

ACT Math Practice Test 7

50 Minutes — 45 Questions

Choose the best answer for each question. A permitted calculator may be used. Figures are not necessarily drawn to scale.

1) A practice begins at 3:45 p.m. and lasts 1 hour 55 minutes. At what time does it end?

☐ A. 5:30 p.m.

☐ C. 5:40 p.m.

☐ B. 5:35 p.m.

☐ D. 6:00 p.m.

2) Solve $4(2x - 3) - 5 = 3x + 18$.

☐ F. $x = 7$

☐ H. $x = 8$

☐ G. $x = 5$

☐ J. $x = 6$

3) Two angles of a triangle measure 44° and 61° . What is the measure of the third angle?

☐ A. 65°

☐ C. 85°

☐ B. 75°

☐ D. 105°

4) What is the median of 4, 8, 13, 20, 26?

☐ F. 8

☐ H. 20

☐ G. 12

☐ J. 13

5) Evaluate $\sqrt{196} + \sqrt[3]{-27}$.

☐ A. 11

☐ C. -17

☐ B. 17

☐ D. -11

6) A \$120 purchase is subject to a 7.5% sales tax. What is the total cost?

☐ F. \$127.50

☐ H. \$129.00

☐ G. \$128.00

☐ J. \$130.50

7) The sum of three consecutive odd integers is 75. What is the greatest of the three integers?

☐ A. 23

☐ C. 25

☐ B. 27

☐ D. 29

8) For $f(x) = 4 - 2x$, what value of x makes $f(x) = -10$?

☐ F. -7

☐ H. 3

☐ G. -3

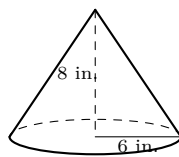
☐ J. 7

- 9) A wheelchair ramp rises 6 feet over a horizontal distance of 8 feet. If θ is the angle the ramp makes with the ground, what is $\tan \theta$?
- ☐ A. $\frac{3}{5}$ ☐ C. $\frac{3}{4}$
☐ B. $\frac{4}{3}$ ☐ D. $\frac{5}{3}$
- 10) A bag contains 5 blue, 4 red, and 3 green tiles. If one tile is selected at random, what is the probability it is not red?
- ☐ F. $\frac{1}{3}$ ☐ H. $\frac{3}{4}$
☐ G. $\frac{2}{3}$ ☐ J. $\frac{4}{5}$
- 11) A crew labels 240 boxes in 6 hours at a constant rate. How many boxes does the crew label per hour?
- ☐ A. 30 ☐ C. 40
☐ B. 36 ☐ D. 46
- 12) Evaluate $\left(-\frac{3}{4}\right)^2 - \frac{1}{8}$.
- ☐ F. $\frac{1}{2}$ ☐ H. $\frac{11}{16}$
☐ G. $\frac{5}{16}$ ☐ J. $\frac{7}{16}$
- 13) Which expression is equivalent to $2x^2 + 7x + 3$?
- ☐ A. $(2x + 3)(x + 1)$ ☐ C. $(2x - 1)(x - 3)$
☐ B. $(2x + 1)(x + 3)$ ☐ D. $(2x + 3)(x + 3)$
- 14) If $f(x) = 3x + 8$, what is $f^{-1}(17)$?
- ☐ F. 2 ☐ H. 5
☐ G. 3 ☐ J. 9
- 15) A parallelogram has a base of 14 inches and a perpendicular height of 5 inches. What is its area?
- ☐ A. 70 square inches ☐ C. 140 square inches
☐ B. 38 square inches ☐ D. 19 square inches
- 16) Two fair coins are tossed. What is the probability of getting exactly one head?
- ☐ F. $\frac{1}{4}$ ☐ H. 1
☐ G. $\frac{3}{4}$ ☐ J. $\frac{1}{2}$
- 17) How many meters are equal to 4.6 kilometers?
- ☐ A. 46 ☐ C. 4,600
☐ B. 460 ☐ D. 46,000
- 18) Solve $\frac{3x+2}{4} - \frac{x-1}{2} = 5$.
- ☐ F. 16 ☐ H. 18
☐ G. 12 ☐ J. 20

