Q1: Which of the following is the radian equivalent of a 320° angle? **(1 point)**

A) $\dfrac{2\pi}{3}$ B) $\dfrac{4\pi}{3}$ C) $\dfrac{8\pi}{9}$ D) $\dfrac{10\pi}{9}$ E) $\dfrac{16\pi}{9}$

Q2:

$$\frac{\cos^2 x - \sin^2 x + 1}{1 - \sin^2 x}$$

Which of the following is the simplest form of the given expression? **(1 point)**

A) 2   B) 2 cotx

C) $\tan^2 x$ D) –2

E) –2tanx

Q3: The point A(x + 2, x – 4) is given in the coordinate plane.

How many different integer values can x take if the point is located in the fourth quadrant (IV)? (1 point)

A) 1   B) 2   C) 3   D) 4   E) 5

Q4: Given the equation of a line:

$$(a + 2)\, x + (a + 4)\, y + 5 = 0$$

If the slope of this line is "–2", what is the value of "a"? (1 point)

A) –10   B) –8   C) –6   D) –4   E) –2

Q5: Given the equations of two lines:

$$4x - 3y + 2 = 0$$
$$ax - 8y + 1 = 0$$

If these lines are perpendicular, what is the value of "α"? (1 point)

A) –2   B) –3   C) –4   D) –5   E) –6

Q6: The point A(a – 1, a + 2) lies on the line given by the equation:

$$3x - 2y + 6 = 0$$

Given this condition, what is the sum of the coordinates of point "A"? (2 points)
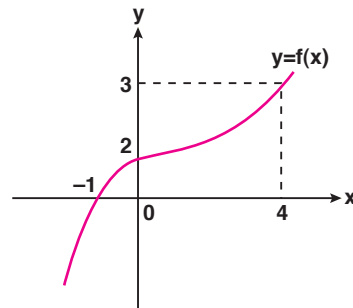
A) 1   B) 2   C) 3   D) 4   E) 5

Q7: The equation of the line passing through points A(2, a) and B(b, 1) is given as:

$$x + y + 2 = 0$$

Using this equation, which one of the followings gives "a – b"? (2 points)

A) –8   B) –7   C) –3   D) –2   E) –1
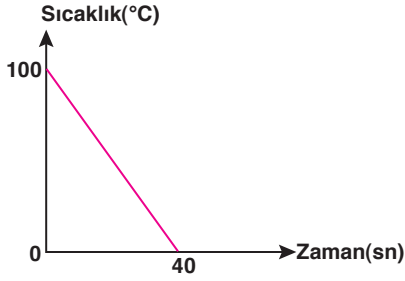
Q8: On the rectangular coordinate plane, the graph of the function f is given.

According to this, what is the result of the operation $\dfrac{f(4) + f^{-1}(3) + f(0)}{f^{-1}(0)}$? **(2 points)**

A) –9   B) –5   C) –3   D) 1   E) 5

Q9:

Sıcaklık(°C)

The graph shows the temperature change of an object over time.

Accordingly, at which second does the object's temperature reach 25°C? (2 points)

A) 10   B) 12   C) 25   D) 30   E) 32

Q10: Given the quadratic function:

$$f(x) = (6 - 2a)x^2 + 5x - 3$$

If the parabola opens upward, what is the sum of all possible positive integer values of "a"?
(2 points)

A) 3   B) 6   C) 10   D) 15   E) 21

Q11: The vertex of the parabola $y = x^2 + 6x - c + 3$ lies on the line $y = 3x + 1$.

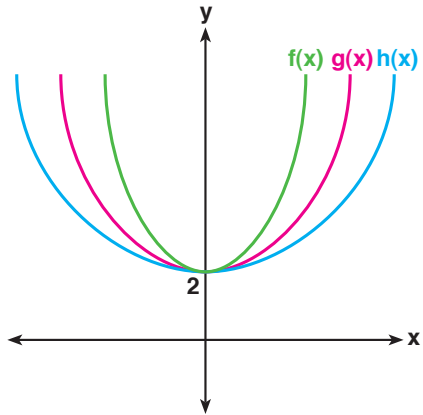**What is the value of "c"? (3 points)**

A) 1   B) 2   C) 3   D) 4   E) 5

Q12: In the given diagram, the parabolas have their vertex at the point (0, 2), and their equations are:

$$f(x) = ax^2 + 2,$$
$$g(x) = bx^2 + 2,$$
$$h(x) = cx^2 + 2.$$

Based on the diagram, which of the following orderings is correct? (3 points)

A) a < b < c   B) b < a < c
C) b < c < a   D) c < a < b
                    E) c < b < a

Q13: The parabola $y = x^2 - 2x + 4$ is translated 3 units to the right and 4 units down, resulting in a new parabola $y = x^2 + bx + c$.

