

Date Completed: \_\_\_\_\_

Mentor Initials: \_\_\_\_\_

A mentor can change everything.



## Strategies (All)

1. What is the value of the expression  $a^2 + 2a + 2ab + 2b + b^2$  when  $a + b = 25$  ?  
A) 25  
B) 625  
C) 675  
D) 2600
2. Which of the following  $(x, y)$  pairs is a solution to the equations  $x - y = 7$  and  $4x - y = 46$ ?  
A) (6, 13)  
B) (7, 14)  
C) (13, 6)  
D) (14, 7)
3. Heading into the last test of the semester, Julian had scored 78, 91, 64, and 95 on the previous four exams. After the last test, Julian had an overall test average somewhere in the B range (80% – 89%) for the semester. Which of the following could NOT have been the score of his final exam?  
A) 68  
B) 72  
C) 95  
D) 100
4. If  $a$  is an odd integer and  $b$  is an even integer, then which of the following produces an odd integer?  
A)  $2a + b$   
B)  $2a - b$   
C)  $ab$   
D)  $3a - b$
5. A function  $f(x)$  is defined as  $f(x) = 4^{5x-7}$ . What is  $x$  when  $f(x) = 64$ ?  
A) 2  
B) 3  
C) 4  
D) 5

6. In the  $xy$ -plane, line  $y$  has slope  $\frac{2}{5}$ , and line  $z$  has slope  $\frac{5}{2}$ . Both lines contain the point  $(0,0)$ . For which of these lines is  $y < x$  for all negative values of  $x$  ?

I. Line  $y$

II. Line  $z$

- A) I only  
B) II only  
C) I and II  
D) Neither I nor II
7. Given  $h > j$  and  $(h + j) < (h^2 - j^2)$ , then  $(h - j)$  must be:  
A) less than 1.  
B) greater than 1.  
C) greater than  $(h + j)$ .  
D) equal to  $(h + j)$ .

8.  $x^2 - 2x - 4 = 0$

What is a solution to the given equation?

- A)  $-2 + \sqrt{10}$   
B)  $-1 + \sqrt{5}$   
C)  $1 + \sqrt{5}$   
D)  $2 + \sqrt{10}$
9. At the beginning of a certain year, the price of a restaurant's burger was \$12. By the end of that year, the price had increased by  $q\%$ . Which expression represents the price of the restaurant's burger, in dollars, at the end of that year?  
A)  $12 + q$   
B)  $12(1 + q)$   
C)  $(12q)(100)$   
D)  $12\left(1 + \frac{q}{100}\right)$

10. The polynomial  $81x^2 + 27x - 10$  is equivalent to the product of  $(9x + 5)$  and which of the following binomials?
- A)  $(-9x - 9)$
  - B)  $(-9x - 2)$
  - C)  $(9x + 2)$
  - D)  $(9x - 2)$
11. A line contains the points  $A, B, C,$  and  $D$ . Point  $D$  is between points  $A$  and  $B$ . Point  $C$  is between points  $D$  and  $B$ . Which of the following inequalities must be true about the lengths of these segments?
- A)  $BC < CD$
  - B)  $CD < BC$
  - C)  $AB < DB$
  - D)  $DB < AB$

12. 
$$\frac{x^2(x-4)-16(x-4)}{x^2-8x+16}$$

If  $x > 4$ , which of the following expressions is equivalent to the given expression?

- A)  $x + 4$
  - B)  $(x + 4)(x - 4)$
  - C)  $(x - 4)^2$
  - D)  $(x + 4)^2$
13. In a right triangle, one angle measures  $x^\circ$ , and  $\sin x^\circ = \frac{3}{5}$ . What is  $\cos(90 - x^\circ)$ ?
- A)  $\frac{2}{5}$
  - B)  $\frac{3}{5}$
  - C)  $\frac{3}{4}$
  - D)  $\frac{4}{5}$

14.  $x^2 + b = 0$

In the quadratic equation shown,  $b$  is a constant. For which of the following values of  $b$  will the equation have one real solution?

- A)  $-4$
- B)  $-2$
- C)  $0$
- D)  $2$

15. The side of a square is  $t$  feet longer than the side of a second square. How many feet longer is the diagonal of the first square than the diagonal of the second square?

- A)  $\sqrt{2}t$
- B)  $2t$
- C)  $4t$
- D)  $t^2$

16. A circle in the  $xy$ -plane intersects the  $y$ -axis at  $(0,8)$  and  $(0,-8)$ . The radius of the circle is 10 coordinate units. Which of the following could be the center of the circle?

- I.  $(-6, 0)$
- II.  $(0, 0)$
- III.  $(6, 0)$

- A) I only
- B) II only
- C) III only
- D) I and III only