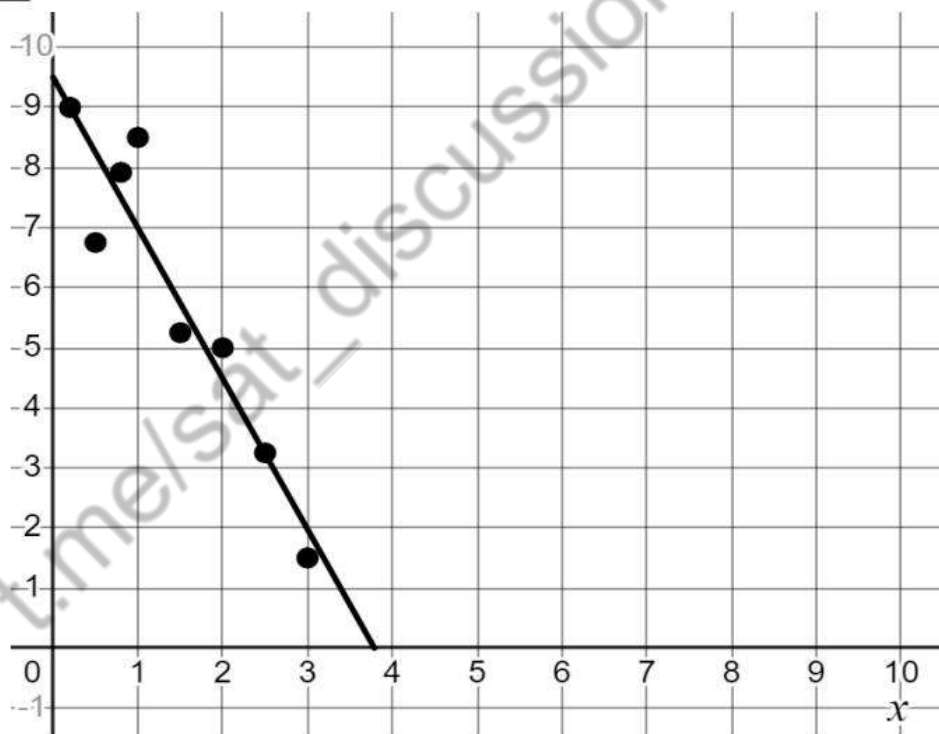


Question 1

In the xy -plane, a parabola has vertex $(-5, -12)$ and has no x -intercepts. If the equation of the parabola is written in the form $y = ax^2 + bx + c$, where a , b , and c are constants, which of the following could be the value of $a + b + c$?

- A) -19
- B) -12
- C) -10
- D) -5

Question 2



The scatterplot shows the relationship between two variables, x and y , for data set P. A line of best fit is shown. Data set Q is created by multiplying the y -coordinate of each data point from data set P by 4.3.

The equation for the line of best fit for data set Q can be written in the form $Q(x) = a + bx$. What is the value of $a - b$? Round your answer to the nearest tenth.

Question 3

$$(3x - a)^2 = (2x + j)(jx - k)$$

The given equation has infinitely many solutions, where a , j , and k are constants. What is the value of a ?

