B. 24 C. 3.6 D. 36 E. 360

Practice Test 1: Numerical Computation (continued)

9. $1\frac{1}{5} \times 11\frac{1}{12} = ?$

- A. $1\frac{7}{60}$ B. $12\frac{1}{55}$ C. $11\frac{1}{60}$ D. $11\frac{1}{17}$ E. $4\frac{7}{12}$

10. $20,091 - 17,734 = ?$

- A. 13,367 B. 2,367 C. 37,825 D. 17,763 E. 2,357

11. $46 - 30.98 = ?$

- A. 1.502 B. 1,502 C. 150.2 D. 16.98 E. 15.02

12. $50,804 - 25,725 = ?$

- A. 25,079 B. 25,089 C. 35,121 D. 35,189 E. 76,529

13. $41 - 9 \times 5 + 8 = ?$

- A. 4 B. 416 C. 168 D. -76 E. -12

14. $1\frac{1}{2} \div 2\frac{2}{5} = ?$

- A. $\frac{1}{5}$ B. $1\frac{1}{4}$ C. 5 D. $2\frac{1}{2}$ E. $\frac{4}{5}$

15. $(-5) \times (-3) - 17 = ?$

- A. 32 B. -32 C. 100 D. -2 E. 2

16. The price of a box of breakers fell from \$60 to \$54. What is the percent decrease?

- A. 10% B. $11\frac{1}{9}\%$ C. 90% D. 6% E. $111\frac{1}{9}\%$

Practice Test 1: Numerical Computation (continued)

17. $7/9 - 1/6 = ?$

- A. $11/18$ B. $1/3$ C. $2/9$ D. 2 E. $13/18$

18. Write $3/16$ as a percent.

- A. 1.875% B. 187.5% C. 3% D. 0.1875% E. 18.75%

19. 27 is what percent of 300?

- A. 0.09% B. $1,111 \frac{1}{9}\%$ C. 27% D. 91% E. 9%

20. $1,015 \div 5 = ?$

- A. 20 B. 203 C. 230 D. 23 E. 2,003

21. 18 is what percent of 75?

- A. 76% B. 18% C. $416 \frac{2}{3}\%$ D. 0.24% E. 24%

22. $3,224 \div 8 = ?$

- A. 43 B. 40 C. 403 D. 4,003 E. 430

23. $228 \times 93 = ?$

- A. 19,484 B. 205,884 C. 684 D. 21,204 E. 2,736

24. A meter costs \$200. Its price goes up 40%, and then the new price goes down 50%. What is the final price?

- A. \$420 B. \$140 C. \$100 D. \$280 E. \$180

Practice Test 1: Numerical Computation (continued)

25. $4\frac{1}{2} \times 1\frac{1}{4} = ?$

A. $5\frac{5}{8}$

B. $1\frac{1}{4}$

C. 4

D. $4\frac{1}{8}$

E. $4\frac{1}{2}$

26. $2,626 \div 26 = ?$

A. 10

B. 101

C. 110

D. 11

E. 1,001

27. $2 \times (9 - 6)^2 \div 2 = ?$

A. -27

B. 9

C. 0

D. 6

E. 18

28. A meter costs \$760. Its price goes up 40%, and then the new price goes down 20%. What is the final price?

A. \$912.00

B. \$1,276.80

C. \$851.20

D. \$608.00

E. \$1,064.00

29. $4\frac{7}{8} \times 5\frac{1}{2} = ?$

A. $24\frac{3}{8}$

B. $4\frac{1}{8}$

C. 20

D. $20\frac{7}{16}$

E. $26\frac{13}{16}$

30. $10,517 \div 13 = ?$

A. 8,009

B. 890

C. 89

D. 809

E. 80

Practice Test 1: Reading answer sheet

Mark one answer for every item. GAN does not publish whether wrong answers cost points. Answer the ones you know first, then rule out choices before you guess.

1 A ☐ B ☐ C ☐ D ☐	2 A ☐ B ☐ C ☐ D ☐	3 A ☐ B ☐ C ☐ D ☐	4 A ☐ B ☐ C ☐ D ☐	5 A ☐ B ☐ C ☐ D ☐
6 A ☐ B ☐ C ☐ D ☐	7 A ☐ B ☐ C ☐ D ☐	8 A ☐ B ☐ C ☐ D ☐	9 A ☐ B ☐ C ☐ D ☐	10 A ☐ B ☐ C ☐ D ☐
11 A ☐ B ☐ C ☐ D ☐	12 A ☐ B ☐ C ☐ D ☐	13 A ☐ B ☐ C ☐ D ☐	14 A ☐ B ☐ C ☐ D ☐	15 A ☐ B ☐ C ☐ D ☐
16 A ☐ B ☐ C ☐ D ☐	17 A ☐ B ☐ C ☐ D ☐	18 A ☐ B ☐ C ☐ D ☐	19 A ☐ B ☐ C ☐ D ☐	20 A ☐ B ☐ C ☐ D ☐
21 A ☐ B ☐ C ☐ D ☐	22 A ☐ B ☐ C ☐ D ☐	23 A ☐ B ☐ C ☐ D ☐	24 A ☐ B ☐ C ☐ D ☐	25 A ☐ B ☐ C ☐ D ☐
26 A ☐ B ☐ C ☐ D ☐	27 A ☐ B ☐ C ☐ D ☐	28 A ☐ B ☐ C ☐ D ☐	29 A ☐ B ☐ C ☐ D ☐	30 A ☐ B ☐ C ☐ D ☐
31 A ☐ B ☐ C ☐ D ☐	32 A ☐ B ☐ C ☐ D ☐	33 A ☐ B ☐ C ☐ D ☐	34 A ☐ B ☐ C ☐ D ☐	35 A ☐ B ☐ C ☐ D ☐
36 A ☐ B ☐ C ☐ D ☐	37 A ☐ B ☐ C ☐ D ☐	38 A ☐ B ☐ C ☐ D ☐	39 A ☐ B ☐ C ☐ D ☐	40 A ☐ B ☐ C ☐ D ☐
41 A ☐ B ☐ C ☐ D ☐	42 A ☐ B ☐ C ☐ D ☐			

Practice Test 1: Reading, passage 1 of 7

Practice time: 25 minutes for 42 sentence completions (practice estimate). Answer from the passage only.

Directions. Each item is the start of a sentence about the passage above it. Choose the completion that best completes the sentence, using only what the passage says.

How a Circuit Breaker Trips

A circuit breaker is an automatic switch that shuts off power when a circuit carries more current than it safely can. Its main job is to protect the wiring inside the walls, because wire that carries too much current heats up and can damage its insulation or start a fire. Most household breakers use two separate methods to detect trouble. The first method relies on a bimetallic strip, which is made of two metals bonded together that expand at different rates when heated. When a circuit is overloaded for a while, the extra current warms the strip until it bends far enough to release a latch and open the circuit. This response is slow on purpose, so a brief rise in current does not cause a needless shutdown. The second method uses a small electromagnet. A short circuit can send a very large current through the breaker almost instantly, and that surge makes the electromagnet pull hard enough to trip the latch within a fraction of a second. After a breaker trips, it can be reset by moving the handle fully off and then back on. However, a breaker that trips again and again is sending a message. Instead of simply resetting it each time, the owner should find out why the circuit is overloaded or faulty.

1. The main point of the passage is that

- A. a circuit breaker protects wiring by opening a circuit when current is unsafe.
- B. a circuit breaker should be reset right away whenever it trips.
- C. bimetallic strips are the most important safety part in a home.
- D. short circuits happen more often than overloads in most homes.

2. According to the passage, the bimetallic strip bends because of

- A. a sudden pull from a small electromagnet.
- B. the handle being moved fully to off.
- C. heat from extra current during an overload.
- D. cold air reaching the inside of the breaker panel.

3. According to the passage, the electromagnet responds to a short circuit

- A. only after the bimetallic strip cools.
- B. within a fraction of a second.
- C. after an overload lasts for a while.
- D. only after the handle is reset.

4. Based on the passage, a breaker that trips again and again most likely indicates that

- A. the bimetallic strip has stopped bending properly.
- B. the electromagnet has become too weak to work.
- C. the handle was not moved fully off before each of the resets.
- D. there is a problem in the circuit that needs attention.

5. As used in the passage, the word 'needless' most nearly means

- A. dangerous.
- B. sudden.
- C. unnecessary.
- D. inconvenient.

6. The author says that a breaker that trips again and again 'is sending a message' in order to

- A. suggest that repeated tripping is a warning worth looking into.
- B. explain that breakers send signals to the electric utility.
- C. show that the bimetallic strip makes a sound as it bends.
- D. argue that any breaker must be replaced after it trips even one time.

Practice Test 1: Reading, passage 2 of 7

Reading Sandpaper Grit Numbers

Anyone who has shopped for sandpaper has seen numbers such as 60, 120, or 220 printed on the back of each sheet. These grit numbers describe the size of the abrasive particles glued to the paper. The system grew out of the screens used to sort the particles, where a higher number meant a screen with more, smaller openings per inch. As a result, the scale can seem backward at first, because a higher grit number means smaller particles and a finer, smoother cut. Coarse paper, around 60 or 80 grit, removes material quickly but leaves deep scratches. Fine paper, such as 180 or 220 grit, removes very little material but leaves a smooth surface ready for paint or finish. Skilled workers rarely jump straight from coarse to fine. Instead, they move through the grits in steps, so that each sheet removes the scratches left by the one before it. If a worker skips too far ahead, the fine paper may need a long time to erase the deep marks, and some of them may show through the final coat. The abrasive itself also matters. Aluminum oxide is a common choice for sanding wood, while silicon carbide is often used for sanding between coats of finish and for wet sanding. Choosing the right grit and the right sequence saves both time and material.

7. The main idea of the passage is that

- A. coarse sandpaper should be avoided on most finishing jobs.
- B. silicon carbide is a better abrasive than aluminum oxide.
- C. sandpaper grit numbers were first printed on sorting screens.
- D. knowing grit numbers helps workers choose sandpaper and the order to use it in.

8. According to the passage, a higher grit number indicates

- A. larger particles that cut faster.
- B. smaller particles that cut more finely.
- C. a stronger glue holding the particles.
- D. a paper meant only for wet sanding.

9. According to the passage, skilled workers move through grits in steps so that

- A. each sheet removes the scratches left by the last one.
- B. the abrasive particles stay glued to the paper longer.
- C. the wood absorbs paint more evenly in the end.
- D. the coarse paper is never needed on the job.

10. Based on the passage, a worker who sands with 60 grit and then switches directly to 220 grit would most likely

- A. finish the job faster than with several steps.
- B. remove more wood with the 220 grit paper.
- C. see some deep scratches under the final coat.
- D. need to switch to silicon carbide paper.

11. As used in the passage, the word 'coarse' most nearly means

- A. rude.
- B. smooth.
- C. costly.
- D. rough.

12. The author explains how the grit system grew out of sorting screens in order to

- A. explain why a higher number means finer particles.
- B. show that sandpaper was invented by accident.
- C. argue that the grit scale should be changed to a simpler one.
- D. describe how sandpaper particles are glued on.

Practice Test 1: Reading, passage 3 of 7

Grounding and Bonding: Two Different Jobs

The terms grounding and bonding are often used as if they mean the same thing, but they describe two different jobs in an electrical system. Grounding means connecting the system to the earth, usually through a metal rod driven into the soil or another grounding electrode. This connection helps limit the voltage that lightning or utility line surges can impose on the system, and it keeps the system's voltage stable in relation to the earth. Bonding means connecting metal parts together, such as equipment enclosures, conduit, and metal piping, so that they form one continuous conductive path. Bonding keeps these parts at the same voltage, so a person touching two of them at once is not exposed to a dangerous difference. Bonding also serves a second purpose that many people overlook. If a hot wire touches a metal enclosure, the bonded path carries the fault current back to the source with very little resistance. That large current makes the breaker trip quickly and clears the danger. A common misconception is that the earth itself provides this path. In fact, soil usually resists current far too much to let enough flow to trip a breaker, so a metal enclosure could stay energized. For that reason, a ground rod alone cannot take the place of proper bonding.

13. The main point of the passage is that

- A. ground rods are the most important part of an electrical system.
- B. bonding is needed only in systems that are exposed to lightning.
- C. the earth provides the safest path for fault current to follow.
- D. grounding and bonding do different jobs, and both are needed.

14. According to the passage, bonding connects

- A. metal parts such as enclosures, conduit, and piping.
- B. the electrical system and a rod driven into the soil.
- C. the hot wire and the neutral wire at each outlet.
- D. the utility lines and the building's lightning rods.

15. According to the passage, when a hot wire touches a metal enclosure, the breaker trips quickly because of

- A. current flowing into the soil through the rod.
- B. voltage rising in relation to the earth.
- C. a large fault current returning on the bonded path.
- D. lightning energy reaching the grounding electrode.

16. Based on the passage, the most likely danger in a system that has a ground rod but poor bonding is that

- A. the ground rod could carry too much current and melt.
- B. a faulted metal enclosure could remain energized.
- C. lightning would be drawn toward the building.
- D. the system voltage would become too low to use.

17. As used in the passage, the word 'impose' most nearly means

- A. force upon.
- B. remove from.
- C. measure in.
- D. store within.

18. The author describes a 'common misconception' near the end of the passage in order to

- A. show that ground rods are no longer installed.
- B. argue that bonding is less important than grounding.
- C. explain why lightning surges are hard to control.
- D. correct a mistaken belief about how fault current returns.

Practice Test 1: Reading, passage 4 of 7

How a Relay Lets a Small Signal Control a Big Load

Many electrical systems need a small, low-power signal to switch on a much larger load. A home thermostat is a good example. It typically works with a control circuit of about 24 volts, yet the furnace blower or air conditioner it controls may run on a far more powerful circuit. The device that connects these two worlds is often a relay. Inside a relay is a coil of wire wrapped around an iron core. When the small control current flows through the coil, it becomes an electromagnet and pulls a movable metal arm, called an armature. The armature closes a set of contacts, completing the separate high-power circuit. When the control current stops, a spring pulls the armature back and the contacts open again. The audible click of many relays is the sound of that arm moving. One major advantage of this design is isolation. The control circuit and the load circuit are not directly connected, so the thermostat wiring never carries the heavy current of the equipment. Larger versions of relays, called contactors, are built to switch motors and other heavy loads. Their contacts are sized to handle bigger currents and to withstand the small arcs that form as contacts open and close.

19. The passage mainly explains that

- A. a relay uses a small control current to switch a separate larger circuit.
- B. thermostats are the most common type of relay found in American homes today.
- C. contactors have replaced relays in most modern buildings.
- D. relays make a clicking sound because they are wearing out.

20. According to the passage, when the control current stops,

- A. the coil becomes an electromagnet.
- B. the contacts close the load circuit.
- C. the thermostat raises its voltage.
- D. a spring pulls the armature back.

21. According to the passage, when current flows through the coil, the armature is pulled by

- A. a spring attached inside the set of contacts.
- B. the electromagnet formed by the coil.
- C. the heavy current of the load.
- D. a small arc between the contacts.

22. Based on the passage, thermostat wiring can be much lighter than the wiring to an air conditioner because

- A. the thermostat is used only during winter.
- B. the air conditioner runs on a lower voltage than the thermostat.
- C. the thermostat wiring never carries the load's heavy current.
- D. the relay turns the heavy current into a small signal.

23. As used in the passage, the word 'audible' most nearly means

- A. loud.
- B. sudden.
- C. happening over and over.
- D. able to be heard.

24. The author describes the home thermostat early in the passage in order to

- A. argue that thermostats should use higher voltages.
- B. give a familiar example of a small signal controlling a large load.
- C. explain how contactors are built for motors.
- D. show that furnaces do not need any relays.

Practice Test 1: Reading, passage 5 of 7

Hammer Drills and Rotary Hammers

Drilling into concrete or brick with an ordinary drill is slow, because spinning alone does little against such hard material. Tools made for masonry add a hammering action that chips the material away while the bit turns. The two main types do this in very different ways. In a hammer drill, two ridged discs inside the tool ride against each other as the chuck spins. Each time the ridges pass over one another, they push the bit forward a tiny distance, producing thousands of small, rapid blows. Because the force of each blow depends on how hard the user presses, a hammer drill works best for occasional, smaller holes in brick or block. A rotary hammer uses a piston instead. The motor drives the piston back and forth, compressing a cushion of air that throws a separate striker against the back of the bit. Each blow carries much more energy, so the tool drills larger holes in concrete faster and with less pushing from the user. Rotary hammers usually take bits with special slotted shanks that can slide in the chuck, letting the bit move with each blow. Many models also offer a hammer-only mode with no rotation, which turns the tool into a small chisel for chipping. In both tools, bits with hard carbide tips are needed to stand up to the pounding.

25. The main idea of the passage is that

- A. an ordinary drill can handle concrete if the user presses hard enough.
- B. rotary hammers have replaced hammer drills on most job sites today.
- C. hammer drills and rotary hammers add hammering in different ways.
- D. carbide-tipped bits are the most important part of masonry drilling.

26. According to the passage, the blows in a rotary hammer are produced by

- A. two ridged discs riding against each other.
- B. a piston compressing air that throws a striker.
- C. the user pressing hard on the tool's handle.
- D. a carbide tip that vibrates rapidly as the bit spins.

27. According to the passage, rotary hammer bits have special slotted shanks so that

- A. the bit can slide in the chuck with each blow.
- B. the bit can be used without any rotation.
- C. the carbide tip stays cool while drilling.
- D. the bit also fits into an ordinary drill's chuck.

28. Based on the passage, the better choice for drilling many large holes in a concrete floor would be

- A. an ordinary drill fitted with a wood bit.
- B. a hammer drill used with very light pressure.
- C. a hammer drill switched to hammer-only mode.
- D. a rotary hammer with carbide-tipped bits.

29. As used in the passage, the word 'occasional' most nearly means

- A. formal.
- B. infrequent.
- C. accidental.
- D. careful.

30. The author mentions the hammer-only mode in order to

- A. explain why hammer drills need more pushing.
- B. warn that rotary hammers can damage bits.
- C. show that spinning alone cannot cut concrete.
- D. point out an added use for a rotary hammer.

Practice Test 1: Reading, passage 6 of 7

Peak Demand and the Logic of Demand Response

An electric grid must be built to meet its highest demand, even though that peak may occur for only a handful of hours each year, often during an intense heat wave when air conditioners run nearly everywhere at once. To cover those rare hours, utilities maintain peaking plants, which sit idle most of the year and are dispatched only when demand surges. Because their construction costs are spread across so few hours of operation, the electricity they produce is comparatively expensive. Demand response approaches the problem from the opposite direction. Rather than adding supply to match the peak, it trims the peak itself. Customers who enroll might agree to let the utility briefly cycle their air conditioner compressors during a critical afternoon, or a factory might postpone an energy-intensive process until evening in exchange for a payment or lower rates. Time-of-use pricing pursues a similar goal more subtly, charging more for electricity during peak periods so that customers have a reason to shift flexible tasks, such as running a dishwasher, to cheaper hours. None of these measures reduces the total energy that customers need by very much. Their value lies chiefly in timing. By flattening the sharpest spikes in demand, they can defer or avoid the expense of building generating capacity that would otherwise stand unused for most of the year.

31. The main point of the passage is that

- A. peaking plants are the most efficient source of power on the grid.
- B. customers should be required to use less energy during heat waves.
- C. demand response saves money by trimming peaks instead of adding supply.
- D. time-of-use pricing has removed the need for any new power plants at all.

32. According to the passage, electricity from peaking plants is comparatively expensive because

- A. the plants burn more fuel than other kinds of plants.
- B. their building costs are spread over few operating hours.
- C. the plants are located far away from their customers.
- D. the plants run constantly throughout the whole year.

33. According to the passage, time-of-use pricing encourages customers to change their behavior by

- A. cycling their air conditioners automatically.
- B. paying factories to close down during the summer months.
- C. limiting how much energy each home may use.
- D. charging more for electricity during peak periods.

34. Based on the passage, a successful demand response program would most likely result in

- A. about the same total energy use, shifted away from peak hours.
- B. a large drop in the total energy customers use each year.
- C. more peaking plants being built to meet rising demand.
- D. higher electricity prices for most customers during off-peak hours.

35. As used in the passage, the word 'dispatched' most nearly means

- A. shipped to another location.
- B. called into operation.
- C. shut down for repair.
- D. sold to other utilities.

36. The author says that demand response 'approaches the problem from the opposite direction' in order to

- A. contrast reducing demand with the usual approach of adding supply.
- B. suggest that demand response actually raises peak demand.
- C. explain why peaking plants sit idle most of the year.
- D. argue that utilities have long misunderstood the problem of peak demand.

Practice Test 1: Reading, passage 7 of 7

Shaping a Sealant Joint

Gaps between building materials, such as the joint between a window frame and a brick wall, are rarely still. As temperatures and moisture levels change, the materials on each side expand and contract, and the gap between them widens and narrows. A sealant placed in that gap has to stretch and compress over and over without tearing or pulling loose. Surprisingly, how the sealant is shaped in the joint matters as much as which product is chosen. A sealant should stick to the two opposite faces of the joint but not to the back. If it bonds on three sides, the back bond holds the bead in place, so the sealant cannot stretch evenly and tends to split. To prevent this, installers first press a flexible foam cord called backer rod into the joint. The sealant does not bond to the rod, and the rod also sets the depth of the bead. Many manufacturers recommend a bead that is thinner in the middle than at its edges, roughly like an hourglass, with a depth around half the joint width. A thin center can stretch easily, while the wider edges provide plenty of bonding area. Finally, the installer tools the bead, drawing a smooth tool along it to press the sealant firmly against the sides. None of this works on dirty or damp surfaces, so cleaning comes first.

37. The main point of the passage is that

- A. the shape and bonding of a sealant bead help it survive joint movement.
- B. window frames move more than any other part of a building's outside.
- C. backer rod is a stronger material than most modern building sealants.
- D. choosing the right sealant product is all that a good joint requires.

38. According to the passage, the two purposes of backer rod are to

- A. clean the joint and to dry its surfaces.
- B. bond the sealant and to fill the whole joint.
- C. prevent a back bond and to set the bead depth.
- D. widen the joint and to smooth the finished bead.

39. According to the passage, many manufacturers recommend a bead depth of about

- A. the same as the joint width.
- B. half the joint width.
- C. twice the joint width.
- D. the full depth of the joint.

40. Based on the passage, a bead that split down its middle soon after installation was most likely

- A. too thin at its edges to hold firmly in place.
- B. installed with too much backer rod in the joint.
- C. tooled much too firmly against the two sides of the joint.
- D. bonded to the back of the joint as well as the sides.

41. As used in the passage, the word 'tools' most nearly means

- A. fixes a crack in.
- B. measures the size of.
- C. shapes and smooths.
- D. cuts away.

42. The author describes how materials expand and contract at the start of the passage in order to

- A. explain why sealants must stretch and compress.
- B. show that brick walls are poorly designed.
- C. argue that windows should be sealed only in summer.
- D. describe the way backer rod is installed.

Practice Test 1: Mechanical Reasoning answer sheet

Mark one answer for every item. GAN does not publish whether wrong answers cost points. Answer the ones you know first, then rule out choices before you guess.

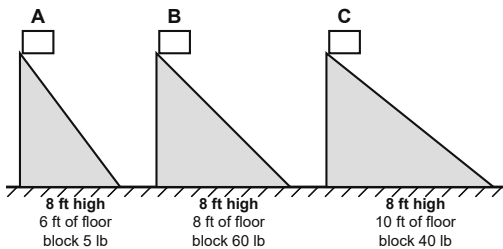
1 A ☐ B ☐ C ☐ D ☐	2 A ☐ B ☐ C ☐ D ☐	3 A ☐ B ☐ C ☐ D ☐	4 A ☐ B ☐ C ☐ D ☐	5 A ☐ B ☐ C ☐ D ☐
6 A ☐ B ☐ C ☐ D ☐	7 A ☐ B ☐ C ☐ D ☐	8 A ☐ B ☐ C ☐ D ☐	9 A ☐ B ☐ C ☐ D ☐	10 A ☐ B ☐ C ☐ D ☐
11 A ☐ B ☐ C ☐ D ☐	12 A ☐ B ☐ C ☐ D ☐	13 A ☐ B ☐ C ☐ D ☐	14 A ☐ B ☐ C ☐ D ☐	15 A ☐ B ☐ C ☐ D ☐
16 A ☐ B ☐ C ☐ D ☐	17 A ☐ B ☐ C ☐ D ☐	18 A ☐ B ☐ C ☐ D ☐	19 A ☐ B ☐ C ☐ D ☐	20 A ☐ B ☐ C ☐ D ☐
21 A ☐ B ☐ C ☐ D ☐	22 A ☐ B ☐ C ☐ D ☐	23 A ☐ B ☐ C ☐ D ☐	24 A ☐ B ☐ C ☐ D ☐	25 A ☐ B ☐ C ☐ D ☐
26 A ☐ B ☐ C ☐ D ☐	27 A ☐ B ☐ C ☐ D ☐	28 A ☐ B ☐ C ☐ D ☐	29 A ☐ B ☐ C ☐ D ☐	30 A ☐ B ☐ C ☐ D ☐
31 A ☐ B ☐ C ☐ D ☐	32 A ☐ B ☐ C ☐ D ☐	33 A ☐ B ☐ C ☐ D ☐	34 A ☐ B ☐ C ☐ D ☐	35 A ☐ B ☐ C ☐ D ☐
36 A ☐ B ☐ C ☐ D ☐	37 A ☐ B ☐ C ☐ D ☐	38 A ☐ B ☐ C ☐ D ☐	39 A ☐ B ☐ C ☐ D ☐	40 A ☐ B ☐ C ☐ D ☐
41 A ☐ B ☐ C ☐ D ☐	42 A ☐ B ☐ C ☐ D ☐	43 A ☐ B ☐ C ☐ D ☐	44 A ☐ B ☐ C ☐ D ☐	45 A ☐ B ☐ C ☐ D ☐

Practice Test 1: Mechanical Reasoning

Practice time: 30 minutes for 45 questions. No calculator. Scrap paper is fine.

Directions. Each item shows a picture of a simple, everyday mechanism and asks a specific question about it. Choose the best answer.

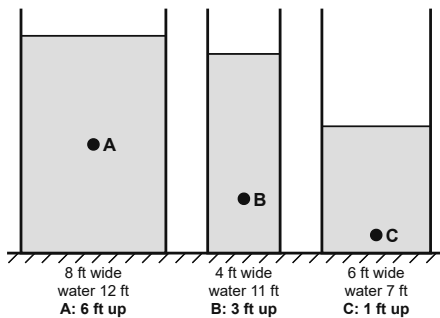
1. Blocks start at rest at the top of three ramps and slide down with no friction. A: 5 lb block, ramp 8 ft high over 6 ft of floor; B: 60 lb block, ramp 8 ft high over 8 ft of floor; C: 40 lb block, ramp 8 ft high over 10 ft of floor. Which block is moving fastest when it reaches the bottom?



A. Block A
C. Block C

B. Block B
D. All the same speed

2. Each of three open tanks has a small hole at the dot: hole A is 6 ft above the floor of a tank 8 ft wide with water 12 ft deep; hole B is 3 ft above the floor of a tank 4 ft wide with water 11 ft deep; hole C is 1 ft above the floor of a tank 6 ft wide with water 7 ft deep. Right now, from which hole does the water squirt out fastest?

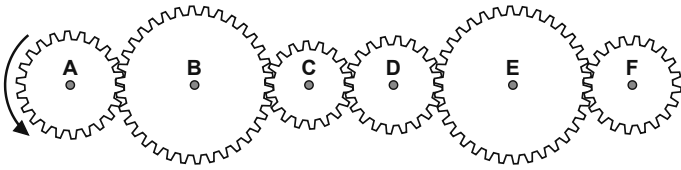


A. Hole A
C. Hole C

B. Hole B
D. All squirt at the same speed

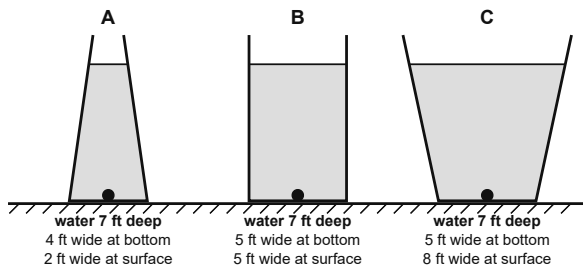
Practice Test 1: Mechanical Reasoning (continued)

3. Six gears mesh in a row, A to F. Gear A turns counterclockwise, as the curved arrow shows. Which gears turn the opposite way to gear A?



