

1

One number is 4 times the value of another number. If their sum is -15 , what is the value of the smaller of the two numbers?

- A) -12
- B) -9
- C) -6
- D) -3

2

Year	Profits
2010	108,000
2011	320,000
2012	415,000
2013	576,000
2014	842,000
2015	1,160,000

The profits of an electronic company during the six years of its operation are given in the table above. Which of the following best approximates the average rate of change of the profits from 2010 to 2015?

- A) \$180,000 per year
- B) \$210,000 per year
- C) \$250,000 per year
- D) \$280,000 per year

3

If $f(x) = \sqrt{x} + 2$ and $g(x) = (x-1)^2$, which of the following is equivalent to $g(f(a)) - 2f(a)$?

- A) $\sqrt{a} + 2$
- B) $\sqrt{a} - 1$
- C) $a + 4$
- D) $a - 3$

4

Which of the following systems of equations has no solution?

- A) $\frac{1}{5}x + \frac{1}{3}y = 1$
 $3x - 5y = 15$
- B) $4x + 3y = 12$
 $3x - 4y = 6$
- C) $-3x + 2y = 7$
 $\frac{1}{2}x - \frac{1}{3}y = 3$
- D) $-x + 2y = 1$
 $2x - 4y = -2$

5

A line in the xy -plane passes through the origin and has a slope of $-\frac{3}{4}$. Which of the following points does NOT lie on the line?

- A) $(2, -\frac{3}{2})$
- B) $(-4, 3)$
- C) $(8, -3)$
- D) $(0, 0)$

6

	Distance to Finish Line (meters)
Mike	$-12t + 1500$
Maria	$-10.5t + 1500$

Mike and Maria race on a 1500-meter course with their bikes. The expressions in the table above show the distance to the finish line t seconds after they started the race. How many meters will Maria have left to bike when Mike completes the course?

- A) 165
- B) 187.5
- C) 210
- D) 232.5

7

x	$f(x)$
-4	-10.5
-2	2.5
1	-8
2	7.5

The function f is defined by a polynomial. Some values of x and $f(x)$ are shown in the table above. What is the remainder when $f(x)$ is divided by $x + 2$?

- A) -10.5
- B) -8
- C) 2.5
- D) 7.5

8

A thermos holds 2 quarts of liquid. If $\frac{1}{2}$ tablespoon of ground coffee makes 4 cups of coffee, how many thermoses can be filled with the coffee made from 3 tablespoons of ground coffee?
(1 quart = 4 cups)

- A) 8
- B) 6
- C) 4
- D) 3

Questions 9 and 10 refer to the following information.

The manufacturer of a cable company sells cable for \$30 per foot. The cost, C , of producing x feet of cable is $C = 12.5x + 210$. The company makes a profit when the amount of money received from selling the cable is greater than the cost of producing the cable.

9

Which of the following inequalities gives all possible values of x for which the company will make a profit?

- A) $x > 12$
- B) $x > 14.4$
- C) $x > 16$
- D) $x > 18.6$

10

What is the profit that the company could earn from the sale of 50 feet of cable?

- A) \$620.00
- B) \$635.00
- C) \$650.00
- D) \$665.00

11

Alice and Bernie both own orchards that grow only apple trees and peach trees. Alice has twice as many apple trees as Bernie has. Bernie has 1.5 times as many peach trees as Alice has. Alice's orchard has 110 more trees than Bernie's orchard, and the total number of trees in both orchards are 1,050. Let x be the number of apple trees in Bernie's orchard and y be the number of peach trees in Alice's orchard. Which of the following systems of equations can be used to find the values of the variables x and y ?

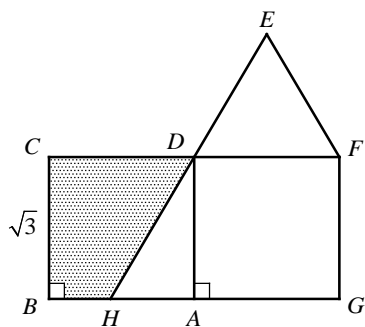
- A) $x + 2y = 1.5x + y + 110$
 $x + 2y + 1.5x + y = 1,050$
- B) $1.5x + y = x + 2y + 110$
 $1.5x + y + x + 2y = 1,050$
- C) $2x + y = x + 1.5y + 110$
 $2x + y + x + 1.5y = 1,050$
- D) $2x + 1.5y = x + y + 110$
 $2x + 1.5y + x + y = 1,050$

12

The average gas mileage of Roy's car is 36 miles per gallon of gas for highway driving and 24 miles per gallon of gas for city driving. If Roy used 10 gallons of gas for driving 340 miles on both highways and cities, how many miles did he drive on highways?

- A) 240
- B) 260
- C) 280
- D) 300

13



In the figure above, $ABCD$ and $ADFG$ are squares each with an area of 3 and DEF is an equilateral triangle. Line segments \overline{AD} , \overline{CF} , and \overline{EH} intersect at point D . Which of the following represents the area of the shaded region?

- A) $3 - \frac{\sqrt{3}}{4}$
 B) $3 - \frac{\sqrt{3}}{2}$
 C) $3 - \frac{3\sqrt{3}}{4}$
 D) $3 - \sqrt{3}$

14

The line of a graph in the xy -plane contains the point $(-2, 4)$ and is parallel to a line with the equation $x + 2y = 10$. The graph of a second line passes through the points $(6, 2)$ and $(-2, -2)$. If the two lines intersect at the point (r, s) , what is the value of $r + s$?

- A) 5
 B) 7
 C) 9
 D) 11

Questions 15 and 16 refer to the following information.

Revenue of the commercial banks in country X in 1995.

