

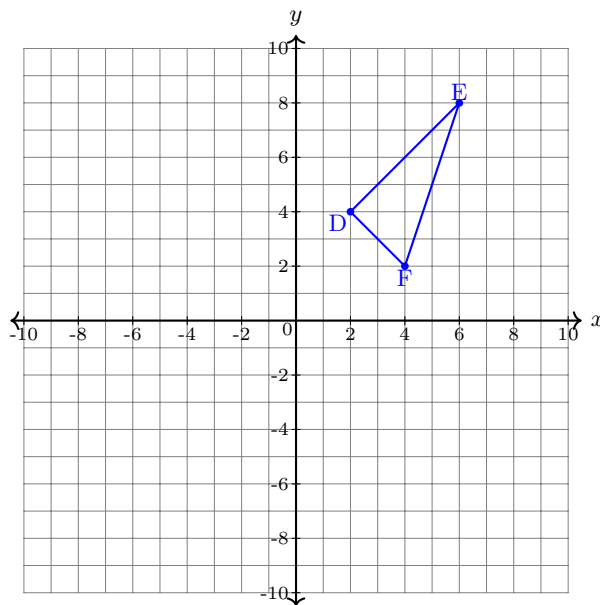
ACT Math Practice Test 10

50 Minutes — 45 Questions

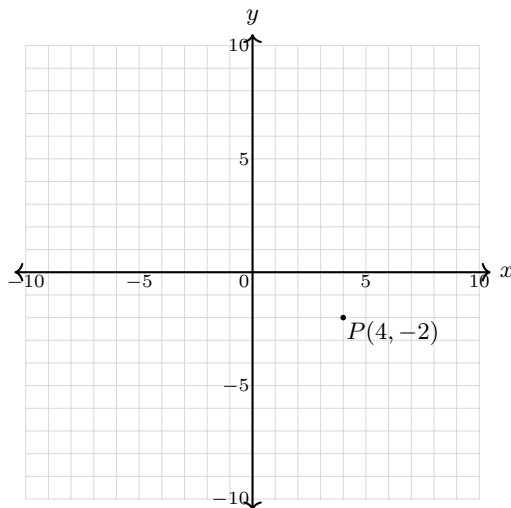
Choose the best answer for each question. A permitted calculator may be used. Figures are not necessarily drawn to scale.

- 1) A store sells notebooks and pencils. Notebooks cost \$3 each and pencils cost \$0.50 each. A student bought 20 items for \$50. How many notebooks did the student buy?
- ☐ A. 8 ☐ C. 14
- ☐ B. 12 ☐ D. 16
- 2) Which statement correctly compares 2π and 6 without using a calculator?
- ☐ F. $2\pi = 6$ exactly, because $\pi = 3$. ☐ H. $2\pi > 6$, because $\pi > 3$, and multiplying both sides by 2 preserves the inequality.
- ☐ G. $2\pi < 6$, because doubling any irrational gives a smaller number. ☐ J. It cannot be determined without a decimal approximation of π .
- 3) A linear function has a slope of 0 and passes through $(6, -3)$. Which equation could represent the function?
- ☐ A. $x = -3$ ☐ C. $y = 6$
- ☐ B. $y = -3$ ☐ D. $x = 6$
- 4) Which decimal is equivalent to $\frac{5}{12}$?
- ☐ F. $0.41\overline{6}$ ☐ H. $0.4\overline{16}$
- ☐ G. $0.\overline{416}$ ☐ J. 0.41666
- 5) Let $\mathbf{u} = \langle 4, -3 \rangle$ and $\mathbf{v} = \langle -2, 5 \rangle$. What is $2\mathbf{u} + \mathbf{v}$?
- ☐ A. $\langle 6, -1 \rangle$ ☐ C. $\langle 6, 1 \rangle$
- ☐ B. $\langle 2, 2 \rangle$ ☐ D. $\langle 10, -6 \rangle$
- 6) A line of best fit for a scatter plot has the equation $y = -2.5x + 80$. According to this model, what does the y-intercept represent?
- ☐ F. The rate of decrease ☐ H. The value when $y = 0$
- ☐ G. The average of all data points ☐ J. The initial value when $x = 0$
- 7) If $f(x) = 3x - 5$, what is $f^{-1}(10)$?
- ☐ A. 3 ☐ C. 15
- ☐ B. 5 ☐ D. 25

- 8) Triangle DEF has vertices $D(2, 4)$, $E(6, 8)$, and $F(4, 2)$. If the triangle is dilated by a scale factor of $\frac{1}{2}$ with the center at the origin, what are the coordinates of E' ?