- 19) If $f(x) = 2^{x-1} + 3$, what is $f^{-1}(35)$?
- ☐ A. 4 ☐ C. 6
☐ B. 5 ☐ D. 7
- 20) What is the midpoint of the segment joining $(-4, 7)$ and $(8, -3)$?
- ☐ F. $(4, 2)$ ☐ H. $(-2, 2)$
☐ G. $(2, 4)$ ☐ J. $(2, 2)$
- 21) A line of best fit relating hours after noon, h , to temperature, T , is $T = 92 - 3h$. What does the slope represent?
- ☐ A. The temperature at noon is predicted to be 3°F . ☐ C. The temperature increases by 3°F each hour.
☐ B. The temperature decreases by 3°F each hour. ☐ D. The temperature decreases by 92°F each hour.
- 22) A bus travels 120 miles in 2 hours and then 80 miles in 1.5 hours. What is its average speed for the entire trip?
- ☐ F. $\frac{400}{7}$ miles per hour ☐ H. 65 miles per hour
☐ G. 60 miles per hour ☐ J. 70 miles per hour
- 23) Simplify $(2\sqrt{5})(3\sqrt{20})$.
- ☐ A. $6\sqrt{25}$ ☐ C. 120
☐ B. $30\sqrt{5}$ ☐ D. 60
- 24) Solve $|3x - 2| \geq 7$.
- ☐ F. $-3 \leq x \leq 3$ ☐ H. $x \leq -3$ or $x \geq \frac{5}{3}$
☐ G. $x \leq -\frac{5}{3}$ or $x \geq 3$ ☐ J. $-\frac{5}{3} \leq x \leq 3$
- 25) What is the domain of $h(x) = \frac{\sqrt{10-2x}}{x-1}$?
- ☐ A. $x \leq 5$ ☐ C. $x < 5$ and $x \neq 1$
☐ B. $x \leq 5$ and $x \neq 1$ ☐ D. $x < 5$
- 26) Twelve students have an average score of 76, and 8 students have an average score of 88. What is the average score of all 20 students?
- ☐ F. 80.8 ☐ H. 84
☐ G. 82 ☐ J. 80
- 27) A \$64 restaurant bill receives an 18% gratuity. If 4 people split the total equally, how much does each person pay?
- ☐ A. \$16.00 ☐ C. \$18.00
☐ B. \$17.92 ☐ D. \$18.88
- 28) For $g(x) = \frac{x^2-16}{x-4}$, where $x \neq 4$, what is $g(7)$?
- ☐ F. 3 ☐ H. 11
☐ G. 7 ☐ J. 33

- 29) Solve $x^2 + 8x + 3 = 0$.
- ☐ A. $x = -4 \pm \sqrt{13}$ ☐ C. $x = -8 \pm \sqrt{3}$
☐ B. $x = 4 \pm \sqrt{13}$ ☐ D. $x = -4 \pm \sqrt{19}$
- 30) Two triangles are similar. A side of length 6 in the smaller triangle corresponds to a side of length 9 in the larger triangle. If another side of the smaller triangle is 8, what is the corresponding side in the larger triangle?
- ☐ F. 12 ☐ H. 13
☐ G. 10 ☐ J. 15
- 31) What is the mean absolute deviation of 4, 8, 10, 14?
- ☐ A. 2 ☐ C. 4
☐ B. 2.5 ☐ D. 3
- 32) A rental cost is modeled by $C(n) = 68 + 0.40n$, where n is the number of miles driven. For what value of n is the cost \$80?
- ☐ F. 24 ☐ H. 32
☐ G. 30 ☐ J. 40
- 33) After a discount of \$24, a jacket costs \$96. What percent of the original price was discounted?
- ☐ A. 15% ☐ C. 20%
☐ B. 18% ☐ D. 25%
- 34) Two secants are drawn from the same exterior point to a circle. The external and whole lengths of the first secant are x and $x + 8$; those of the second are $x + 2$ and $x + 5$. What is x ?
- ☐ F. 8 ☐ H. 10
☐ G. 9 ☐ J. 12
- 35) Solve $\frac{x+1}{x-2} + \frac{x-2}{x+1} = \frac{5}{2}$.
- ☐ A. $x = -4$ only ☐ C. $x = -1$ or $x = 2$
☐ B. $x = 5$ only ☐ D. $x = -4$ or $x = 5$
- 36) A quadratic function f has vertex $(3, -8)$ and passes through $(1, 0)$. What is $f(0)$?
- ☐ F. 4 ☐ H. 18
☐ G. 8 ☐ J. 10
- 37) Each of the following data sets has 5 values and a mean of 10. Which data set has the greatest standard deviation?
- ☐ A. $\{8, 9, 10, 11, 12\}$ ☐ C. $\{7, 7, 10, 13, 13\}$
☐ B. $\{6, 8, 10, 12, 14\}$ ☐ D. $\{5, 9, 10, 11, 15\}$
- 38) A container holds 0.035 cubic meter of water. How many cubic centimeters of water does it hold? (1 meter = 100 centimeters)
- ☐ F. 350 ☐ H. 35,000
☐ G. 3,500 ☐ J. 350,000

