IML – FANAR **ANNÉE SCOLAIRE: 2019-2020**

Nom et prénom : **Octobre 2019**

SAT

No Calculator

1. Which of the following equations has a vertex of (3, -3)?

- A. $y = 5(x - 3)^2 - 3$
- B. $y = 5(x + 3)^2 - 3$
- C. $y = 5(x - 3)^2 + 3$
- D. $y = 5(x + 3)^2 + 3$

2. A beverage store charges a base price of x dollars for one keg of root beer. A sales tax of a certain percentage is applied to the base price, and an untaxed deposit for the keg is added. If the total amount, in dollars, paid at the time of purchase for one keg is given by the expression $1.07x + 17$, then what is the sales tax, expressed as a percentage of the base price?

- A. 0.07%
- B. 1.07%
- C. 7%
- D. 17%

3- What is the equation of a line that contains the point (1, 6) and has a y-intercept of 4 ?

- A. $y = 1/2x + 4$
- B. $y = x + 4$
- C. $y = 2x + 4$
- D. $y = 4x + 2$

4. The number of bonus points, $B(p)$, that a credit card holder receives is given by the function $B(p) = 4p + 7$, where p represents the number of purchases made. If the number of purchases is increased by 3, by how much does the number of bonus points increase?

- A. 3
- B. 4
- C. 12
- D. 19

5. Jeff tests how the total volume occupied by a fluid contained in a graduated cylinder changes when round marbles of various sizes are added. He found that the total volume occupied by the fluid, *V*, in cubic centimeters, can be found using the equation below, where *x* equals the number of identical marbles Jeff added, one at a time, to the cylinder, and *r* is the radius of one of the marbles.

$$V = 24\pi + x\left(\frac{4}{3}\pi r^3\right)$$

If the volume of the graduated cylinder is 96π cubic centimeters, then, what is the maximum number of marbles with a radius of 3 centimeters that Jeff can add without the volume of the fluid exceeding that of the graduated cylinder?

- A. 1
- B. 2
- C. 3
- D. 4

6. If *b* is two more than one-third of *c*, which of the following expresses the value of *c* in terms of *b* ?

- A. $c = \frac{b-2}{3}$
- B. $c = \frac{b+2}{3}$
- C. $c = 3(b - 2)$
- D. $c = 3(b - 6)$

7. The rotation rate of a mixing blade, in rotations per second, slows as a liquid is being added to the mixer. The blade rotates at 1,000 rotations per second when the mixer is empty. The rate at which the blade slows is four rotations per second less

than three times the square of the height of the liquid. If h is the height of liquid in the mixer, which of the following represents $R(h)$, the rate of rotation?

- A. $4 - 9h^2$
- B. $1{,}000 - (4 - 3h)$
- C. $1{,}000 - (9h - 4)$
- D. $1{,}000 - (3h^2 - 4)$

8. A dental hygiene company is creating a new 24-ounce tube of toothpaste by combining its most popular toothpastes, Cavity Crusher and Bad Breath Obliterator. Cavity Crusher contains 0.25% of sodium fluoride as its active ingredient, and Bad Breath Obliterator contains 0.30% of triclosan as its active ingredient for a total of 0.069 ounces of active ingredients in both toothpastes. Solving which of the following systems of equations yields the number of ounces of Cavity Crusher, c, and the number of ounces of Bad Breath Obliterator, b, that are in the new toothpaste?

- A. $c + b = 0.069$
  $0.25c + 0.3b = 24$
- B. $c + b = 24$
  $0.0025c + 0.003b = 0.069$
- C. $c + b = 24$
  $0.025c + 0.03b = 0.069$
- D. $c + b = 24$
  $0.25c + 0.3b = 0.069$

9. $$\frac{2d^2 - d - 10}{d^2 + 7d + 10} = \frac{d^2 - 4d + 3}{d^2 + 2d - 15}$$

In the equation above, what is the value of d ?

- A. -4
- B. 2
- C. 4
- D. 6

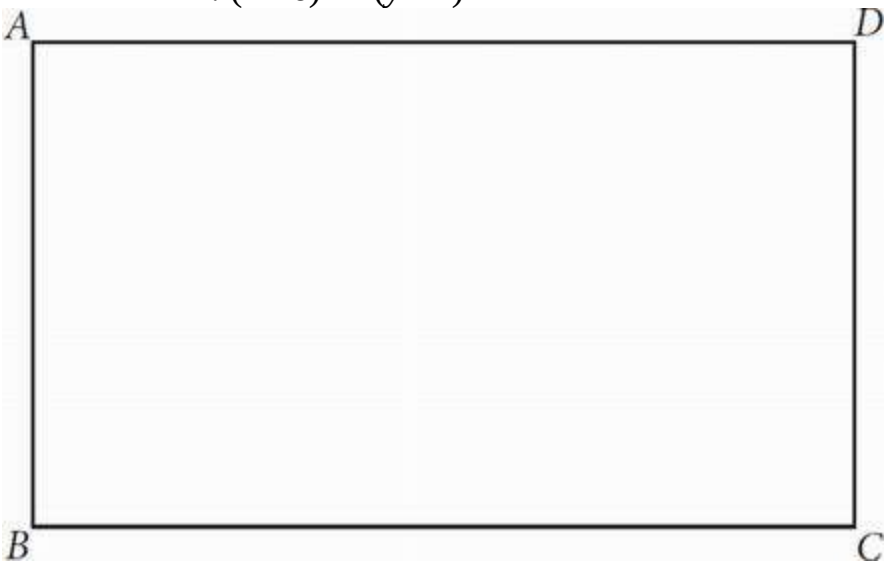
10. Which of the following is a possible equation for a circle that is tangent to both the x-axis and the line $x = 4$?