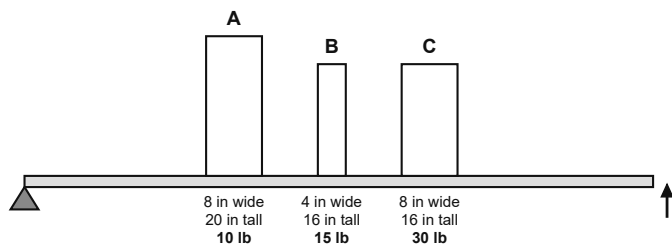
- A. B, D and F
- B. C and E
- C. B, C, D, E and F
- D. B only

4. Three open containers hold water. A: water 7 ft deep, 4 ft wide at the bottom and 2 ft wide at the surface; B: water 7 ft deep, 5 ft wide at the bottom and 5 ft wide at the surface; C: water 7 ft deep, 5 ft wide at the bottom and 8 ft wide at the surface. The water is still. At which container's bottom (the dot) is the water pressure greatest?



- A. Container A
- B. Container B
- C. Container C
- D. All the same

5. Solid blocks, each made of one material all the way through, stand on a board: A is 8 in wide, 20 in tall, 10 lb; B is 4 in wide, 16 in tall, 15 lb; C is 8 in wide, 16 in tall, 30 lb. One end of the board is raised slowly, and the blocks do not slide. Which block tips over first?

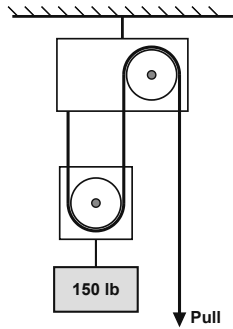


The hinged left end stays down; the right end of the board is raised slowly.

- A. Block A
- B. Block B
- C. Block C
- D. All tip at the same time

Practice Test 1: Mechanical Reasoning (continued)

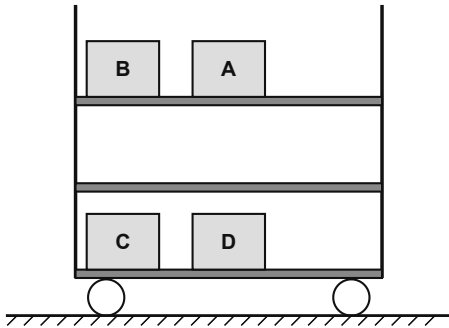
6. The 150 lb load hangs from the pulley system shown. The system has one fixed pulley at the top and one moving pulley on the load. The rope is tied to the top, and you pull down on its free end. How many rope segments hold up the load (the moving part)? Ignore friction and the weight of the pulleys and rope.



- A. 4
- C. 3

- B. 1
- D. 2

7. A 120 lb spool of wire can be placed in spot A, B, C or D on this 3-shelf cart (front view). In which spot is the loaded cart most likely to tip over sideways?

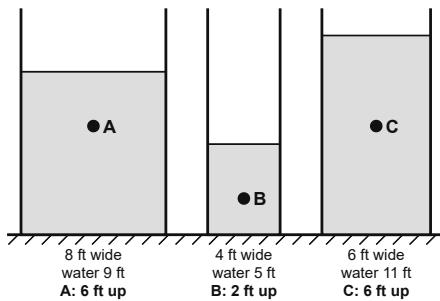


- A. Spot A
- C. Spot C

- B. Spot B
- D. Spot D

Practice Test 1: Mechanical Reasoning (continued)

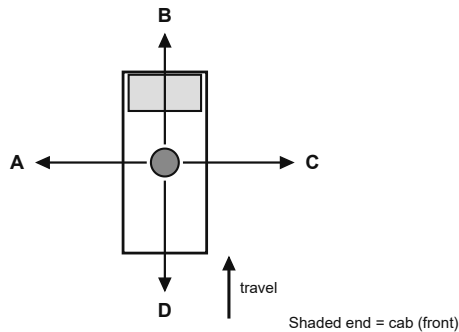
8. Each of three open tanks has a small hole at the dot: hole A is 6 ft above the floor of a tank 8 ft wide with water 9 ft deep; hole B is 2 ft above the floor of a tank 4 ft wide with water 5 ft deep; hole C is 6 ft above the floor of a tank 6 ft wide with water 11 ft deep. Right now, from which hole does the water squirt out fastest?



- A. Hole A
- C. Hole C

- B. Hole B
- D. All squirt at the same speed

9. Seen from above, a utility truck is driving toward the top of the page with a spool of conduit hanging from its crane hook. The driver speeds up quickly. Which way does the load swing, compared with the utility truck?

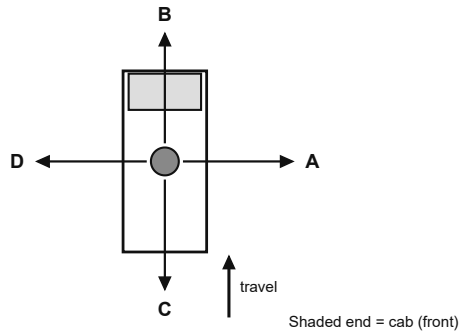


- A. Toward arrow A
- C. Toward arrow B

- B. It keeps hanging straight down
- D. Toward arrow D

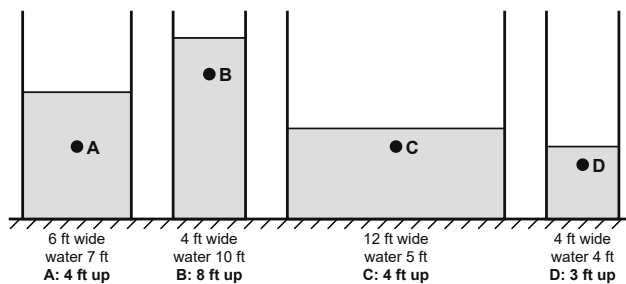
Practice Test 1: Mechanical Reasoning (continued)

10. Seen from above, a boom truck is driving toward the top of the page with a cable reel hanging from its hook. The driver turns sharply to the driver's left. Which way does the load swing, compared with the boom truck?



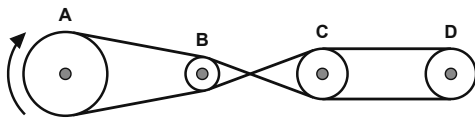
- A. Toward arrow A
- B. Toward arrow B
- C. It keeps hanging straight down
- D. Toward arrow D

11. Four open tanks hold still water. A is 4 ft above the floor of a tank 6 ft wide with water 7 ft deep; B is 8 ft above the floor of a tank 4 ft wide with water 10 ft deep; C is 4 ft above the floor of a tank 12 ft wide with water 5 ft deep; D is 3 ft above the floor of a tank 4 ft wide with water 4 ft deep. At which point is the water pressure greatest?



- A. Point A
- B. Point B
- C. Point C
- D. Point D

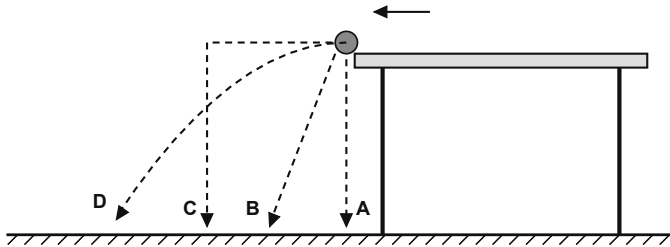
12. Four pulleys are linked by belts (A to B open, B to C crossed, C to D open). Pulley A turns clockwise, as the arrow shows. Which pulleys turn the opposite way to pulley A?



- A. B and C
- B. C and D
- C. None of them
- D. B and D

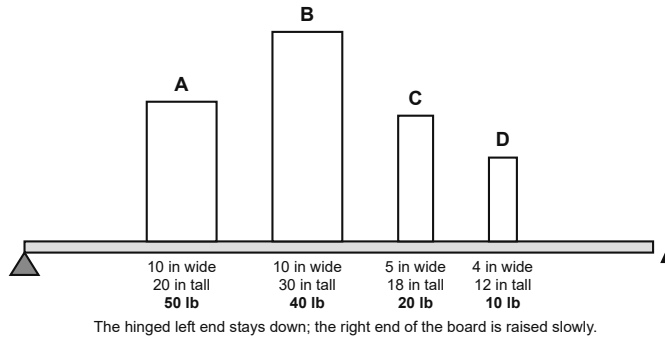
Practice Test 1: Mechanical Reasoning (continued)

13. A wooden ball rolls to the left across a 4 ft high table at 2 ft/s and goes off the edge. Which path does it follow to the floor? Ignore air resistance.



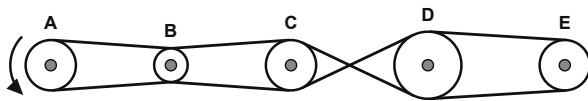
- A. Path A
B. Path B
C. Path C
D. Path D

14. Solid blocks, each made of one material all the way through, stand on a board: A is 10 in wide, 20 in tall, 50 lb; B is 10 in wide, 30 in tall, 40 lb; C is 5 in wide, 18 in tall, 20 lb; D is 4 in wide, 12 in tall, 10 lb. One end of the board is raised slowly, and the blocks do not slide. Which block tips over first?



- A. Block A
B. Block B
C. Block C
D. Block D

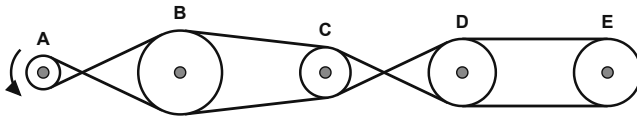
15. Five pulleys are linked by belts (A to B open, B to C open, C to D crossed, D to E open). Pulley A turns counterclockwise, as the arrow shows. Which way do pulleys B and E turn?



- A. B clockwise, E counterclockwise
B. B clockwise, E clockwise
C. B counterclockwise, E counterclockwise
D. B counterclockwise, E clockwise

Practice Test 1: Mechanical Reasoning (continued)

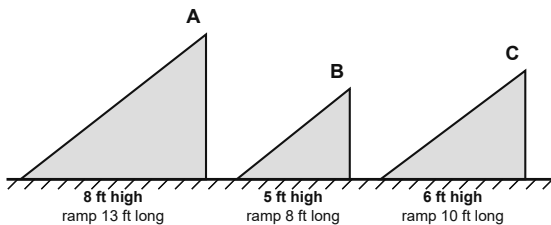
16. Five pulleys are linked by belts (A to B crossed, B to C open, C to D crossed, D to E open). Pulley A turns counterclockwise, as the arrow shows. Which pulleys turn the opposite way to pulley A?



- A. B and C
- C. C and D

- B. None of them
- D. B and D

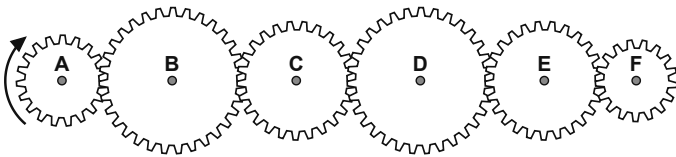
17. The same 300 lb cart is pushed up each ramp at a steady speed with no friction. A is 8 ft high and 13 ft long; B is 5 ft high and 8 ft long; C is 6 ft high and 10 ft long. Which ramp needs the least push along the ramp?



- A. Ramp A
- C. Ramp C

- B. Ramp B
- D. All need the same push

18. Six gears mesh in a row, A to F. Gear A turns clockwise, as the curved arrow shows. Which way do gears B and F turn?

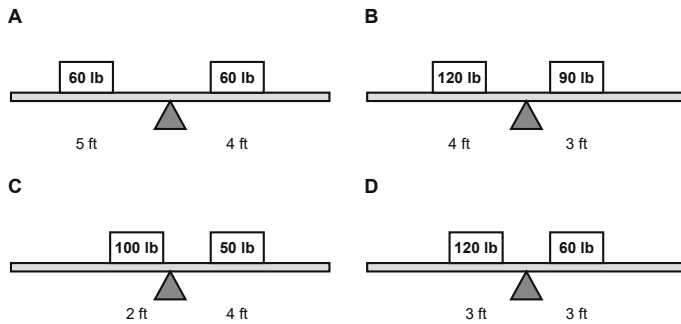


- A. B clockwise, F clockwise
- C. B clockwise, F counterclockwise

- B. B counterclockwise, F clockwise
- D. B counterclockwise, F counterclockwise

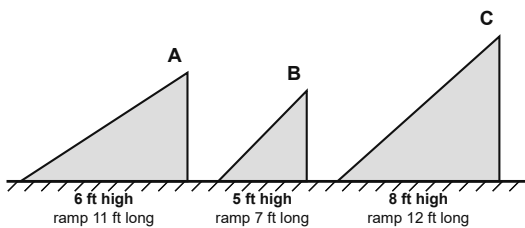
Practice Test 1: Mechanical Reasoning (continued)

19. Four seesaws have children sitting as shown (weight, distance from the middle, side). A: 60 lb 5 ft left, 60 lb 4 ft right; B: 120 lb 4 ft left, 90 lb 3 ft right; C: 100 lb 2 ft left, 50 lb 4 ft right; D: 120 lb 3 ft left, 60 lb 3 ft right. Which seesaw stays level?



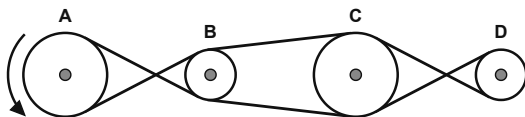
- A. Seesaw A
B. Seesaw B
C. Seesaw C
D. Seesaw D

20. The same 250 lb cart is pushed up each ramp at a steady speed with no friction. A is 6 ft high and 11 ft long; B is 5 ft high and 7 ft long; C is 8 ft high and 12 ft long. Which ramp needs the least push along the ramp?



- A. Ramp A
B. Ramp B
C. Ramp C
D. All need the same push

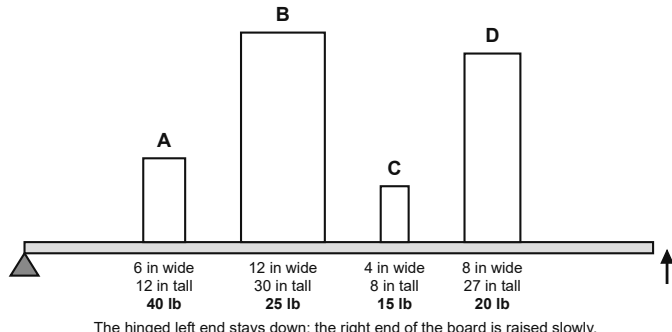
21. Four pulleys are linked by belts (A to B crossed, B to C open, C to D crossed). Pulley A turns counterclockwise, as the arrow shows. Which way do pulleys B and C turn?



- A. B counterclockwise, C clockwise
B. B clockwise, C counterclockwise
C. B counterclockwise, C counterclockwise
D. B clockwise, C clockwise

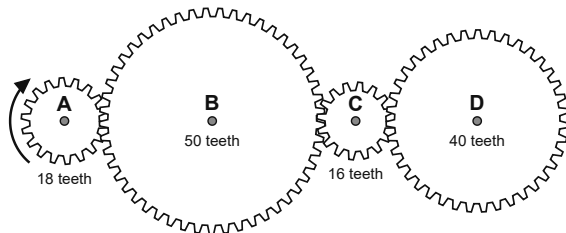
Practice Test 1: Mechanical Reasoning (continued)

22. Solid blocks, each made of one material all the way through, stand on a board: A is 6 in wide, 12 in tall, 40 lb; B is 12 in wide, 30 in tall, 25 lb; C is 4 in wide, 8 in tall, 15 lb; D is 8 in wide, 27 in tall, 20 lb. One end of the board is raised slowly, and the blocks do not slide. Which block tips over first?



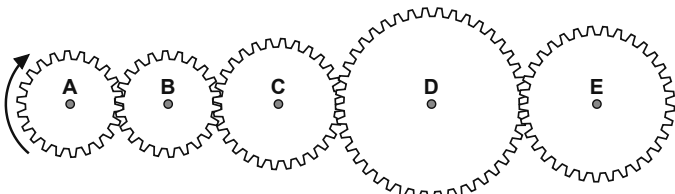
- A. Block A
- B. Block B
- C. Block C
- D. Block D

23. Gear A drives this row of 4 gears. Tooth counts: A 18, B 50, C 16, D 40. Which gear turns fastest?



- A. Gear A
- B. Gear B
- C. Gear C
- D. Gear D

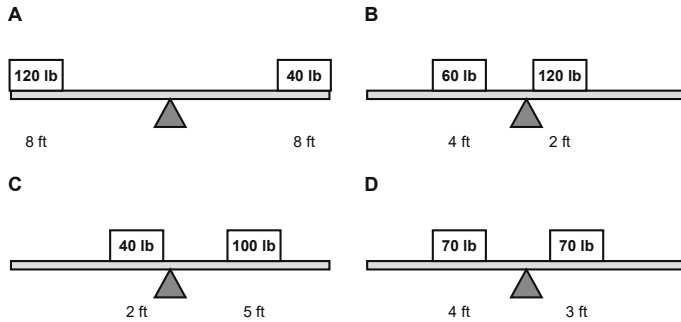
24. Five gears mesh in a row, A to E. Gear A turns clockwise, as the curved arrow shows. Which way do gears C and D turn?



- A. C clockwise, D clockwise
- B. C clockwise, D counterclockwise
- C. C counterclockwise, D clockwise
- D. C counterclockwise, D counterclockwise

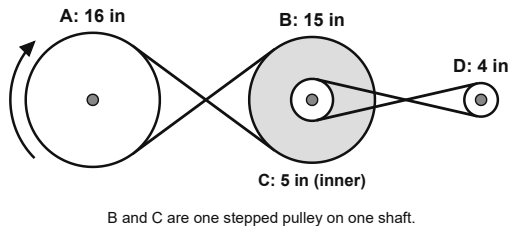
Practice Test 1: Mechanical Reasoning (continued)

25. Four seesaws have children sitting as shown (weight, distance from the middle, side). A: 120 lb 8 ft left, 40 lb 8 ft right; B: 60 lb 4 ft left, 120 lb 2 ft right; C: 40 lb 2 ft left, 100 lb 5 ft right; D: 70 lb 4 ft left, 70 lb 3 ft right. Which seesaw stays level?



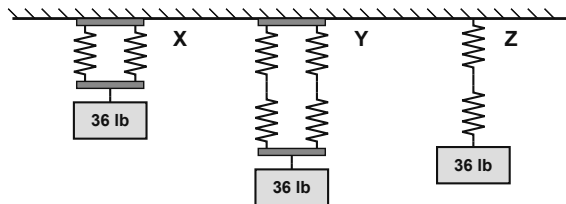
- A. Seesaw A
B. Seesaw B
C. Seesaw C
D. Seesaw D

26. Pulley A (16 in) turns clockwise and drives pulley B (15 in) with a crossed belt. Pulley C (5 in) is part of B. A crossed belt from C drives pulley D (4 in). Which way does pulley D turn, and is it faster or slower than pulley A?



- A. Clockwise, slower than A
B. Counterclockwise, faster than A
C. Clockwise, faster than A
D. Counterclockwise, slower than A

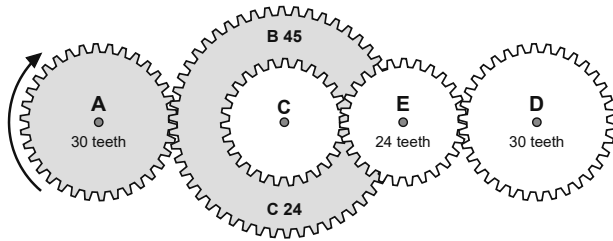
27. All the springs are identical, and each arrangement holds the same 36 lb load (bars stay level). X: two springs side by side (in parallel). Y: two identical branches side by side, each made of two springs in series. Z: two springs in series (one below the other). Which arrangement stretches the most?



- A. Arrangement Z
B. Arrangement X
C. All stretch the same
D. Arrangement Y

Practice Test 1: Mechanical Reasoning (continued)

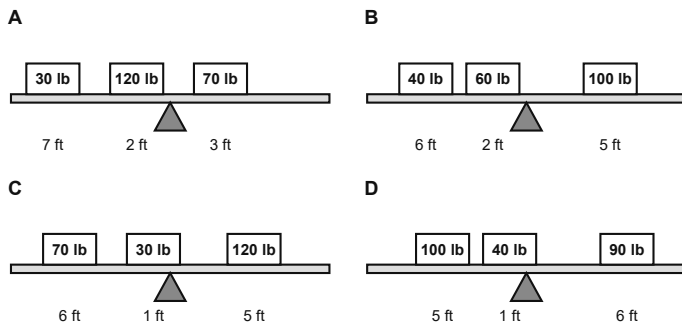
28. Gear A (30 teeth) turns clockwise and drives gear B (45 teeth). Gear C (24 teeth) is fixed to B's shaft and drives gear D (30 teeth) through idler gear E (24 teeth). Which way does gear D turn, and is it faster or slower than gear A?



Shaded A and B are in the back row. B and C share one shaft.

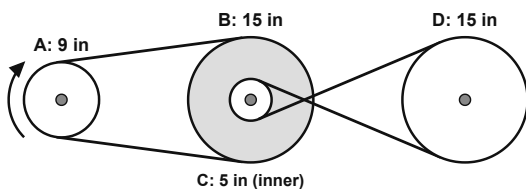
- A. Counterclockwise, slower than A
- B. Clockwise, slower than A
- C. Clockwise, faster than A
- D. Counterclockwise, faster than A

29. Four seesaws have children sitting as shown (weight, distance from the middle, side). A: 120 lb 2 ft left, 30 lb 7 ft left, 70 lb 3 ft right; B: 60 lb 2 ft left, 40 lb 6 ft left, 100 lb 5 ft right; C: 30 lb 1 ft left, 70 lb 6 ft left, 120 lb 5 ft right; D: 40 lb 1 ft left, 100 lb 5 ft left, 90 lb 6 ft right. Which seesaw stays level?



- A. Seesaw A
- B. Seesaw B
- C. Seesaw C
- D. Seesaw D

30. Pulley A (9 in) turns clockwise and drives pulley B (15 in) with an open belt. Pulley C (5 in) is part of B. A crossed belt from C drives pulley D (15 in). Which way does pulley D turn, and is it faster or slower than pulley A?

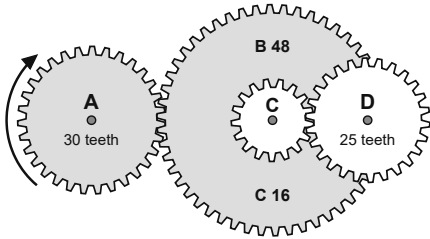


B and C are one stepped pulley on one shaft.

- A. Clockwise, faster than A
- B. Counterclockwise, slower than A
- C. Clockwise, slower than A
- D. Counterclockwise, faster than A

Practice Test 1: Mechanical Reasoning (continued)

31. Gear A (30 teeth) turns clockwise and drives gear B (48 teeth). Gear C (16 teeth) is fixed to B's shaft and drives gear D (25 teeth). Which way does gear D turn, and is it faster or slower than gear A?

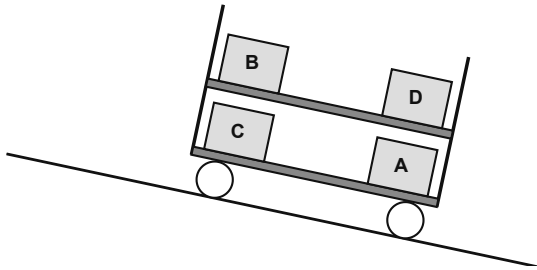


Shaded A and B are in the back row. B and C share one shaft.

- A. Clockwise, slower than A
- B. Counterclockwise, faster than A
- C. Clockwise, faster than A
- D. Counterclockwise, slower than A

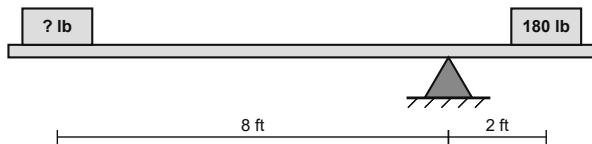
32. A 2-shelf cart stands across a slope that goes down to the right (front view). A 150 lb spool of wire can go in spot A, B, C or D. In which spot is the cart most likely to tip over downhill?

The ground slopes down to the right.



- A. Spot A
- B. Spot B
- C. Spot C
- D. Spot D

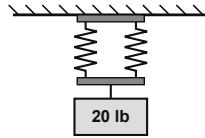
33. A bar balances on a fulcrum. A 180 lb weight sits 2 ft to the right of the fulcrum. What weight, placed 8 ft to the left of the fulcrum, balances it? Ignore the weight of the bar.



- A. 180 lb
- B. 720 lb
- C. 45 lb
- D. 36 lb

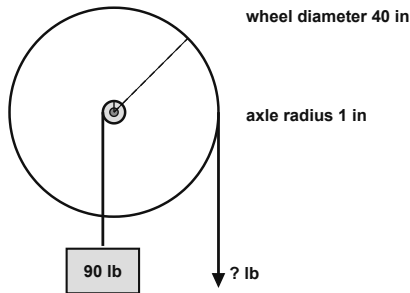
Practice Test 1: Mechanical Reasoning (continued)

34. Each spring is the same: it stretches 2 in when it holds 10 lb. Two springs side by side (in parallel) hold a 20 lb load as shown. How far does the load move down from where it hangs with no load (the total stretch)?



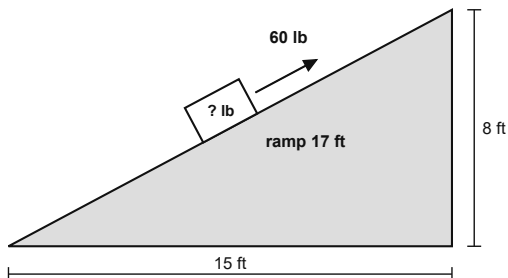
- A. 0.5 in
- B. 4 in
- C. 2 in
- D. 8 in

35. A wheel and axle lifts a 90 lb load hanging from a rope on the axle. The wheel has a 40 in diameter. The axle has a 1 in radius. What pull on the rope around the wheel holds the load still? Assume an ideal machine with no friction.



- A. 90 lb
- B. 1800 lb
- C. 2.25 lb
- D. 4.5 lb

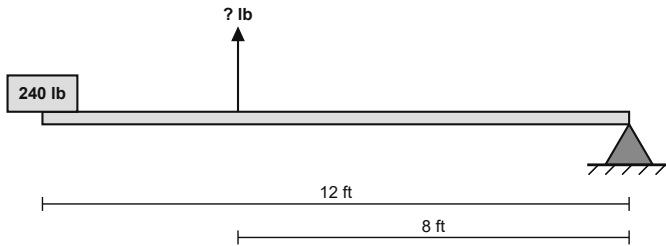
36. A worker can push with 60 lb of force along a ramp that is 17 ft long and rises 8 ft (the flat distance is 15 ft). What is the heaviest load the worker can push up the ramp at a steady speed? Assume an ideal machine with no friction.



- A. 68 lb
- B. 127.5 lb
- C. 60 lb
- D. 112.5 lb

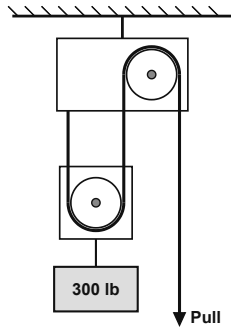
Practice Test 1: Mechanical Reasoning (continued)

37. This is a third class lever. The 240 lb load is 12 ft from the fulcrum. The effort, pulling up, is applied 8 ft from the fulcrum. What effort force holds the load level? Ignore the weight of the bar.



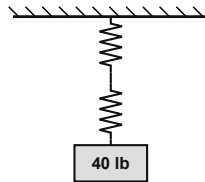
- A. 720 lb
- B. 240 lb
- C. 360 lb
- D. 160 lb

38. The system has one fixed pulley at the top and one moving pulley on the load. The rope is tied to the top, and you pull down on its free end. What pulling force holds the 300 lb load still? Ignore friction and the weight of the pulleys and rope.



- A. 600 lb
- B. 100 lb
- C. 150 lb
- D. 300 lb

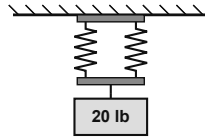
39. Each spring is the same: it stretches 1 in when it holds 10 lb. Two springs in series (one below the other) hold a 40 lb load as shown. How far does the load move down from where it hangs with no load (the total stretch)?



- A. 0.5 in
- B. 8 in
- C. 4 in
- D. 2 in

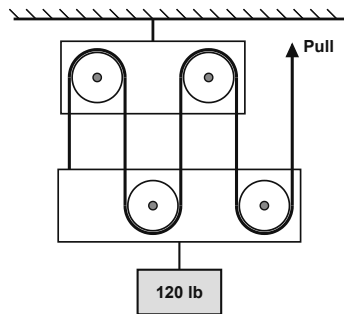
Practice Test 1: Mechanical Reasoning (continued)

40. Each spring is the same: it stretches 1 in when it holds 4 lb. Two springs side by side (in parallel) hold a 20 lb load as shown. How far does the load move down from where it hangs with no load (the total stretch)?



