

# **SAT and ACT Combo Test: Answer Explanations**

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## Section 3 – ACT Math Test

15 minutes, 15 questions

1. Create a fraction in the form  $\frac{\text{favorable outcomes}}{\text{total possible outcomes}}$  to calculate probability. This case offers one favorable outcome: that Louis is selected. The total number of possible outcomes is 12 because 12 members of the committee could be selected. **The correct answer is D.**
2. Follow the order of operations:  
 $|9(-2) + 3| = |-18 + 3| = |-15| = 15.$   
**The correct answer is J.**
3.  $3x = -2(x + 1) + 6$   
 $3x = -2x - 2 + 6$   
 $3x = -2x + 4$   
 $5x = 4$   
 $x = \frac{4}{5}.$  **The correct answer is A.**
4. Use the slope formula  $m = \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{-3 - 1}{3 - 1} = \frac{-4}{2}.$   
Plug the slope and either of the points into point-slope form, then solve for y:  
 $y - y_1 = m(x - x_1)$   
 $y - 1 = -2(x - 1)$   
 $y - 1 = -2x + 2$   
 $y = -2x + 3$   
The resulting equation is in slope-intercept form, and you can see that the y-intercept is 3.  
**The correct answer is J.**
5. Use SOHCAHTOA to find the following about  $\angle R$ :  $\sin R = \frac{24}{25}$ ;  $\cos R = \frac{7}{25}$ ;  $\tan R = \frac{24}{7}.$   
**The correct answer is A.**
6. Notice that the slope of this line is negative, so cross off F. Notice that the y-intercept is 10, so cross off K. To find the final answer, select two lattice points, such as (0, 10) and (4, 0) and use the slope formula  
 $\frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 10}{4 - 0} = \frac{-10}{4}.$   
**The correct answer is H.** (Do NOT use the grid to count out rise and run because the x and y axes do not have equal intervals. If you try this method, you will fall for the trap answer of J.)
7. Factor the numerator and denominator, then cancel common factors:  
 $\frac{(x^2 + x - 6)(x^2 + 1)}{(x^4 - 3x^2 - 4)} =$   
 $\frac{(x + 3)(x - 2)(x^2 + 1)}{(x^2 - 4)(x^2 + 1)} =$   
 $\frac{(x + 3)(x - 2)(x^2 + 1)}{(x + 2)(x - 2)(x^2 + 1)} = \frac{(x + 3)}{(x + 2)}$   
**The correct answer is B.**
8. Use the distance formula to find the length of this segment. Use (0,500) and (100,0) for the endpoints.  
 $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} =$   
 $\sqrt{(100 - 0)^2 + (0 - 500)^2} =$   
 $\sqrt{260000} \approx 510$   
**The correct answer is J.**

9. The formula Joy is using will give her the area of the triangle formed by  $\overline{BC}$  and the x- and y-axes. You can see that the shaded area is a little smaller than the triangle.

**The correct answer is D.**

10. Solve this problem by Backtracking. Check each option one by one until you find the correct answer.

F. Cube the smallest and largest 1-digit numbers:  $1^3 = 1$  and  $9^3 = 729$ . Neither of these are 5-digit numbers, so eliminate F.

G. Cube the smallest and largest 2-digit numbers:  $10^3 = 1000$  and  $99^3 = 970229$ .

These answers are 4- and 6-digit numbers, respectively. Logically, all cubes with 5 digits must fall in this category.

**The correct answer is G**, so you do not need to check the other options.

11. These two angles form a linear pair, so they will add up to  $180^\circ$ . Set up the following equation to solve for  $a$ :

$$10a + 3 + 24a - 10 = 180$$

$$34a - 7 = 180$$

$$34a = 187$$

$$a = 5.5$$

Substitute  $a = 5.5$  into the expression for the larger angle:  $24(5.5) - 10 = 122$ .

**The correct answer is D.**

12. First, determine whether  $\sin\alpha$  is positive or negative. Angles in QIII always have a negative sine, so eliminate J and K. (Many students use the mnemonic “All Students Take Calc” to remember the signs of the trig functions in the different quadrants.) Second, draw a line from  $(-4, -3)$  to the x axis to form a reference triangle with reference angle  $\beta$ . Label the horizontal side of this triangle 4 and the vertical side 3. By the Pythagorean Theorem, the hypotenuse will be 5. Now you can see that  $\sin\beta = \frac{3}{5}$ . Put that together with your first step, and you know  $\sin\alpha = -\frac{3}{5}$ .

**The correct answer is H.**

13. To start this problem, label the missing sides of the figure.

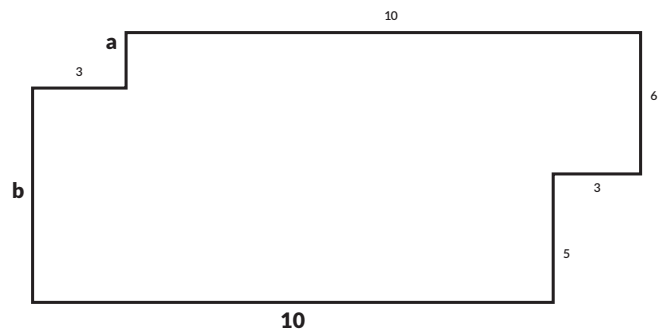


FIGURE NOT DRAWN TO SCALE

It's not possible to know exactly what  $a$  and  $b$  are, but we can see by adding up the vertical sides on the right that  $a + b = 5 + 6 = 11$ . Finally, add up all the sides to find the perimeter:

$$10 + 6 + 3 + 5 + 10 + b + 3 + a = 48.$$

**The correct answer is E.**

14. To simplify this expression, multiply both the numerator and denominator by the conjugate of the denominator:

$$\frac{i}{i + \sqrt{2x}} \cdot \frac{i - \sqrt{2x}}{i - \sqrt{2x}} = \frac{i^2 - i\sqrt{2x}}{i^2 - 2x} = \frac{-1 - i\sqrt{2x}}{-1 - 2x} = \frac{1 + i\sqrt{2x}}{1 + 2x}$$

**The correct answer is J.**

15. Because the question does not give the actual heights of the plants, use the Number Picking strategy. Any number will work, but 10 is a good choice because it makes the calculations easier. Set up a quick table to keep track of your calculations:

Day	Height
5	10
10	
15	

Height increased 20% from day 5 to day 10, so the height at day 10 =  $10(1.2) = 12$ .

Height increased 25% increase from day 10 to day 15, so at day 15 =  $12(1.25) = 15$ .

Finally, compare the heights on days 5 and 15 using the formula

$$\%change = \frac{|old - new|}{old} \times 100\%$$

$$\frac{|10 - 15|}{10} \times 100\% = 50\%$$

**The correct answer is D.**