A. $(x + 2)^2 + (y + 2)^2 = 4$

B. $(x + 2)^2 + (y - 2)^2 = 4$

C. $(x - 2)^2 + (y + 4)^2 = 4$

D. $(x - 6)^2 + (y - 2)^2 = 4$



11.If rectangle *ABCD* has an area of 324 and the tangent of $\angle BCA$ (not shown) is $\frac{4}{9}$, then which of the following is closest to the length of *BD* (not shown)?

A. 9.8

B. 27

C. 29.5

D. It cannot be determined from the given information.

12. Which of the following is equivalent to $\frac{2m + 6}{4} \times \frac{6m - 36}{3m + 9}$?

A. $\frac{12m^2 - 216}{12m + 36}$

B. $\frac{8m - 30}{3m + 13}$

C. $\frac{m - 6}{4}$

D. $m - 6$

13. If $a^{b} = 4$, and $3b = 2$, what is the value of a ?

14. $4x + 2y = 24$ and $\frac{7y}{2x} = 7$, what is the value of x ?

15. If $\frac{x^2 + x - 6}{x^2 - 8x + 12} = 4$, what is the value of x ?

16. If $-1 \leq a \leq 2$ and $-3 \leq b \leq 2$, what is the greatest possible value of $(a + b)(b - a)$?

Calculator

1. If 7 times a number is 84, what is 4 times the number?

- A. 16
- B. 28
- C. 48
- D. 56

2. If $3x = 12$, what is the value of $\frac{24}{x}$?

- A. $\frac{1}{6}$

B. $\frac{2}{3}$

C. 4

D. 6

3. If $\sqrt{x} + 22 = 38$, what is the value of x ?

A. 4

B. 16

C. 32

D. 256

4. If each number in the following sum were increased by t, the new sum would be 4.22. What is the value of t ?

$$\begin{array}{r} 0.65 \\ 0.85 \\ 0.38 \\ +\ 0.86 \\ \hline 2.74 \end{array}$$

A. 0.24

B. 0.29

C. 0.33

D. 0.37

5. If $4^x \cdot n^2 = 4^{x+1} \cdot n$ and x and n are both positive integers, what is the value of n ?

A. 2

B. 4

C. 6

D. 8

6. If $x + 6 > 0$ and $1 - 2x > -1$, then x could equal each of the following EXCEPT

A. -6

B. -4

C. 0

D. $\frac{1}{2}$

7. If $\frac{2x}{x^2+1} = \frac{2}{x+2}$, what is the value of x ?

A. $-\frac{1}{4}$

B. $\frac{1}{2}$

C. 0

D. 2

8. If the product of x and y is 76, and x is twice the square of y, which of the following pairs of equations could be used to determine the values of x and y ?

A. $xy = 76$
$x = 2y^2$

B. $xy = 76$
$x = (2y)^2$

C. $x + y = 76$
$x = 4y^2$

D. $xy = 76$
$x = 2y$

9. If $-6 < -4r + 10 \leq 2$, what is the least possible value of $4r + 3$?

A. 2

B. 5

C. 8

D. 11

10. How many solutions exist to the equation $|x| = |2x - 1|$?

A. 0

B. 1

C. 2

D. 3

11. The sum of three numbers, *a*, *b*, and *c*, is 400. One of the numbers, *a*, is 40 percent less than the sum of *b* and *c*. What is the value of $b + c$?

A. 40

B. 60

C. 150

D. 250

12. The length of a certain rectangle is twice the width. If the area of the rectangle is 128, what is the length of the rectangle?

A. 4

B. 8

C. 16

D. $21\frac{1}{3}$

13. If $xy < 0$, which of the following must be true?
I. $x + y = 0$
II. $2y - 2x < 0$
III. $x^2 + y^2 > 0$

A. I only

B. III only

C. I and III

D. II and III

14. If $\frac{\sqrt{x}}{2} = 2\sqrt{2}$, what is the value of x ?

A. 4

B. 16

C. $16\sqrt{2}$

D. 32

15. If $y = 3^x$ and x and y are both integers, which of the following is equivalent to $9^x + 3^{x+1}$?

A. y^3

B. $3y + 3$

C. $y(y + 3)$

D. $y^2 + 3$

SUBMIT