9

Which quadratic equation has exactly one distinct real solution?

Ⓐ $-97x^2 = 0$

Ⓑ $9x^2 + 3 = 0$

Ⓒ $9x^2 + 3x + 1 = 0$

Ⓓ $-97x^2 - 97x = 0$

10

$$x^2 + 9x + 5 = 0$$

One solution to the given equation can be written as $x = \frac{-9 + \sqrt{k}}{2}$, where k is a constant. What is the value of k?

_____

11

The table gives the distribution of favorite core subject and grade level for 80 students.

Subject	Grade level			
	Sixth	Seventh	Eighth	Total
English	4	9	9	22
Mathematics	10	1	9	20
Science	4	6	4	14
Social studies	6	9	9	24
Total	24	25	31	80

If a student is selected at random, what is the probability of selecting a student whose favorite core subject is mathematics?

Ⓐ $\frac{1}{10}$

Ⓑ $\frac{1}{5}$

Ⓒ $\frac{1}{4}$

Ⓓ $\frac{2}{3}$

12

If $17 - 5(4 - 7x) = 4 - 6(4 - 7x)$, what is the value of $4 - 7x$?

_____

14

The function f is defined by $f(x) = 41(0.28)^x$. For any positive integer n, the value of $f(n)$ is $p\%$ less than the value of $f(n-1)$. What is the value of p?

Ⓐ 72

Ⓑ 59

Ⓒ 41

Ⓓ 28

13

A rectangular poster has an area of 360 square inches. A copy of the poster is made in which the length and width of the original poster are each increased by 40%. What is the area of the copy, in square inches?

15

$$5x = 75y - 125$$

One of the two equations in a system of linear equations is given. The system has no solution. Which equation could be the second equation in this system?

Ⓐ $x = 3y$

Ⓑ $\frac{1}{5}x = 3y$

Ⓒ $x = 15y - 25$

Ⓓ $\frac{1}{5}x = 15y - 25$

16

$$f(x) = (x - a)(x - b)$$

The function f is defined by the given equation, where a and b are integer constants. If $f(35) > 0$, $f(38) < 0$, and $f(41) > 0$, which of the following could be the value of $a + b$?

Ⓐ 38

Ⓑ 40

Ⓒ 73

Ⓓ 75

17

$$\sqrt{x^2 - 20x + 100} - 11x = 0$$

What are all possible solutions to the given equation?

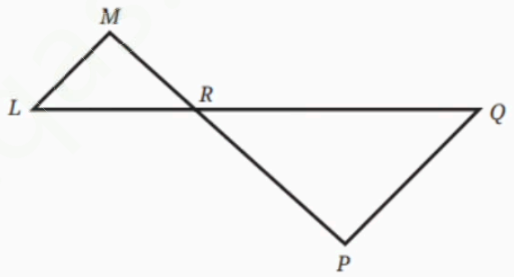
Ⓐ −1

Ⓑ $\frac{5}{6}$

Ⓒ −1 and 1

Ⓓ −1 and $\frac{5}{6}$

18



Note: Figure not drawn to scale.

In the figure, $\overline{LQ}$ intersects $\overline{MP}$ at point R, and $\overline{LM}$ is parallel to $\overline{PQ}$. The lengths of $\overline{MR}$ and $\overline{RP}$ are 9 and 17 units, respectively. The area of ΔLMR is 45 square units. What is the area of ΔPQR, in square units?

Ⓐ $\frac{3,645}{289}$

Ⓑ $\frac{405}{17}$

Ⓒ 85

Ⓓ $\frac{1,445}{9}$

19

$$6x^2(3x-16)(3x-u)=0$$

In the given equation, u is a positive constant. The sum of the solution to the equation is 13. What is the value of u?

20

The cost of renting a power washer is \$44 for the first day and \$22 for each additional day. Which of the following functions gives the cost $C(d)$, in dollars, of renting the power washer for d days, where d is a positive integer?

Ⓐ $C(d)=22d+22$

Ⓑ $C(d)=22d+44$

Ⓒ $C(d)=44d-22$

Ⓓ $C(d)=44d+66$

21

Function f is a quadratic function. The graph of $y=f(x)$ in the xy-plane has a vertex at (9, −7), contains the point (8, −9), and has a y-intercept at (0, a). The graph of $y=6\cdot f(x)$ has a y-intercept at (0, b). What is the positive difference between a and b?

22

A 9-pound cat eats two types of canned cat food: chicken-flavored and duck-flavored. The recommended amount of chicken-flavored food is 2.25 cans per 8 pounds of a cat's weight per day. The recommended amount of duck-flavored food is 0.75 cans per 5 pounds of a cat's weight per day. If c is the number of chicken-flavored cans and d is the number of duck-flavored cans a 9-pound cat eats in one day, which equation describes all the possible values of c and d for the cat to eat the recommended amount of food based on its weight?

Ⓐ $\frac{0.75}{5}c+\frac{2.25}{8}d=9$

Ⓑ $\frac{2.25}{8}c+\frac{0.75}{5}d=9$

Ⓒ $\frac{5}{0.75}c+\frac{8}{2.25}d=9$

Ⓓ $\frac{8}{2.25}c+\frac{5}{0.75}d=9$

Anwer：

M1

1–5 B,D,14,88,A

6–10 B,B,158,D,A

11–15 A,D,C,–10,D

16–20 D,B,B,C,D

21–22 42,B

M2

1–5 C,D,A,1,A

6–10 C,D,184,A,61

11–15 C,–13,705.6,A,B

16–20 D,D,D,23,A

21–22 845,D