- ☐ F. (3, 4)
 ☐ H. (4, 6)
- ☐ G. (12, 16)
 ☐ J. (6, 4)
- 9) The graph of $y = x^2$ is translated to form $y = (x + 4)^2 - 7$. What is the vertex of the new graph?
- ☐ A. (4, -7)
 ☐ C. (-4, 7)
- ☐ B. (-4, -7)
 ☐ D. (4, 7)
- 10) Point P is located at (4, -2). What are the coordinates of P' after reflection across the line $y = x$?



- ☐ F. (-4, 2)
 ☐ H. (-2, 4)
- ☐ G. (2, -4)
 ☐ J. (4, 2)
- 11) At a market, 3 pounds of apples cost \$4.50. At the same price per pound, what is the cost of 5 pounds?
- ☐ A. \$6.00
 ☐ C. \$8.00
- ☐ B. \$7.50
 ☐ D. \$9.00

- 12) $\frac{2x-1}{3} + \frac{x+2}{4} = 5$. What is the value of x ?
- ☐ F. $\frac{50}{11}$ ☐ H. 6
- ☐ G. $\frac{58}{11}$ ☐ J. $\frac{62}{11}$
- 13) A van has a 20-gallon fuel tank that is $\frac{3}{4}$ full. The van averages 24 miles per gallon. After it travels 180 miles, how many gallons of fuel remain?
- ☐ A. 6 ☐ C. 7.5
- ☐ B. 7 ☐ D. 9
- 14) A random sample of 80 students from a school of 400 finds that 18 students walk to school. Based on this sample, about how many students in the school walk to school?
- ☐ F. 90 ☐ H. 112
- ☐ G. 72 ☐ J. 144
- 15) A study finds a strong positive correlation between the number of hours students sleep and their scores on a test. Which conclusion is supported by this result?
- ☐ A. Sleeping more causes every student to score higher. ☐ C. Test scores determine how many hours students sleep.
- ☐ B. Students who sleep more tend to have higher scores in this study. ☐ D. Every student who sleeps more than 8 hours earns a perfect score.
- 16) The circumference of a circle is 18π inches. What is the area of the circle, in square inches?
- ☐ F. 9π ☐ H. 36π
- ☐ G. 81π ☐ J. 324π
- 17) On a map with scale 1 centimeter representing 250 meters, a hiking route measures 6 centimeters. A hiker walks at 4.5 kilometers per hour and takes a 12-minute break. How long does the trip take, including the break?
- ☐ A. 24 minutes ☐ C. 32 minutes
- ☐ B. 30 minutes ☐ D. 42 minutes
- 18) A theater charges \$14 per ticket. The cost of presenting a show is \$240 plus \$6 for each ticket sold. What is the least whole number of tickets the theater must sell for its revenue to exceed its cost?
- ☐ F. 29 ☐ H. 31
- ☐ G. 30 ☐ J. 32
- 19) Solve $4(x-2) = 3x+5$.
- ☐ A. 9 ☐ C. 13
- ☐ B. 11 ☐ D. 15
- 20) A transformation maps $Q(-3, 4)$ to $Q'(-3, -4)$. Which transformation could this be?
- ☐ F. Reflection over the x -axis ☐ H. Translation 4 units down
- ☐ G. Reflection over the y -axis ☐ J. Rotation 90° clockwise
- 21) The sum of two numbers is 28. Three times the larger number minus twice the smaller number is 34. What is the larger number?
- ☐ A. 10 ☐ C. 16
- ☐ B. 14 ☐ D. 18