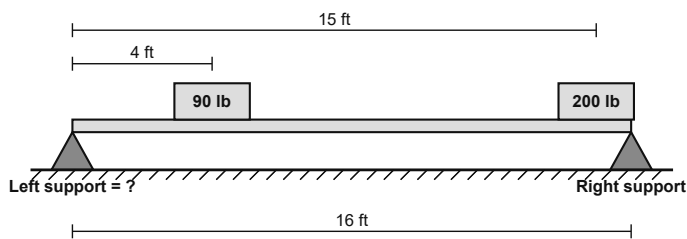
- A. 0.1 in
- B. 5 in
- C. 10 in
- D. 2.5 in

41. The system has two fixed pulleys at the top and two moving pulleys on the load. The rope is tied to the moving block, and you pull up on its free end. To raise the 120 lb load 3 ft, how much rope must you pull? Ignore friction and the weight of the pulleys and rope.



- A. 15 ft
- B. 0.6 ft
- C. 12 ft
- D. 3 ft

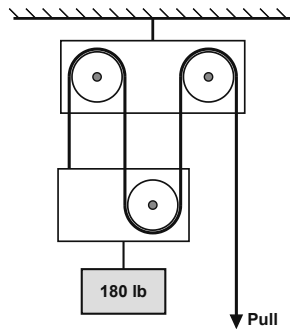
42. A 16 ft plank rests on a support at each end. A 90 lb load sits 4 ft from the left end and a 200 lb load sits 15 ft from the left end. How much weight does the left support carry? Ignore the plank's weight.



- A. 80 lb
- B. 67.5 lb
- C. 145 lb
- D. 210 lb

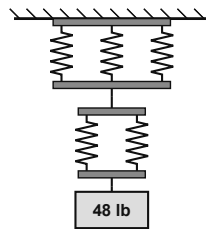
Practice Test 1: Mechanical Reasoning (continued)

43. The system has two fixed pulleys at the top and one moving pulley on the load. The rope is tied to the moving block, and you pull down on its free end. What pulling force holds the 180 lb load, and how much rope must you pull to raise it 2 ft? Ignore friction and the weight of the pulleys and rope.



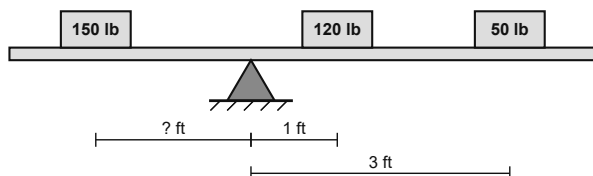
- A. 45 lb, 8 ft of rope
- B. 60 lb, 2 ft of rope
- C. 60 lb, 6 ft of rope
- D. 180 lb, 2 ft of rope

44. Each spring is the same: it stretches 3 in when it holds 12 lb. The springs are arranged as shown (from the top: a group of three springs side by side, then a group of two springs side by side) and hold a 48 lb load. Bars between groups stay level. How far does the load move down in total?



- A. 60 in
- B. 12 in
- C. 10 in
- D. 14.4 in

45. On the right side of a fulcrum, a 120 lb weight sits 1 ft away and a 50 lb weight sits 3 ft away. How far to the left of the fulcrum must a 150 lb weight sit to balance the bar? Ignore the weight of the bar.



- A. 1 ft
- B. 1.8 ft
- C. 3.4 ft
- D. 4 ft

Practice Test 1: Numerical Reasoning answer sheet

Mark one answer for every item. GAN does not publish whether wrong answers cost points. Answer the ones you know first, then rule out choices before you guess.

1 A ☐ B ☐ C ☐ D ☐ E ☐	2 A ☐ B ☐ C ☐ D ☐ E ☐	3 A ☐ B ☐ C ☐ D ☐ E ☐	4 A ☐ B ☐ C ☐ D ☐ E ☐
5 A ☐ B ☐ C ☐ D ☐ E ☐	6 A ☐ B ☐ C ☐ D ☐ E ☐	7 A ☐ B ☐ C ☐ D ☐ E ☐	8 A ☐ B ☐ C ☐ D ☐ E ☐
9 A ☐ B ☐ C ☐ D ☐ E ☐	10 A ☐ B ☐ C ☐ D ☐ E ☐	11 A ☐ B ☐ C ☐ D ☐ E ☐	12 A ☐ B ☐ C ☐ D ☐ E ☐
13 A ☐ B ☐ C ☐ D ☐ E ☐	14 A ☐ B ☐ C ☐ D ☐ E ☐	15 A ☐ B ☐ C ☐ D ☐ E ☐	16 A ☐ B ☐ C ☐ D ☐ E ☐
17 A ☐ B ☐ C ☐ D ☐ E ☐	18 A ☐ B ☐ C ☐ D ☐ E ☐	19 A ☐ B ☐ C ☐ D ☐ E ☐	20 A ☐ B ☐ C ☐ D ☐ E ☐

Practice Test 1: Numerical Reasoning

Practice time: 22 minutes for 20 questions. No calculator. Scrap paper is fine.

Directions. Each item is a series of numbers that follows a rule. Find the number that continues the series, or the missing number in the place marked with a ? in the series.

1. What number comes next in the series? -7, -14, -21, -28, -35, ?

- A. -43 B. -49 C. -42 D. -41 E. -28

2. What number comes next in the series? 384, 192, 96, 48, 24, 12, ?

- A. 10 B. 0 C. 24 D. 6 E. 3

3. What number comes next in the series? 58, 73, 88, 103, 118, 133, ?

- A. 149 B. 148 C. 118 D. 147 E. 163

4. What number comes next in the series? 13, 26, 52, 104, 208, 416, ?

- A. 832 B. 624 C. 1,664 D. 418 E. 429

5. What number comes next in the series? 66, 59, 52, 45, 38, ?

- A. 45 B. 31 C. 32 D. 30 E. 24

6. What number comes next in the series? 640, 320, 160, 80, 40, 20, ?

- A. 0 B. 18 C. 40 D. 5 E. 10

7. What number comes next in the series? 32, 43, 56, 71, 88, ?

- A. 107 B. 105 C. 128 D. 106 E. 100

8. What number comes next in the series? 17, 25, 22, 30, 27, ?

- A. 32 B. 19 C. 38 D. 24 E. 35

9. What number comes next in the series? 1, -2, 4, -8, 16, ?

- A. -32 B. 32 C. 14 D. 64 E. 40

10. What number is missing from the series? 8, 16, ?, 64, 128, 256

- A. 48 B. 40 C. 24 D. 32 E. 18

Practice Test 1: Numerical Reasoning (continued)

11. What number is missing from the series? 21, 26, 33, ?, 53, 66

A. 46

B. 40

C. 42

D. 44

E. 43

12. What number comes next in the series? 4, 10, 28, 82, 244, ?

A. 726

B. 242

C. 730

D. 732

E. 406

13. What number comes next in the series? 62, 79, 98, 119, 142, ?

A. 165

B. 167

C. 169

D. 166

E. 194

14. What number comes next in the series? 29, 37, 48, 62, 79, 99, ?

A. 125

B. 119

C. 122

D. 139

E. 102

15. What number comes next in the series? 1, 9, 10, 19, 29, 48, ?

A. 67

B. 125

C. 76

D. 77

E. 96

16. What number comes next in the series? 9, 30, 3, 27, -3, 24, -9, 21, ?

A. -12

B. 18

C. -21

D. -15

E. 51

17. What number comes next in the series? 6, 12, 24, 15, 21, 42, 33, ?

A. 27

B. 39

C. 66

D. 78

E. 24

18. What number comes next in the series? 11, 10, 9, 15, 7, 20, 5, 25, ?

A. 3

B. 10

C. 1

D. 45

E. 30

19. What number comes next in the series? 1, 4, 12, 15, 45, ?

A. 144

B. 75

C. 42

D. 135

E. 48

20. What number comes next in the series? 4, 6, 12, 30, 84, ?

A. 234

B. 78

C. 138

D. 252

E. 246

Practice Test 1: Paper Folding answer sheet

Mark one answer for every item. GAN does not publish whether wrong answers cost points. Answer the ones you know first, then rule out choices before you guess.

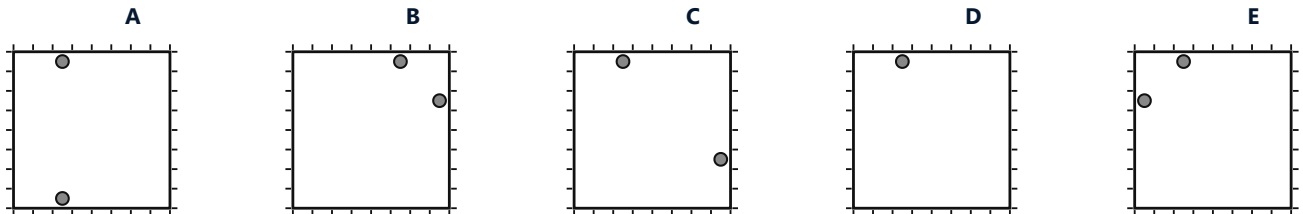
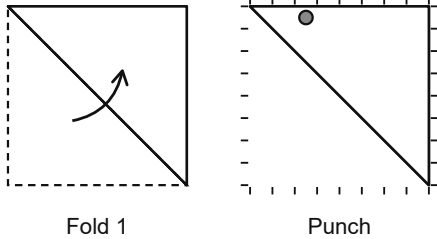
1 A ☐ B ☐ C ☐ D ☐ E ☐	2 A ☐ B ☐ C ☐ D ☐ E ☐	3 A ☐ B ☐ C ☐ D ☐ E ☐	4 A ☐ B ☐ C ☐ D ☐ E ☐
5 A ☐ B ☐ C ☐ D ☐ E ☐	6 A ☐ B ☐ C ☐ D ☐ E ☐	7 A ☐ B ☐ C ☐ D ☐ E ☐	8 A ☐ B ☐ C ☐ D ☐ E ☐
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13 A ☐ B ☐ C ☐ D ☐ E ☐	14 A ☐ B ☐ C ☐ D ☐ E ☐	15 A ☐ B ☐ C ☐ D ☐ E ☐	16 A ☐ B ☐ C ☐ D ☐ E ☐
17 A ☐ B ☐ C ☐ D ☐ E ☐	18 A ☐ B ☐ C ☐ D ☐ E ☐	19 A ☐ B ☐ C ☐ D ☐ E ☐	20 A ☐ B ☐ C ☐ D ☐ E ☐
21 A ☐ B ☐ C ☐ D ☐ E ☐	22 A ☐ B ☐ C ☐ D ☐ E ☐	23 A ☐ B ☐ C ☐ D ☐ E ☐	24 A ☐ B ☐ C ☐ D ☐ E ☐
25 A ☐ B ☐ C ☐ D ☐ E ☐	26 A ☐ B ☐ C ☐ D ☐ E ☐	27 A ☐ B ☐ C ☐ D ☐ E ☐	28 A ☐ B ☐ C ☐ D ☐ E ☐
29 A ☐ B ☐ C ☐ D ☐ E ☐	30 A ☐ B ☐ C ☐ D ☐ E ☐		

Practice Test 1: Paper Folding

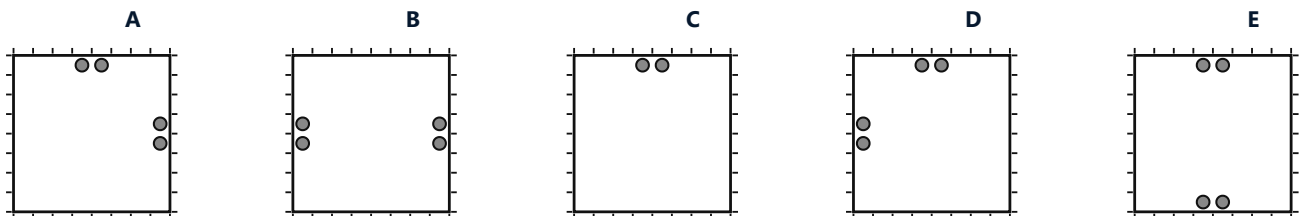
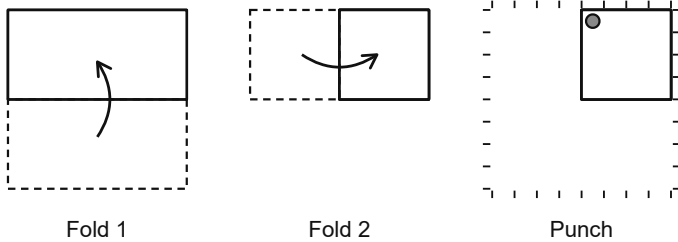
Practice time: 30 minutes for 30 questions. No calculator. Scrap paper is fine.

Directions. The pictures on the left show a square sheet of paper folded, then punched through every layer under the punch. Choose the picture of the sheet when it is completely unfolded. In each picture, a dashed outline shows where the folded part started and an arrow shows the direction of the fold. Each item below gives only its own fold and punch counts. **Practice aid:** the tick marks around the punched square are added in this pack; they split each side into 8 columns and 8 rows so the keys can name a hole's place (column 1 at the left, row 1 at the top).

1. Folded once; 1 hole punched.

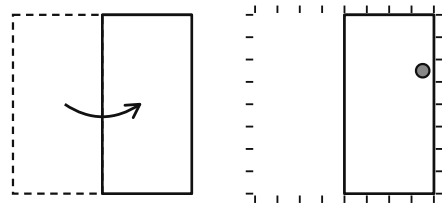


2. Folded 2 times; 1 hole punched.



Practice Test 1: Paper Folding (continued)

3. Folded once; 1 hole punched.



Fold 1

Punch

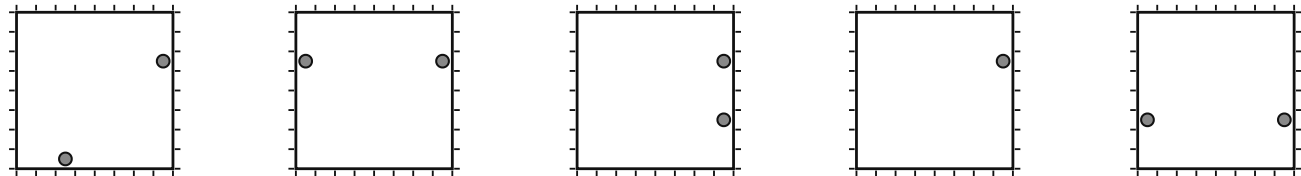
A

B

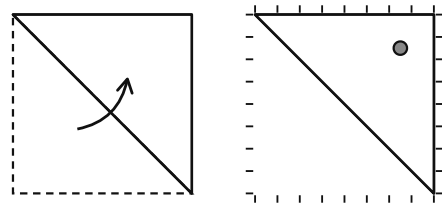
C

D

E



4. Folded once; 1 hole punched.



Fold 1

Punch

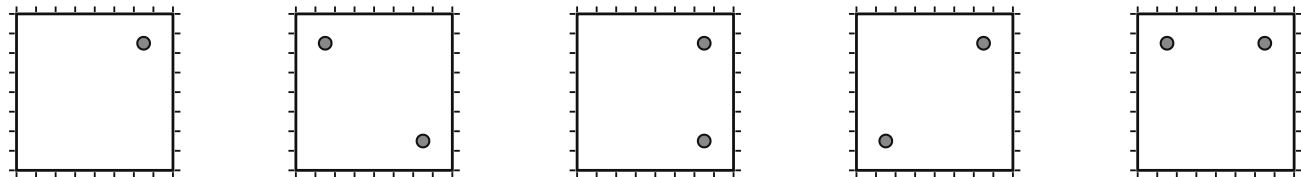
A

B

C

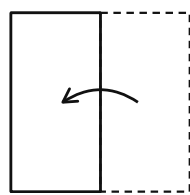
D

E

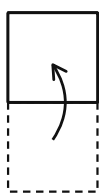


Practice Test 1: Paper Folding (continued)

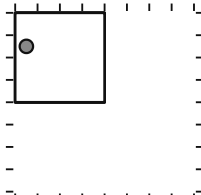
5. Folded 2 times; 1 hole punched.



Fold 1

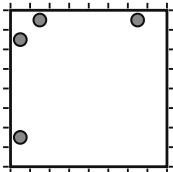


Fold 2

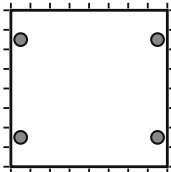


Punch

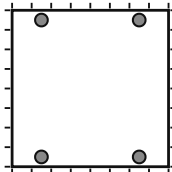
A



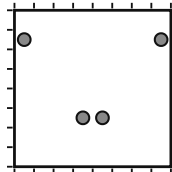
B



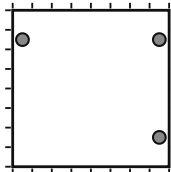
C



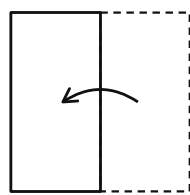
D



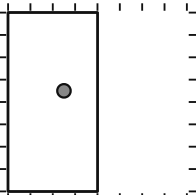
E



6. Folded once; 1 hole punched.

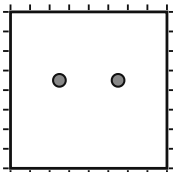


Fold 1

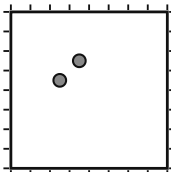


Punch

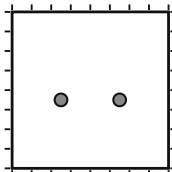
A



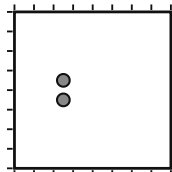
B



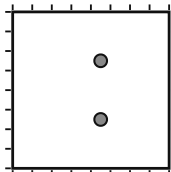
C



D

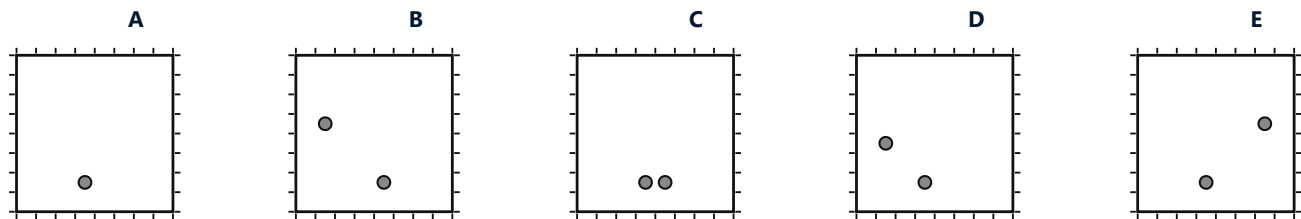
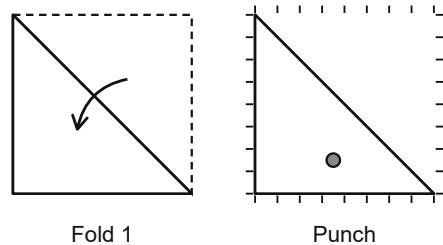


E

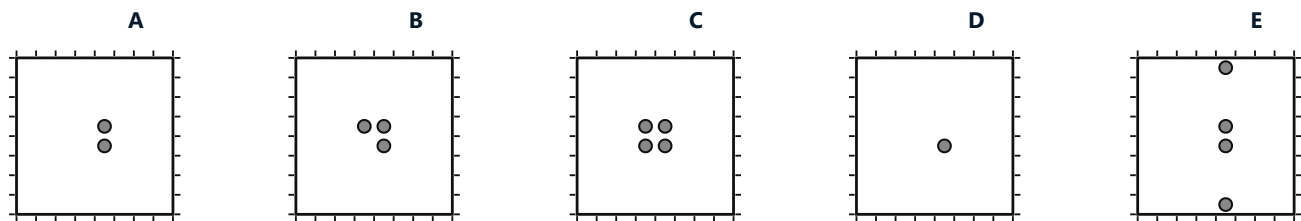
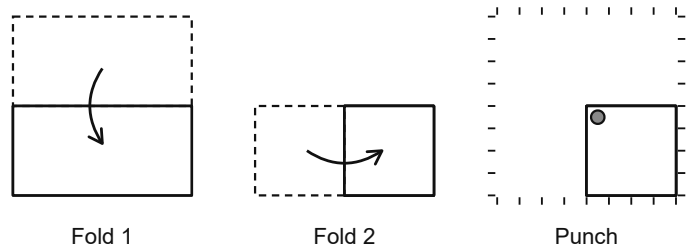


Practice Test 1: Paper Folding (continued)

7. Folded once; 1 hole punched.

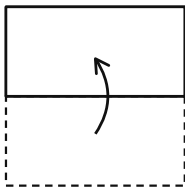


8. Folded 2 times; 1 hole punched.

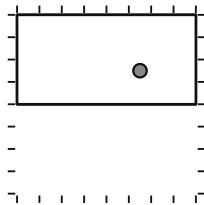


Practice Test 1: Paper Folding (continued)

9. Folded once; 1 hole punched.

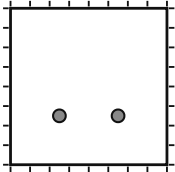


Fold 1

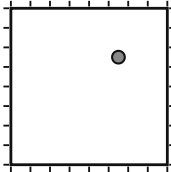


Punch

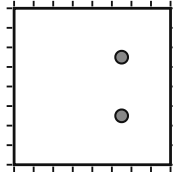
A



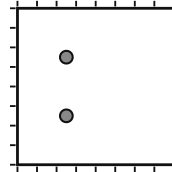
B



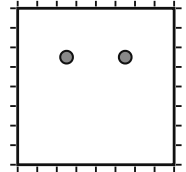
C



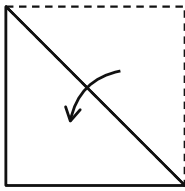
D



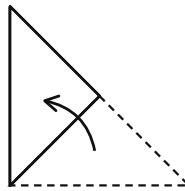
E



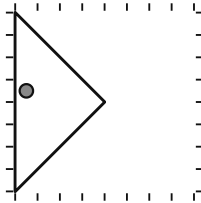
10. Folded 2 times; 1 hole punched.



Fold 1

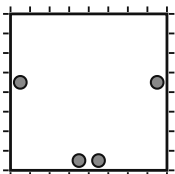


Fold 2

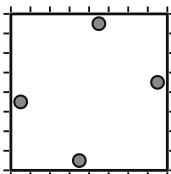


Punch

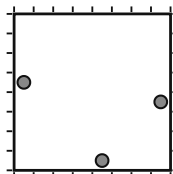
A



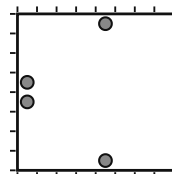
B



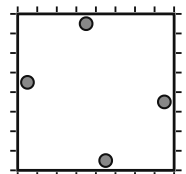
C



D

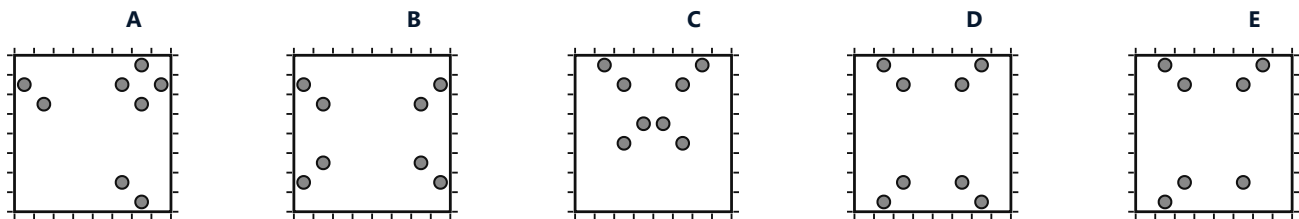
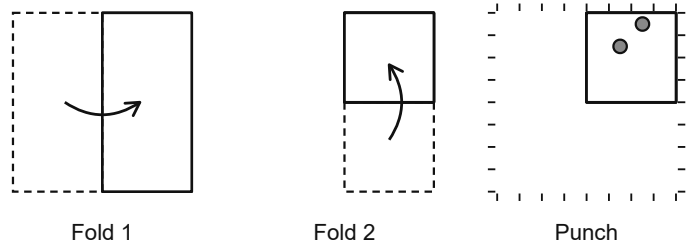


E

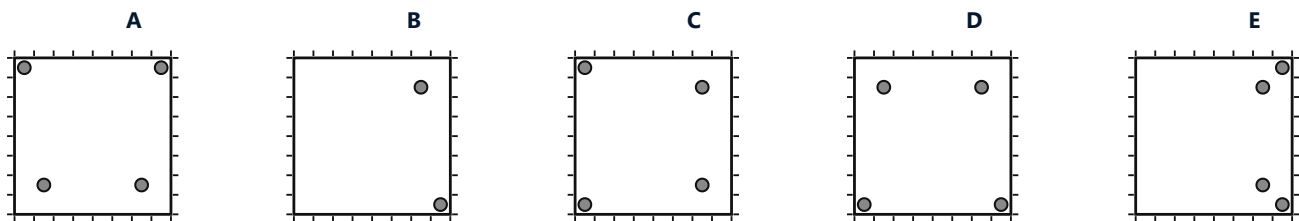
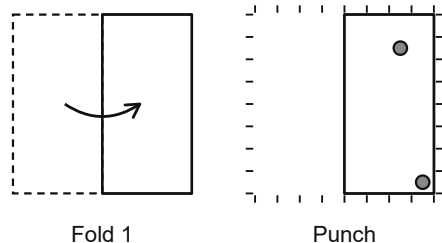


Practice Test 1: Paper Folding (continued)

11. Folded 2 times; 2 holes punched.

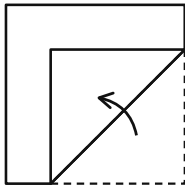


12. Folded once; 2 holes punched.

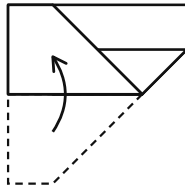


Practice Test 1: Paper Folding (continued)

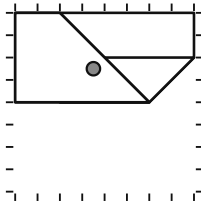
13. Folded 2 times; 1 hole punched.



Fold 1

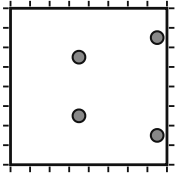


Fold 2

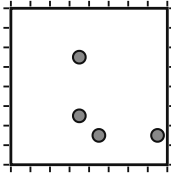


Punch

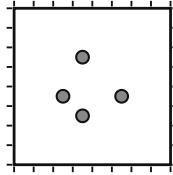
A



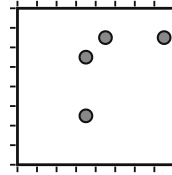
B



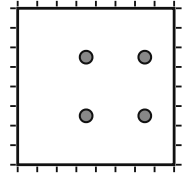
C



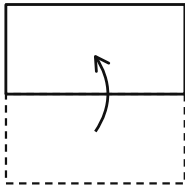
D



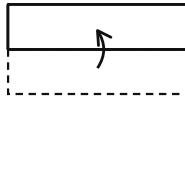
E



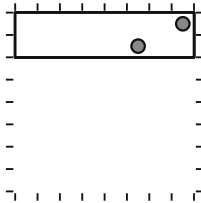
14. Folded 2 times; 2 holes punched.