What is the value of "b + c"? (3 points)

A) 3   B) 4   C) 5   D) 6   E) 7

Q15:

13 cm

In the given figure, the diagonal length of the rectangular board is 13 cm.

The area of the board is 60 cm².

What is the perimeter of the board? (3 points)

A) 32 cm   B) 34 cm

C) 36 cm   D) 38 cm

E) 40 cm

Q14: Solve the system of equations:

$$x^2 - y^2 = 9$$
$$2x^2 - y = 0$$

Which of the following represents the solution set? (3 points)

A) {(3,0)}   B) {(3,18)}

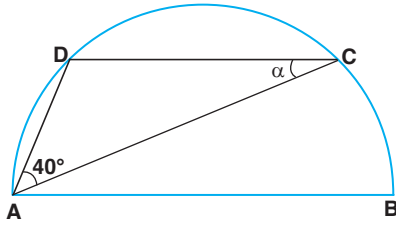C) {(−3,0)}   D) $\varnothing$

E) R

Q16: Given the equation:

$$x^2 + (a - 3)x + 4 = 0$$

If the equation has no real roots, which of the following represents the possible range of values for "a"? (4 points)

A) (−7, −1)   B) (−7, 1)

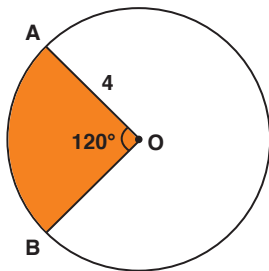C) (−1, 7)   D) (−∞, −1)

E) (7, ∞)

Q17:

In the given semicircle, AB is parallel to CD (AB // CD) and the size of arc CD is 80°

$m(\overset{\frown}{CD}) = 80°$.

What is the measure of $m(\overset{\frown}{BAD})$? **(4 points)**
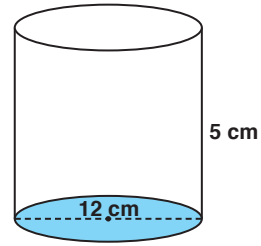
A) 10°   B) 15°   C) 20°   D) 25°   E) 30°

Q18:

In a circle centered at O, given that $m(\overset{\frown}{AOB}) = 120$ and $IAOI = 4$ cm,

what is the area of the shaded region?
(4 points)

A) $\dfrac{16\pi}{3}$ B) 5π C) $\dfrac{14\pi}{3}$ D) $\dfrac{13\pi}{3}$ E) 4π
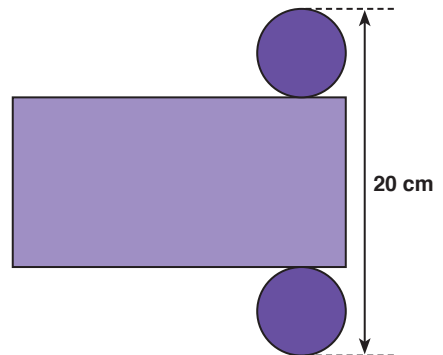
Q19:

A cylinder with a diameter of 12 cm and a height of 5 cm is given. A right circular cone is to be placed inside it.

What is the maximum volume of the cone in terms of π cm³? **(4 points)**

A) 48   B) 60   C) 72   D) 84   E) 96

Q20:

The unfolded shape of a cylinder is given, and its height is 8 cm.

What is the volume of the cylinder in cm³?
(4 points)

A) 72π B) 66π C) 60π D) 54π E) 48π

Q21: In a class of 28 students, each student attends at least one of the two courses: music or painting.

- Number of students attending the painting course: 16
- Number of students attending the music course: 22
- Number of students attending both courses: 10

Given that a randomly selected student attends the music course, what is the probability that they also attend the painting course?

(5 points)

A) $\dfrac{5}{11}$ B) $\dfrac{6}{11}$ C) $\dfrac{7}{11}$ D) $\dfrac{8}{11}$ E) $\dfrac{9}{11}$

Q22: Below is a circular target board divided into four sections.
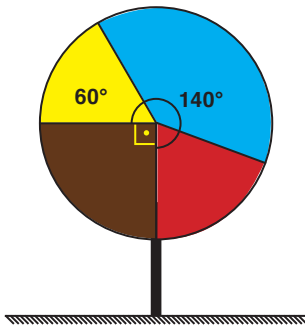
James throws a dart at the target, and it is known that the dart lands in either the yellow, blue, or red sections.

Given this information, what is the probability that the dart lands in the yellow section?

(5 points)

A) $\dfrac{1}{9}$ B) $\dfrac{2}{9}$ C) $\dfrac{5}{14}$ D) $\dfrac{7}{27}$ E) $\dfrac{11}{36}$

Q23: A biology teacher has 4 different keys, but only one of them opens the biology lab door. If a key does not open the door, it will not be tried again.

