Questions 1-9 Calculator Active

1.

$$(x^2 - 3) - (-3x^2 + 5)$$

Which of the following expressions is equivalent to the one above?

A) $4x^2 - 8$

B) $4x^2 - 2$

C) $-2x^2 - 8$

D) $-2x^2 - 2$

2.

In the equation $(ax + 3)^2 = 36$, a is a constant. If $x = -3$ is one solution to the equation, what is a possible value of a ?

A) -11

B) -5

C) -1

D) 0

3.

$$9ax + 9b - 6 = 21$$

Based on the equation above, what is the value of $ax + b$?

A) 3

B) 6

C) 8

D) 12

4.

A software company is selling a new game in a standard edition and a collector's edition. The box for the standard edition has a volume of 20 cubic inches, and the box for the collector's edition has a volume of 30 cubic inches. The company receives an order for 75 copies of the game, and the total volume of the order to be shipped is 1,870 cubic inches. Which of the following systems of equations can be used to determine the number of standard edition games, s, and collector's edition games, c, that were ordered?

A) $75 - s = c$
$20s + 30c = 1{,}870$

B) $75 - s = c$
$30s + 20c = 1{,}870$

C) $s - c = 75$
$25(s + c) = 1{,}870$

D) $s - c = 75$
$30s + 20c = 1{,}870$

5.

A customer paid \$53.00 for a jacket after a 6 percent sales tax was added. What was the price of the jacket before the sales tax was added?

A) \$47.60

B) \$50.00

C) \$52.60

D) \$52.84

For question 6 and 7, use the following information

Mosteller's formula: $A = \frac{\sqrt{hw}}{60}$

Current's formula: $A = \frac{4 + w}{30}$

The formulas above are used in medicine to estimate the body surface area A, in square meters, of infants and children whose weight w ranges between 3 and 30 kilograms and whose height h is measured in centimeters.

6.

Based on Current's formula, what is w in terms of A ?

A) $w = 30A - 4$

B) $w = 30A + 4$

C) $w = 30(A - 4)$

D) $w = 30(A + 4)$

7.

If Mosteller's and Current's formulas give the same estimate for A, which of the following expressions is equivalent to $\sqrt{hw}$?

A) $\frac{4 + w}{2}$

B) $\frac{4 + w}{1{,}800}$

C) $2(4 + w)$

D) $\frac{(4 + w)^2}{2}$

8.

$$h(t) = -16t^2 + 110t + 72$$

The function above models the height h, in feet, of an object above ground t seconds after being launched straight up in the air. What does the number 72 represent in the function?

A) The initial height, in feet, of the object

B) The maximum height, in feet, of the object

C) The initial speed, in feet per second, of the object

D) The maximum speed, in feet per second, of the object

9.

The world's population has grown at an average rate of 1.9 percent per year since 1945. There were approximately 4 billion people in the world in 1975. Which of the following functions represents the world's population P, in billions of people, t years since 1975 ? (1 billion = 1,000,000,000)

A) $P(t) = 4(1.019)^t$

B) $P(t) = 4(1.9)^t$

C) $P(t) = 1.19t + 4$

D) $P(t) = 1.019t + 4$

Questions 10-21 Non Calculator Section

10.

$$x = y - 3$$
$$\frac{x}{2} + 2y = 6$$

Which ordered pair (x, y) satisfies the system of equations shown above?

A) $(-3, 0)$

B) $(0, 3)$

C) $(6, -3)$

D) $(36, -6)$

11.

Which of the following complex numbers is equal to $(5 + 12i) - (9i^2 - 6i)$, for $i = \sqrt{-1}$?

A) $-14 - 18i$

B) $-4 - 6i$

C) $4 + 6i$

D) $14 + 18i$

12.

If $f(x) = \dfrac{x^2 - 6x + 3}{x - 1}$, what is $f(-1)$?

A) -5

B) -2

C) 2

D) 5

13.

$$x^2 + 6x + 4$$

Which of the following is equivalent to the expression above?

A) $(x + 3)^2 + 5$

B) $(x + 3)^2 - 5$

C) $(x - 3)^2 + 5$

D) $(x - 3)^2 - 5$

14.

$$ax^3 + bx^2 + cx + d = 0$$

In the equation above, a, b, c, and d are constants. If the equation has roots -1, -3, and 5, which of the following is a factor of $ax^3 + bx^2 + cx + d$?

A) $x - 1$

B) $x + 1$

C) $x - 3$

D) $x + 5$

15.

The expression $\dfrac{x^{-2}y^{\frac{1}{2}}}{x^{\frac{1}{3}}y^{-1}}$, where $x > 1$ and $y > 1$, is

equivalent to which of the following?

A) $\dfrac{\sqrt{y}}{\sqrt[3]{x^2}}$

B) $\dfrac{y\sqrt{y}}{\sqrt[3]{x^2}}$

C) $\dfrac{y\sqrt{y}}{x\sqrt{x}}$

D) $\dfrac{y\sqrt{y}}{x^2\sqrt[3]{x}}$

16.

The function f is defined by $f(x) = (x + 3)(x + 1)$. The graph of f in the xy-plane is a parabola. Which of the following intervals contains the x-coordinate of the vertex of the graph of f ?

A) $-4 < x < -3$

B) $-3 < x < 1$

C) $1 < x < 3$

D) $3 < x < 4$

17.

Which of the following expressions is equivalent to $\dfrac{x^2 - 2x - 5}{x - 3}$?

A) $x - 5 - \dfrac{20}{x - 3}$

B) $x - 5 - \dfrac{10}{x - 3}$

C) $x + 1 - \dfrac{8}{x - 3}$

D) $x + 1 - \dfrac{2}{x - 3}$

18.

The formula below is often used by project managers to compute E, the estimated time to complete a job, where O is the shortest completion time, P is the longest completion time, and M is the most likely completion time.

$$E = \frac{O + 4M + P}{6}$$

Which of the following correctly gives P in terms of E, O, and M ?

A) $P = 6E - O - 4M$

B) $P = -6E + O + 4M$

C) $P = \frac{O + 4M + E}{6}$

D) $P = \frac{O + 4M - E}{6}$

19.

$$\sqrt{2x + 6} + 4 = x + 3$$

What is the solution set of the equation above?

A) $\{-1\}$

B) $\{5\}$

C) $\{-1, 5\}$

D) $\{0, -1, 5\}$

20.

$$f(x) = x^3 - 9x$$
$$g(x) = x^2 - 2x - 3$$

Which of the following expressions is equivalent to $\frac{f(x)}{g(x)}$, for $x > 3$?

A) $\frac{1}{x + 1}$

B) $\frac{x + 3}{x + 1}$

C) $\frac{x(x - 3)}{x + 1}$

D) $\frac{x(x + 3)}{x + 1}$

21.

$$(x - 6)^2 + (y + 5)^2 = 16$$

In the xy-plane, the graph of the equation above is a circle. Point P is on the circle and has coordinates $(10, -5)$. If $\overline{PQ}$ is a diameter of the circle, what are the coordinates of point Q ?

A) $(2, -5)$

B) $(6, -1)$

C) $(6, -5)$

D) $(6, -9)$