Fold 1

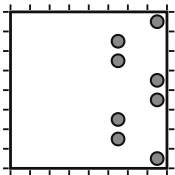


Fold 2

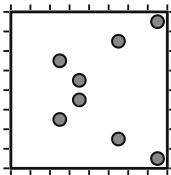


Punch

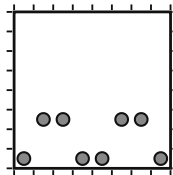
A



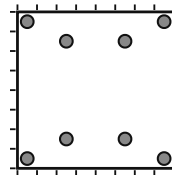
B



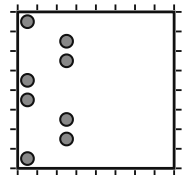
C



D

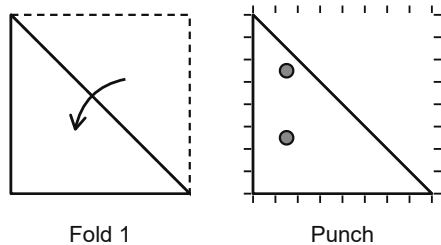


E



Practice Test 1: Paper Folding (continued)

15. Folded once; 2 holes punched.



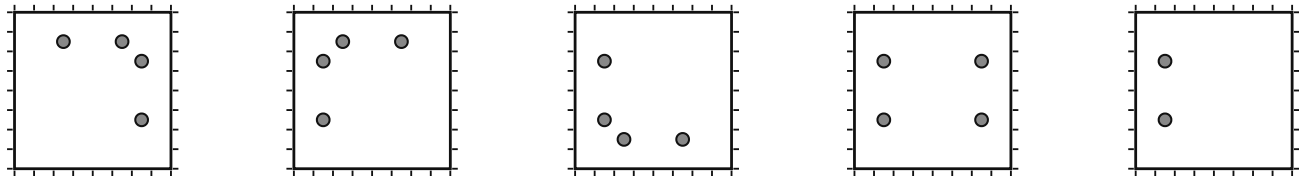
A

B

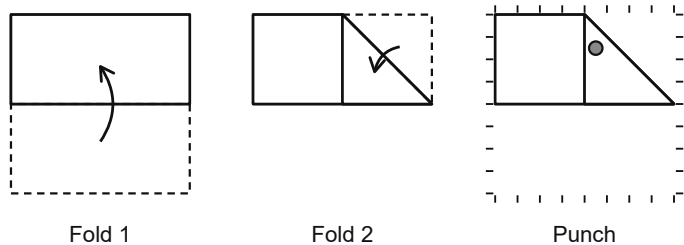
C

D

E



16. Folded 2 times; 1 hole punched.



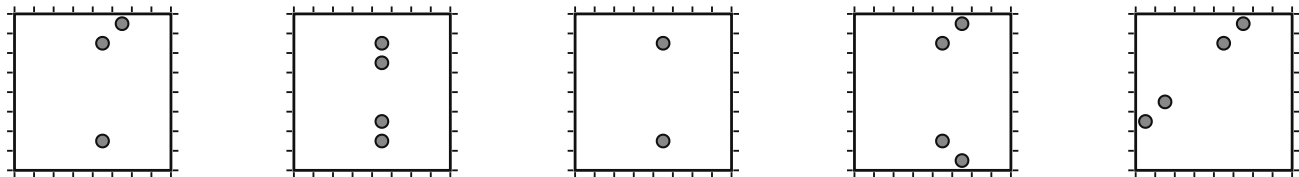
A

B

C

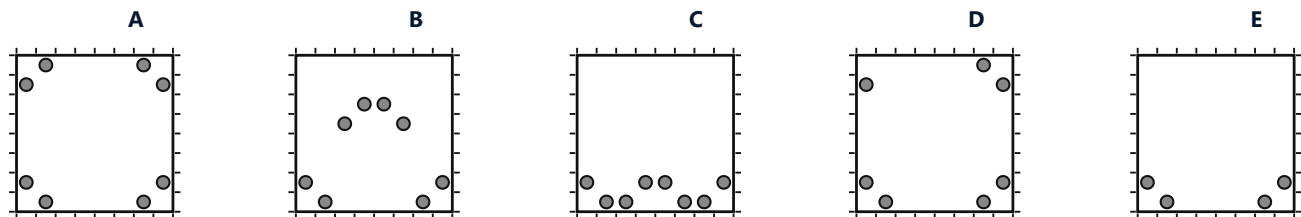
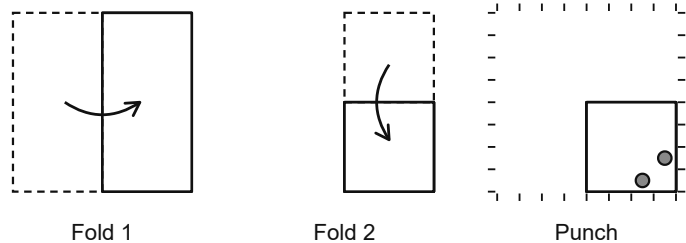
D

E

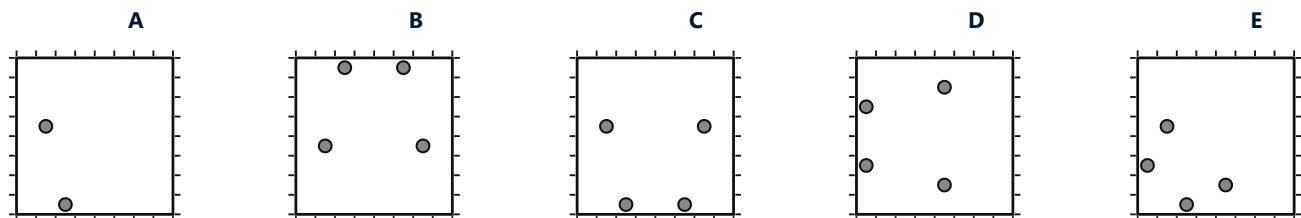
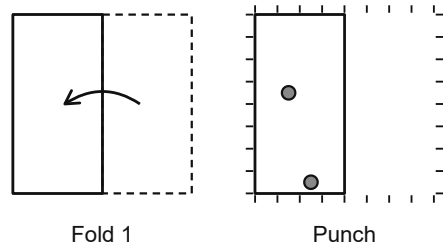


Practice Test 1: Paper Folding (continued)

17. Folded 2 times; 2 holes punched.

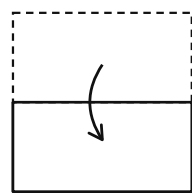


18. Folded once; 2 holes punched.



Practice Test 1: Paper Folding (continued)

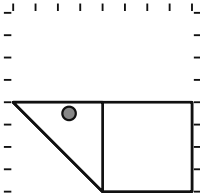
19. Folded 2 times; 1 hole punched.



Fold 1

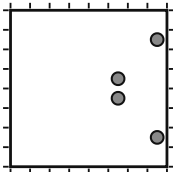


Fold 2

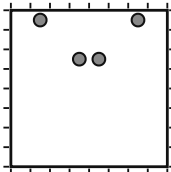


Punch

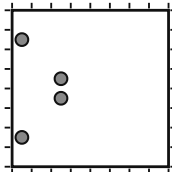
A



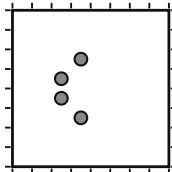
B



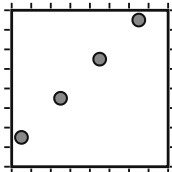
C



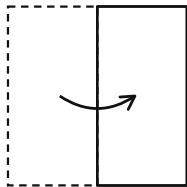
D



E



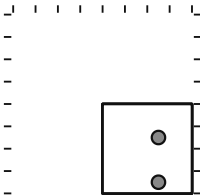
20. Folded 2 times; 2 holes punched.



Fold 1

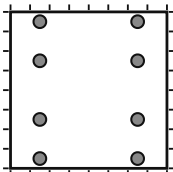


Fold 2

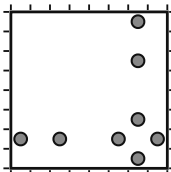


Punch

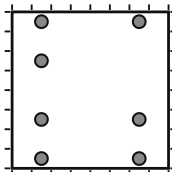
A



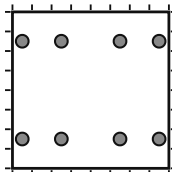
B



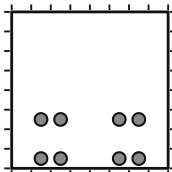
C



D

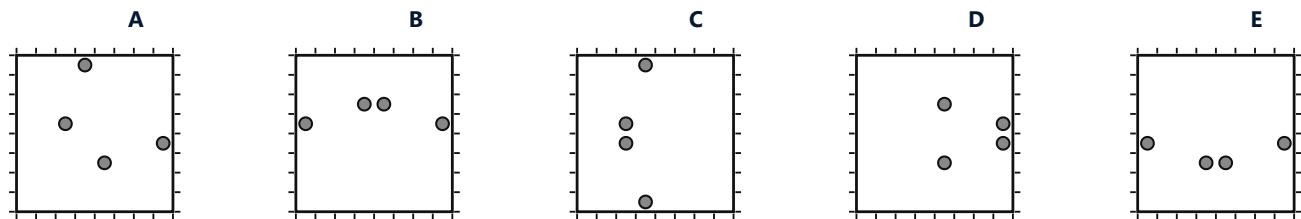
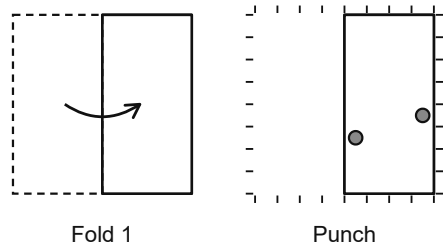


E

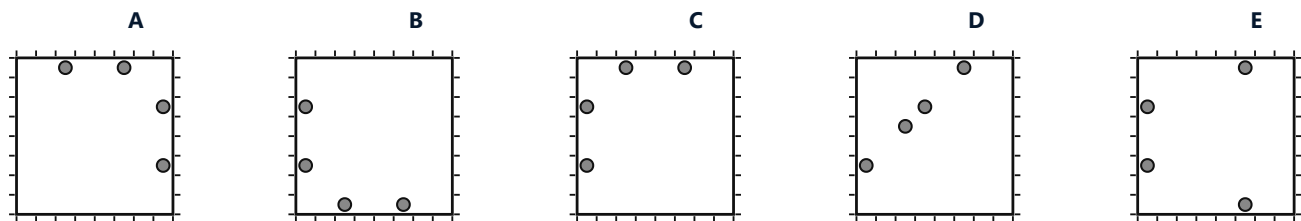
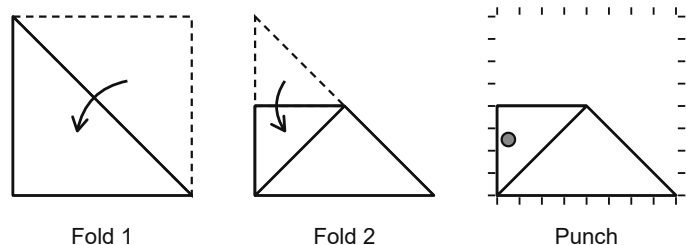


Practice Test 1: Paper Folding (continued)

21. Folded once; 2 holes punched.

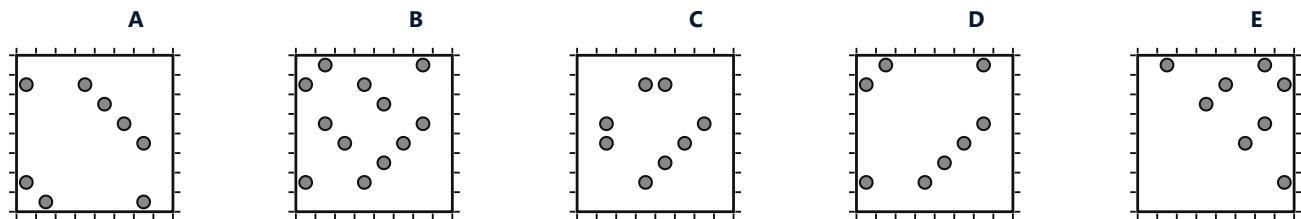
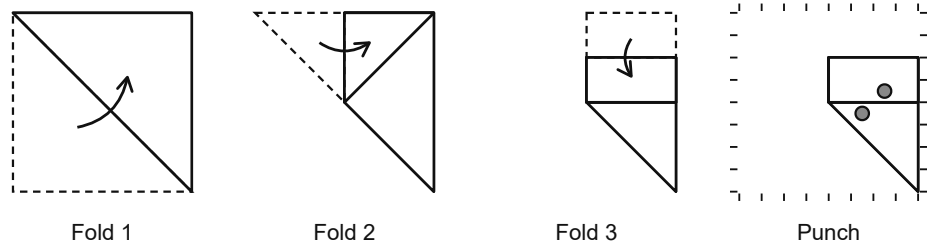


22. Folded 2 times; 1 hole punched.

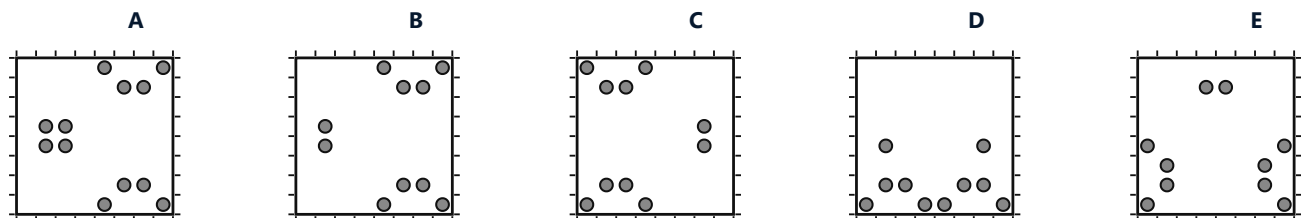
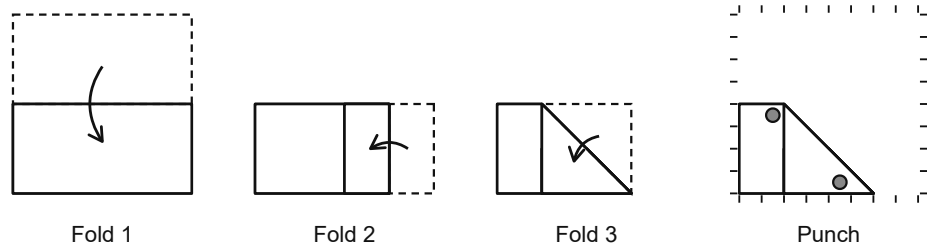


Practice Test 1: Paper Folding (continued)

23. Folded 3 times; 2 holes punched.

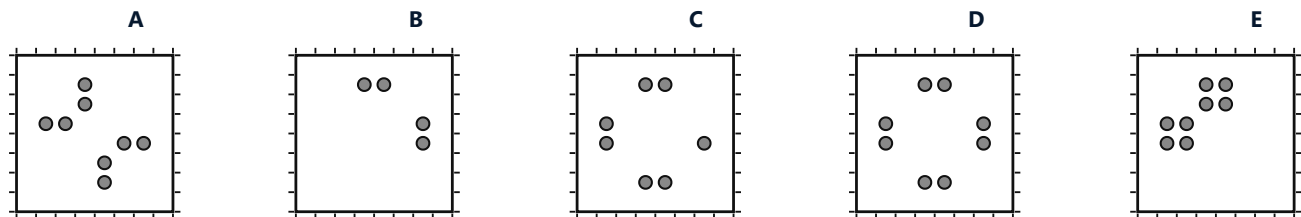
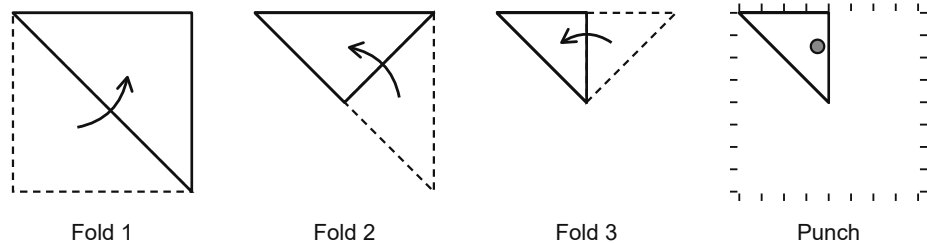


24. Folded 3 times; 2 holes punched.

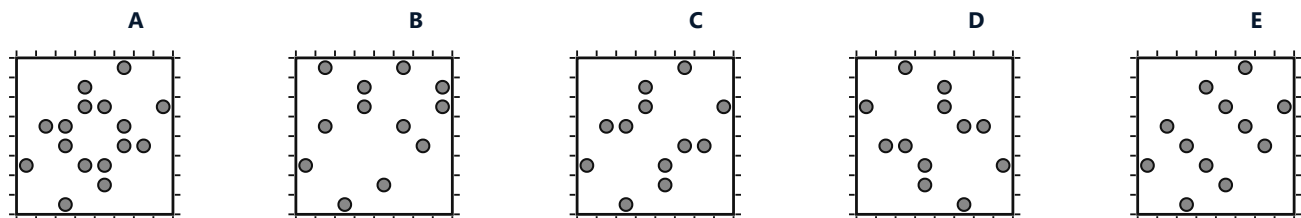
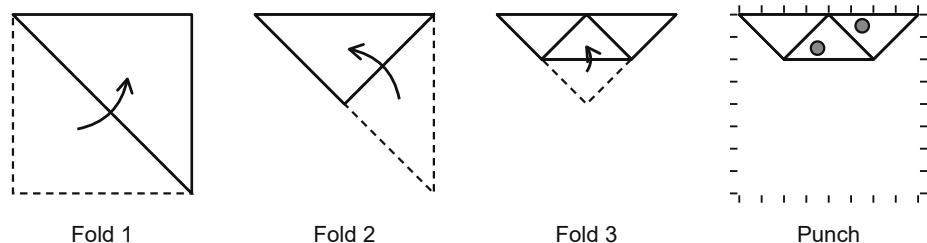


Practice Test 1: Paper Folding (continued)

25. Folded 3 times; 1 hole punched.

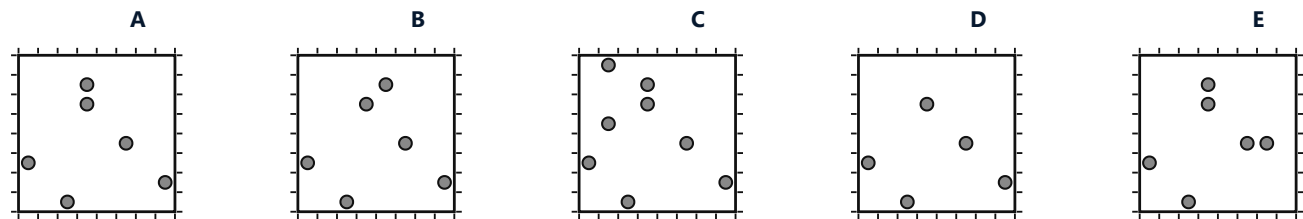
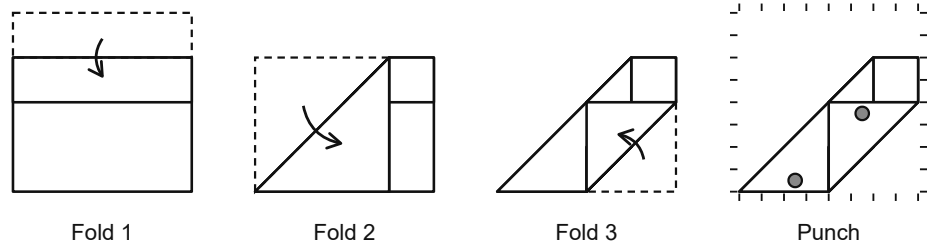


26. Folded 3 times; 2 holes punched.

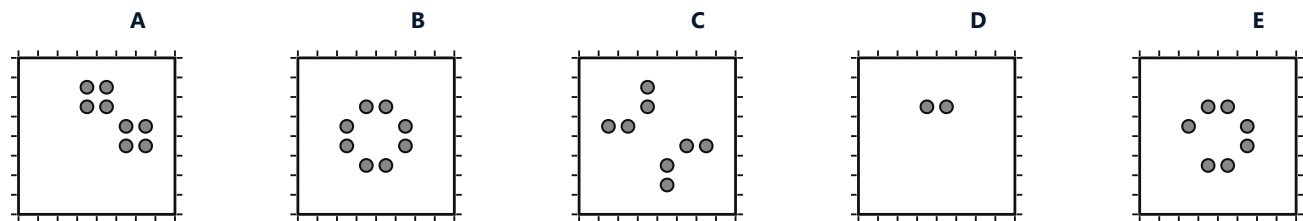
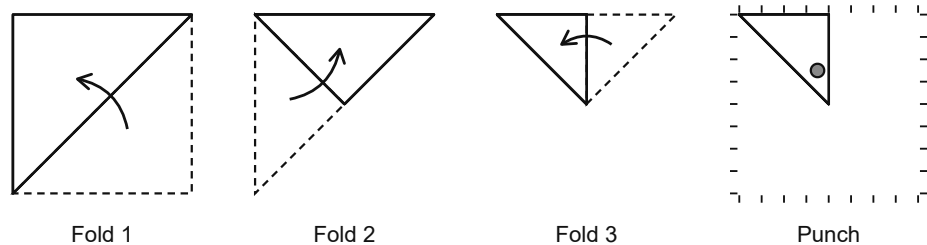


Practice Test 1: Paper Folding (continued)

27. Folded 3 times; 2 holes punched.

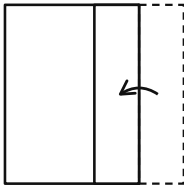


28. Folded 3 times; 1 hole punched.

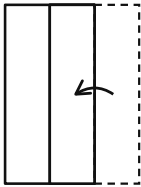


Practice Test 1: Paper Folding (continued)

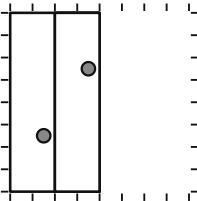
29. Folded 2 times; 2 holes punched.



Fold 1

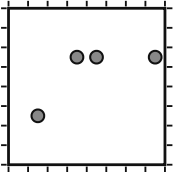


Fold 2

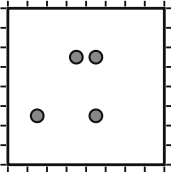


Punch

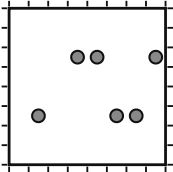
A



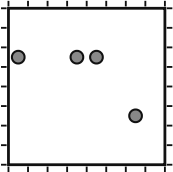
B



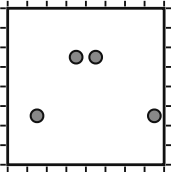
C



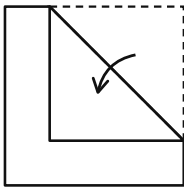
D



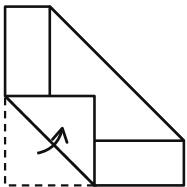
E



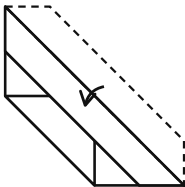
30. Folded 3 times; 2 holes punched.



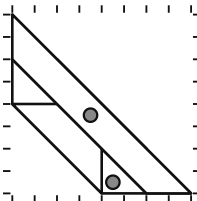
Fold 1



Fold 2

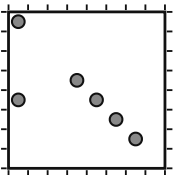


Fold 3

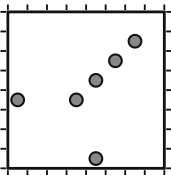


Punch

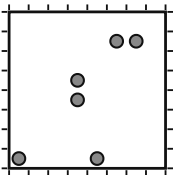
A



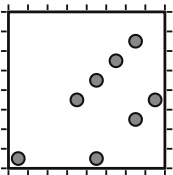
B



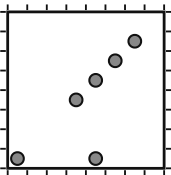
C



D



E



Practice Test 1: Problem Solving (6-section version only) answer sheet

Mark one answer for every item. GAN does not publish whether wrong answers cost points. Answer the ones you know first, then rule out choices before you guess.

1 A ☐ B ☐ C ☐ D ☐ E ☐	2 A ☐ B ☐ C ☐ D ☐ E ☐	3 A ☐ B ☐ C ☐ D ☐ E ☐	4 A ☐ B ☐ C ☐ D ☐ E ☐
5 A ☐ B ☐ C ☐ D ☐ E ☐	6 A ☐ B ☐ C ☐ D ☐ E ☐	7 A ☐ B ☐ C ☐ D ☐ E ☐	8 A ☐ B ☐ C ☐ D ☐ E ☐
9 A ☐ B ☐ C ☐ D ☐ E ☐	10 A ☐ B ☐ C ☐ D ☐ E ☐	11 A ☐ B ☐ C ☐ D ☐ E ☐	12 A ☐ B ☐ C ☐ D ☐ E ☐
13 A ☐ B ☐ C ☐ D ☐ E ☐	14 A ☐ B ☐ C ☐ D ☐ E ☐	15 A ☐ B ☐ C ☐ D ☐ E ☐	16 A ☐ B ☐ C ☐ D ☐ E ☐
17 A ☐ B ☐ C ☐ D ☐ E ☐	18 A ☐ B ☐ C ☐ D ☐ E ☐	19 A ☐ B ☐ C ☐ D ☐ E ☐	20 A ☐ B ☐ C ☐ D ☐ E ☐
21 A ☐ B ☐ C ☐ D ☐ E ☐	22 A ☐ B ☐ C ☐ D ☐ E ☐	23 A ☐ B ☐ C ☐ D ☐ E ☐	24 A ☐ B ☐ C ☐ D ☐ E ☐
25 A ☐ B ☐ C ☐ D ☐ E ☐	26 A ☐ B ☐ C ☐ D ☐ E ☐	27 A ☐ B ☐ C ☐ D ☐ E ☐	28 A ☐ B ☐ C ☐ D ☐ E ☐
29 A ☐ B ☐ C ☐ D ☐ E ☐	30 A ☐ B ☐ C ☐ D ☐ E ☐	31 A ☐ B ☐ C ☐ D ☐ E ☐	32 A ☐ B ☐ C ☐ D ☐ E ☐
33 A ☐ B ☐ C ☐ D ☐ E ☐	34 A ☐ B ☐ C ☐ D ☐ E ☐	35 A ☐ B ☐ C ☐ D ☐ E ☐	

Practice Test 1: Problem Solving (6-section version only)

Practice time: 35 minutes for 35 questions. No calculator. Scrap paper is fine.

Directions. Solve each word problem and choose the answer. Choose "Not given" if the information does not let you decide.

1. A service van travels at 45 miles per hour for 2 hours and 20 minutes. How many miles does it travel?

- A. 90 miles B. 105 miles C. 99 miles D. 135 miles E. Not given

2. Use only the facts below. If they are not enough to answer the question, choose "Not given". Conduit costs \$18 per stick. Couplings cost \$4 each. A job uses 5 sticks of conduit and at least one coupling for every stick. What is the total cost of the conduit and couplings?

- A. \$94 B. \$110 C. \$130 D. \$90 E. Not given

3. A supply house pays \$185 for a conduit bender and marks it up 20%. What is the selling price?

- A. \$148 B. \$222 C. \$37 D. \$205 E. Not given

4. A job needs 280 labor hours. A crew of 4 electricians works 10 hours a day. How many days will the job take?

- A. 28 days B. 70 days C. 20 days D. 7 days E. Not given

5. A spool holds 1,000 ft of 12 AWG wire. An electrician pulls 7 runs of 60 ft each. How many feet are left on the spool?

- A. 940 ft B. 580 ft C. 420 ft D. 640 ft E. Not given

6. A room is 23 ft long and 12 ft wide. Surface raceway will run around the whole room except across one 4 ft doorway. How many feet of raceway are needed?

- A. 70 ft B. 31 ft C. 272 ft D. 66 ft E. Not given

Practice Test 1: Problem Solving (6-section version only) (continued)

7. 6 boxes of wire nuts cost \$90. At the same price per box, how much do 10 boxes cost?

- A. \$94 B. \$54 C. \$150 D. \$900 E. Not given

8. A crew logged these hours on 4 days (Monday to Thursday): 6, 11, 9, 10. What is the average number of hours per day?

- A. 9 hours B. 8 hours C. 9.5 hours D. 12 hours E. Not given

9. A voltage tester lists for \$156. It is on sale for 30% off. What is the sale price?

- A. \$202.80 B. \$46.80 C. \$126.00 D. \$109.20 E. Not given

10. A crew worked 3 hours and 25 minutes on a panel change. How many minutes is that in all?

- A. 180 minutes B. 205 minutes C. 325 minutes D. 195 minutes E. Not given

11. Iris can wire a basement in 9 hours. Jamal can wire the same basement in 18 hours. Working together at these rates, how many hours will the job take?

- A. 13.5 hours B. 27 hours C. 4.5 hours D. 6 hours E. Not given

12. A wire stripper set lists for \$400. It is 25% off, and then 8% sales tax is added to the sale price. What is the total cost?

- A. \$300 B. \$432 C. \$332 D. \$324 E. Not given

Practice Test 1: Problem Solving (6-section version only) (continued)

13. Sam can wire a basement in 7 hours. Iris can wire the same basement in 21 hours. Working together at these rates, how many hours will the job take?

- A. 28 hours B. 14 hours C. 5.25 hours D. 3.5 hours E. Not given

14. A crew truck drives 75 miles at a steady 60 miles per hour. How long does the drive take?

- A. 1 hour B. 1 hour 15 minutes C. 1 hour 25 minutes
D. 2 hours E. Not given

15. An apprentice's average on 3 quizzes is 83. What score is needed on the next quiz to raise the average to 86?

- A. 95 points B. 89 points C. 86 points D. 98 points E. Not given

16. A roll holds 200 ft of cable. How many full pieces 4 ft 4 in long can be cut from it?

- A. 50 pieces B. 46 pieces C. 54 pieces D. 45 pieces E. Not given

17. A shop floor is 11 ft by 16 ft. Each box of floor tile covers 15 square feet. How many boxes must be bought?

- A. 12 boxes B. 11 boxes C. 2 boxes D. 4 boxes E. Not given

18. Each stick of conduit is 10 ft long. You need pieces that are 46 inches long, and leftover scraps cannot be joined. How many full pieces can you cut from 3 sticks?

- A. 6 pieces B. 2 pieces C. 9 pieces D. 7 pieces E. Not given

Practice Test 1: Problem Solving (6-section version only) (continued)

19. A room is shaped like an L. The bottom wall is 34 ft and the left wall is 18 ft. A corner 8 ft wide and 5 ft deep is cut out of the top right, as shown. What is the perimeter of the room?