- 39) A \$2,000 deposit earns 6% annual interest compounded quarterly. How much more interest does it earn in 3 years than it would earn at the same annual rate with simple interest?
- ☐ A. \$31.24 ☐ C. \$360.00
- ☐ B. \$30.00 ☐ D. \$391.24
- 40) Solve $\frac{(x-1)(x-4)}{x-2} < 0$.
- ☐ F. $(1, 2) \cup (4, \infty)$ ☐ H. $(-\infty, 2) \cup (4, \infty)$
- ☐ G. $(-\infty, 1] \cup (2, 4]$ ☐ J. $(-\infty, 1) \cup (2, 4)$
- 41) A 15-foot ladder leans against a vertical wall. The foot of the ladder is moved 3 feet farther from the wall, and the top slides down 3 feet. How high above the ground was the top of the ladder at first?
- ☐ A. 9 feet ☐ C. 13 feet
- ☐ B. 12 feet ☐ D. 15 feet
- 42) A right circular cone has radius 6 inches and height 8 inches, as shown. What is its total surface area?



- ☐ F. 60π square inches ☐ H. 90π square inches
- ☐ G. 84π square inches ☐ J. 96π square inches
- 43) A car has a 24-gallon tank that is $\frac{3}{4}$ full. It travels 210 miles at 30 miles per gallon, then stops to fill the tank at \$3.20 per gallon. What is the cost to fill the tank?
- ☐ A. \$28.80 ☐ C. \$41.60
- ☐ B. \$42.00 ☐ D. \$57.60
- 44) On a map with scale 1 : 50,000, a route is 13.2 cm long. A cyclist rides the first $\frac{3}{5}$ of the route at 12 km/h and walks the rest at 4 km/h. How long does the trip take?
- ☐ F. 49.5 minutes ☐ H. 59.4 minutes
- ☐ G. 55.0 minutes ☐ J. 66.0 minutes
- 45) Solve $\sqrt{x+8} - \sqrt{x-1} = 1$.
- ☐ A. $x = 8$ ☐ C. $x = 17$
- ☐ B. $x = 16$ ☐ D. $x = 25$

Scratch work

Answer Key and Explanations

1. C Standard: ACT Math: Integrating Essential Skills

Add 1 hour to 3:45 to get 4:45. Another 55 minutes brings the time to 5:40 p.m. Checking by splitting 55 minutes into 15 minutes to 5:00 and 40 more minutes gives the same result.

2. F Standard: ACT Math: Algebra

Distribute first: $8x - 12 - 5 = 3x + 18$, so $8x - 17 = 3x + 18$. Subtract $3x$ and add 17 to get $5x = 35$. Dividing by 5 gives $x = 7$; substituting 7 makes both sides equal 39.

3. B Standard: ACT Math: Geometry

The interior angles of every triangle sum to 180° . The two known angles add to $44 + 61 = 105^\circ$, so the missing angle is $180 - 105 = 75^\circ$. The answer is less than a right angle, which fits the remaining amount.

4. J Standard: ACT Math: Statistics & Probability

The values are already in order. With five values, the median is the single value in the middle, which is 13. The mean would be a different measure because it uses all five values in a sum.

5. A Standard: ACT Math: Number & Quantity

The principal square root of 196 is 14, and the cube root of -27 is -3 because $(-3)^3 = -27$. Add them: $14 + (-3) = 11$. The even root is nonnegative, while the odd root keeps the sign of its input.