What is the probability that the door opens on the third attempt? (5 points)

A) $\dfrac{1}{4}$ B) $\dfrac{1}{2}$ C) $\dfrac{1}{3}$ D) $\dfrac{3}{4}$ E) $\dfrac{2}{3}$
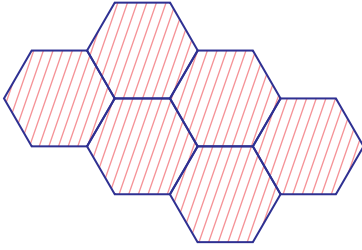
Q24: Given the equations:

$$\ln x^3 + \ln_y = 11$$
$$\ln x^4 - \ln_y = 3$$

What is the value of $\log_x \cdot y$? (5 points)

A) $\dfrac{1}{2}$ B) $\dfrac{3}{2}$ C) 2   D) $\dfrac{5}{2}$ E) $\dfrac{7}{2}$

Q25:

The given shape is formed using three regular hexagons.

If the side length of one regular hexagon is $\log_9 27$ cm, what is the perimeter of the entire shape in cm? (5 points)

A) 18   B) 21   C) 24   D) 27   E) 30

Q26: The sum of the first n terms of a sequence is given by:

$$S_n = 3n^2 + 2n$$

What is the 10th term (a_{10}) of the sequence? (6 points)

A) 59   B) 60   C) 61   D) 62   E) 63

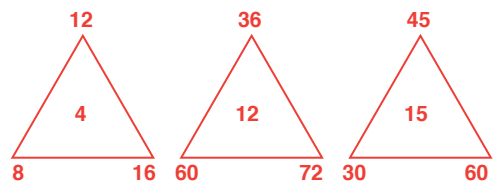**Q27:**

$$\lim_{n \to 4} \left| \frac{x^2 - 16}{x - 8} + \log(x + 6) \right|$$
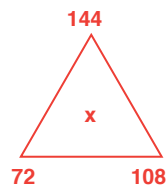
What is the value of the given limit? (6 points)

A) 0   B) 1   C) 2

D) 4   E) Does not exist

Q28: There is a relationship between the numbers inside the triangles and the numbers at their vertices.

Based on the same relationship,

what is the value of the missing expression? (6 points)

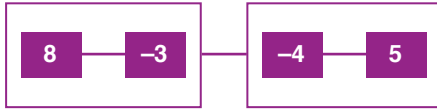A) 18   B) 24   C) 30   D) 32   E) 36

Q29:

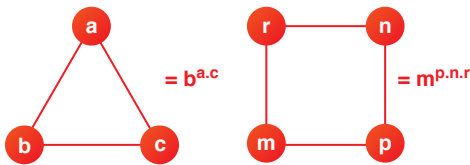$$\boxed{A}\!-\!\boxed{B} = |A| - |B|$$

is defined as a model accordingly.
Based on this,

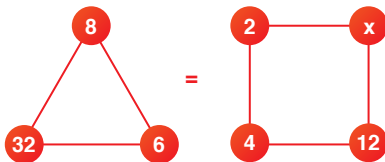**Which of the following is equivalent to the given model? (6 points)**

A) 6   B) 4   C) 1   D) –3   E) –4

Q30:

$$= b^{a.c} \qquad\qquad = m^{p.n.r}$$

According to the models provided above;

What is the value of "x" that satisfies the given model? (6 points)

A) 8   B) 5   C) 4   D) 2   E) 1

Q31: The geometric mean of the numbers x and y is 8, and the geometric mean of the numbers $(x + 3)$ and $(y + 3)$ is 10.

Accordingly, what is the arithmetic mean of x and y? (7 points)

A) 4   B) 4.5   C) 6   D) 9   E) 12

Q32: In the expansion of $(5x - 3y)^6$, the following statements are given:

  I. There are 7 terms in the expansion.
  II. The sum of the coefficients is 64.
  III. The constant term is zero.

Which of the following is correct? (7 points)

A) Only I   B) Only II   C) Only III
          D) I and III   E) I, II, and III

Q33: A polynomial P(x) satisfies the following conditions:

- The sum of its coefficients is 36.
- It satisfies the equation $P(x) = P(x - 3) - 6$

Based on this information, what is the remainder when P(x + 3) is divided by (x – 7)? (7 points)

A) 24   B) 22   C) 20   D) 18   E) 16

Q34: P(x) represents the polynomial P(x), and P'(x) represents its derivative.

Given that:

$$P(x) + 2P'(x) = 4x^2 + 13x + 19$$

What is the value of P(–2)? (7 points)

A) 20   B) 32   C) 39   D) 47   E) 49

Q35: The function given is:

$$f(x) = 2x^3 - 6x^2 - (m + 2)x + n + 3$$

It has a local minimum at A(2, –20).

What is the product of "m and n"? (7 points)

A) –14   B) –16   C) –24   D) 20   E) 30