- A. 572 ft B. 104 ft C. 65 ft D. 91 ft E. Not given
20. Four apprentices, Ben, Eli, Wes and Fatima, finished a timed wiring test one at a time, with no ties. Exactly one person finished between Ben and Wes. Wes did not finish third. Wes finished right before Fatima. Fatima did not finish third. Who finished second?
- A. Fatima B. Ben C. Eli D. Wes E. Not given
21. Two pieces of conduit measure 15 ft 8 in and 8 ft 9 in. What is their total length in inches?
- A. 276 inches B. 293 inches C. 247 inches D. 40 inches E. Not given

Practice Test 1: Problem Solving (6-section version only) (continued)

22. Four applicants, Uma, Noah, Omar and Zane, finished the aptitude practice test one at a time, with no ties. Uma did not finish second. Exactly one person finished between Noah and Zane. Zane did not finish second. Uma finished right before Noah. Who finished third?

- A. Zane B. Omar C. Noah D. Uma E. Not given

23. Two pieces of conduit measure 15 ft 8 in and 7 ft 7 in. What is their total length in inches?

- A. 279 inches B. 264 inches C. 235 inches D. 37 inches E. Not given

24. Use only the facts below. If they are not enough to answer the question, choose "Not given". A job used 96 boxes in all: square boxes, single-gang boxes and round boxes. 6 of the boxes were square. There were 2 times as many single-gang boxes as round boxes. How many round boxes were used?

- A. 45 boxes B. 60 boxes C. 32 boxes D. 30 boxes E. Not given

25. Use only the facts below. If they are not enough to answer the question, choose "Not given". On Monday three workers logged 5, 12 and 7 hours. A fourth worker also logged hours. The average for all four workers was 9 hours. How many hours did the fourth worker log?

- A. 8 hours B. 9 hours C. 36 hours D. 12 hours E. Not given

26. A supply house ships 12 AWG and 14 AWG wire in the ratio 2:7. A shipment has 54 spools in all. How many spools are 14 AWG?

- A. 12 spools B. 6 spools C. 42 spools D. 189 spools E. Not given

27. A crew drives 15 miles at 30 miles per hour, then 60 miles at 60 miles per hour. What is the average speed for the whole trip?

- A. 50 mph B. 45 mph C. 37.5 mph D. 54 mph E. Not given

Practice Test 1: Problem Solving (6-section version only) (continued)

28. Use only the facts below. If they are not enough to answer the question, choose "Not given". Ben worked 4 more hours than Ava. Fatima worked 5 fewer hours than Ben. Together the three worked 33 hours. How many hours did Fatima work?

- A. 10 hours B. 14 hours C. 9 hours D. 11 hours E. Not given

29. A crew drives 20 miles at 40 miles per hour, then 60 miles at 30 miles per hour. What is the average speed for the whole trip?

- A. 32 mph B. 40 mph C. 32.5 mph D. 35 mph E. Not given

30. Use only the facts below. If they are not enough to answer the question, choose "Not given". Cable ties cost \$6 a bag, or \$2 a bag when you buy 10 or more bags. A crew paid \$24 for cable ties. How many bags did the crew buy?

- A. 4 bags B. 12 bags C. 6 bags D. 10 bags E. Not given

31. Five apprentices, Fatima, Tara, Ava, Zane and Hector, finished a timed wiring test one at a time, with no ties. Ava finished fourth. Exactly one person finished between Zane and Hector. Hector finished earlier than Ava. Fatima finished right before Zane. Who finished first?

- A. Fatima B. Tara C. Hector D. Zane E. Not given

32. A morning class of 20 apprentices averaged 94 on a code test. An evening class of 12 apprentices averaged 78. What is the average score of all the apprentices together?

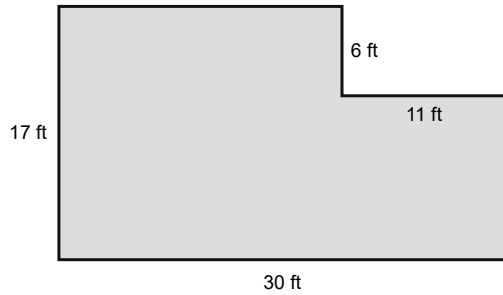
- A. 84 points B. 1,408 points C. 88 points D. 86 points E. Not given

33. A shop buys a panel for \$220, marks it up 25%, and later puts it on sale for 25% off the marked-up price. What is the sale price?

- A. \$165.00 B. \$220.00 C. \$206.25 D. \$275.00 E. Not given

Practice Test 1: Problem Solving (6-section version only) (continued)

34. A room is shaped like an L. The bottom wall is 30 ft and the left wall is 17 ft. An 11 ft by 6 ft corner is cut out of the top right, as shown. What is the floor area of the room?



- A. 510 sq ft B. 94 sq ft C. 444 sq ft D. 330 sq ft E. Not given

35. Use only the facts below. If they are not enough to answer the question, choose "Not given". Ben worked 4 more hours than Uma. Wes worked 5 fewer hours than Ben. Together the three worked 21 hours. How many hours did Wes work?

- A. 10 hours B. 7 hours C. 6 hours D. 5 hours E. Not given

Practice Test 1: score it

Score each section: number right divided by the number of questions, times 100. GAN programs rank applicants, so every section counts; there is no pass mark.

Band	Percent right	Next move
Building	0 to 59%	Go back to that section's lesson and drill in Book 1.
Close	60 to 79%	Redo every missed question, then the next practice test.
Strong	80 to 100%	Keep pace; spend time on your weakest section.

These bands are this pack's study-planning guide, not GAN score bands, pass marks or predictions of your rank.

Practice Test 1 key: Numerical Computation (1)

1. C **WHOLE ADD SUBTRACT** Line the numbers up by place value, ones under ones.

Add each column from the right. When a column adds to 10 or more, write the ones digit and carry 1.

Check: $9,532 - 474 = 9,058$.

Answer: 9,532

Why not A: Lined the numbers up on the left instead of by place value.

Why not B: Forgot to carry when a column added to 10 or more.

Why not D: Subtracted instead of adding.

Why not E: Forgot the carry from the ones column only.

2. A **DECIMALS** Multiply as whole numbers: $19 \times 2 = 38$.

Count decimal places: $1 + 1 = 2$.

Place the decimal point 2 places from the right.

Answer: 0.38

Why not B: Added instead of multiplying.

Why not C: Counted one decimal place too many in the product.

Why not D: Ignored the decimal points.

Why not E: Counted one decimal place too few in the product.

3. D **WHOLE MULTIPLY** Multiply each digit of 647 by 7, starting with the ones.

Write the ones digit of each product and carry the tens digit to the next column, adding it after you multiply.

In the last column write the whole result.

Answer: 4,529

Why not A: Forgot the carry from the ones column.

Why not B: Added the carry before multiplying instead of after.

Why not C: Forgot to carry between columns.

Why not E: Dropped the carry from the last column.

4. D **CONVERT FRACTION DECIMAL PERCENT** Percent means per hundred: $78\% = 78/100$.

Divide the top and bottom by 2.

$78/100 = 39/50$.

Answer: 39/50

Why not A: Simplified the numerator but not the denominator.

Why not B: Put 100 over the percent (flipped the fraction).

Why not C: Put the percent over 10 instead of 100.

Why not E: Put the percent over 1,000 instead of 100.

5. C **PLACE VALUE ROUNDING** Find the hundredth place in 84.577.

Look at the next digit to the right (the thousandths digit): it is 7, which is 5 or more.

Round up and drop the digits after the rounding place.

Answer: 84.58

Why not A: Did not round.

Why not B: Rounded to the nearest tenth instead.

Why not D: Rounded to the nearest whole number instead.

Why not E: Cut off the extra digits without rounding up.

6. B **FRACTIONS ADD SUBTRACT** The least common denominator of 5 and 4 is 20.

$1/5 = 4/20$ and $1/4 = 5/20$.

$4/20 + 5/20 = 9/20$, already in lowest terms.

Answer: 9/20

Why not A: Renamed only the second fraction to the common denominator.

Why not C: Used the common denominator but did not change the numerators.

Why not D: Added the numerators and added the denominators.

Why not E: Renamed only the first fraction to the common denominator.

Practice Test 1 key: Numerical Computation (2)

7. C **NEGATIVE NUMBERS** Multiply the sizes: $9 \times 2 = 18$.

Negative times negative is positive.

So the product is 18.

Answer: 18

Why not A: Subtracted instead of multiplying.

Why not B: Added instead of multiplying.

Why not D: Got the sign of the product wrong.

Why not E: Added the sizes and dropped the signs.

8. D **PERCENTS** $60\% = 60/100 = 0.6$.

$0.6 \times 60 = 36$.

Check: 10% of 60 is 6.

Answer: 36

Why not A: Added the percent amount to the number.

Why not B: Found the part that is left (40%) instead.

Why not C: Wrote 60% as 0.06 (moved the decimal point three places).

Why not E: Wrote 60% as 6 (moved the decimal point only one place).

9. C **FRACTIONS MULTIPLY DIVIDE** Multiply the numerators: $1 \times 11 = 11$.

Multiply the denominators: $5 \times 12 = 60$.

11/60 in lowest terms.

Answer: 11/60

Why not A: Added the fractions instead of multiplying.

Why not B: Flipped the second fraction (divided instead of multiplied).

Why not D: Multiplied the numerators but added the denominators.

Why not E: Flipped the first fraction.

10. E **WHOLE ADD SUBTRACT** Line the numbers up by place value.

Subtract each column from the right. When the top digit is smaller, borrow 1 from the next column (borrowing across zeros turns each 0 into 9).

Check: $2,357 + 17,734 = 20,091$.

Answer: 2,357

Why not A: Borrowed 10 but did not reduce the digit it was borrowed from.

Why not B: Borrowed for the ones column but did not reduce the tens digit.

Why not C: Added instead of subtracting.

Why not D: Forgot to borrow: took the smaller digit from the larger in each column.

11. E **DECIMALS** Write 46 as 46.00 so both numbers have two decimal places.

$46.00 - 30.98$: borrow across the zeros, working from the right.

Check: $15.02 + 30.98 = 46$.

Answer: 15.02

Why not A: Misplaced the decimal point one place to the left.

Why not B: Left the decimal point out of the answer.

Why not C: Misplaced the decimal point one place to the right.

Why not D: Subtracted the whole numbers and brought down the decimal part.

12. A **WHOLE ADD SUBTRACT** Line the numbers up by place value.

Subtract each column from the right. When the top digit is smaller, borrow 1 from the next column (borrowing across zeros turns each 0 into 9).

Check: $25,079 + 25,725 = 50,804$.

Answer: 25,079

Why not B: Borrowed for the ones column but did not reduce the tens digit.

Why not C: Forgot to borrow: took the smaller digit from the larger in each column.

Why not D: Borrowed 10 but did not reduce the digit it was borrowed from.

Why not E: Added instead of subtracting.

Practice Test 1 key: Numerical Computation (3)

13. A ORDER OF OPERATIONS Multiply first: $9 \times 5 = 45$.

Then work left to right: $41 - 45 = -4$.

$-4 + 8 = 4$.

Answer: 4

Why not B: Did addition and subtraction before multiplication and division.

Why not C: Ignored order of operations: worked straight from left to right.

Why not D: Worked from right to left.

Why not E: Subtracted everything after the minus sign as one group.

14. B FRACTIONS MULTIPLY DIVIDE Dividing by $2/5$ is the same as multiplying by its reciprocal $5/2$.

$1/2 \times 5/2 = 5/4$.

Simplify (write as a mixed number if it is more than 1).

Answer: $1 \frac{1}{4}$

Why not A: Multiplied straight across without flipping the divisor.

Why not C: Flipped both fractions.

Why not D: Multiplied by the divisor's denominator but did not divide by its numerator.

Why not E: Inverted the wrong fraction (flipped the first one).

15. D NEGATIVE NUMBERS Negative times negative is positive: $(-5) \times (-3) = 15$.

Then subtract: $15 - 17 = -2$.

Multiply before you subtract.

Answer: -2

Why not A: Added the last number instead of subtracting it.

Why not B: Made negative times negative a negative.

Why not C: Subtracted before multiplying.

Why not E: Got the sign of the answer wrong.

16. A PERCENTS Change = $\$60 - \$54 = \$6$.

Divide by the original price: $6 \div 60 = 0.1$.

$0.1 \times 100 = 10\%$ decrease.

Answer: 10%

Why not B: Divided the change by the new price instead of the original.

Why not C: Gave the new price as a percent of the old price.

Why not D: Gave the dollar change as the percent.

Why not E: Gave the old price as a percent of the new price.

17. A FRACTIONS ADD SUBTRACT The least common denominator of 9 and 6 is 18.

$7/9 = 14/18$ and $1/6 = 3/18$.

$14/18 - 3/18 = 11/18$, already in lowest terms.

Answer: $11/18$

Why not B: Used the common denominator but did not change the numerators.

Why not C: Renamed only the second fraction to the common denominator.

Why not D: Subtracted the numerators and subtracted the denominators.

Why not E: Renamed only the first fraction to the common denominator.

18. E CONVERT FRACTION DECIMAL PERCENT Divide: $3 \div 16 = 0.1875$.

Multiply by 100 to change to a percent.

$0.1875 \times 100 = 18.75\%$.

Answer: 18.75%

Why not A: Moved the decimal point only one place.

Why not B: Moved the decimal point three places.

Why not C: Used the numerator as the percent.

Why not D: Changed to a decimal but did not multiply by 100.

Practice Test 1 key: Numerical Computation (4)

19. E PERCENTS Percent = part ÷ whole × 100.

$$27 \div 300 = 0.09.$$

$$0.09 \times 100 = 9\%.$$

Answer: 9%

Why not A: Found the decimal but forgot to multiply by 100.

Why not B: Divided the wrong way (whole by part).

Why not C: Gave the part as the percent.

Why not D: Found the percent that is left over.

20. B WHOLE DIVIDE 5 goes into 10 2 times; $10 - 10 = 0$.

Bring down the next digit: 1 is less than 5, so write 0 in the quotient.

Bring down the last digit: $15 \div 5 = 3$. Check: $203 \times 5 = 1,015$.

Answer: 203

Why not A: Stopped before bringing down the last digit.

Why not C: Put the quotient zero at the end instead of the middle.

Why not D: Dropped the zero in the middle of the quotient.

Why not E: Wrote two zeros in the middle of the quotient.

21. E PERCENTS Percent = part ÷ whole × 100.

$$18 \div 75 = 0.24.$$

$$0.24 \times 100 = 24\%.$$

Answer: 24%

Why not A: Found the percent that is left over.

Why not B: Gave the part as the percent.

Why not C: Divided the wrong way (whole by part).

Why not D: Found the decimal but forgot to multiply by 100.

22. C WHOLE DIVIDE 8 goes into 32 4 times; $32 - 32 = 0$.

Bring down the next digit: 2 is less than 8, so write 0 in the quotient.

Bring down the last digit: $24 \div 8 = 3$. Check: $403 \times 8 = 3,224$.

Answer: 403

Why not A: Dropped the zero in the middle of the quotient.

Why not B: Stopped before bringing down the last digit.

Why not D: Wrote two zeros in the middle of the quotient.

Why not E: Put the quotient zero at the end instead of the middle.

23. D WHOLE MULTIPLY Partial product for the ones digit: $228 \times 3 = 684$.

Partial product for the tens digit: $228 \times 90 = 20,520$ (shift one place left).

Add the partial products: $684 + 20,520 = 21,204$.

Answer: 21,204

Why not A: Forgot to carry inside the partial products.

Why not B: Shifted the tens partial product two places instead of one.

Why not C: Multiplied by the ones digit only.

Why not E: Forgot the placeholder zero: did not shift the tens partial product.

24. B PERCENTS Increase: $\$200 \times 1.4 = \$280$.

Decrease the NEW price: $\$280 \times 0.5 = \$140$.

The second percent applies to the new price, not the original.

Answer: \$140

Why not A: Treated the decrease as another increase.

Why not C: Applied only the decrease.

Why not D: Applied only the increase.

Why not E: Combined the changes into one 10% change on the original price.

Practice Test 1 key: Numerical Computation (5)

25. A **MIXED NUMBERS** Change to improper fractions: $4\frac{1}{2} = \frac{9}{2}$ and $1\frac{1}{4} = \frac{5}{4}$.

Multiply: $9 \times 5 = 45$ and $2 \times 4 = 8$.

Simplify $\frac{45}{8} = 5\frac{5}{8}$.

Answer: $5\frac{5}{8}$

Why not B: Changed each mixed number to (whole + numerator)/denominator.

Why not C: Multiplied only the whole numbers.

Why not D: Multiplied the whole numbers and the fractions separately.

Why not E: Multiplied by the whole-number part of the second number only.

26. B **WHOLE DIVIDE** 26 goes into 26 1 time; $26 - 26 = 0$.

Bring down the next digit: 2 is less than 26, so write 0 in the quotient.

Bring down the last digit: $26 \div 26 = 1$. Check: $101 \times 26 = 2,626$.

Answer: 101

Why not A: Stopped before bringing down the last digit.

Why not C: Put the quotient zero at the end instead of the middle.

Why not D: Dropped the zero in the middle of the quotient.

Why not E: Wrote two zeros in the middle of the quotient.

27. B **ORDER OF OPERATIONS** Parentheses first: $9 - 6 = 3$.

Exponent next: $3^2 = 9$.

Multiply and divide left to right: $2 \times 9 = 18$, then $\div 2$.

Answer: 9

Why not A: Squared only the last number inside the parentheses.

Why not C: Ignored the parentheses.

Why not D: Multiplied by the exponent instead of squaring.

Why not E: Squared the product instead of just the number with the exponent.

28. C **PERCENTS** Increase: $\$760 \times 1.4 = \$1,064$.

Decrease the NEW price: $\$1,064 \times 0.8 = \$851.20$.

The second percent applies to the new price, not the original.

Answer: \$851.20

Why not A: Combined the changes into one 20% change on the original price.

Why not B: Treated the decrease as another increase.

Why not D: Applied only the decrease.

Why not E: Applied only the increase.

29. E **MIXED NUMBERS** Change to improper fractions: $4\frac{7}{8} = \frac{39}{8}$ and $5\frac{1}{2} = \frac{11}{2}$.

Multiply: $39 \times 11 = 429$ and $8 \times 2 = 16$.

Simplify $\frac{429}{16} = 26\frac{13}{16}$.

Answer: $26\frac{13}{16}$

Why not A: Multiplied by the whole-number part of the second number only.

Why not B: Changed each mixed number to (whole + numerator)/denominator.

Why not C: Multiplied only the whole numbers.

Why not D: Multiplied the whole numbers and the fractions separately.

30. D **WHOLE DIVIDE** 13 goes into 105 8 times; $105 - 104 = 1$.

Bring down the next digit: 11 is less than 13, so write 0 in the quotient.

Bring down the last digit: $117 \div 13 = 9$. Check: $809 \times 13 = 10,517$.

Answer: 809

Why not A: Wrote two zeros in the middle of the quotient.

Why not B: Put the quotient zero at the end instead of the middle.

Why not C: Dropped the zero in the middle of the quotient.

Why not E: Stopped before bringing down the last digit.

Practice Test 1 key: Reading (1)

- 1. A** **MAIN IDEA** Evidence: A circuit breaker is an automatic switch that shuts off power when a circuit carries more current than it safely can.
Why not B: The passage warns against simply resetting a breaker that trips again and again.
Why not C: The strip is one of two methods; the passage does not rank it as the most important part.
Why not D: The passage never compares how often short circuits and overloads occur.
-
- 2. C** **DETAIL** Evidence: When a circuit is overloaded for a while, the extra current warms the strip until it bends far enough to release a latch and open the circuit.
Why not A: The electromagnet is the second, separate method.
Why not B: Moving the handle resets the breaker; it does not bend the strip.
Why not D: The passage says heat, not cold, makes the strip bend.
-
- 3. B** **DETAIL** Evidence: A short circuit can send a very large current through the breaker almost instantly, and that surge makes the electromagnet pull hard enough to trip the latch within a fraction of a second.
Why not A: The strip cooling is not part of the magnetic response.
Why not C: A slow response to a lasting overload describes the bimetallic strip.
Why not D: Resetting happens after a trip, not before it.
-
- 4. D** **INFERENCE** Evidence: Instead of simply resetting it each time, the owner should find out why the circuit is overloaded or faulty.
Why not A: The passage points to the circuit, not to a failed strip.
Why not B: Nothing in the passage suggests the electromagnet weakens.
Why not C: The passage describes how to reset but does not link repeated trips to a bad reset.
-
- 5. C** **VOCABULARY IN CONTEXT** Evidence: This response is slow on purpose, so a brief rise in current does not cause a needless shutdown.
Why not A: A shutdown is safe; the point is that this one would not be needed.
Why not B: Sudden describes the short circuit surge, not the shutdown being avoided.
Why not D: Inconvenience is not the point; the shutdown would simply not be needed.
-
- 6. A** **AUTHOR'S REASONING** Evidence: Instead of simply resetting it each time, the owner should find out why the circuit is overloaded or faulty.
Why not B: The phrase is a figure of speech; no signal to the utility is described.
Why not C: No sound from the strip is mentioned.
Why not D: The passage says a tripped breaker can be reset, not replaced.
-
- 7. D** **MAIN IDEA** Evidence: Choosing the right grit and the right sequence saves both time and material.
Why not A: The passage says coarse paper is useful for removing material quickly.
Why not B: The passage says each abrasive suits different jobs, not that one is better.
Why not C: The screens are part of the history, not the main point.
-
- 8. B** **DETAIL** Evidence: As a result, the scale can seem backward at first, because a higher grit number means smaller particles and a finer, smoother cut.
Why not A: This reverses the scale; higher numbers mean smaller particles.
Why not C: The strength of the glue is not mentioned.
Why not D: Wet sanding is linked to silicon carbide, not to grit number.
-
- 9. A** **DETAIL** Evidence: Instead, they move through the grits in steps, so that each sheet removes the scratches left by the one before it.
Why not B: How long particles stay glued is not discussed.
Why not C: Paint absorption is not mentioned as a reason for stepping.
Why not D: Stepping starts with coarse paper; it does not avoid it.
-
- 10. C** **INFERENCE** Evidence: If a worker skips too far ahead, the fine paper may need a long time to erase the deep marks, and some of them may show through the final coat.
Why not A: The passage says skipping ahead makes the fine paper take a long time.
Why not B: Fine paper removes very little material.
Why not D: The passage does not link skipping grits to a change of abrasive.
-

Practice Test 1 key: Reading (2)

11. D **VOCABULARY IN CONTEXT** Evidence: Coarse paper, around 60 or 80 grit, removes material quickly but leaves deep scratches.

Why not A: Rude is a meaning of coarse for speech, not for sandpaper.

Why not B: Smooth is the opposite of coarse in this passage.

Why not C: Price is not discussed.

12. A **AUTHOR'S REASONING** Evidence: The system grew out of the screens used to sort the particles, where a higher number meant a screen with more, smaller openings per inch.

Why not B: The passage gives no story of an accidental invention.

Why not C: The passage does not call for changing the scale.

Why not D: The gluing process is not described.

13. D **MAIN IDEA** Evidence: The terms grounding and bonding are often used as if they mean the same thing, but they describe two different jobs in an electrical system.

Why not A: The passage says a ground rod alone cannot replace bonding.

Why not B: Lightning is linked to grounding, not to bonding.

Why not C: The passage says soil usually resists current too much.

14. A **DETAIL** Evidence: Bonding means connecting metal parts together, such as equipment enclosures, conduit, and metal piping, so that they form one continuous conductive path.

Why not B: Connecting the system to a rod in the soil is grounding.

Why not C: Hot and neutral wires are not part of the bonding description.

Why not D: Lightning rods are not mentioned.

15. C **DETAIL** Evidence: If a hot wire touches a metal enclosure, the bonded path carries the fault current back to the source with very little resistance.

Why not A: The passage says soil usually resists current too much to trip a breaker.

Why not B: Stable voltage to earth is a grounding job, not what trips the breaker.

Why not D: Lightning is not involved in clearing a fault.

16. B **INFERENCE** Evidence: In fact, soil usually resists current far too much to let enough flow to trip a breaker, so a metal enclosure could stay energized.

Why not A: Nothing suggests the rod would melt.

Why not C: The passage does not say poor bonding attracts lightning.

Why not D: Low system voltage is not discussed.

17. A **VOCABULARY IN CONTEXT** Evidence: This connection helps limit the voltage that lightning or utility line surges can impose on the system, and it keeps the system's voltage stable in relation to the earth.

Why not B: Grounding limits the voltage that surges add, so remove is the opposite idea.

Why not C: Surges do not measure anything.

Why not D: The sentence is about voltage forced onto the system, not stored in it.

18. D **AUTHOR'S REASONING** Evidence: A common misconception is that the earth itself provides this path.

Why not A: The passage still describes ground rods as part of grounding.

Why not B: The point is that bonding cannot be replaced by a ground rod.

Why not C: Lightning is not part of the misconception.

19. A **MAIN IDEA** Evidence: Many electrical systems need a small, low-power signal to switch on a much larger load.

Why not B: The thermostat works through a relay; it is not described as one.

Why not C: Contactors are larger relays for heavy loads, not replacements.

Why not D: The click is the sound of the arm moving.

20. D **DETAIL** Evidence: When the control current stops, a spring pulls the armature back and the contacts open again.

Why not A: The coil becomes a magnet when current flows, not when it stops.

Why not B: The contacts open when the current stops.

Why not C: Nothing says the thermostat changes its voltage.

Practice Test 1 key: Reading (3)

21. B **DETAIL** Evidence: When the small control current flows through the coil, it becomes an electromagnet and pulls a movable metal arm, called an armature.

- Why not A: The spring pulls the armature back when current stops.
- Why not C: The load current never flows through the control coil.
- Why not D: Arcs form at the contacts; they do not move the arm.

22. C **INFERENCE** Evidence: The control circuit and the load circuit are not directly connected, so the thermostat wiring never carries the heavy current of the equipment.

- Why not A: The thermostat also controls an air conditioner.
- Why not B: The passage says the equipment runs on a far more powerful circuit.
- Why not D: The two circuits are separate; the relay does not convert current.

23. D **VOCABULARY IN CONTEXT** Evidence: The audible click of many relays is the sound of that arm moving.

- Why not A: A sound can be audible without being loud.
- Why not B: Suddenness is not what the word describes.
- Why not C: The word does not describe how often the click happens.

24. B **AUTHOR'S REASONING** Evidence: A home thermostat is a good example.

- Why not A: The author does not suggest changing thermostat voltage.
- Why not C: Contactors are described near the end.
- Why not D: The passage says a relay often connects the two circuits.

25. C **MAIN IDEA** Evidence: The two main types do this in very different ways.

- Why not A: The passage says spinning alone does little against hard material.
- Why not B: The passage gives each tool its own uses rather than saying one replaced the other.
- Why not D: Carbide bits are a shared detail, not the main idea.

26. B **DETAIL** Evidence: The motor drives the piston back and forth, compressing a cushion of air that throws a separate striker against the back of the bit.

- Why not A: Ridged discs describe a hammer drill.
- Why not C: Pressing hard matters for a hammer drill, and a rotary hammer needs less pushing.
- Why not D: The carbide tip resists wear; it does not create the blows.

27. A **DETAIL** Evidence: Rotary hammers usually take bits with special slotted shanks that can slide in the chuck, letting the bit move with each blow.

- Why not B: Hammer-only mode, not the shank, allows use without rotation.
- Why not C: Cooling is not mentioned.
- Why not D: Fitting an ordinary drill is not mentioned.

28. D **INFERENCE** Evidence: Each blow carries much more energy, so the tool drills larger holes in concrete faster and with less pushing from the user.

- Why not A: An ordinary drill is slow in concrete, and wood bits are not mentioned for masonry.
- Why not B: A hammer drill's blows depend on pressure and suit occasional, smaller holes.
- Why not C: Hammer-only mode is described for rotary hammers, and it stops rotation.

29. B **VOCABULARY IN CONTEXT** Evidence: Because the force of each blow depends on how hard the user presses, a hammer drill works best for occasional, smaller holes in brick or block.

- Why not A: Formal relates to occasion in another sense, not frequency.
- Why not C: Accidental does not fit holes the user chooses to drill.
- Why not D: Careful does not describe how often holes are drilled.

30. D **AUTHOR'S REASONING** Evidence: Many models also offer a hammer-only mode with no rotation, which turns the tool into a small chisel for chipping.

- Why not A: Pushing is explained by the disc mechanism, not this mode.
- Why not B: Damage to bits is not mentioned.
- Why not C: That point is made in the first sentence, not by the hammer-only mode.

Practice Test 1 key: Reading (4)

31. C **MAIN IDEA** Evidence: By flattening the sharpest spikes in demand, they can defer or avoid the expense of building generating capacity that would otherwise stand unused for most of the year.

Why not A: The passage calls the electricity from peaking plants comparatively expensive.

Why not B: The programs described rely on enrollment and prices, not requirements.

Why not D: The passage says such measures can defer or avoid some capacity, not all.

32. B **DETAIL** Evidence: Because their construction costs are spread across so few hours of operation, the electricity they produce is comparatively expensive.

Why not A: Fuel use is not discussed.

Why not C: Location is not mentioned.

Why not D: The passage says they sit idle most of the year.

