

# SAT Prep

## Advanced Math 3



# CONCEPTS

# QUESTIONS

1. If  $x - 3$  is a factor of the expression  $x^2 + kx + 12$ , what is the value of  $k$ ?
- A. -7
  - B. -5
  - C. 5
  - D. 7



# QUESTIONS

2. If the equation of a circle is given by  $(x - 3)^2 + (y + 5)^2 + 75 = 100$ , then what is the radius of the circle?



# QUESTIONS

3. What is the radius of a circle with the equation  $x^2 + y^2 - 6x - 8y - 75 = 0$ ?



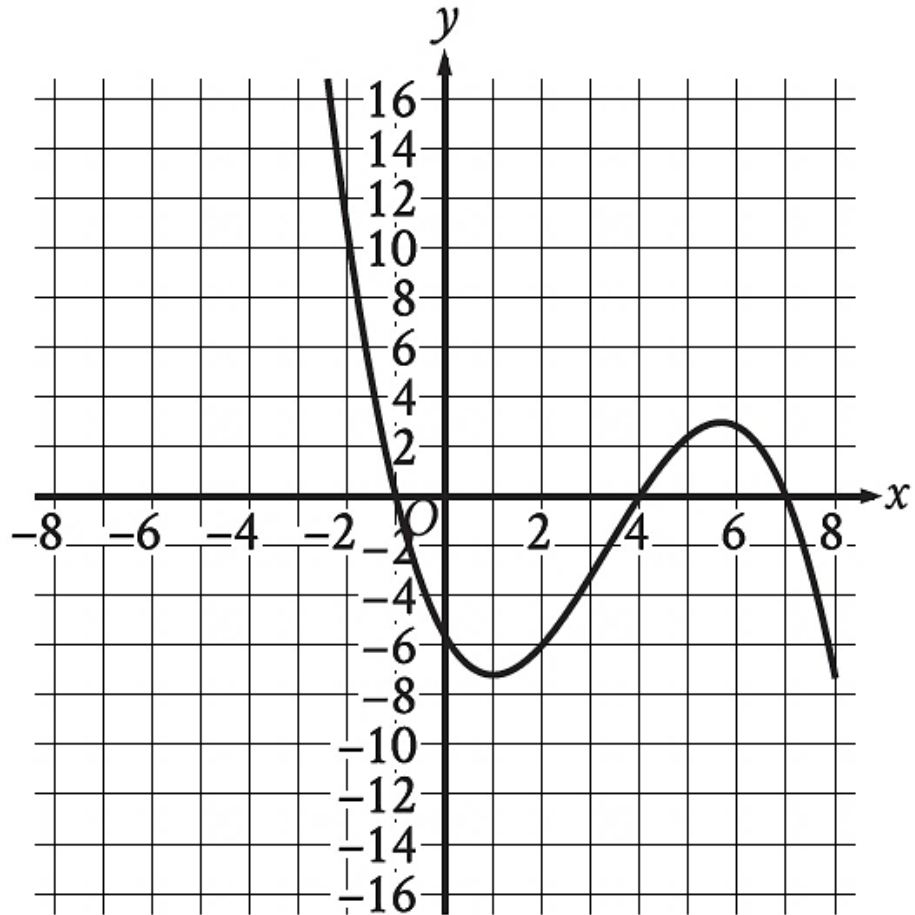
# QUESTIONS

4. A circle in the  $xy$ -plane has a diameter with endpoints  $(-1,4)$  and  $(-1,10)$ . What is the  $y$ -coordinate of the centre of the circle?



# QUESTIONS

5



The graph of  $y = f(x)$  is shown, where the function is defined by  $f(x) = ax^3 + bx^2 + cx + d$  and  $a$ ,  $b$ ,  $c$ , and  $d$  are constants. If  $f(x) + k$  graph has only one  $x$ -intercept, then the value of  $k$  can lie between?

- A. 2 and 4
- B. 4 and 6
- C. 5 and 7
- D. 6 and 8

# QUESTIONS

6. The parabola  $y = -x^2 + 5x + 6$  is intersected by the line  $y = -\frac{1}{2}x + 12$ . What is the y-coordinate of the intersection closest to the x-axis?





# QUESTIONS

7. The graph of the function  $f$  in the  $xy$ -plane crosses the  $x$ -axis at  $-4$ ,  $2$ , and  $5$ . Which of the following could define  $f$ ?