- 22) The two roots of $x^2 - 8x + k = 0$ differ by 2. What is the value of k ?
- ☐ F. 15 ☐ H. 16
- ☐ G. 12 ☐ J. 18
- 23) In a right triangle, the hypotenuse is 17 and one leg is 8. An acute angle θ is opposite the leg of length 8. What is $\cos \theta$?
- ☐ A. $\frac{8}{17}$ ☐ C. $\frac{15}{17}$
- ☐ B. $\frac{8}{15}$ ☐ D. $\frac{15}{8}$
- 24) A cube has side length 7 feet. What is its volume?
- ☐ F. 49 ft^3 ☐ H. 294 ft^3
- ☐ G. 343 ft^3 ☐ J. 21 ft^3
- 25) A floor plan uses the scale $\frac{1}{4}$ inch to represent 1 foot. A room measures 3.5 inches by 4 inches on the plan. Flooring is sold in boxes that cover 12 square feet and cost \$48 per box. What is the least cost to cover the room?
- ☐ A. \$912 ☐ C. \$936
- ☐ B. \$864 ☐ D. \$960
- 26) A jacket is discounted by 20%, then sales tax of 10% is added to the discounted price. The final cost is \$88. What was the original price of the jacket?
- ☐ F. \$80 ☐ H. \$100
- ☐ G. \$90 ☐ J. \$110
- 27) What is the domain of $f(x) = \frac{\sqrt{2x-1}}{x-3}$?
- ☐ A. $[\frac{1}{2}, \infty)$ ☐ C. $(-\infty, 3) \cup (3, \infty)$
- ☐ B. $[\frac{1}{2}, 3) \cup (3, \infty)$ ☐ D. $(\frac{1}{2}, \infty)$
- 28) Let $f(x) = 3x^2 - 1$ and $g(x) = x + 3$. What is $f(g(-1))$?
- ☐ F. 3 ☐ H. 15
- ☐ G. 7 ☐ J. 11
- 29) The table gives values of two linear functions f and g . At what x -value do the functions have equal values?

x	$f(x)$	$g(x)$
0	2	14
1	5	12
2	8	10
3	11	8
4	14	6

- ☐ A. 2 ☐ C. 2.4
- ☐ B. 2.2 ☐ D. 2.5
- 30) A data set has first quartile $Q_1 = 11$ and third quartile $Q_3 = 26$. Under the 1.5-IQR rule, which value is above the current upper outlier fence?
- ☐ F. 44 ☐ H. 48
- ☐ G. 46 ☐ J. 50

- 31) What is the exact value of $0.\overline{27} + 0.1\overline{6}$?
- ☐ A. $\frac{7}{22}$ ☐ C. $\frac{5}{11}$
☐ B. $\frac{1}{3}$ ☐ D. $\frac{29}{66}$
- 32) Which expression is equivalent to $\frac{(3x^2y^4)^3}{9x^3y^2}$ for all values where the expression is defined?
- ☐ F. x^3y^{10} ☐ H. $x^3y^{10}/3$
☐ G. $3x^3y^{10}$ ☐ J. x^3y^8
- 33) A spinner has 8 equal sections: 3 red, 2 blue, and 3 green. A game costs \$3 to play. A red result pays \$8, a blue result pays \$3, and a green result pays nothing. What is the expected net gain per game?
- ☐ A. $-\$3$ ☐ C. $\$3.75$
☐ B. $-\$0.25$ ☐ D. $\$0.75$
- 34) A rectangular garden measures 18 feet by 12 feet. A path of uniform width x feet is built around the garden. The garden and path together cover 352 square feet. What is the path width?
- ☐ F. 1 foot ☐ H. 4 feet
☐ G. 3 feet ☐ J. 2 feet
- 35) A fair six-sided die is rolled twice. Given that the first roll is even, what is the probability that the sum of the two rolls is at least 10?
- ☐ A. $\frac{1}{6}$ ☐ C. $\frac{1}{3}$
☐ B. $\frac{2}{9}$ ☐ D. $\frac{4}{9}$
- 36) For $x \neq 2$, the real solutions of $\frac{x+1}{x-2} = x+2$ have what sum?
- ☐ F. 1 ☐ H. 2
☐ G. -5 ☐ J. 5
- 37) Let $f(x) = x^2 - 5x + 6$ and $g(x) = x^2 + 1$. What is the sum of the squares of all real solutions to $f(g(x)) = 0$?
- ☐ A. 4 ☐ C. 6
☐ B. 5 ☐ D. 8
- 38) A triangle has side lengths 13, 14, and 15 units. What is its area?
- ☐ F. 72 ☐ H. 90
☐ G. 84 ☐ J. 96
- 39) A town's population rose by 20% and then fell by 10%, ending at 6,480. What was its original population?
- ☐ A. 5,800 ☐ C. 6,200
☐ B. 6,000 ☐ D. 6,400
- 40) If $\frac{16^{x+1} \cdot 8^{2-x}}{4^{x-1}} = 2^{10}$, what is x ?
- ☐ F. 0 ☐ H. 2
☐ G. 1 ☐ J. 4