33. D **DETAIL** Evidence: Time-of-use pricing pursues a similar goal more subtly, charging more for electricity during peak periods so that customers have a reason to shift flexible tasks, such as running a dishwasher, to cheaper hours.

Why not A: Cycling compressors is a separate demand response option.

Why not B: Factories are described as postponing a process, not closing.

Why not C: No limit on household use is described.

34. A **INFERENCE** Evidence: None of these measures reduces the total energy that customers need by very much.

Why not B: The passage says total energy use does not fall by very much.

Why not C: The goal is to defer or avoid building such capacity.

Why not D: Off-peak hours are described as the cheaper hours.

35. B **VOCABULARY IN CONTEXT** Evidence: To cover those rare hours, utilities maintain peaking plants, which sit idle most of the year and are dispatched only when demand surges.

Why not A: Power plants are not moved anywhere.

Why not C: The plants are needed when demand surges, not taken offline.

Why not D: Selling plants is not discussed.

36. A **AUTHOR'S REASONING** Evidence: Rather than adding supply to match the peak, it trims the peak itself.

Why not B: Demand response trims the peak; it does not raise it.

Why not C: Idle peaking plants are explained in an earlier sentence.

Why not D: The author presents a second approach, not a criticism of utilities.

37. A **MAIN IDEA** Evidence: Surprisingly, how the sealant is shaped in the joint matters as much as which product is chosen.

Why not B: The window frame is an example; the passage does not rank movement.

Why not C: The passage does not compare the strength of backer rod and sealant.

Why not D: The passage says shape matters as much as the product.

38. C **DETAIL** Evidence: The sealant does not bond to the rod, and the rod also sets the depth of the bead.

Why not A: Cleaning is a separate first step.

Why not B: The sealant does not bond to the rod.

Why not D: Smoothing is done by tooling, and widening is not mentioned.

39. B **DETAIL** Evidence: Many manufacturers recommend a bead that is thinner in the middle than at its edges, roughly like an hourglass, with a depth around half the joint width.

Why not A: The passage says half, not equal to the width.

Why not C: Twice the width would make a deep bead, the opposite of the advice.

Why not D: Backer rod sets the depth so the bead does not fill the whole joint.

40. D **INFERENCE** Evidence: If it bonds on three sides, the back bond holds the bead in place, so the sealant cannot stretch evenly and tends to split.

Why not A: Thin edges would reduce bonding area, which is a different problem from a split center.

Why not B: Backer rod helps prevent the problem rather than cause it.

Why not C: The passage recommends pressing the sealant firmly against the sides.

Practice Test 1 key: Reading (5)

41. C **VOCABULARY IN CONTEXT** Evidence: Finally, the installer tools the bead, drawing a smooth tool along it to press the sealant firmly against the sides.

Why not A: Nothing is cracked, so fixing does not fit.

Why not B: The installer is pressing the sealant, not measuring it.

Why not D: The bead stays in place, so cutting it away does not fit.

42. A **AUTHOR'S REASONING** Evidence: A sealant placed in that gap has to stretch and compress over and over without tearing or pulling loose.

Why not B: The passage does not criticize brick walls.

Why not C: The season for sealing is not discussed.

Why not D: Backer rod is described later and for a different reason.

Practice Test 1 key: Mechanical Reasoning (1)

1. D **EVERYDAY MECHANISMS** With no friction, a sliding block turns all of its height into speed.

Speed at the bottom depends only on the starting height, not on the slope, the ramp length or the weight.

All three start from the same height, so all reach the bottom at the same speed.

Why not A: thought the steepest ramp always gives the most speed.

Why not B: thought the heaviest block slides fastest.

Why not C: thought a longer ramp builds up more speed.

2. B **FLUIDS** Water leaves a hole faster when there is more water depth above the hole.

Depth above each hole: A 6 ft, B 8 ft, C 6 ft.

Hole B has the most water above it, so it squirts fastest.

Why not A: thought the tank with the most water squirts fastest.

Why not C: picked the hole nearest the floor instead of the deepest under water.

Why not D: thought every hole squirts at the same speed.

3. A **GEARS** Two gears in mesh always turn in opposite directions.

Go down the row: A counterclockwise, B clockwise, C counterclockwise, D clockwise, E counterclockwise, F clockwise.

So the gears that turn the opposite way to gear A are B, D and F.

Why not B: picked the gears that turn the same way as A.

Why not C: thought every gear driven by A turns opposite to A.

Why not D: only counted the gear touching A.

4. D **EVERYDAY MECHANISMS** Water pressure at a point depends only on how deep the point is below the surface.

The width, the shape and the amount of water do not change it.

All three have the same depth, so the bottom pressure is the same in all of them.

Why not A: thought a narrow container squeezes the water harder.

Why not B: thought straight walls hold the water pressure in better.

Why not C: thought more water means more pressure on the bottom.

5. B **STABILITY** A block tips when its center of gravity passes the downhill edge of its base.

For a uniform block that depends only on width / height; weight does not matter.

Width / height: A 8/20, B 4/16, C 8/16.

Block B has the smallest width for its height, so it tips first.

Why not A: picked the tallest block without comparing its base.

Why not C: thought the heaviest block tips first.

Why not D: thought the tilt affects every block the same way.

6. D **PULLEY SYSTEMS** Count only the rope segments that pull up on the moving block or load.

A segment that ends at the hand only counts when it pulls up on the moving block.

Here 2 segments hold up the load, so each carries 1/2 of it.

Why not A: counted every rope line in the picture, including the pull end.

Why not B: missed the segment tied at the top.

Why not C: counted the rope end you pull down as holding the load.

Practice Test 1 key: Mechanical Reasoning (2)

7. B **STABILITY** A cart tips when its center of gravity moves outside the wheels.

A low load keeps the center of gravity low; a centered load keeps it far from the tipping edge.

Spot B is high and near the edge, so the cart is most likely to tip there.

Why not A: looked only at the height, not the sideways position.

Why not C: looked only at the sideways position, not the height.

Why not D: mixed up most and least stable.

8. C **FLUIDS** Water leaves a hole faster when there is more water depth above the hole.

Depth above each hole: A 3 ft, B 3 ft, C 5 ft.

Hole C has the most water above it, so it squirts fastest.

Why not A: thought the tank with the most water squirts fastest.

Why not B: picked the hole nearest the floor instead of the deepest under water.

Why not D: thought every hole squirts at the same speed.

9. D **MOTION** A hanging load keeps moving the way it was moving (inertia).

Here the load lags behind while the utility truck speeds up.

That is toward arrow D.

Why not A: mixed up a speed change with a turn.

Why not B: forgot that the load keeps moving the way it was going (inertia).

Why not C: thought the load is pulled ahead when the truck speeds up.

10. A **MOTION** A hanging load keeps moving the way it was moving (inertia).

Here the load keeps going straight while the boom truck turns left, so it swings to the outside (right).

That is toward arrow A.

Why not B: mixed up a turn with braking.

Why not C: forgot that the load keeps moving the way it was going (inertia).

Why not D: thought the load leans into the turn.

11. A **FLUIDS** Water pressure depends only on depth below the water surface, not on tank width or total water.

Depth = water depth minus height above the floor: A 3 ft, B 2 ft, C 1 ft, D 1 ft.

Point A is deepest (3 ft), so its pressure is greatest.

Why not B: looked only at how deep the tank is, not where the point is.

Why not C: thought more water in the tank means more pressure.

Why not D: measured from the tank floor instead of from the water surface.

12. B **BELTS** An open belt keeps the direction; a crossed belt reverses it.

Go along the belts: A clockwise, B clockwise, C counterclockwise, D counterclockwise.

So the pulleys that turn the opposite way to pulley A: C and D.

Why not A: mixed up the rule: thought open belts reverse and crossed belts do not.

Why not C: treated the crossed belt like an open belt.

Why not D: thought every belt reverses the direction.

Practice Test 1 key: Mechanical Reasoning (3)

13. D **MOTION** After the edge, the ball keeps moving sideways at the same speed.

At the same time gravity makes it fall faster and faster.

Together that makes a curve that bends more and more downward: Path D.

Why not A: forgot that the ball keeps its sideways speed after the edge.

Why not B: thought the ball falls in a straight slanted line.

Why not C: thought the ball keeps going level until its sideways speed runs out.

14. C **STABILITY** A block tips when its center of gravity passes the downhill edge of its base.

For a uniform block that depends only on width / height; weight does not matter.

Width / height: A 10/20, B 10/30, C 5/18, D 4/12.

Block C has the smallest width for its height, so it tips first.

Why not A: thought the heaviest block tips first.

Why not B: picked the tallest block without comparing its base.

Why not D: picked the narrowest base without comparing the height.

15. D **BELTS** An open belt keeps the direction; a crossed belt reverses it.

Go along the belts: A counterclockwise, B counterclockwise, C counterclockwise, D clockwise, E clockwise.

So B counterclockwise, E clockwise.

Why not A: thought every belt reverses the direction.

Why not B: mixed up the rule: thought open belts reverse and crossed belts do not.

Why not C: treated the crossed belt like an open belt.

16. A **BELTS** An open belt keeps the direction; a crossed belt reverses it.

Go along the belts: A counterclockwise, B clockwise, C clockwise, D counterclockwise, E counterclockwise.

So the pulleys that turn the opposite way to pulley A: B and C.

Why not B: treated the crossed belt like an open belt.

Why not C: mixed up the rule: thought open belts reverse and crossed belts do not.

Why not D: thought every belt reverses the direction.

17. C **SIMPLE MACHINES** On a ramp, push x ramp length = load x height, so the push goes with height / length.

Height / length: A 8/13, B 5/8, C 6/10.

Ramp C is the gentlest, so it needs the least push.

Why not A: picked the longest ramp without comparing its height.

Why not B: picked the lowest ramp without comparing its length.

Why not D: thought the push depends only on the load.

18. D **GEARS** Each gear turns opposite to the gear it meshes with.

Go along the row: A clockwise, B counterclockwise, C clockwise, D counterclockwise, E clockwise, F counterclockwise.

So B counterclockwise, F counterclockwise.

Why not A: was off by one gear all the way along.

Why not B: miscounted the meshes between A and F.

Why not C: miscounted the meshes between A and B.

Practice Test 1 key: Mechanical Reasoning (4)

19. C **LEVERS** A seesaw stays level when weight x distance is the same on both sides.

Seesaw C: left 200, right 200.

On every other seesaw the two sides do not match.

Why not A: thought equal weights always balance.

Why not B: matched each weight with the other child's distance.

Why not D: thought children at equal distances always balance.

20. A **SIMPLE MACHINES** On a ramp, push x ramp length = load x height, so the push goes with height / length.

Height / length: A 6/11, B 5/7, C 8/12.

Ramp A is the gentlest, so it needs the least push.

Why not B: picked the lowest ramp without comparing its length.

Why not C: picked the longest ramp without comparing its height.

Why not D: thought the push depends only on the load.

21. D **BELTS** An open belt keeps the direction; a crossed belt reverses it.

Go along the belts: A counterclockwise, B clockwise, C clockwise, D counterclockwise.

So B clockwise, C clockwise.

Why not A: mixed up the rule: thought open belts reverse and crossed belts do not.

Why not B: thought every belt reverses the direction.

Why not C: treated the crossed belt like an open belt.

22. D **STABILITY** A block tips when its center of gravity passes the downhill edge of its base.

For a uniform block that depends only on width / height; weight does not matter.

Width / height: A 6/12, B 12/30, C 4/8, D 8/27.

Block D has the smallest width for its height, so it tips first.

Why not A: thought the heaviest block tips first.

Why not B: picked the tallest block without comparing its base.

Why not C: picked the narrowest base without comparing the height.

23. C **GEARS** Gears in mesh pass the same number of teeth per second.

A gear with fewer teeth must make more turns to pass that many teeth.

Gear C has the fewest teeth (16), so it turns fastest.

Why not A: assumed the driver gear always turns fastest.

Why not B: thought the biggest gear turns fastest.

Why not D: assumed the last gear in the train turns fastest.

24. B **GEARS** Each gear turns opposite to the gear it meshes with.

Go along the row: A clockwise, B counterclockwise, C clockwise, D counterclockwise, E clockwise.

So C clockwise, D counterclockwise.

Why not A: miscounted the meshes between A and D.

Why not C: was off by one gear all the way along.

Why not D: miscounted the meshes between A and C.

Practice Test 1 key: Mechanical Reasoning (5)

25. B **LEVERS** A seesaw stays level when weight x distance is the same on both sides.

Seesaw B: left 240, right 240.

On every other seesaw the two sides do not match.

Why not A: thought children at equal distances always balance.

Why not C: matched each weight with the other child's distance.

Why not D: thought equal weights always balance.

26. C **BELTS** Direction: an open belt keeps it, a crossed belt reverses it, and C turns with B.

A to B crossed, C to D crossed: D turns clockwise.

Speed: on both belts a bigger pulley drives a smaller one, so the speed goes up twice. D is faster than A.

Why not A: thought a big pulley driving a small one slows it down.

Why not B: treated a crossed belt like an open belt.

Why not D: got the crossed belt wrong and judged the speed change backward.

27. A **SPRINGS** Springs in series each carry the whole load, so their stretches add.

Springs side by side share the load, so each stretches less.

Relative stretch (one spring = 1): X 1/2, Y 1, Z 2.

So Z stretches the most.

Why not B: mixed up series and parallel springs.

Why not C: thought the same load always gives the same stretch.

Why not D: thought more springs means more stretch.

28. A **GEARS** Direction: A to B reverses, the shaft keeps the direction, C to D reverses, and the idler reverses once more.

So D turns counterclockwise.

Speed: at both meshes a smaller gear drives a bigger one, so the speed goes down twice. D is slower than A.

Why not B: treated the shared shaft like a mesh that reverses direction.

Why not C: reversed at the shaft and judged the speed change backward.

Why not D: thought a big gear driving a small one slows it down.

29. D **LEVERS** A seesaw stays level when weight x distance is the same on both sides.

Seesaw D: left 540, right 540.

On every other seesaw the two sides do not match.

Why not A: ignored the child sitting closer to the middle.

Why not B: added the weights and ignored the distances.

Why not C: added the left weights and used only the farther distance.

30. B **BELTS** Direction: an open belt keeps it, a crossed belt reverses it, and C turns with B.

A to B open, C to D crossed: D turns counterclockwise.

Speed: on both belts a smaller pulley drives a bigger one, so the speed goes down twice. D is slower than A.

Why not A: got the crossed belt wrong and judged the speed change backward.

Why not C: treated a crossed belt like an open belt.

Why not D: thought a big pulley driving a small one slows it down.

Practice Test 1 key: Mechanical Reasoning (6)

31. A **GEARS** Direction: A to B reverses, the shaft keeps the direction, C to D reverses.

So D turns clockwise.

Speed: at both meshes a smaller gear drives a bigger one, so the speed goes down twice. D is slower than A.

Why not B: reversed at the shaft and judged the speed change backward.

Why not C: thought a big gear driving a small one slows it down.

Why not D: treated the shared shaft like a mesh that reverses direction.

32. D **STABILITY** On a slope, the cart tips downhill when its center of gravity moves past the downhill wheel.

A low load keeps the center of gravity low; a load on the uphill side keeps it away from the downhill wheel.

Spot D is high and on the downhill side, so the cart is most likely to tip there.

Why not A: looked only at the uphill or downhill side, not the height.

Why not B: looked only at the height, not the uphill or downhill side.

Why not C: mixed up most and least likely to tip.

33. C **LEVERS** For balance, weight x distance must be equal on both sides of the fulcrum.

Known side: $180 \text{ lb} \times 2 \text{ ft} = 360 \text{ lb-ft}$.

Other side: $? \times 8 \text{ ft} = 360 \text{ lb-ft}$, so $? = 360 / 8 = 45 \text{ lb}$.

Why not A: thought equal weights balance no matter where they sit.

Why not B: used the distances upside down.

Why not D: measured the second distance from the right weight, not from the fulcrum.

34. C **SPRINGS** Side by side, the 2 springs share the load: 10 lb each.

Each spring stretches $2 \times 10 / 10 = 2 \text{ in}$.

They all stretch together, so the load drops 2 in.

Why not A: set up the weight proportion upside down.

Why not B: worked out the stretch of one spring and ignored the others.

Why not D: mixed up series and parallel springs.

35. D **SIMPLE MACHINES** First put both sizes in the same form: wheel radius = $40 / 2 = 20 \text{ in}$.

Pull x wheel radius = load x axle radius: pull x 20 = $90 \times 1 = 90$.

Pull = $90 / 20 = 4.5 \text{ lb}$.

Why not A: thought a wheel and axle does not change the force.

Why not B: used the radius ratio upside down.

Why not C: used the wheel diameter as if it were a radius.

36. B **SIMPLE MACHINES** Work in = work out: force x ramp length = weight x height.

$60 \times 17 = \text{weight} \times 8$.

Weight = $1020 / 8 = 127.5 \text{ lb}$.

Why not A: used the flat distance instead of the height.

Why not C: thought a ramp does not let you move more weight.

Why not D: used the flat distance instead of the ramp length.

Practice Test 1 key: Mechanical Reasoning (7)

37. C **LEVERS** Effort x effort arm = load x load arm, with both arms measured from the fulcrum.

Effort x 8 = 240 x 12 = 2880.

Effort = 2880 / 8 = 360 lb.

Why not A: measured the effort arm from the load instead of from the fulcrum.

Why not B: thought a lever does not change the force needed.

Why not D: used the arm lengths upside down.

38. C **PULLEY SYSTEMS** Count the rope segments that hold up the moving block: 2.

One rope has the same pull all along it, so those 2 segments share the load.

Pull = 300 / 2 = 150 lb.

Why not A: multiplied by the number of segments instead of dividing.

Why not B: counted the rope end you pull down as holding the load.

Why not D: thought pulleys only change the direction of the pull.

39. B **SPRINGS** In series, every spring carries the whole 40 lb load.

One spring under 40 lb stretches $1 \times 40 / 10 = 4$ in.

The stretches add: $2 \times 4 = 8$ in.

Why not A: set up the weight proportion upside down.

Why not C: worked out the stretch of one spring and ignored the others.

Why not D: mixed up series and parallel springs.

40. D **SPRINGS** Side by side, the 2 springs share the load: 10 lb each.

Each spring stretches $1 \times 10 / 4 = 2.5$ in.

They all stretch together, so the load drops 2.5 in.

Why not A: set up the weight proportion upside down.

Why not B: worked out the stretch of one spring and ignored the others.

Why not C: mixed up series and parallel springs.

41. A **PULLEY SYSTEMS** 5 rope segments hold up the moving block.

When the load rises 3 ft, each of those segments gets 3 ft shorter.

Rope pulled = $5 \times 3 = 15$ ft. The force is smaller, but you pull farther.

Why not B: divided by the segments instead of multiplying.

Why not C: did not count the rope end you pull up, which also holds the moving block.

Why not D: thought you pull the same length of rope that the load rises.

42. A **STABILITY** Take turning effects about the right support, so its unknown force drops out.

Loads: $90 \times 12 + 200 \times 1 = 1280$ lb-ft.

Left support x 16 ft = 1280, so it carries $1280 / 16 = 80$ lb.

Why not B: left out the 200 lb load.

Why not C: split the load equally between the two supports.

Why not D: worked out the other support's share.

Practice Test 1 key: Mechanical Reasoning (8)

43. C **PULLEY SYSTEMS** 3 rope segments hold up the moving block.

Force: $180 / 3 = 60$ lb.

Rope: each holding segment shortens by 2 ft, so you pull $3 \times 2 = 6$ ft.

Force goes down by 3 times; rope pulled goes up by 3 times.

Why not A: counted the rope end you pull down as holding the load.

Why not B: thought the rope moves the same distance as the load.

Why not D: thought the pulleys give no advantage.

44. C **SPRINGS** Work from the top group down. Springs side by side share the load equally; springs in series each carry it all.

group of 3 side by side: 16 lb each, 4 in; group of 2 side by side: 24 lb each, 6 in.

Groups in series add their stretches: total 10 in.

Why not A: added the stretch of every spring as if all were in series.

Why not B: worked out the stretch of one spring and ignored the others.

Why not D: mixed up series and parallel springs.

45. B **LEVERS** Add the turning effect (weight x distance) of every weight on the loaded side.

$120 \times 1 + 50 \times 3 = 120 + 150 = 270$ lb-ft.

The other side must match 270 lb-ft. $? = 270 / 150 = 1.8$ ft.

Why not A: left out the 120 lb load.

Why not C: added the two weights and used only the farther distance.

Why not D: added the two distances.

Practice Test 1 key: Numerical Reasoning (1)

1. C **ARITHMETIC** Find the change from each term to the next: $-7, -7, -7, -7$.

The series subtracts 7 every time.

$$-35 - 7 = -42.$$

Answer: -42

Why not A: Miscounted the gap by one.

Why not B: Skipped a term (added the difference twice).

Why not D: Miscounted the gap by one (one short).

Why not E: Went the wrong direction (reversed the sign of the step).

2. D **GEOMETRIC** Each term is half of the one before.

$$384 \div 2 = 192, \text{ and so on.}$$

$$12 \div 2 = 6.$$

Answer: 6

Why not A: Subtracted 2 instead of dividing by 2.

Why not B: Used the last difference instead of halving.

Why not C: Doubled instead of halving.

Why not E: Skipped a term (halved twice).

3. B **ARITHMETIC** Find the change from each term to the next: $+15, +15, +15, +15, +15$.

The series adds 15 every time.

$$133 + 15 = 148.$$

Answer: 148

Why not A: Miscounted the gap by one.

Why not C: Went the wrong direction (reversed the sign of the step).

Why not D: Miscounted the gap by one (one short).

Why not E: Skipped a term (added the difference twice).

4. A **GEOMETRIC** Each term is 2 times the one before ($13 \times 2 = 26$).

The differences are not equal, but the ratio is.

$$416 \times 2 = 832.$$

Answer: 832

Why not B: Used the last difference instead of the ratio.

Why not C: Skipped a term (multiplied twice).

Why not D: Added 2 instead of multiplying by 2.

Why not E: Added the first difference as if the series added a fixed amount.

5. B **ARITHMETIC** Find the change from each term to the next: $-7, -7, -7, -7$.

The series subtracts 7 every time.

$$38 - 7 = 31.$$

Answer: 31

Why not A: Went the wrong direction (reversed the sign of the step).

Why not C: Miscounted the gap by one (one short).

Why not D: Miscounted the gap by one.

Why not E: Skipped a term (added the difference twice).

6. E **GEOMETRIC** Each term is half of the one before.

$$640 \div 2 = 320, \text{ and so on.}$$

$$20 \div 2 = 10.$$

Answer: 10

Why not A: Used the last difference instead of halving.

Why not B: Subtracted 2 instead of dividing by 2.

Why not C: Doubled instead of halving.

Why not D: Skipped a term (halved twice).

Practice Test 1 key: Numerical Reasoning (2)

7. A **SQUARES CUBES** Compare each term with a square number: $32 = 5^2 + 7$, $43 = 6^2 + 7$, $56 = 7^2 + 7$, $71 = 8^2 + 7$, $88 = 9^2 + 7$.

The next square is $10^2 = 100$.

$100 + 7 = 107$.

Answer: 107

Why not B: Repeated the last difference.

Why not C: Skipped a square.

Why not D: Increased the last difference by 1 only.

Why not E: Used the next square but forgot the +7.

8. E **OPERATION CYCLE** The steps repeat in a cycle: +8, -3, then the cycle starts again.

The series has 4 steps so far, so the next step is +8.

$27 + 8 = 35$.

Answer: 35

Why not A: Applied two steps of the cycle instead of one.

Why not B: Subtracted the next step instead of adding it.

Why not C: Added both step sizes and ignored the minus sign.

Why not D: Applied the wrong step of the cycle.

9. A **GEOMETRIC** Each term is -2 times the one before, so the sign flips each time.

$-2 \div 1 = -2$.

$16 \times (-2) = -32$.

Answer: -32

Why not B: Forgot that the sign flips every term.

Why not C: Added the ratio instead of multiplying.

Why not D: Skipped a term (multiplied twice).

Why not E: Used the last difference instead of the ratio.

10. D **GEOMETRIC** Each known term is 2 times the one before ($8 \times 2 = 16$).

The missing term is $16 \times 2 = 32$.

Check: $32 \times 2 = 64$.

Answer: 32

Why not A: Used the gap between the two neighbors.

Why not B: Averaged the two neighbors.

Why not C: Repeated the difference before the gap.

Why not E: Added 2 instead of multiplying by 2.

11. C **SECOND DIFFERENCES** Differences before the gap grow by 2: +5, +7.

The next difference is 9, so the missing term is $33 + 9 = 42$.

Check: $42 + 11 = 53$.

Answer: 42

Why not A: Worked back from the next term using the difference before the gap.

Why not B: Repeated the difference before the gap.

Why not D: Increased the difference twice across the gap.

Why not E: Averaged the two neighbors.

12. C **MULTIPLY THEN ADD** Each term is the one before times 3, then - 2: $4 \times 3 - 2 = 10$.

Check: $10 \times 3 - 2 = 28$.

$244 \times 3 - 2 = 730$.

Answer: 730

Why not A: Did the -2 step before multiplying.

Why not B: Did only the add step.

Why not D: Multiplied by 3 but forgot to subtract 2.

Why not E: Repeated the last difference.

Practice Test 1 key: Numerical Reasoning (3)

13. B **SQUARES CUBES** Compare each term with a square number: $62 = 8^2 - 2$, $79 = 9^2 - 2$, $98 = 10^2 - 2$, $119 = 11^2 - 2$, $142 = 12^2 - 2$.

The next square is $13^2 = 169$.

$169 - 2 = 167$.

Answer: 167

Why not A: Repeated the last difference.

Why not C: Used the next square but forgot the -2 .

Why not D: Increased the last difference by 1 only.

Why not E: Skipped a square.

14. C **SECOND DIFFERENCES** Differences: $+8$, $+11$, $+14$, $+17$, $+20$.

The differences grow by 3 each time, so the next difference is 23.

$99 + 23 = 122$.

Answer: 122

Why not A: Increased the difference twice.

Why not B: Repeated the last difference.

Why not D: Doubled the last difference.

Why not E: Added the change in the difference (3) to the last term.

15. D **FIBONACCI LIKE** Each term is the sum of the two terms before it ($1 + 9 = 10$).

The last two terms are 29 and 48.

$29 + 48 = 77$.

Answer: 77

Why not A: Repeated the last difference.

Why not B: Skipped a term (gave the term after the next one).

Why not C: Treated it as differences that grow by a fixed amount.

Why not E: Doubled the last term.

16. D **INTERLEAVED** Split the series into two series: the terms in odd positions and the terms in even positions.

The next term is in position 9, so it belongs to the series in positions 1, 3, 5, ..., which changes by -6 each time.

Its last term is -9 , so the next one is -15 .

Answer: -15

Why not A: Used the other series' rule on this series.

Why not B: Continued the other series instead of this one.

Why not C: Skipped a term in its own series.

Why not E: Treated it as one series and repeated the last gap.

17. B **OPERATION CYCLE** The steps repeat in a cycle: $+6$, $\times 2$, -9 , then the cycle starts again.

The series has 6 steps so far, so the next step is $+6$.

$33 + 6 = 39$.

Answer: 39

Why not A: Subtracted the next step instead of adding it.

Why not C: Applied the wrong step of the cycle.

Why not D: Applied two steps of the cycle instead of one.

Why not E: Repeated the last difference.

18. A **INTERLEAVED** Split the series into two series: the terms in odd positions and the terms in even positions.

The next term is in position 9, so it belongs to the series in positions 1, 3, 5, ..., which changes by -2 each time.

Its last term is 5, so the next one is 3.

Answer: 3

Why not B: Used the other series' rule on this series.

Why not C: Skipped a term in its own series.

Why not D: Treated it as one series and repeated the last gap.

Why not E: Continued the other series instead of this one.

Practice Test 1 key: Numerical Reasoning (4)

19. E OPERATION CYCLE The steps repeat in a cycle: $+3$, $\times 3$, then the cycle starts again.

The series has 4 steps so far, so the next step is $+3$.

$$45 + 3 = 48.$$

Answer: 48

Why not A: Applied two steps of the cycle instead of one.

Why not B: Repeated the last difference.

Why not C: Subtracted the next step instead of adding it.

Why not D: Applied the wrong step of the cycle.

20. E MULTIPLY THEN ADD Each term is the one before times 3, then -6 : $4 \times 3 - 6 = 6$.

Check: $6 \times 3 - 6 = 12$.

$$84 \times 3 - 6 = 246.$$

Answer: 246

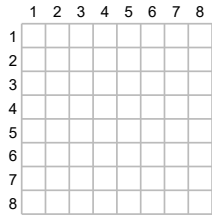
Why not A: Did the -6 step before multiplying.

Why not B: Did only the add step.

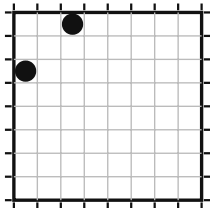
Why not C: Repeated the last difference.

Why not D: Multiplied by 3 but forgot to subtract 6.