6. H Standard: ACT Math: Integrating Essential Skills

Find the tax first: $0.075(120) = 9$ dollars. Add it to the original price, $120 + 9 = 129$. You can also multiply by 1.075, the fraction of the price paid after adding the tax.

7. B Standard: ACT Math: Algebra

Let the integers be n , $n + 2$, and $n + 4$. Their sum is $3n + 6 = 75$, so $3n = 69$ and $n = 23$. The integers are 23, 25, and 27, making 27 the greatest.

8. J Standard: ACT Math: Functions

Set the expression for the function equal to the requested output: $4 - 2x = -10$. Subtract 4 to get $-2x = -14$, then divide by -2 . The input is $x = 7$, and $4 - 2(7) = -10$ confirms it.

9. C Standard: ACT Math: Geometry

Tangent is opposite over adjacent. The vertical rise is opposite θ , and the horizontal distance is adjacent, so $\tan \theta = 6/8 = 3/4$. The ramp length would be the hypotenuse, which is not part of the tangent ratio.

10. G Standard: ACT Math: Statistics & Probability

There are $5 + 4 + 3 = 12$ tiles altogether. Eight are not red, so the probability is $8/12$, which reduces to $2/3$. Counting blue and green directly gives the same favorable total as subtracting the four red tiles.

11. C Standard: ACT Math: Integrating Essential Skills

Divide the total number of boxes by the 6 hours: $240 \div 6 = 40$. The crew labels 40 boxes each hour. Multiplying 240 by 6 would count the hours twice instead of finding a per-hour rate.

12. J Standard: ACT Math: Number & Quantity

Squaring the negative fraction gives $9/16$. Rewrite $1/8$ as $2/16$ so the denominators match, then subtract: $9/16 - 2/16 = 7/16$. The square is positive because the negative sign is also multiplied by itself.

13. B Standard: ACT Math: Algebra

Look for two factors whose first terms multiply to $2x^2$ and whose constants multiply to 3. Testing $(2x + 1)(x + 3)$ gives $2x^2 + 6x + x + 3 = 2x^2 + 7x + 3$. The middle terms add to $7x$, so this is the matching factorization.

14. G Standard: ACT Math: Functions

An inverse reverses the input-output relationship. Find the input that produces 17 by solving $3x + 8 = 17$. Subtracting 8 and dividing by 3 gives $x = 3$, so $f^{-1}(17) = 3$.

15. A Standard: ACT Math: Geometry

The area of a parallelogram is base times perpendicular height. Here that is $14(5) = 70$ square inches. The slanted side length does not enter this calculation; the height must be measured at a right angle to the base.

16. J Standard: ACT Math: Statistics & Probability

The equally likely outcomes are HH, HT, TH, and TT. Exactly one head occurs in HT and TH, so 2 of the 4 outcomes work. The probability is $2/4 = 1/2$.

17. C Standard: ACT Math: Integrating Essential Skills

One kilometer is 1,000 meters. Multiply 4.6 by 1,000, moving the decimal three places to the right: 4.6 km is 4,600 m. A quick size check helps: several kilometers should be several thousand meters.

18. F Standard: ACT Math: Algebra

Multiply every term by 4 to clear the denominators: $3x + 2 - 2(x - 1) = 20$. Distribute the negative to get $3x + 2 - 2x + 2 = 20$, so $x + 4 = 20$ and $x = 16$. Substitution gives $50/4 - 15/2 = 5$.

19. C Standard: ACT Math: Functions

To find $f^{-1}(35)$, solve $f(x) = 35$: $2^{x-1} + 3 = 35$. Subtract 3 to get $2^{x-1} = 32 = 2^5$, so $x - 1 = 5$ and $x = 6$. Thus the input that produces 35 is 6, which is exactly what the inverse value asks for.

20. J Standard: ACT Math: Geometry

Average the x-coordinates and the y-coordinates separately. The midpoint is $((-4 + 8)/2, (7 + (-3))/2) = (4/2, 4/2) = (2, 2)$. Each coordinate lies halfway between the corresponding endpoint coordinates.

21. B Standard: ACT Math: Statistics & Probability

The slope is the coefficient of h , which is -3 . Its negative sign means the predicted temperature falls, and the magnitude 3 gives the rate of change. The constant 92 is the predicted temperature when $h = 0$, or noon.