A.  $f(x) = (x - 2)^2(x - 5)$

B.  $f(x) = (x^2 + 2x - 8)(3x - 15)$

C.  $f(x) = (x^2 - 7x + 10)(x - 4)$

D.  $f(x) = (x - 4)(x + 2)(x + 5)$



# QUESTIONS

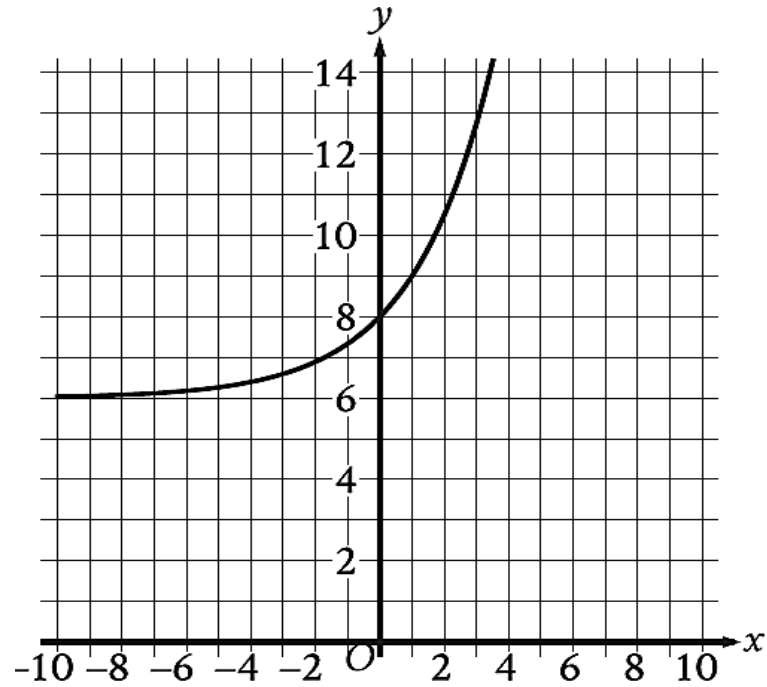
8. In the  $xy$ -plane, the graph of the line  $y = \frac{15}{4}$  intersects the graph of the equation  $y = x^2 + x$  at two points. What is the distance between these two points?

- A.  $\frac{3}{2}$
- B.  $\frac{5}{2}$
- C.  $\frac{15}{4}$
- D. 4



# QUESTIONS

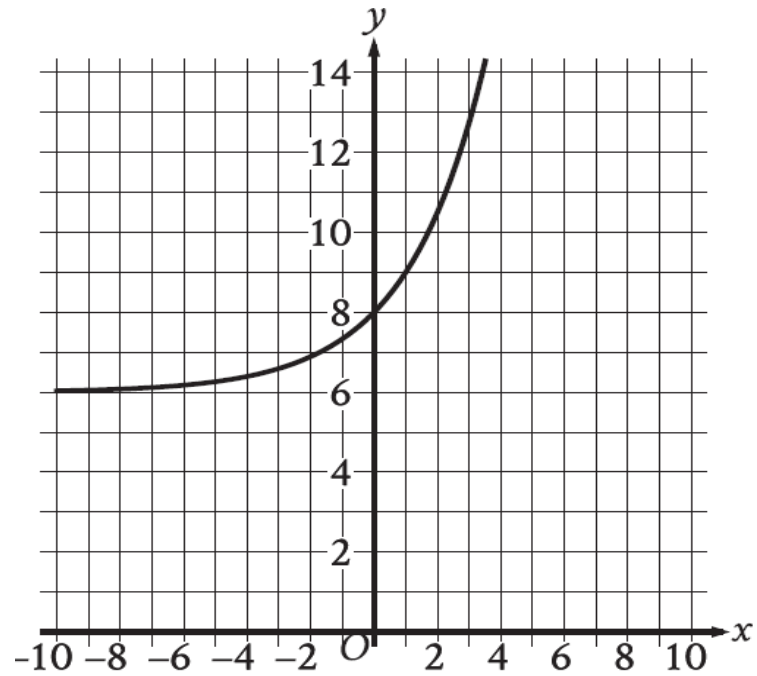
9.