Practice Test 1 key: Paper Folding (1)



Column and row numbers used in the keys: columns 1 to 8 from the left, rows 1 to 8 from the top, matching the tick marks on each square.



Opened sheet (E)

1. E ONE FOLD DIAGONAL Folds in order:

Fold 1: the bottom left half is folded over onto the top right side along the diagonal from the top left corner to the bottom right corner.

Punch: column 3, row 1, through 2 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 1 (the diagonal from the top left corner to the bottom right corner): the hole at column 3, row 1 is mirrored to column 1, row 3.

Result: 2 holes at column 3, row 1; column 1, row 3. That is choice E.

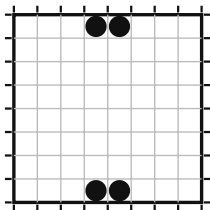
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Reflected across the wrong line when undoing fold 1: used the horizontal center line instead of the diagonal from the top left corner to the bottom right corner.

Why not B: Mirrored the whole pattern left to right.

Why not C: Reflected across the wrong line when undoing fold 1: used the diagonal from the bottom left corner to the top right corner instead of the diagonal from the top left corner to the bottom right corner.

Why not D: Only the holes on the top layer: drew the punch without unfolding.



Opened sheet (E)

2. E TWO FOLDS VERTICAL HORIZONTAL Folds in order:

Fold 1: the bottom half is folded over onto the top side along the horizontal center line.

Fold 2: the left half is folded over onto the right side along the vertical center line.

Punch: column 5, row 1, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the vertical center line): the hole at column 5, row 1 is mirrored to column 4, row 1.

Unfold fold 1 (the horizontal center line): the hole at column 5, row 1 is mirrored to column 5, row 8; the hole at column 4, row 1 is mirrored to column 4, row 8.

Result: 4 holes at column 4, row 1; column 5, row 1; column 4, row 8; column 5, row 8. That is choice E.

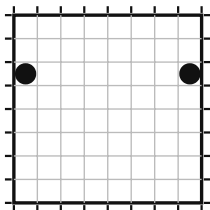
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Reflected across the wrong line when undoing fold 1: used the diagonal from the bottom left corner to the top right corner instead of the horizontal center line.

Why not B: Rotated the correct pattern a quarter turn clockwise.

Why not C: Forgot the last unfold: fold 1 was never opened.

Why not D: Reflected across the wrong line when undoing fold 1: used the diagonal from the top left corner to the bottom right corner instead of the horizontal center line.



Opened sheet (B)

3. B ONE FOLD HALF Folds in order:

Fold 1: the left half is folded over onto the right side along the vertical center line.

Punch: column 8, row 3, through 2 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 1 (the vertical center line): the hole at column 8, row 3 is mirrored to column 1, row 3.

Result: 2 holes at column 1, row 3; column 8, row 3. That is choice B.

Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

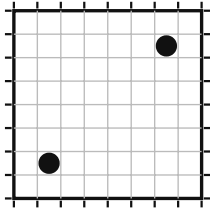
Why not A: Reflected across the wrong line when undoing fold 1: used the diagonal from the top left corner to the bottom right corner instead of the vertical center line.

Why not C: Reflected across the wrong line when undoing fold 1: used the horizontal center line instead of the vertical center line.

Why not D: Only the holes on the top layer: drew the punch without unfolding.

Why not E: Mirrored the whole pattern top to bottom.

Practice Test 1 key: Paper Folding (2)



Opened sheet (D)

4. D ONE FOLD DIAGONAL Folds in order:

Fold 1: the bottom left half is folded over onto the top right side along the diagonal from the top left corner to the bottom right corner.

Punch: column 7, row 2, through 2 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 1 (the diagonal from the top left corner to the bottom right corner): the hole at column 7, row 2 is mirrored to column 2, row 7.

Result: 2 holes at column 7, row 2; column 2, row 7. That is choice D.

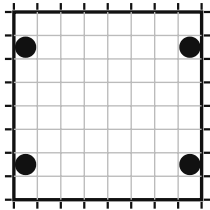
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Only the holes on the top layer: drew the punch without unfolding.

Why not B: Mirrored the whole pattern left to right.

Why not C: Reflected across the wrong line when undoing fold 1: used the horizontal center line instead of the diagonal from the top left corner to the bottom right corner.

Why not E: Reflected across the wrong line when undoing fold 1: used the vertical center line instead of the diagonal from the top left corner to the bottom right corner.



Opened sheet (B)

5. B TWO FOLDS VERTICAL HORIZONTAL Folds in order:

Fold 1: the right half is folded over onto the left side along the vertical center line.

Fold 2: the bottom half is folded over onto the top side along the horizontal center line.

Punch: column 1, row 2, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the horizontal center line): the hole at column 1, row 2 is mirrored to column 1, row 7.

Unfold fold 1 (the vertical center line): the hole at column 1, row 2 is mirrored to column 8, row 2; the hole at column 1, row 7 is mirrored to column 8, row 7.

Result: 4 holes at column 1, row 2; column 8, row 2; column 1, row 7; column 8, row 7. That is choice B.

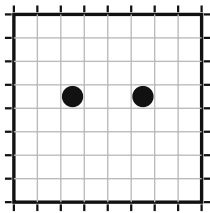
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Reflected across the wrong line when undoing fold 1: used the diagonal from the top left corner to the bottom right corner instead of the vertical center line.

Why not C: Rotated the correct pattern a quarter turn clockwise.

Why not D: Reflected across the wrong line when undoing fold 2: used the diagonal from the point 3/4 of the way down the left edge to the point 3/4 of the way across the top edge instead of the horizontal center line.

Why not E: Missed one layer: the hole at column 1, row 7 was left out.



Opened sheet (A)

6. A ONE FOLD HALF Folds in order:

Fold 1: the right half is folded over onto the left side along the vertical center line.

Punch: column 3, row 4, through 2 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 1 (the vertical center line): the hole at column 3, row 4 is mirrored to column 6, row 4.

Result: 2 holes at column 3, row 4; column 6, row 4. That is choice A.

Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

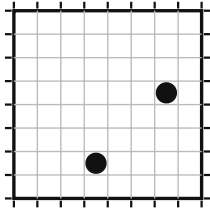
Why not B: Reflected across the wrong line when undoing fold 1: used the diagonal from the top left corner to the bottom right corner instead of the vertical center line.

Why not C: Mirrored the whole pattern top to bottom.

Why not D: Reflected across the wrong line when undoing fold 1: used the horizontal center line instead of the vertical center line.

Why not E: Rotated the correct pattern a quarter turn clockwise.

Practice Test 1 key: Paper Folding (3)



Opened sheet (E)

7. E ONE FOLD DIAGONAL Folds in order:

Fold 1: the top right half is folded over onto the bottom left side along the diagonal from the top left corner to the bottom right corner.

Punch: column 4, row 7, through 2 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 1 (the diagonal from the top left corner to the bottom right corner): the hole at column 4, row 7 is mirrored to column 7, row 4.

Result: 2 holes at column 7, row 4; column 4, row 7. That is choice E.

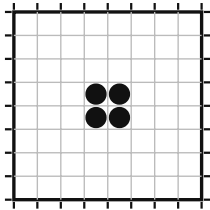
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Only the holes on the top layer: drew the punch without unfolding.

Why not B: Mirrored the whole pattern left to right.

Why not C: Reflected across the wrong line when undoing fold 1: used the vertical center line instead of the diagonal from the top left corner to the bottom right corner.

Why not D: Reflected across the wrong line when undoing fold 1: used the diagonal from the bottom left corner to the top right corner instead of the diagonal from the top left corner to the bottom right corner.



Opened sheet (C)

8. C TWO FOLDS VERTICAL HORIZONTAL Folds in order:

Fold 1: the top half is folded over onto the bottom side along the horizontal center line.

Fold 2: the left half is folded over onto the right side along the vertical center line.

Punch: column 5, row 5, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the vertical center line): the hole at column 5, row 5 is mirrored to column 4, row 5.

Unfold fold 1 (the horizontal center line): the hole at column 5, row 5 is mirrored to column 5, row 4; the hole at column 4, row 5 is mirrored to column 4, row 4.

Result: 4 holes at column 4, row 4; column 5, row 4; column 4, row 5; column 5, row 5. That is choice C.

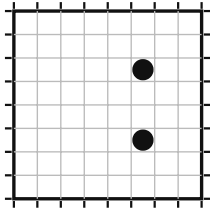
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Skipped unfolding fold 2, so its mirror holes are missing.

Why not B: Missed one layer: the hole at column 4, row 5 was left out.

Why not D: Only the holes on the top layer: drew the punch without unfolding.

Why not E: Reflected across the wrong line when undoing fold 2: used the horizontal line 3/4 of the way down from the top edge instead of the vertical center line.



Opened sheet (C)

9. C ONE FOLD HALF Folds in order:

Fold 1: the bottom half is folded over onto the top side along the horizontal center line.

Punch: column 6, row 3, through 2 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 1 (the horizontal center line): the hole at column 6, row 3 is mirrored to column 6, row 6.

Result: 2 holes at column 6, row 3; column 6, row 6. That is choice C.

Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

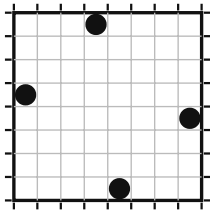
Why not A: Rotated the correct pattern a quarter turn clockwise.

Why not B: Only the holes on the top layer: drew the punch without unfolding.

Why not D: Mirrored the whole pattern left to right.

Why not E: Reflected across the wrong line when undoing fold 1: used the vertical center line instead of the horizontal center line.

Practice Test 1 key: Paper Folding (4)



Opened sheet (E)

10. E TWO FOLDS WITH DIAGONAL Folds in order:

Fold 1: the top right half is folded over onto the bottom left side along the diagonal from the top left corner to the bottom right corner.

Fold 2: the bottom right half is folded over onto the top left side along the diagonal from the bottom left corner to the top right corner.

Punch: column 1, row 4, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the diagonal from the bottom left corner to the top right corner): the hole at column 1, row 4 is mirrored to column 5, row 8.

Unfold fold 1 (the diagonal from the top left corner to the bottom right corner): the hole at column 1, row 4 is mirrored to column 4, row 1; the hole at column 5, row 8 is mirrored to column 8, row 5.

Result: 4 holes at column 4, row 1; column 1, row 4; column 8, row 5; column 5, row 8. That is choice E.

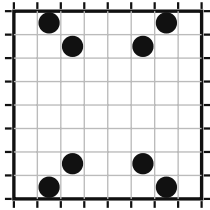
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Reflected across the wrong line when undoing fold 1: used the vertical center line instead of the diagonal from the top left corner to the bottom right corner.

Why not B: Mirrored the whole pattern left to right.

Why not C: Missed one layer: the hole at column 4, row 1 was left out.

Why not D: Reflected across the wrong line when undoing fold 1: used the horizontal center line instead of the diagonal from the top left corner to the bottom right corner.



Opened sheet (D)

11. D TWO FOLDS TWO HOLES Folds in order:

Fold 1: the left half is folded over onto the right side along the vertical center line.

Fold 2: the bottom half is folded over onto the top side along the horizontal center line.

Punch 1: column 6, row 2, through 4 layers.

Punch 2: column 7, row 1, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the horizontal center line): the hole at column 6, row 2 is mirrored to column 6, row 7; the hole at column 7, row 1 is mirrored to column 7, row 8.

Unfold fold 1 (the vertical center line): the hole at column 6, row 2 is mirrored to column 3, row 2; the hole at column 6, row 7 is mirrored to column 3, row 7; the hole at column 7, row 1 is mirrored to column 2, row 1; the hole at column 7, row 8 is mirrored to column 2, row 8.

Result: 8 holes at column 2, row 1; column 7, row 1; column 3, row 2; column 6, row 2; column 3, row 7; column 6, row 7; column 2, row 8; column 7, row 8. That is choice D.

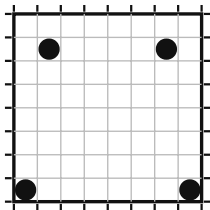
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Reflected across the wrong line when undoing fold 1: used the diagonal from the bottom left corner to the top right corner instead of the vertical center line.

Why not B: Rotated the correct pattern a quarter turn clockwise.

Why not C: Reflected across the wrong line when undoing fold 2: used the diagonal from the point 1/4 of the way across the top edge to the point 3/4 of the way down the right edge instead of the horizontal center line.

Why not E: Missed one layer: the hole at column 7, row 8 was left out.



Opened sheet (D)

12. D ONE FOLD TWO HOLES Folds in order:

Fold 1: the left half is folded over onto the right side along the vertical center line.

Punch 1: column 7, row 2, through 2 layers.

Punch 2: column 8, row 8, through 2 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 1 (the vertical center line): the hole at column 7, row 2 is mirrored to column 2, row 2; the hole at column 8, row 8 is mirrored to column 1, row 8.

Result: 4 holes at column 2, row 2; column 7, row 2; column 1, row 8; column 8, row 8. That is choice D.

Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

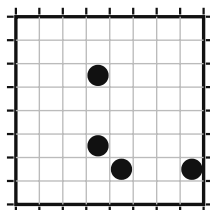
Why not A: Mirrored the whole pattern top to bottom.

Why not B: Only the holes on the top layer: drew the punch without unfolding.

Why not C: Rotated the correct pattern a quarter turn clockwise.

Why not E: Reflected across the wrong line when undoing fold 1: used the horizontal center line instead of the vertical center line.

Practice Test 1 key: Paper Folding (5)



Opened sheet (B)

13. B TWO FOLDS WITH DIAGONAL Folds in order:

Fold 1: the bottom right part is folded over onto the top left side along the diagonal from the point 1/4 of the way across the bottom edge to the point 1/4 of the way down the right edge.

Fold 2: the bottom part is folded over onto the top side along the horizontal center line.

Punch: column 4, row 3, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the horizontal center line): the hole at column 4, row 3 is mirrored to column 4, row 6.

Unfold fold 1 (the diagonal from the point 1/4 of the way across the bottom edge to the point 1/4 of the way down the right edge): the hole at column 4, row 3 is mirrored to column 8, row 7; the hole at column 4, row 6 is mirrored to column 5, row 7.

Result: 4 holes at column 4, row 3; column 4, row 6; column 5, row 7; column 8, row 7. That is choice B.

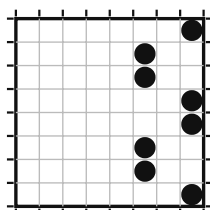
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Unfolded in the wrong order: undid fold 1 first instead of the last fold.

Why not C: Reflected across the wrong line when undoing fold 1: used the diagonal from the bottom left corner to the top right corner instead of the diagonal from the point 1/4 of the way across the bottom edge to the point 1/4 of the way down the right edge.

Why not D: Mirrored the whole pattern top to bottom.

Why not E: Reflected across the wrong line when undoing fold 1: used the vertical line 5/8 of the way from the left edge instead of the diagonal from the point 1/4 of the way across the bottom edge to the point 1/4 of the way down the right edge.



Opened sheet (A)

14. A TWO FOLDS TWO HOLES Folds in order:

Fold 1: the bottom half is folded over onto the top side along the horizontal center line.

Fold 2: the bottom half is folded over onto the top side along the horizontal line 1/4 of the way down from the top edge.

Punch 1: column 6, row 2, through 4 layers.

Punch 2: column 8, row 1, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the horizontal line 1/4 of the way down from the top edge): the hole at column 6, row 2 is mirrored to column 6, row 3; the hole at column 8, row 1 is mirrored to column 8, row 4.

Unfold fold 1 (the horizontal center line): the hole at column 6, row 2 is mirrored to column 6, row 7; the hole at column 6, row 3 is mirrored to column 6, row 6; the hole at column 8, row 1 is mirrored to column 8, row 8; the hole at column 8, row 4 is mirrored to column 8, row 5.

Result: 8 holes at column 6, row 1; column 6, row 2; column 6, row 3; column 8, row 4; column 8, row 5; column 6, row 6; column 6, row 7; column 8, row 8. That is choice A.

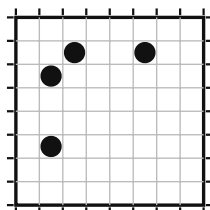
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not B: Reflected across the wrong line when undoing fold 2: used the diagonal from the point 1/4 of the way across the top edge to the point 3/4 of the way down the right edge instead of the horizontal line 1/4 of the way down from the top edge.

Why not C: Rotated the correct pattern a quarter turn clockwise.

Why not D: Reflected across the wrong line when undoing fold 2: used the vertical center line instead of the horizontal line 1/4 of the way down from the top edge.

Why not E: Mirrored the whole pattern left to right.



Opened sheet (B)

15. B ONE FOLD TWO HOLES Folds in order:

Fold 1: the top right half is folded over onto the bottom left side along the diagonal from the top left corner to the bottom right corner.

Punch 1: column 2, row 3, through 2 layers.

Punch 2: column 2, row 6, through 2 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 1 (the diagonal from the top left corner to the bottom right corner): the hole at column 2, row 3 is mirrored to column 3, row 2; the hole at column 2, row 6 is mirrored to column 6, row 2.

Result: 4 holes at column 3, row 2; column 6, row 2; column 2, row 3; column 2, row 6. That is choice B.

Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

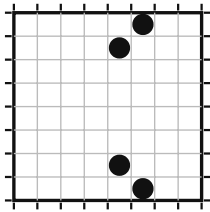
Why not A: Mirrored the whole pattern left to right.

Why not C: Reflected across the wrong line when undoing fold 1: used the diagonal from the bottom left corner to the top right corner instead of the diagonal from the top left corner to the bottom right corner.

Why not D: Reflected across the wrong line when undoing fold 1: used the vertical center line instead of the diagonal from the top left corner to the bottom right corner.

Why not E: Only the holes on the top layer: drew the punch without unfolding.

Practice Test 1 key: Paper Folding (6)



Opened sheet (D)

16. D TWO FOLDS WITH DIAGONAL Folds in order:

Fold 1: the bottom half is folded over onto the top side along the horizontal center line.

Fold 2: the top right part is folded over onto the bottom left side along the diagonal from the middle of the top edge to the middle of the right edge.

Punch: column 5, row 2, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the diagonal from the middle of the top edge to the middle of the right edge): the hole at column 5, row 2 is mirrored to column 6, row 1.

Unfold fold 1 (the horizontal center line): the hole at column 5, row 2 is mirrored to column 5, row 7; the hole at column 6, row 1 is mirrored to column 6, row 8.

Result: 4 holes at column 6, row 1; column 5, row 2; column 5, row 7; column 6, row 8. That is choice D.

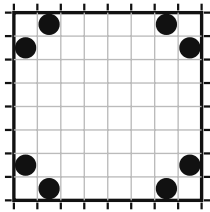
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Unfolded in the wrong order: undid fold 1 first instead of the last fold.

Why not B: Reflected across the wrong line when undoing fold 2: used the horizontal line 1/4 of the way down from the top edge instead of the diagonal from the middle of the top edge to the middle of the right edge.

Why not C: Skipped unfolding fold 2, so its mirror holes are missing.

Why not E: Reflected across the wrong line when undoing fold 1: used the diagonal from the top left corner to the bottom right corner instead of the horizontal center line.



Opened sheet (A)

17. A TWO FOLDS TWO HOLES Folds in order:

Fold 1: the left half is folded over onto the right side along the vertical center line.

Fold 2: the top half is folded over onto the bottom side along the horizontal center line.

Punch 1: column 7, row 8, through 4 layers.

Punch 2: column 8, row 7, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the horizontal center line): the hole at column 7, row 8 is mirrored to column 7, row 1; the hole at column 8, row 7 is mirrored to column 8, row 2.

Unfold fold 1 (the vertical center line): the hole at column 7, row 8 is mirrored to column 2, row 8; the hole at column 7, row 1 is mirrored to column 2, row 1; the hole at column 8, row 7 is mirrored to column 1, row 7; the hole at column 8, row 2 is mirrored to column 1, row 2.

Result: 8 holes at column 2, row 1; column 7, row 1; column 1, row 2; column 8, row 2; column 1, row 7; column 8, row 7; column 2, row 8; column 7, row 8. That is choice A.

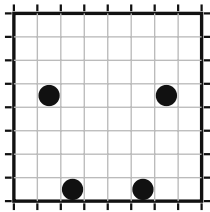
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not B: Reflected across the wrong line when undoing fold 2: used the diagonal from the point 1/4 of the way across the bottom edge to the point 1/4 of the way down the right edge instead of the horizontal center line.

Why not C: Reflected across the wrong line when undoing fold 2: used the vertical line 3/4 of the way from the left edge instead of the horizontal center line.

Why not D: Missed one layer: the hole at column 2, row 1 was left out.

Why not E: Skipped unfolding fold 2, so its mirror holes are missing.



Opened sheet (C)

18. C ONE FOLD TWO HOLES Folds in order:

Fold 1: the right half is folded over onto the left side along the vertical center line.

Punch 1: column 2, row 4, through 2 layers.

Punch 2: column 3, row 8, through 2 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 1 (the vertical center line): the hole at column 2, row 4 is mirrored to column 7, row 4; the hole at column 3, row 8 is mirrored to column 6, row 8.

Result: 4 holes at column 2, row 4; column 7, row 4; column 3, row 8; column 6, row 8. That is choice C.

Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

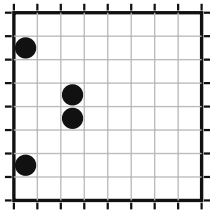
Why not A: Only the holes on the top layer: drew the punch without unfolding.

Why not B: Mirrored the whole pattern top to bottom.

Why not D: Rotated the correct pattern a quarter turn clockwise.

Why not E: Reflected across the wrong line when undoing fold 1: used the diagonal from the bottom left corner to the top right corner instead of the vertical center line.

Practice Test 1 key: Paper Folding (7)



Opened sheet (C)

19. C TWO FOLDS WITH DIAGONAL Folds in order:

Fold 1: the top half is folded over onto the bottom side along the horizontal center line.

Fold 2: the bottom left part is folded over onto the top right side along the diagonal from the middle of the left edge to the middle of the bottom edge.

Punch: column 3, row 5, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the diagonal from the middle of the left edge to the middle of the bottom edge): the hole at column 3, row 5 is mirrored to column 1, row 7.

Unfold fold 1 (the horizontal center line): the hole at column 3, row 5 is mirrored to column 3, row 4; the hole at column 1, row 7 is mirrored to column 1, row 2.

Result: 4 holes at column 1, row 2; column 3, row 4; column 3, row 5; column 1, row 7. That is choice C.

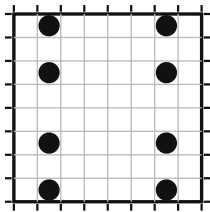
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Mirrored the whole pattern left to right.

Why not B: Rotated the correct pattern a quarter turn clockwise.

Why not D: Reflected across the wrong line when undoing fold 2: used the diagonal from the bottom left corner to the top right corner instead of the diagonal from the middle of the left edge to the middle of the bottom edge.

Why not E: Reflected across the wrong line when undoing fold 1: used the diagonal from the top left corner to the bottom right corner instead of the horizontal center line.



Opened sheet (A)

20. A TWO FOLDS TWO HOLES Folds in order:

Fold 1: the left half is folded over onto the right side along the vertical center line.

Fold 2: the top half is folded over onto the bottom side along the horizontal center line.

Punch 1: column 7, row 6, through 4 layers.

Punch 2: column 7, row 8, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the horizontal center line): the hole at column 7, row 6 is mirrored to column 7, row 3; the hole at column 7, row 8 is mirrored to column 7, row 1.

Unfold fold 1 (the vertical center line): the hole at column 7, row 6 is mirrored to column 2, row 6; the hole at column 7, row 3 is mirrored to column 2, row 3; the hole at column 7, row 8 is mirrored to column 2, row 1; the hole at column 7, row 1 is mirrored to column 2, row 8.

Result: 8 holes at column 2, row 1; column 7, row 1; column 2, row 3; column 7, row 3; column 2, row 6; column 7, row 6; column 2, row 8; column 7, row 8. That is choice A.

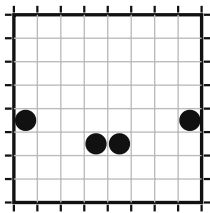
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not B: Reflected across the wrong line when undoing fold 1: used the diagonal from the top left corner to the bottom right corner instead of the vertical center line.

Why not C: Missed one layer: the hole at column 7, row 3 was left out.

Why not D: Rotated the correct pattern a quarter turn clockwise.

Why not E: Reflected across the wrong line when undoing fold 2: used the vertical line 3/4 of the way from the left edge instead of the horizontal center line.



Opened sheet (E)

21. E ONE FOLD TWO HOLES Folds in order:

Fold 1: the left half is folded over onto the right side along the vertical center line.

Punch 1: column 5, row 6, through 2 layers.

Punch 2: column 8, row 5, through 2 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 1 (the vertical center line): the hole at column 5, row 6 is mirrored to column 4, row 6; the hole at column 8, row 5 is mirrored to column 1, row 5.

Result: 4 holes at column 1, row 5; column 8, row 5; column 4, row 6; column 5, row 6. That is choice E.

Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

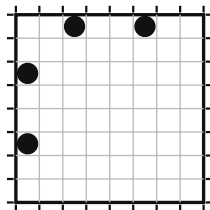
Why not A: Reflected across the wrong line when undoing fold 1: used the diagonal from the bottom left corner to the top right corner instead of the vertical center line.

Why not B: Mirrored the whole pattern top to bottom.

Why not C: Rotated the correct pattern a quarter turn clockwise.

Why not D: Reflected across the wrong line when undoing fold 1: used the horizontal center line instead of the vertical center line.

Practice Test 1 key: Paper Folding (8)



Opened sheet (C)

22. C TWO FOLDS WITH DIAGONAL Folds in order:

Fold 1: the top right half is folded over onto the bottom left side along the diagonal from the top left corner to the bottom right corner.

Fold 2: the top part is folded over onto the bottom side along the horizontal center line.

Punch: column 1, row 6, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the horizontal center line): the hole at column 1, row 6 is mirrored to column 1, row 3.

Unfold fold 1 (the diagonal from the top left corner to the bottom right corner): the hole at column 1, row 6 is mirrored to column 6, row 1; the hole at column 1, row 3 is mirrored to column 3, row 1.

Result: 4 holes at column 3, row 1; column 6, row 1; column 1, row 3; column 1, row 6. That is choice C.

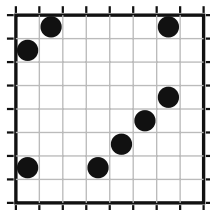
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Mirrored the whole pattern left to right.

Why not B: Reflected across the wrong line when undoing fold 1: used the diagonal from the bottom left corner to the top right corner instead of the diagonal from the top left corner to the bottom right corner.

Why not D: Reflected across the wrong line when undoing fold 2: used the diagonal from the point 1/4 of the way down the left edge to the point 3/4 of the way across the bottom edge instead of the horizontal center line.

Why not E: Unfolded in the wrong order: undid fold 1 first instead of the last fold.



Opened sheet (D)

23. D QUARTER FOLD PARTIAL LAYERS Folds in order:

Fold 1: the bottom left half is folded over onto the top right side along the diagonal from the top left corner to the bottom right corner.

Fold 2: the left part is folded over onto the right side along the vertical center line.

Fold 3: the top part is folded over onto the bottom side along the horizontal line 1/4 of the way down from the top edge.

Punch 1: column 6, row 5, through 2 layers.

Punch 2: column 7, row 4, through 6 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 3 (the horizontal line 1/4 of the way down from the top edge): the hole at column 6, row 5 stays single (this flap did not cover it); the hole at column 7, row 4 is mirrored to column 7, row 1.

Unfold fold 2 (the vertical center line): the hole at column 6, row 5 stays single (this flap did not cover it); the hole at column 7, row 4 stays single (this flap did not cover it); the hole at column 7, row 1 is mirrored to column 2, row 1.

Unfold fold 1 (the diagonal from the top left corner to the bottom right corner): the hole at column 6, row 5 is mirrored to column 5, row 6; the hole at column 7, row 4 is mirrored to column 4, row 7; the hole at column 7, row 1 is mirrored to column 1, row 7; the hole at column 2, row 1 is mirrored to column 1, row 2.

Result: 8 holes at column 2, row 1; column 7, row 1; column 1, row 2; column 7, row 4; column 6, row 5; column 5, row 6; column 1, row 7; column 4, row 7. That is choice D.

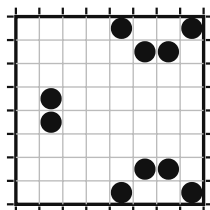
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Mirrored the whole pattern top to bottom.

Why not B: Extra hole: counted a layer that is not under the punch (mirrored where the flap did not reach).

Why not C: Reflected across the wrong line when undoing fold 3: used the diagonal from the bottom left corner to the top right corner instead of the horizontal line 1/4 of the way down from the top edge.

Why not E: Reflected across the wrong line when undoing fold 1: used the diagonal from the bottom left corner to the top right corner instead of the diagonal from the top left corner to the bottom right corner.