- 41) If x is a nonzero real number and $x + \frac{1}{x} = 6$, what is $x^2 + \frac{1}{x^2}$?
- ☐ A. 32 ☐ C. 36
- ☐ B. 34 ☐ D. 38
- 42) How many real solutions does $|2x - 5| + |x + 1| = 5$ have?
- ☐ F. 0 ☐ H. 3
- ☐ G. 1 ☐ J. 2
- 43) From an external point, a tangent to a circle is 15 units long. A secant from the same point has an external segment of 9 units and an internal segment of x units. What is x ?
- ☐ A. 12 ☐ C. 18
- ☐ B. 14 ☐ D. 16
- 44) A component passes inspection with probability 0.4, independently on each trial. If 5 components are inspected, what is the probability that exactly 2 pass?
- ☐ F. 0.2304 ☐ H. 0.3456
- ☐ G. 0.3072 ☐ J. 0.4320
- 45) A 20-foot ladder leans against a vertical wall. The ladder makes a 60° angle with the level ground. The base of the ladder is then moved 4 feet farther from the wall while the top remains against the wall. How high above the ground is the top of the ladder now?
- ☐ A. $10\sqrt{3}$ feet ☐ C. $4\sqrt{21}$ feet
- ☐ B. $2\sqrt{51}$ feet ☐ D. 16 feet

Scratch work

Answer Key and Explanations

1. D Standard: ACT Math: Integrating Essential Skills

Let n = notebooks and p = pencils. We have $n + p = 20$ and $3n + 0.5p = 50$. From the first, $p = 20 - n$. Substituting: $3n + 0.5(20 - n) = 50 \Rightarrow 3n + 10 - 0.5n = 50 \Rightarrow 2.5n = 40 \Rightarrow n = 16$.

2. H Standard: ACT Math: Number & Quantity

We know $\pi > 3$. Multiplying both sides by the positive number 2 keeps the inequality pointing the same way: $2\pi > 2(3) = 6$. So 2π is greater than 6; a decimal approximation is unnecessary. Choice F treats π as exactly 3, while choice J overlooks the comparison we can make from $\pi > 3$.

3. B Standard: ACT Math: Functions

A line with slope 0 is horizontal, so its equation has the form $y = c$. Passing through $(6, -3)$ means $c = -3$. Verify: the point $(6, -3)$ satisfies $y = -3$ (true) and has slope 0 between any two points on this line. The equation is $y = -3$.

4. F Standard: ACT Math: Number & Quantity

Long division begins $5/12 = 0.41$ with remainder 8. Bringing down a zero gives $80 = 12(6) + 8$, so the remainder is 8 again. That same remainder keeps returning, so the digit 6 repeats: $5/12 = 0.41666\dots$

5. A Standard: ACT Math: Number & Quantity

Multiply each component of $\mathbf{u}$ by 2 to get $2\mathbf{u} = \langle 8, -6 \rangle$. Add $\mathbf{v}$ component by component: $\langle 8 + (-2), -6 + 5 \rangle = \langle 6, -1 \rangle$. A vector expression is handled coordinate by coordinate, using the usual rules for signed numbers.