22. F Standard: ACT Math: Integrating Essential Skills

Average speed uses total distance divided by total time. The bus travels $120 + 80 = 200$ miles in $2 + 1.5 = 3.5$ hours. Thus its average speed is $200/3.5 = 400/7$, or about 57.1 miles per hour. Averaging 60 and about 53.3 directly would give the wrong weighting.

23. D Standard: ACT Math: Number & Quantity

Multiply the coefficients and the radical factors: $(2\sqrt{5})(3\sqrt{20}) = 6\sqrt{100}$. Since the principal square root of 100 is 10, the product is $6(10) = 60$. Combining the radicands first gives the same result.

24. G Standard: ACT Math: Algebra

For an absolute value at least 7, the expression is at most -7 or at least 7. Solve $3x - 2 \leq -7$ to get $x \leq -5/3$, and solve $3x - 2 \geq 7$ to get $x \geq 3$. These are two outer intervals, not the interval between the endpoints.

25. B Standard: ACT Math: Functions

The radicand must be nonnegative, so $10 - 2x \geq 0$ and $x \leq 5$. The denominator also cannot be zero, which excludes $x = 1$. Combining the two restrictions gives all real $x \leq 5$ except 1; the endpoint 5 is allowed.

26. F Standard: ACT Math: Statistics & Probability

Turn each average into a group total: $12(76) = 912$ and $8(88) = 704$. Together the students earned 1,616 points. Divide by all 20 students to get $1,616/20 = 80.8$. The two group averages should not be averaged equally because the groups have different sizes.

27. D Standard: ACT Math: Integrating Essential Skills

The gratuity is $0.18(64) = \$11.52$, so the total bill is $64 + 11.52 = \$75.52$. Divide by 4 people: $75.52/4 = \$18.88$ each. The same amount results if each person first pays one-fourth of the bill and then adds 18% of that share.

28. H Standard: ACT Math: Functions

Factor the numerator as $(x - 4)(x + 4)$. For inputs other than 4, the common factor cancels, so $g(x) = x + 4$. Since 7 is allowed, $g(7) = 7 + 4 = 11$. The original function remains undefined at 4 even though the simplified expression has a value there.

29. A Standard: ACT Math: Algebra

Move 3 to the other side and complete the square: $x^2 + 8x = -3$, so $x^2 + 8x + 16 = 13$. This gives $(x + 4)^2 = 13$. Taking both square roots yields $x + 4 = \pm\sqrt{13}$, hence $x = -4 \pm \sqrt{13}$.

30. F Standard: ACT Math: Geometry

The larger-to-smaller scale factor is $9/6 = 3/2$. Multiply the corresponding smaller side by that factor: $8(3/2) = 12$. Similarity preserves angle measures and multiplies every side length by the same scale factor.

31. D Standard: ACT Math: Statistics & Probability

The mean is $(4 + 8 + 10 + 14)/4 = 9$. The absolute distances from 9 are 5, 1, 1, and 5. Their average is $(5 + 1 + 1 + 5)/4 = 3$, so the mean absolute deviation is 3.

32. G Standard: ACT Math: Functions

Set the model equal to the cost: $68 + 0.40n = 80$. Subtracting 68 leaves $0.40n = 12$. Divide by 0.40 to obtain $n = 30$. At 30 miles, the variable charge is \$12, which brings the total to \$80.

33. C Standard: ACT Math: Integrating Essential Skills

The original price was $96 + 24 = \$120$. The discount fraction is $24/120 = 0.20$, which is 20%. Use the original price as the denominator; dividing by the sale price would compare the discount to the wrong amount.

34. H Standard: ACT Math: Geometry

For two secants from the same exterior point, external length times whole length is equal: $x(x + 8) = (x + 2)(x + 5)$. Expanding gives $x^2 + 8x = x^2 + 7x + 10$, so $x = 10$. This value makes the paired products both 180, confirming the secant relationship.

35. D Standard: ACT Math: Algebra

The denominators require $x \neq 2$ and $x \neq -1$. Multiply both sides by $2(x - 2)(x + 1)$ to get $2[(x + 1)^2 + (x - 2)^2] = 5(x - 2)(x + 1)$. Simplifying gives $x^2 - x - 20 = 0$, or $(x - 5)(x + 4) = 0$. Both roots avoid the excluded values, so both -4 and 5 satisfy the original equation.