The graph of  $y = f(x)$  is shown. What is the y-intercept of  $-f(x) + 3$  ?

# QUESTIONS

10.



The graph of  $y = f(x)$  is shown. What is the y-intercept of  $f(-x) + 3$  ?

# QUESTIONS

11. The function  $f$  is given as  $f(x) = 3x - 5$ . Which table of values represents  $y = f(x) - 3$ ?

A.

x	y
-6	-26
-5	-8
4	1

B.

x	y
-6	-3
-5	-3
4	4

C.

x	y
-6	-26
-5	-23
4	4

D.

x	y
-6	-3
-5	-23
4	3

# QUESTIONS

12. One of the factors of  $f(x) = 2x^3 + 32x^2 + 120x$  is  $x + k$ , where  $k$  is a positive constant. What is the smallest possible value of  $k$ ?



# QUESTIONS

13.  $y = -1.5$   
 $y = x^2 + 8x + a$

In the given system of equations,  $a$  is a positive constant. The system has exactly one distinct real solution. What is the value of  $a$ ?



# QUESTIONS

14. For the function  $h$ , the value  $h(x)$  increases by 35% for every increase in the value of  $x$  by 2. If  $h(0) = 20$ , which equation defines  $h$ ?

A.  $h(x) = 20(1.35)^{2x}$

B.  $h(x) = 20(1.35)^{x/2}$

C.  $h(x) = 1.35(20)^{2x}$

D.  $h(x) = 20(0.35)^{2x}$





# QUESTIONS

15.  $p(t) = 1000(3)^{t/2}$

The growth of a certain kind of bacteria is observed and its population growth,  $p$ ,  $t$  days from the first observation, is modeled by the function above. By how much does the bacterial population increase from  $t = 4$  to  $t = 6$ ?

- A. 18,000
- B. 16,000
- C. 15,000
- D. 14,000



# QUESTIONS

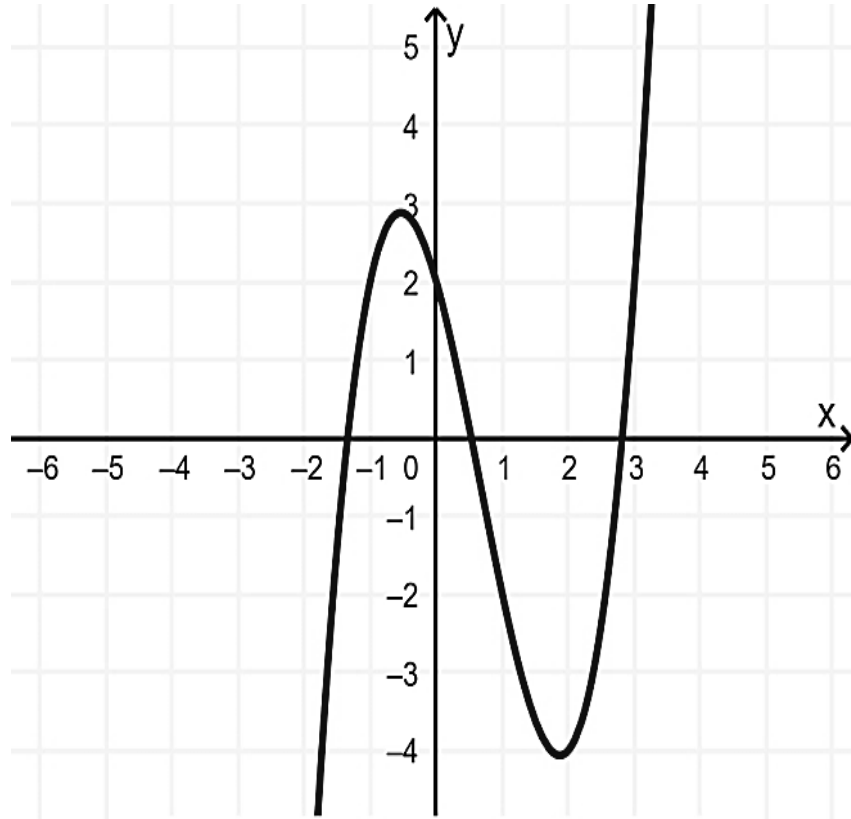
16. A bacteria population,  $P$ , can be modelled by the equation  $P = P_0(3)^{0.2t}$ , where  $P_0$  is the bacteria population at the beginning of the experiment and  $t$  is the time in hours since the beginning of the experiment. How much time, in minutes, does it take for the bacteria population to become 9 times of  $P_0$  ?