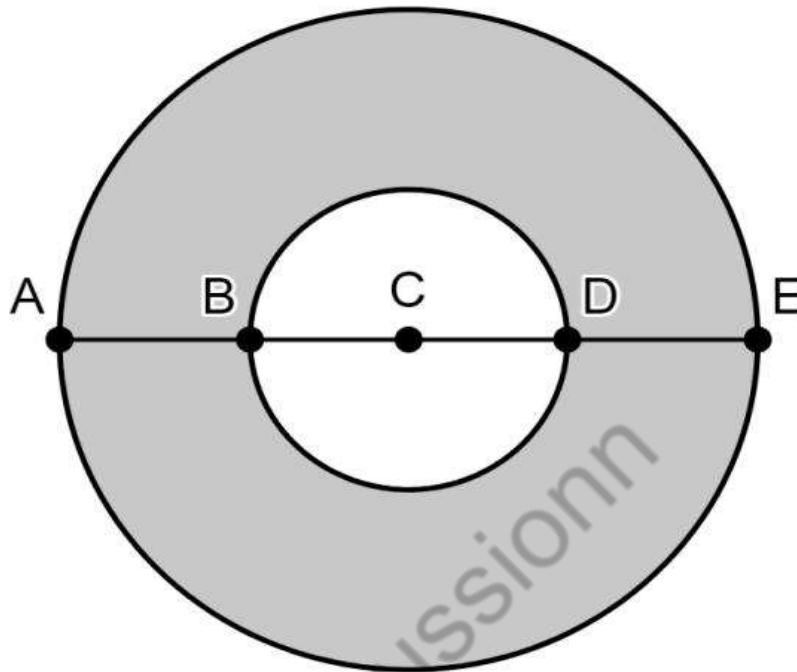
Question 4

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

The function f is defined by the equation above, where a and b are constants. The graph of $g(x)$ is formed by taking the graph of $f(x)$ and translating it both 6 units in the negative x direction and 2 units in the negative y direction. The x -coordinate of

the x -intercept for the graph of $g(x)$ is -3 and $g(-6) = \frac{61}{64}$. What is the value of a ?

Question 5



In the figure shown, point C is the center of both circles. The ratio of AB to CD is 6 to 5. If the area of the large circle is 242, what is the area of the shaded region?

Question 6

A content creator conducted a survey and selected a random sample of 800 Nepalese SAT Math students. The selected students were asked whether they approved of the change to a digital testing format, and 496 students responded that they approved of the new digital format. Which of the following is the largest population to which the results of the study can be generalized?

- A) The 800 Nepalese SAT Math students in the sample
- B) All Nepalese students
- C) All SAT Math students
- D) All Nepalese SAT Math students

Question 7

$$a(x - 5) + 4b = 7(b - 5x)$$

The equation above has no solution where a and b are constants. The number b CANNOT be equal to the number m . What is the value of m ?

8

A video streaming service offers a monthly subscription for 40 dollars that allows unlimited streaming. Individual movies can be rented for 4 dollars, 6 dollars, or 8 dollars, depending on the release date. What is the minimum number of movies to watch per month for a monthly subscription to always be cost-effective?

9

$ax^2 + 210x + c$, $kx + l$ is a factor of the equation. k , l , a , and b are positive constants, what is the greatest value of ac ?

10

The similarity ratio of the volume of right cylinder A and right cylinder B is 8 : 27. Cylinder A has a radius of 6 cm and a surface area of $(s\pi)$ cm². Cylinder B has a height of 12 cm and surface area of $(t\pi)$ cm². What is the product of $t - s$?

(Hint: Surface Area = $2\pi rh + 2\pi r^2$)

11

$x^2 + 9x + 6$ has two solutions r and s , $r < s$ and $x^2 + 18x + 36$ has two solutions t and u , $t < u$. If $x^2 + 14x + c$ has two solutions $t + r$ and $u + s$, what is the value of c ?

12

The functions f and g are defined by the given equations, where $2 \leq x \leq 8$. Which of the following equations displays, as a constant or coefficient, the minimum value of the function it defines, where $2 \leq x \leq 8$?

I. $f(x) = 0.0625(0.5)(2)^{x+2}$

II. $g(x) = 1500(0.2)^{x-3}$

- A) I only
- B) II only
- C) I and II
- D) Neither I nor II

13

For a data set that consists of 9 values, the median is much larger than the mean. Which of the following could explain why the median is much larger than the mean?

- A) The distribution of the values from the data set is symmetric about the median.
- B) The data set contains a value that is unusually large relative to the other values in the data set.
- C) The data set contains a value that is unusually small relative to the other values in the data set.
- D) Each value in the data set is the same.

14

Two numbers, a and b , are each greater than zero, and the square root of a is equal to the cube root of b . For what value of x is a^{2x-1} equal to b ?

15

$$0 \leq x \leq y \leq 6$$

What is the area, in the xy -plane, of the region consisting of all points that satisfy the inequality above?

Larry plans to make at least 10 pounds of a snack mix that will consist of almonds and dried fruit. If he wants the snack mix to be at least 60% almonds by weight, which of the following systems of inequalities represents the constraints on the number of pounds of almonds, a , and the number of pounds of dried fruit, f ?