36. J Standard: ACT Math: Functions

Write the function in vertex form as $f(x) = a(x - 3)^2 - 8$. Since the graph passes through $(1, 0)$, $0 = a(1 - 3)^2 - 8 = 4a - 8$, so $a = 2$. Then $f(0) = 2(0 - 3)^2 - 8 = 18 - 8 = 10$.

37. D Standard: ACT Math: Statistics & Probability

Standard deviation measures how far the values typically lie from the mean. Since all four sets have the same number of values and the same mean, compare the sums of the squared distances from 10. For A, the sum is $4 + 1 + 0 + 1 + 4 = 10$; for B, it is $16 + 4 + 0 + 4 + 16 = 40$; for C, it is $9 + 9 + 0 + 9 + 9 = 36$; and for D, it is $25 + 1 + 0 + 1 + 25 = 52$. Set D has the largest sum of squared deviations, so it has the greatest standard deviation.

38. H Standard: ACT Math: Number & Quantity

The conversion factor for length is 100 centimeters per meter, but this is a volume, so the factor must be cubed: $1 \text{ m}^3 = (100 \text{ cm})^3 = 1,000,000 \text{ cm}^3$. Therefore, 0.035 m^3 is $0.035(1,000,000) = 35,000 \text{ cm}^3$. The key is to convert all three dimensions, not just multiply by 100 once.

39. A Standard: ACT Math: Functions

With quarterly compounding, the balance is $2000(1 + 0.06/4)^{12}$, which is about \$2,391.24, so the compound interest is \$391.24. Simple interest for 3 years is $2000(0.06)(3) = \$360$. The compound account therefore earns about $391.24 - 360 = \$31.24$ more.

40. J Standard: ACT Math: Algebra

The critical values are 1 and 4, where the numerator is zero, and 2, where the expression is undefined. Check the signs on the four intervals they create: the expression is negative on $(-\infty, 1)$ and $(2, 4)$, and positive on the other two. Because the inequality is strict, 1 and 4 are excluded; 2 is always excluded from the domain.

41. B Standard: ACT Math: Geometry

Let the ladder's initial horizontal and vertical distances be x and y . Its length stays 15 feet, so $x^2 + y^2 = 225$ and $(x + 3)^2 + (y - 3)^2 = 225$. Subtracting the equations gives $y = x + 3$. Substituting into the first gives $x^2 + (x + 3)^2 = 225$, whose positive solution is $x = 9$, so the original height was $y = 12$ feet.

42. J Standard: ACT Math: Geometry

The slant height is the hypotenuse of a right triangle with legs 6 and 8, so it is $\sqrt{6^2 + 8^2} = 10$ inches. Total surface area includes the base and the curved surface: $\pi r^2 + \pi r \ell = \pi(6^2) + \pi(6)(10) = 36\pi + 60\pi = 96\pi$ square inches.

43. C Standard: ACT Math: Integrating Essential Skills

The tank starts with $\frac{3}{4}(24) = 18$ gallons. The trip uses $210/30 = 7$ gallons, leaving 11 gallons in the tank. Filling it to 24 gallons takes 13 gallons, and those cost $13(3.20) = \$41.60$.

44. H Standard: ACT Math: Integrating Essential Skills

At this scale, 1 cm represents 50,000 cm, or 0.5 km, so the route is $13.2(0.5) = 6.6$ km. The cyclist rides $\frac{3}{5}(6.6) = 3.96$ km in $3.96/12 = 0.33$ hour, or 19.8 minutes. The remaining 2.64 km takes $2.64/4 = 0.66$ hour, or 39.6 minutes. Together the trip takes 59.4 minutes.

45. C Standard: ACT Math: Number & Quantity

The domain requires $x \geq 1$. Let $A = \sqrt{x+8}$ and $B = \sqrt{x-1}$. The equation gives $A - B = 1$, while $A^2 - B^2 = 9$. Since $A^2 - B^2 = (A - B)(A + B)$, we get $A + B = 9$. Solving the two simple equations gives $A = 5$ and $B = 4$, so $x + 8 = 25$ and $x = 17$. Substitution confirms $5 - 4 = 1$.