Opened sheet (B)

24. B CORNER FOLD PARTIAL LAYERS Folds in order:

Fold 1: the top half is folded over onto the bottom side along the horizontal center line.

Fold 2: the right part is folded over onto the left side along the vertical line 3/4 of the way from the left edge.

Fold 3: the top right part is folded over onto the bottom left side along the diagonal from the point 1/4 of the way down the left edge to the point 3/4 of the way across the bottom edge.

Punch 1: column 2, row 5, through 2 layers.

Punch 2: column 5, row 8, through 8 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 3 (the diagonal from the point 1/4 of the way down the left edge to the point 3/4 of the way across the bottom edge): the hole at column 2, row 5 stays single (this flap did not cover it); the hole at column 5, row 8 is mirrored to column 6, row 7.

Unfold fold 2 (the vertical line 3/4 of the way from the left edge): the hole at column 2, row 5 stays single (this flap did not cover it); the hole at column 5, row 8 is mirrored to column 8, row 8; the hole at column 6, row 7 is mirrored to column 7, row 7.

Unfold fold 1 (the horizontal center line): the hole at column 2, row 5 is mirrored to column 2, row 4; the hole at column 5, row 8 is mirrored to column 5, row 1; the hole at column 6, row 7 is mirrored to column 6, row 2; the hole at column 8, row 8 is mirrored to column 8, row 1; the hole at column 7, row 7 is mirrored to column 7, row 2.

Result: 10 holes at column 5, row 1; column 8, row 1; column 6, row 2; column 7, row 2; column 2, row 4; column 2, row 5; column 6, row 7; column 7, row 7; column 5, row 8; column 8, row 8. That is choice B.

Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

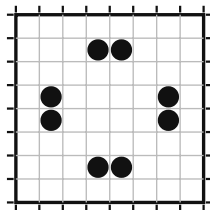
Why not A: Extra hole: counted a layer that is not under the punch (mirrored where the flap did not reach).

Why not C: Mirrored the whole pattern left to right.

Why not D: Reflected across the wrong line when undoing fold 1: used the vertical center line instead of the horizontal center line.

Why not E: Rotated the correct pattern a quarter turn clockwise.

Practice Test 1 key: Paper Folding (9)



Opened sheet (D)

25. D THREE FOLDS Folds in order:

Fold 1: the bottom left half is folded over onto the top right side along the diagonal from the top left corner to the bottom right corner.

Fold 2: the bottom right half is folded over onto the top left side along the diagonal from the bottom left corner to the top right corner.

Fold 3: the right half is folded over onto the left side along the vertical center line.

Punch: column 4, row 2, through 8 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 3 (the vertical center line): the hole at column 4, row 2 is mirrored to column 5, row 2.

Unfold fold 2 (the diagonal from the bottom left corner to the top right corner): the hole at column 4, row 2 is mirrored to column 7, row 5; the hole at column 5, row 2 is mirrored to column 7, row 4.

Unfold fold 1 (the diagonal from the top left corner to the bottom right corner): the hole at column 4, row 2 is mirrored to column 2, row 4; the hole at column 5, row 2 is mirrored to column 2, row 5; the hole at column 7, row 5 is mirrored to column 5, row 7; the hole at column 7, row 4 is mirrored to column 4, row 7.

Result: 8 holes at column 4, row 2; column 5, row 2; column 2, row 4; column 7, row 4; column 2, row 5; column 7, row 5; column 4, row 7; column 5, row 7. That is choice D.

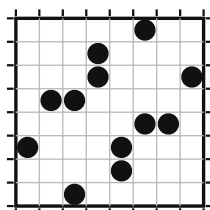
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Reflected across the wrong line when undoing fold 3: used the horizontal line 1/4 of the way down from the top edge instead of the vertical center line.

Why not B: Forgot the last unfold: fold 1 was never opened.

Why not C: Missed one layer: the hole at column 7, row 4 was left out.

Why not E: Reflected across the wrong line when undoing fold 2: used the horizontal line 1/4 of the way down from the top edge instead of the diagonal from the bottom left corner to the top right corner.



Opened sheet (C)

26. C QUARTER FOLD PARTIAL LAYERS Folds in order:

Fold 1: the bottom left half is folded over onto the top right side along the diagonal from the top left corner to the bottom right corner.

Fold 2: the bottom right half is folded over onto the top left side along the diagonal from the bottom left corner to the top right corner.

Fold 3: the bottom part is folded over onto the top side along the horizontal line 1/4 of the way down from the top edge.

Punch 1: column 4, row 2, through 8 layers.

Punch 2: column 6, row 1, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 3 (the horizontal line 1/4 of the way down from the top edge): the hole at column 4, row 2 is mirrored to column 4, row 3; the hole at column 6, row 1 stays single (this flap did not cover it).

Unfold fold 2 (the diagonal from the bottom left corner to the top right corner): the hole at column 4, row 2 is mirrored to column 7, row 5; the hole at column 4, row 3 is mirrored to column 6, row 5; the hole at column 6, row 1 is mirrored to column 8, row 3.

Unfold fold 1 (the diagonal from the top left corner to the bottom right corner): the hole at column 4, row 2 is mirrored to column 2, row 4; the hole at column 4, row 3 is mirrored to column 3, row 4; the hole at column 7, row 5 is mirrored to column 5, row 7; the hole at column 6, row 5 is mirrored to column 5, row 6; the hole at column 8, row 3 is mirrored to column 3, row 8.

Result: 12 holes at column 6, row 1; column 4, row 2; column 4, row 3; column 8, row 3; column 2, row 4; column 3, row 4; column 6, row 5; column 7, row 5; column 1, row 6; column 5, row 6; column 5, row 7; column 3, row 8. That is choice C.

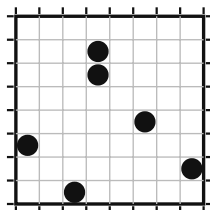
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Extra hole: counted a layer that is not under the punch (mirrored where the flap did not reach).

Why not B: Unfolded in the wrong order: undid fold 1 first instead of the last fold.

Why not D: Mirrored the whole pattern left to right.

Why not E: Reflected across the wrong line when undoing fold 3: used the diagonal from the point 3/4 of the way down the left edge to the point 3/4 of the way across the top edge instead of the horizontal line 1/4 of the way down from the top edge.



Opened sheet (A)

27. A CORNER FOLD PARTIAL LAYERS Folds in order:

Fold 1: the top part is folded over onto the bottom side along the horizontal line 1/4 of the way down from the top edge.

Fold 2: the top left part is folded over onto the bottom right side along the diagonal from the bottom left corner to the top right corner.

Fold 3: the bottom right part is folded over onto the top left side along the diagonal from the middle of the bottom edge to the middle of the right edge.

Punch 1: column 3, row 8, through 2 layers.

Punch 2: column 6, row 5, through 4 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 3 (the diagonal from the middle of the bottom edge to the middle of the right edge): the hole at column 3, row 8 stays single (this flap did not cover it); the hole at column 6, row 5 is mirrored to column 8, row 7.

Unfold fold 2 (the diagonal from the bottom left corner to the top right corner): the hole at column 3, row 8 is mirrored to column 1, row 6; the hole at column 6, row 5 is mirrored to column 4, row 3; the hole at column 8, row 7 stays single (this flap did not cover it).

Unfold fold 1 (the horizontal line 1/4 of the way down from the top edge): the hole at column 3, row 8 stays single (this flap did not cover it); the hole at column 1, row 6 stays single (this flap did not cover it); the hole at column 6, row 5 stays single (this flap did not cover it); the hole at column 8, row 7 stays single (this flap did not cover it); the hole at column 4, row 3 is mirrored to column 4, row 2.

Result: 6 holes at column 4, row 2; column 4, row 3; column 6, row 5; column 1, row 6; column 8, row 7; column 3, row 8. That is choice A.

Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

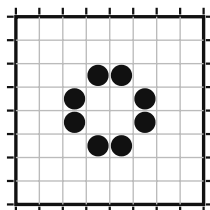
Why not B: Reflected across the wrong line when undoing fold 1: used the diagonal from the point 1/4 of the way across the top edge to the point 3/4 of the way down the right edge instead of the horizontal line 1/4 of the way down from the top edge.

Why not C: Extra hole: counted a layer that is not under the punch (mirrored where the flap did not reach).

Why not D: Forgot the last unfold: fold 1 was never opened.

Why not E: Reflected across the wrong line when undoing fold 3: used the vertical line 3/4 of the way from the left edge instead of the diagonal from the middle of the bottom edge to the middle of the right edge.

Practice Test 1 key: Paper Folding (10)



Opened sheet (B)

28. B THREE FOLDS

Folds in order:

Fold 1: the bottom right half is folded over onto the top left side along the diagonal from the bottom left corner to the top right corner.

Fold 2: the bottom left half is folded over onto the top right side along the diagonal from the top left corner to the bottom right corner.

Fold 3: the right half is folded over onto the left side along the vertical center line.

Punch: column 4, row 3, through 8 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 3 (the vertical center line): the hole at column 4, row 3 is mirrored to column 5, row 3.

Unfold fold 2 (the diagonal from the top left corner to the bottom right corner): the hole at column 4, row 3 is mirrored to column 3, row 4; the hole at column 5, row 3 is mirrored to column 3, row 5.

Unfold fold 1 (the diagonal from the bottom left corner to the top right corner): the hole at column 4, row 3 is mirrored to column 6, row 5; the hole at column 4, row 3 is mirrored to column 6, row 4; the hole at column 3, row 4 is mirrored to column 5, row 6; the hole at column 3, row 5 is mirrored to column 4, row 6.

Result: 8 holes at column 4, row 3; column 5, row 3; column 3, row 4; column 6, row 4; column 3, row 5; column 6, row 5; column 4, row 6; column 5, row 6. That is choice B.

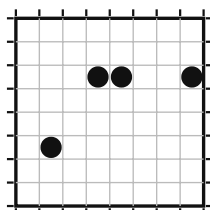
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Reflected across the wrong line when undoing fold 2: used the horizontal line 1/4 of the way down from the top edge instead of the diagonal from the top left corner to the bottom right corner.

Why not C: Reflected across the wrong line when undoing fold 3: used the horizontal line 1/4 of the way down from the top edge instead of the vertical center line.

Why not D: Stopped after one unfold: folds 1 and 2 were never opened.

Why not E: Missed one layer: the hole at column 3, row 5 was left out.



Opened sheet (A)

29. A QUARTER FOLD PARTIAL LAYERS

Folds in order:

Fold 1: the right part is folded over onto the left side along the vertical line 3/4 of the way from the left edge.

Fold 2: the right part is folded over onto the left side along the vertical center line.

Punch 1: column 2, row 6, through 1 layer.

Punch 2: column 4, row 3, through 3 layers.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 2 (the vertical center line): the hole at column 2, row 6 stays single (this flap did not cover it); the hole at column 4, row 3 is mirrored to column 5, row 3.

Unfold fold 1 (the vertical line 3/4 of the way from the left edge): the hole at column 2, row 6 stays single (this flap did not cover it); the hole at column 4, row 3 stays single (this flap did not cover it); the hole at column 5, row 3 is mirrored to column 8, row 3.

Result: 4 holes at column 4, row 3; column 5, row 3; column 8, row 3; column 2, row 6. That is choice A.

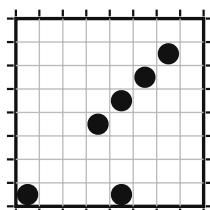
Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not B: Reflected across the wrong line when undoing fold 1: used the horizontal center line instead of the vertical line 3/4 of the way from the left edge.

Why not C: Extra hole: counted a layer that is not under the punch (mirrored where the flap did not reach).

Why not D: Mirrored the whole pattern left to right.

Why not E: Reflected across the wrong line when undoing fold 1: used the diagonal from the point 1/4 of the way across the bottom edge to the point 1/4 of the way down the right edge instead of the vertical line 3/4 of the way from the left edge.



Opened sheet (E)

30. E CORNER FOLD PARTIAL LAYERS

Folds in order:

Fold 1: the top right part is folded over onto the bottom left side along the diagonal from the point 1/4 of the way across the top edge to the point 3/4 of the way down the right edge.

Fold 2: the bottom left part is folded over onto the top right side along the diagonal from the middle of the left edge to the middle of the bottom edge.

Fold 3: the top right part is folded over onto the bottom left side along the diagonal from the top left corner to the bottom right corner.

Punch 1: column 4, row 5, through 5 layers.

Punch 2: column 5, row 8, through 1 layer.

Work backward: undo the folds in reverse order and mirror each hole across that fold line.

Unfold fold 3 (the diagonal from the top left corner to the bottom right corner): the hole at column 4, row 5 is mirrored to column 5, row 4; the hole at column 5, row 8 stays single (this flap did not cover it).

Unfold fold 2 (the diagonal from the middle of the left edge to the middle of the bottom edge): the hole at column 4, row 5 is mirrored to column 1, row 8; the hole at column 5, row 4 stays single (this flap did not cover it); the hole at column 5, row 8 stays single (this flap did not cover it).

Unfold fold 1 (the diagonal from the point 1/4 of the way across the top edge to the point 3/4 of the way down the right edge): the hole at column 4, row 5 is mirrored to column 7, row 2; the hole at column 5, row 4 is mirrored to column 6, row 3; the hole at column 1, row 8 stays single (this flap did not cover it); the hole at column 5, row 8 stays single (this flap did not cover it).

Result: 6 holes at column 7, row 2; column 6, row 3; column 5, row 4; column 4, row 5; column 1, row 8; column 5, row 8. That is choice E.

Positions use the tick marks: columns 1 to 8 from the left, rows 1 to 8 from the top.

Why not A: Rotated the correct pattern a quarter turn clockwise.

Why not B: Reflected across the wrong line when undoing fold 2: used the vertical line 1/4 of the way from the left edge instead of the diagonal from the middle of the left edge to the middle of the bottom edge.

Why not C: Reflected across the wrong line when undoing fold 3: used the horizontal center line instead of the diagonal from the top left corner to the bottom right corner.

Why not D: Extra hole: counted a layer that is not under the punch (mirrored where the flap did not reach).

Practice Test 1 key: Problem Solving (6-section version only) (1)

1. B **RATES TIME** Change the minutes to hours: $20 \text{ minutes} = 20/60 = 1/3 \text{ hour}$.
Distance = speed $\times$ time = $45 \times 2 \frac{1}{3}$.

Answer: 105 miles

Why not A: Used only the whole hours.

Why not C: Treated 20 minutes as 0.20 hour.

Why not D: Rounded the time up to the next whole hour.

Why not E: Chose Not given although the facts determine the answer.

2. E **ENOUGH FACTS CHECK** The facts give a minimum number of couplings, not the exact number.
With 5 couplings the total is \$110; with 6 couplings it is \$114.

More than one total fits the facts.

Answer: Not given

Why not A: Counted only one coupling.

Why not B: Assumed exactly one coupling per stick, which is not stated.

Why not C: Assumed two couplings per stick, which is not stated.

Why not D: Left out the couplings.

3. B **PERCENT DISCOUNT MARKUP** Markup = 20% of \$185 = $0.2 \times 185 = \$37$.
Selling price = \$185 + \$37.

Answer: \$222

Why not A: Subtracted the markup.

Why not C: Found the markup, not the selling price.

Why not D: Added \$20 instead of 20%.

Why not E: Chose Not given although the facts determine the answer.

4. D **TRADE CREW HOURS** Labor hours per day: 4 workers $\times$ 10 hours = 40.
Days: $280 \div 40$.

Answer: 7 days

Why not A: Divided by the hours per day only.

Why not B: Divided by the crew size only.

Why not C: Added the crew size and hours per day.

Why not E: Chose Not given although the facts determine the answer.

5. B **TRADE WIRE CONDUIT** Wire used: $7 \times 60 = 420 \text{ ft}$.
Wire left: $1,000 - 420$.

Answer: 580 ft

Why not A: Subtracted only one run.

Why not C: Found the wire used, not the wire left.

Why not D: Counted one run too few.

Why not E: Chose Not given although the facts determine the answer.

6. D **AREA PERIMETER** Perimeter of the room: $2 \times (23 + 12) = 70 \text{ ft}$.
Leave out the doorway: $70 - 4$.

Answer: 66 ft

Why not A: Forgot to leave out the doorway.

Why not B: Added only one length and one width.

Why not C: Used the area instead of the perimeter.

Why not E: Chose Not given although the facts determine the answer.

Practice Test 1 key: Problem Solving (6-section version only) (2)

7. C **RATIO PROPORTION** Price of one box: $\$90 \div 6 = \$15$.

Price of 10 boxes: $10 \times \$15$.

Answer: \$150

Why not A: Added the difference in boxes to the price.

Why not B: Set up the proportion upside down.

Why not D: Multiplied the total price by the new count.

Why not E: Chose Not given although the facts determine the answer.

8. A **AVERAGES** Add the hours: $6 + 11 + 9 + 10 = 36$.

Divide by the number of days: $36 \div 4 = 9$.

Answer: 9 hours

Why not B: Averaged only the first and last days.

Why not C: Took the middle value instead of the average.

Why not D: Divided by 3 instead of 4.

Why not E: Chose Not given although the facts determine the answer.

9. D **PERCENT DISCOUNT MARKUP** Discount = 30% of $\$156 = 0.3 \times 156 = \$46.80$.

Sale price = $\$156 - \$46.80$.

Answer: \$109.20

Why not A: Added the discount to the price.

Why not B: Found the discount, not the sale price.

Why not C: Took \$30 off instead of 30%.

Why not E: Chose Not given although the facts determine the answer.

10. B **UNIT CONVERSION** Each hour is 60 minutes: $3 \times 60 = 180$ minutes.

Add the extra minutes: $180 + 25 = 205$.

Answer: 205 minutes

Why not A: Forgot to add the 25 minutes.

Why not C: Used 100 minutes in an hour.

Why not D: Treated 3 hours 25 minutes as 3.25 hours.

Why not E: Chose Not given although the facts determine the answer.

11. D **WORK TOGETHER** Iris does $1/9$ of the job per hour; Jamal does $1/18$.

Together: $1/9 + 1/18 = 1/6$ of the job per hour.

Time = $1 \div 1/6 = 6$ hours.

Answer: 6 hours

Why not A: Averaged the two times.

Why not B: Added the two times.

Why not C: Assumed both work as fast as the faster worker.

Why not E: Chose Not given although the facts determine the answer.

12. D **PERCENT DISCOUNT MARKUP** Sale price: $\$400 \times 0.75 = \$300$.

Add 8% tax on the sale price: $\$300 \times 1.08$.

The tax is figured on the sale price, not the list price.

Answer: \$324

Why not A: Forgot to add the sales tax.

Why not B: Forgot the discount.

Why not C: Combined the two into one 17% discount.

Why not E: Chose Not given although the facts determine the answer.

Practice Test 1 key: Problem Solving (6-section version only) (3)

13. C **WORK TOGETHER** Sam does $\frac{1}{7}$ of the job per hour; Iris does $\frac{1}{21}$.

Together: $\frac{1}{7} + \frac{1}{21} = \frac{4}{21}$ of the job per hour.

Time = $1 \div \frac{4}{21} = 5.25$ hours.

Answer: 5.25 hours

Why not A: Added the two times.

Why not B: Averaged the two times.

Why not D: Assumed both work as fast as the faster worker.

Why not E: Chose Not given although the facts determine the answer.

14. B **RATES TIME** Time = distance $\div$ speed = $75 \div 60 = 1.25$ hours.

$0.25 \text{ hour} \times 60 = 15$ minutes.

Combine the hours and minutes.

Answer: 1 hour 15 minutes

Why not A: Dropped the part of an hour.

Why not C: Read 1.25 hours as 1 hour 25 minutes.

Why not D: Rounded up to a whole hour.

Why not E: Chose Not given although the facts determine the answer.

15. A **AVERAGES** Points so far: $3 \times 83 = 249$.

Points needed in all: $4 \times 86 = 344$.

Score needed: $344 - 249$.

Answer: 95 points

Why not B: Added the gap only once.

Why not C: Gave the target average as the score needed.

Why not D: Multiplied the gap by 4.

Why not E: Chose Not given although the facts determine the answer.

16. B **UNIT CONVERSION** Roll length in inches: $200 \times 12 = 2,400$.

Piece length: $4 \times 12 + 4 = 52$ inches.

$2,400 \div 52$, rounded down to whole pieces.

Answer: 46 pieces

Why not A: Ignored the 4 inches.

Why not C: Read 4 ft 4 in as 44 inches.

Why not D: Treated 4 ft 4 in as 4.4 ft.

Why not E: Chose Not given although the facts determine the answer.

17. A **AREA PERIMETER** Floor area: $11 \times 16 = 176$ sq ft.

Boxes: $176 \div 15 = 11 \frac{11}{15}$.

You cannot buy part of a box, so round up.

Answer: 12 boxes

Why not B: Rounded down, leaving part of the floor bare.

Why not C: Added length and width instead of multiplying.

Why not D: Used the perimeter instead of the area.

Why not E: Chose Not given although the facts determine the answer.

18. A **TRADE WIRE CONDUIT** Each stick is 10 ft = 120 inches.

Full pieces per stick: $120 \div 46 = 2$ (the scrap is wasted).

Pieces from 3 sticks: 3×2 .

Answer: 6 pieces

Why not B: Counted the pieces from one stick only.

Why not C: Rounded the pieces per stick up.

Why not D: Pooled the scraps as if they could be joined.

Why not E: Chose Not given although the facts determine the answer.

Practice Test 1 key: Problem Solving (6-section version only) (4)

19. B **AREA PERIMETER** Unlabeled top edge: $34 - 8 = 26$ ft. Unlabeled right edge: $18 - 5 = 13$ ft.

Add all six sides: $34 + 18 + 26 + 5 + 8 + 13$.

The notch does not change the perimeter of an L shape.

Answer: 104 ft

Why not A: Found the area instead of the perimeter.

Why not C: Added only the four labeled sides.

Why not D: Subtracted the notch sides from the outer perimeter.

Why not E: Chose Not given although the facts determine the answer.

20. A **LOGIC ORDERING** Test the possible finishing orders against every clue.

Only one order fits all 4 clues: Wes, Fatima, Ben, Eli.

The person who finished second is Fatima.

Answer: Fatima

Why not B: Counted positions from the last place instead of the first.

Why not C: Missed the word "not" in the clue "Wes did not finish third".

Why not D: Read the clue "Wes finished right before Fatima" backwards.

Why not E: Chose Not given although the facts determine the answer.

21. B **UNIT CONVERSION** Change feet to inches: $15 \text{ ft} = 180 \text{ in}$ and $8 \text{ ft} = 96 \text{ in}$.

Add the extra inches: $180 + 8 + 96 + 9$.

Total in inches.

Answer: 293 inches

Why not A: Forgot to add the extra inches.

Why not C: Used 10 inches in a foot.

Why not D: Added feet and inches as if they were the same unit.

Why not E: Chose Not given although the facts determine the answer.

22. B **LOGIC ORDERING** Test the possible finishing orders against every clue.

Only one order fits all 4 clues: Uma, Noah, Omar, Zane.

The person who finished third is Omar.

Answer: Omar

Why not A: Missed the person in between in the clue "Exactly one person finished between Noah and Zane".

Why not C: Missed the word "not" in the clue "Uma did not finish second".

Why not D: Missed the word "not" in the clue "Zane did not finish second".

Why not E: Chose Not given although the facts determine the answer.

23. A **UNIT CONVERSION** Change feet to inches: $15 \text{ ft} = 180 \text{ in}$ and $7 \text{ ft} = 84 \text{ in}$.

Add the extra inches: $180 + 8 + 84 + 7$.

Total in inches.

Answer: 279 inches

Why not B: Forgot to add the extra inches.

Why not C: Used 10 inches in a foot.

Why not D: Added feet and inches as if they were the same unit.

Why not E: Chose Not given although the facts determine the answer.

24. D **ENOUGH FACTS CHECK** Round and single-gang boxes together: $96 - 6 = 90$.

Each round box comes with 2 single-gang boxes, a group of 3.

$90 \div 3 = 30$.

Answer: 30 boxes

Why not A: Divided by 2 instead of 3.

Why not B: Gave the single-gang count.

Why not C: Did not subtract the square boxes.

Why not E: Decided the facts were not enough, but they are.

Practice Test 1 key: Problem Solving (6-section version only) (5)

25. D **ENOUGH FACTS CHECK** Total for four workers: $4 \times 9 = 36$ hours.

Known hours: $5 + 12 + 7 = 24$.

Fourth worker: $36 - 24 = 12$.

Answer: 12 hours

Why not A: Used the average of the other three.

Why not B: Gave the average.

Why not C: Gave the total for all four.

Why not E: Decided the facts were not enough, but they are.

26. C **RATIO PROPORTION** Total parts: $2 + 7 = 9$.

One part: $54 \div 9 = 6$ spools.

14 AWG: $7 \times 6 = 42$.

Answer: 42 spools

Why not A: Found the 12 AWG count instead.

Why not B: Found one share and stopped.

Why not D: Used 7 out of 2 instead of 7 out of 9.

Why not E: Chose Not given although the facts determine the answer.

27. A **RATES TIME** Time for each leg: $15 \div 30 = 0.5$ h and $60 \div 60 = 1$ h.

Total distance 75 miles, total time 1.5 h.

Average speed = total distance $\div$ total time.

Answer: 50 mph

Why not B: Averaged the two speeds.

Why not C: Divided the total miles by the number of legs.

Why not D: Weighted the speeds by miles instead of by hours.

Why not E: Chose Not given although the facts determine the answer.

28. C **ENOUGH FACTS CHECK** Write everything in terms of Ava: Ben = Ava + 4, Fatima = Ava + 4 - 5 = Ava - 1.

Total: $3 \times \text{Ava} + 3 = 33$, so Ava = 10.

Fatima = $10 + 4 - 5 = 9$.

Answer: 9 hours

Why not A: Gave Ava's hours.

Why not B: Gave Ben's hours.

Why not D: Divided the total by 3.

Why not E: Decided the facts were not enough, but they are.

29. A **RATES TIME** Time for each leg: $20 \div 40 = 0.5$ h and $60 \div 30 = 2$ h.

Total distance 80 miles, total time 2.5 h.

Average speed = total distance $\div$ total time.

Answer: 32 mph

Why not B: Divided the total miles by the number of legs.

Why not C: Weighted the speeds by miles instead of by hours.

Why not D: Averaged the two speeds.

Why not E: Chose Not given although the facts determine the answer.

30. E **ENOUGH FACTS CHECK** 4 bags at \$6 = \$24, and 4 is under 10, so that fits.

12 bags at \$2 = \$24, and 12 is 10 or more, so that fits too.

Two different counts fit the facts.

Answer: Not given

Why not A: Used only the regular price.

Why not B: Used only the bulk price.

Why not C: Divided by the price difference.

Why not D: Assumed the crew bought exactly 10 bags.

Practice Test 1 key: Problem Solving (6-section version only) (6)

31. C **LOGIC ORDERING** Test the possible finishing orders against every clue.

Only one order fits all 4 clues: Hector, Fatima, Zane, Ava, Tara.

The person who finished first is Hector.

Answer: Hector

Why not A: Missed the person in between in the clue "Exactly one person finished between Zane and Hector".

Why not B: Read the clue "Hector finished earlier than Ava" backwards.

Why not D: Read the clue "Fatima finished right before Zane" backwards.

Why not E: Chose Not given although the facts determine the answer.

32. C **AVERAGES** Points in class 1: $20 \times 94 = 1,880$. Points in class 2: $12 \times 78 = 936$.

Total points: 2,816. Total students: 32.

Average: $2,816 \div 32$.

Answer: 88 points

Why not A: Matched each average with the wrong class size.

Why not B: Divided the total points by 2 classes.

Why not D: Averaged the two class averages.

Why not E: Chose Not given although the facts determine the answer.

33. C **PERCENT DISCOUNT MARKUP** Marked-up price: $\$220 \times 1.25 = \$275$.

Sale price: $\$275 \times 0.75$.

The sale percent applies to the marked-up price.

Answer: \$206.25

Why not A: Took the sale off the cost and skipped the markup.

Why not B: Combined into one 0% markup.

Why not D: Forgot the sale.

Why not E: Chose Not given although the facts determine the answer.

34. C **AREA PERIMETER** Area of the full rectangle: $30 \times 17 = 510$ sq ft.

Area of the cut-out corner: $11 \times 6 = 66$ sq ft.

Subtract: $510 - 66$.

Answer: 444 sq ft

Why not A: Forgot to subtract the cut-out corner.

Why not B: Found the perimeter instead of the area.

Why not D: Counted only the bottom rectangle.

Why not E: Chose Not given although the facts determine the answer.

35. D **ENOUGH FACTS CHECK** Write everything in terms of Uma: Ben = Uma + 4, Wes = Uma + 4 - 5 = Uma - 1.

Total: $3 \times \text{Uma} + 3 = 21$, so Uma = 6.

Wes = $6 + 4 - 5 = 5$.

Answer: 5 hours

Why not A: Gave Ben's hours.

Why not B: Divided the total by 3.

Why not C: Gave Uma's hours.

Why not E: Decided the facts were not enough, but they are.