A) $a + f \leq 10$

$0.6a \leq f$

B) $a + f \geq 10$

$0.6f \leq a$

C) $a + f \geq 10$

$1.5f \leq a$

D) $a + f \leq 10$

$1.5a \geq f$

Several values of x , and the corresponding values for polynomial functions f and g are shown in the table below. Which of the following statements is true?

x	$f(x)$	$g(x)$
-3	3	0
-1	0	3
0	-4	4
2	0	-2

I. $f(0) + g(0) = 0$

II. $f(x)$ is divisible by $x + 2$

III. $g(x)$ is divisible by $x + 3$

(A) I, II, and III

(B) I and II, only

(C) II and III, only

(D) I and III, only

18)

$$(x - 2)^2 + (y - 5)^2 = 25$$

A horizontal line $y = k$ passes through the center of the circle. The points $A(a, k)$ and $B(b, k)$ are both on the line and on the circle. What is the value of $(a + b)$?

19)

$$f(x) = 2x^m$$

The equation of $f(x)$ is given, m is a constant. If $f(2x) = 64 \cdot f\left(\frac{1}{2}x\right)$, what is the value of m ?

20)

Half-life: Some radioactive substances lost its half of weight for every certain period of time. Half-life of Thorium-235 is about 24 days. After how many days only 12.5% of initial substance will remain?

21)

There is an entertain summer camp for students only schools' official can order tickets. If number of tickets is less than or equal to 150, the price of a ticket is \$24. For every extra ticket, schools must pay only half of the price. If a school orders x tickets, where $x > 150$, what will be the cost of school, $f(x)$, in dollars?

A) $f(x) = 12x + 3600$

B) $f(x) = 24x + 1800$

C) $f(x) = 12x + 1800$

D) $f(x) = 24x + 3600$

22)

x	y
20	882
64	1190
89	1365

The given points are on the line of l . Line l is the result of translating line k left 5 units in the xy -plane. What is the x-coordinate of the x-intercept of line k ?

A) -101

B) $-\frac{230}{7}$

C) -111

D) 221

23)

Predicted number of marbles	Frequency
4,000	3
2,500	6
1,500	3
1,000	3

A transparent jar is filled with 2341 small marbles. An experiment claimed that a person may not estimate the number of marbles in the jar too close to the actual number of marbles, but the average of survey's answers is about equal to the actual number. If 120 people took the survey, what was the result of the average predicted number of marbles in the jar?

24)

City	Party X, in percent	Party Y, in percent
A	55	25
B	15	45

City	Population, in thousands of people	Voters, in percent
A	250	70
B	440	65

It is known that 86% of voters in City A and 92% of voters in City B voted in the election. How much, in percent, voters from the given cities voted for X is more than Y? (Round your answer to the nearest whole number)

25)

$$3x + 2y = 10$$

If a and b are constants and $2a = 3b$, which of the following lines is perpendicular to the given line?

A) $ax + by = 5$

B) $bx + ay = 7$

C) $ax - by = 11$

D) $bx - ay = 4$

26)

x	f(x)
0	-357
6	-69
16	-69

Some points on the graph of a certain parabola, $f(x)$, are given. For what value of k , $f(k) = k - 7$, where k is a positive integer?

27)

The vertex of a certain downward parabola, $f(x)$, is at $(3, 24)$. One of the intersection points of the graph of $f(x)$ and a horizontal line $g(x) = k$ is $(1, k)$. If $f(b) > g(b)$, where b is an integer, what is the maximum value of b ?

28)

The value of an exponential decreasing function, $f(x)$, is always greater than zero. A line, $g(x)$, with negative slope intersects with the graph of $f(x)$ at (m, n) and (k, l) . In which of the following ranges, $f(x) > g(x)$?

A) $m < x < k$

B) $x < m$ and $k < x$

C) $l < x < n$

D) $m \leq x \leq k$

29)

In the xy -plane, a circle has center C with coordinates (h, k) . Points A and B lie on the circle. Point A has coordinates $(h + 1, k + \sqrt{143})$, and $\angle ACB$ is a right angle. What is the length of $\overline{AB}$?

- A) $2\sqrt{143}$
- B) $\sqrt{143}$
- C) 12
- D) $\sqrt{288}$

30)

Point F lies on a unit circle in the xy -plane and has coordinates $(1, 0)$. Point G is the center of the circle and has coordinates $(0, 0)$. Point H also lies on the circle and has coordinates $(x, -1)$, where x is a constant. Which of the following could be the positive measure of angle FGH , in radians?

- A) $\frac{25\pi}{2}$
- B) $\frac{27\pi}{2}$
- C) 22π
- D) 23π