6. J Standard: ACT Math: Statistics & Probability

In the equation $y = mx + b$, the y-intercept b represents the value of y when $x = 0$. For $y = -2.5x + 80$: the slope is -2.5 (rate of change) and the y-intercept is 80 (initial value). When $x = 0$: $y = -2.5(0) + 80 = 80$. The y-intercept represents the initial value when $x = 0$.

7. B Standard: ACT Math: Functions

The statement $f^{-1}(10) = x$ means that $f(x) = 10$. Solve $3x - 5 = 10$: adding 5 gives $3x = 15$, so $x = 5$. Therefore $f^{-1}(10) = 5$.

8. F Standard: ACT Math: Geometry

Apply the scale factor $\frac{1}{2}$ to point $E(6, 8)$ using the rule $(x, y) \rightarrow (kx, ky)$: $E' = (\frac{1}{2} \cdot 6, \frac{1}{2} \cdot 8) = (3, 4)$. The coordinates of E' are $(3, 4)$.

9. B Standard: ACT Math: Functions

Vertex form is $y = (x - h)^2 + k$, with vertex (h, k) . Here $x + 4 = x - (-4)$, so $h = -4$, and the vertical shift is $k = -7$. The vertex is $(-4, -7)$.

10. H Standard: ACT Math: Geometry

Reflection across the line $y = x$ swaps the x and y coordinates. Rule: $(x, y) \rightarrow (y, x)$. Apply to $P(4, -2)$: $P'(-2, 4)$. The coordinates are $(-2, 4)$.

11. B Standard: ACT Math: Integrating Essential Skills

First find the price for one pound: $4.50/3 = \$1.50$. Five pounds at that rate cost $5(1.50) = \$7.50$. The cost rises in the same proportion as the weight.

12. G Standard: ACT Math: Algebra

Multiply each term by 12, the least common denominator: $4(2x - 1) + 3(x + 2) = 60$. This gives $8x - 4 + 3x + 6 = 60$, so $11x = 58$ and $x = 58/11$.

13. C Standard: ACT Math: Integrating Essential Skills

At the start, the tank contains $\frac{3}{4}(20) = 15$ gallons. Traveling 180 miles at 24 miles per gallon uses $180/24 = 7.5$ gallons. Subtract the fuel used from the starting amount: $15 - 7.5 = 7.5$ gallons remain.

14. F Standard: ACT Math: Statistics & Probability

The sample proportion who walk is $18/80 = 0.225$. Applying that proportion to all 400 students gives $0.225(400) = 90$. This is an estimate from the sample, not a guarantee that exactly 90 students walk.

15. B Standard: ACT Math: Statistics & Probability

A positive correlation means the two measured variables tend to increase together. It does not establish that sleep caused the score difference, and it does not mean every student follows the pattern. The second choice states only the association the study supports.

16. G Standard: ACT Math: Geometry

Use the circumference formula $C = 2\pi r$. From $2\pi r = 18\pi$, the radius is $r = 9$ inches. The area is then $A = \pi r^2 = \pi(9)^2 = 81\pi$ square inches. The radius is 9; 18 is the diameter, so squaring 18 would use the wrong measure.

17. C Standard: ACT Math: Integrating Essential Skills

The route is $6(250) = 1,500$ meters, or 1.5 kilometers. Walking that distance at 4.5 kilometers per hour takes $1.5/4.5 = 1/3$ hour, which is 20 minutes. Add the 12-minute break for a total of 32 minutes.

18. H Standard: ACT Math: Algebra

If n tickets are sold, revenue is $14n$ dollars and cost is $240 + 6n$. For revenue to exceed cost, solve $14n > 240 + 6n$, so $8n > 240$ and $n > 30$. The least whole number that works is 31.

19. C Standard: ACT Math: Algebra

Distribute the 4 to get $4x - 8 = 3x + 5$. Subtract $3x$ from both sides, leaving $x - 8 = 5$. Adding 8 gives $x = 13$. Substitution confirms that both sides equal 44.

20. F Standard: ACT Math: Geometry

The x -coordinate stays -3 , while the y -coordinate changes from 4 to -4 . That is exactly the rule for reflecting over the x -axis, $(x, y) \rightarrow (x, -y)$. So the transformation could be reflection over the x -axis.