Revenue of the commercial banks in country X in 2005.

Banks	Percent
Bank A	40%
Bank B	29%
Bank C	15%
Bank D	8%
Other Banks	8%

100% = 10 billion dollars

Banks	Percent
Bank A	36%
Bank B	21%
Bank C	18%
Bank D	10%
Other Banks	15%

100% = 14 billion dollars

The tables above show the percentage of revenue of the commercial banks in country X. Total revenue of the commercial banks in 1995 was 10 billion dollars and total revenue of the commercial banks in 2005 was 14 billion dollars.

15

According to the tables above, which commercial bank had amounts of revenue that were nearly equal in 1995 and 2005?

- A) Bank A
 B) Bank B
 C) Bank C
 D) Bank D

16

According to the tables above, what is the percent increase of the revenue of Bank D from 1995 to 2005?

- A) 2%
 B) 20%
 C) 43%
 D) 75%

17

If p is 20 percent less than r , r is 20 percent less than s , and s is 20 percent less than t , which of the following is equal to p ?

- A) $0.4t$
- B) $0.4096t$
- C) $0.512t$
- D) $0.64t$

18

A large container can be filled with four times as much water as a medium-sized container, or nine times as much as a small-sized container. If x small containers and x large containers are needed to fill a water tank that could be filled with 120 medium-sized containers, what is the value of x ?

- A) 21
- B) 25
- C) 27
- D) 32

19

	Engineering	Humanities
Female		
Male		
Total	56	52

The incomplete table above summarizes the number of faculty members in engineering and humanities departments at a certain college. The ratio of female faculty members in engineering to male faculty members in engineering is 3 to 11, and the ratio of female faculty members in humanities to male faculty members in humanities is 9 to 4. There are a total of 56 faculty members in engineering and 52 faculty members in humanities. If one female faculty member is randomly selected, what is the probability that she will be in humanities?

- A) $\frac{5}{8}$
- B) $\frac{11}{16}$
- C) $\frac{20}{27}$
- D) $\frac{3}{4}$

20

A parabola with the equation $f(x) = a(x+1)(x-3)$ has a minimum value at $x = 1$ in the xy -plane. If $f(p) = f(-3)$, which of the following could be the value of p ?

- A) 4
- B) 5
- C) 6
- D) 7

21

$$x^2 - x + y^2 + 2y - \frac{19}{4} = 0$$

The equation of a circle in the xy -plane is shown above. What is the area of the circle?

- A) 6π
- B) $\frac{13}{2}\pi$
- C) 7π
- D) $\frac{15}{2}\pi$

22

$$g(x) = -(x^2 - 6x + 5) - 4(x - c)$$

In the polynomial $g(x)$ defined above, c is a constant. If $g(x)$ is divisible by $x+1$, what is the value of c ?

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

23

If A_0 is the initial amount deposited in a savings that earns at a fixed rate of r percent per year, and if a constant amount of c is added to the account each year, then the amount A_n of the savings, n years after the initial deposit is made, is given by the equation $A_n = (1 + \frac{r}{100}) \cdot A_{n-1} + c$.

If Alan made an initial deposit of \$10,000 that earns at a fixed rate of 4 percent per year, and he adds a constant amount of \$3,000 to his account each year, what is A_3 , the amount he has in the savings three years after he made his initial deposit?

- A) \$19,816.00
- B) \$20,248.64
- C) \$20,613.44
- D) \$20,623.23

24

What are the solutions to $(x+3)(x-3) = 4x$?

- A) $4 \pm \sqrt{5}$
- B) $4 \pm \sqrt{13}$
- C) $2 \pm \sqrt{5}$
- D) $2 \pm \sqrt{13}$

25

If $x \neq \pm 1$, which of the following is equivalent

to $\frac{\frac{1}{x+1}-1}{\frac{1}{x^2-1}+1}$?

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

B) $\frac{1-x}{x}$

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

D) $\frac{x}{1-x}$

26

The average (arithmetic mean) test score for all the students in a class is 79.6. If the average score of 16 boys in the class was 81, while that of n girls was 78, what is the value of n ?

A) 14

B) 15

C) 16

D) 17

27

The mean price of a gallon of gas in a certain state is \$2.95 with a standard deviation of 12 cents. Which of the following prices is not within 2 standard deviations of the mean price?

A) \$2.69

B) \$2.72

C) \$3.05

D) \$3.18

28

A cylindrical shape container 40 cm high inside with an internal diameter of 20 centimeters (cm) is 80 percent filled with fruit punch. If Kara pours 12 fluid ounces of fruit punch to each plastic cup, what is the largest number of plastic cups with 12 fluid ounces of fruit punch, that she can pour from the container?

(1 fluid ounce = 29.6 cubic centimeters)

A) 22

B) 25

C) 28

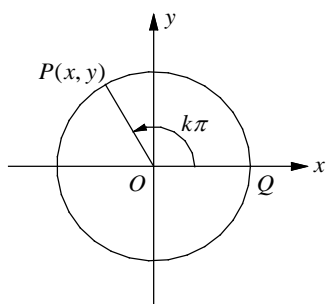
D) 31

29

Which of the following is NOT a factor of the polynomial $p(x) = 2x^3 - 5x^2 - 4x + 3$?

- A) $2x - 1$
- B) $x + 1$
- C) $x - 3$
- D) $x - 1$

30



In the xy -plane above, O is the center of the unit circle, and the measure of $\angle POQ$ is $k\pi$ radians. If $\sin(k\pi) = a$, which of the following could be $\sin(k\pi + \pi)$?

- A) $-\frac{1}{2}a$
- B) $\frac{1}{2}a$
- C) $-a$
- D) a