- A. 1
- B. 60
- C. 10
- D. 600



# QUESTIONS

17.



$$f(x) = x^3 - 2x^2 - 3x + 2$$

In the  $xy$ -plane, the graph of  $y = f(x)$  is the result of translating the graph of  $y = g(x)$  down 5 units.

What is the value of  $g(0) + 1$  ?

- A. -3
- B. -2
- C. 2
- D. 8

# QUESTIONS

18.  $f(x) = -m^x + n$ , where  $m$  and  $n$  are constants. In the  $xy$ -plane, the graph of  $y = f(x) - 3$  has a  $y$ -intercept at  $(0, -\frac{25}{3})$ . If  $m + n = 20$ , what is the value of  $m$ ?



# QUESTIONS

19. What is the remainder when the expression  $x^3 + 3x^2 + 4x + 5$  is divided by  $x - 1$  ?



# QUESTIONS

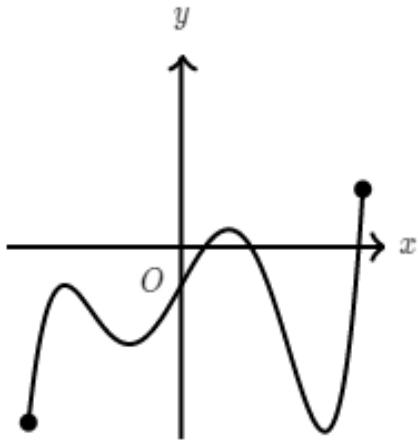
20. For a polynomial  $q(y)$ , the value of  $q(-4)$  is 5. Which of the following is true about  $q(y)$ ?
- A.  $y - 5$  is a factor of  $q(y)$ .
  - B.  $y + 1$  is a factor of  $q(y)$ .
  - C. The remainder when  $q(y)$  is divided by  $y - 5$  is  $-4$ .
  - D. The remainder when  $q(y)$  is divided by  $y + 4$  is 5.



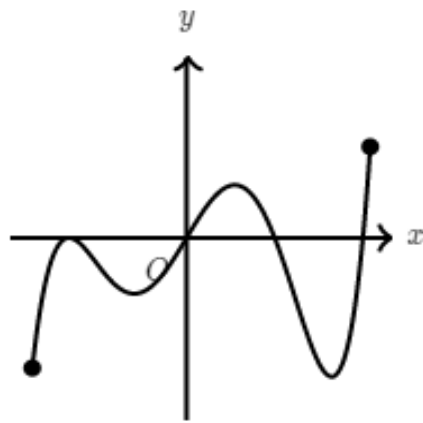
# QUESTIONS

21. If the function  $f$  has four distinct zeros, which of the following could represent the complete graph of  $f$  in the  $xy$ -plane?

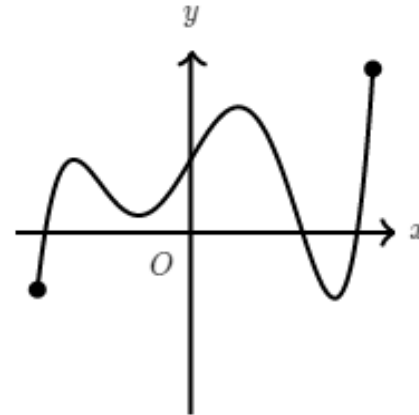
A.



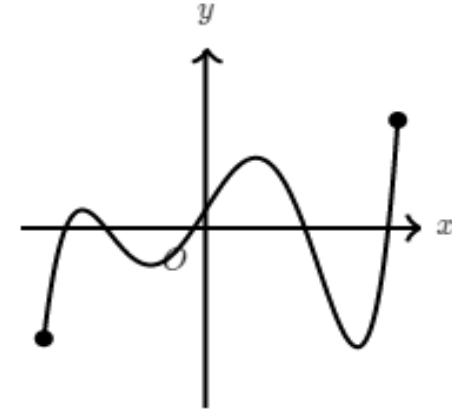
B.



C.



D.





*Thank you*