21. D Standard: ACT Math: Algebra

Let L be the larger number and S be the smaller number. The system is $L + S = 28$ and $3L - 2S = 34$. Substitute $S = 28 - L$ into the second equation: $3L - 2(28 - L) = 34$. Then $5L - 56 = 34$, so $5L = 90$ and $L = 18$.

22. F Standard: ACT Math: Algebra

Let the roots be r and s . Their sum is 8, and $|r - s| = 2$. Since $(r - s)^2 = (r + s)^2 - 4rs$, we have $4 = 64 - 4k$. Solving gives $k = 15$. The roots are 3 and 5, which confirms the condition.

23. C Standard: ACT Math: Geometry

The remaining leg is $\sqrt{17^2 - 8^2} = \sqrt{225} = 15$. Since θ is opposite the leg of length 8, the adjacent leg has length 15. Cosine is adjacent over hypotenuse, so $\cos \theta = 15/17$.

24. G Standard: ACT Math: Geometry

A cube has the same measurement in all three dimensions. To find how much space it holds, multiply its side length by itself three times: $7 \cdot 7 \cdot 7 = 343$. The unit is cubic feet because the multiplication uses length in three dimensions. The volume is 343 ft^3 .

25. A Standard: ACT Math: Integrating Essential Skills

The room measures 14 feet by 16 feet, so it has area 224 square feet. Eighteen boxes cover only 216 square feet, so 19 boxes are needed. At \$48 each, the total is $19(48) = \$912$.

26. H Standard: ACT Math: Integrating Essential Skills

If the original price is p , the discounted price is $0.80p$, and the taxed total is $1.10(0.80p) = 88$. Thus $0.88p = 88$, so $p = 100$. The discount and tax apply in sequence, so their percentages should not simply be added.

27. B Standard: ACT Math: Functions

The square root requires $2x - 1 \geq 0$, so $x \geq \frac{1}{2}$. The denominator also requires $x \neq 3$. Combine those restrictions: include $\frac{1}{2}$, leave out 3, and keep every larger value.

28. J Standard: ACT Math: Functions

In a composition, evaluate the inside function first. Here, $g(-1) = -1 + 3 = 2$, so the expression becomes $f(2)$. Substitute 2 into f : $f(2) = 3(2^2) - 1 = 12 - 1 = 11$. The composition is 11.

29. C Standard: ACT Math: Functions

The f -values rise by 3 each time, so $f(x) = 2 + 3x$. The g -values fall by 2 each time, so $g(x) = 14 - 2x$. Set them equal: $2 + 3x = 14 - 2x$, which gives $5x = 12$ and $x = 2.4$.

30. J Standard: ACT Math: Statistics & Probability

The interquartile range is $26 - 11 = 15$. The upper outlier fence is $Q_3 + 1.5(\text{IQR}) = 26 + 22.5 = 48.5$. A value must be greater than 48.5 to qualify, so 50 is the only listed high outlier.

31. D Standard: ACT Math: Number & Quantity

The repeating decimal $0.\overline{27}$ is $27/99 = 3/11$, and $0.\overline{16} = 1/6$. With denominator 66, their sum is $18/66 + 11/66 = 29/66$.

32. G Standard: ACT Math: Algebra

Simplify the numerator using the power of a product rule: $(3x^2y^4)^3 = 3^3 \cdot (x^2)^3 \cdot (y^4)^3 = 27x^6y^{12}$. Now divide by the denominator: $\frac{27x^6y^{12}}{9x^3y^2} = \frac{27}{9} \cdot \frac{x^6}{x^3} \cdot \frac{y^{12}}{y^2} = 3x^3y^{10}$. The equivalent expression is $3x^3y^{10}$.

33. D Standard: ACT Math: Statistics & Probability

The expected prize is $\frac{3}{8}(8) + \frac{2}{8}(3) + \frac{3}{8}(0) = \3.75 . Subtract the \$3 entry fee, and the expected net gain is \$0.75 per game. That is a long-run average, not a promise about any one spin.

34. J Standard: ACT Math: Integrating Essential Skills

The outside dimensions are $18 + 2x$ and $12 + 2x$, so $(18 + 2x)(12 + 2x) = 352$. Expanding and dividing by 4 gives $x^2 + 15x - 34 = 0$, which factors as $(x + 17)(x - 2) = 0$. Width cannot be negative, so $x = 2$ feet.

35. B Standard: ACT Math: Statistics & Probability

Once the first roll is known to be even, there are $3(6) = 18$ equally likely ordered outcomes. If the first roll is 2, no second roll makes the sum at least 10. If it is 4, only 6 works. If it is 6, the second roll can be 4, 5, or 6. That gives 4 favorable outcomes, so the probability is $4/18 = 2/9$.

36. F Standard: ACT Math: Algebra

Multiply by $x - 2$ to get $x + 1 = (x + 2)(x - 2) = x^2 - 4$, so the equation becomes $x^2 - x - 5 = 0$. Its two roots have sum 1 by Vieta's formula. Neither root is the excluded value 2, so both count.

37. C Standard: ACT Math: Functions

Factor $f(u) = u^2 - 5u + 6 = (u - 2)(u - 3)$. Thus $g(x)$ must equal 2 or 3. The first equation gives $x = \pm 1$, and the second gives $x = \pm\sqrt{2}$. The sum of their squares is $1 + 1 + 2 + 2 = 6$.

38. G Standard: ACT Math: Geometry

Drop an altitude to the side of length 14, splitting it into lengths a and $14 - a$. The two right triangles give $a^2 + h^2 = 13^2$ and $(14 - a)^2 + h^2 = 15^2$. Subtracting the equations gives $196 - 28a = 56$, so $a = 5$ and $h = 12$. The area is $\frac{1}{2}(14)(12) = 84$ square units.

39. B Standard: ACT Math: Integrating Essential Skills

Let the starting population be p . The two changes multiply it by 1.20 and then 0.90, so $1.20(0.90)p = 6,480$. Since the combined multiplier is 1.08, $p = 6,480/1.08 = 6,000$.

40. H Standard: ACT Math: Number & Quantity

Rewrite each base as a power of 2. The exponent on the left becomes $4(x + 1) + 3(2 - x) - 2(x - 1) = 12 - x$. Thus $2^{12-x} = 2^{10}$, so $12 - x = 10$ and $x = 2$.

41. B Standard: ACT Math: Algebra

Square the given relationship: $(x + 1/x)^2 = x^2 + 2 + 1/x^2 = 36$. Subtract 2 to obtain $x^2 + 1/x^2 = 34$. The nonzero condition makes the reciprocal terms valid.

42. J Standard: ACT Math: Functions

The expressions change sign at $x = -1$ and $x = 5/2$. For $-1 \leq x \leq 5/2$, the left side simplifies to $6 - x$, giving $x = 1$, which is in that interval. For $x < -1$ it is $4 - 3x$, whose equation gives $x = -1/3$, outside the interval. For $x > 5/2$ it is $3x - 4$, giving $x = 3$, which is valid. There are two solutions.

43. D Standard: ACT Math: Geometry

By the tangent-secant theorem, $15^2 = 9(9 + x)$. Thus $225 = 81 + 9x$, so $144 = 9x$ and $x = 16$. The full secant length is $9 + x$, which is why the external segment appears twice in the product.

44. H Standard: ACT Math: Statistics & Probability

Choose which 2 of the 5 components pass, giving $\binom{5}{2} = 10$ patterns. Each pattern has probability $(0.4)^2(0.6)^3 = 0.03456$. Multiplying by 10 gives 0.3456. The factor of 10 counts the different positions of the two passing components.

45. B Standard: ACT Math: Integrating Essential Skills

Initially, the ladder is the hypotenuse of a right triangle. Since it makes a 60° angle with the ground, its horizontal distance from the wall is $20 \cos 60^\circ = 10$ feet. Moving the base 4 feet farther makes the new horizontal leg 14 feet, while the ladder remains 20 feet long. If the new height is h , then $h^2 + 14^2 = 20^2$, so $h = \sqrt{204} = 2\sqrt{51}$ feet.