

15-Second Questions [2 points each]

1. What is the sum of the 10 consecutive integers starting from 4? [85]
2. Find the least value of x that satisfies the inequality $5 - 4x \leq 2$. [3/4]
3. The sides of a triangle are 8, 12, and 14 cm long. A new triangle is constructed by joining the midpoints of the sides of the first triangle with segments. What is the perimeter of this new triangle? [17 cm]
4. What is the remainder when $1 - x + 2x^2 - 3x^3$ is divided by $x + 1$? [7]
5. Find the values of x that satisfy the equation $|x| + x = 0$. [$x \leq 0$]
6. A map has a scale of 2 cm is to 5 km. If a highway is 28 km, how long is it in the map? [11.2 cm]
7. Two chords of a circle intersect inside it. If the segments of one chord are 12 and 16 cm long, and one segment of the second chord is 24 cm, how long is the other segment of the second chord? [8 cm]
8. What is the sum of the first 100 even positive integers? [10 100]
9. What is the perimeter of a square that is inscribed in a circle with circumference 10π cm? [$4\sqrt{5}$ cm]
10. Two men are repainting a wall. Working alone, the first man can finish it in 10 hours, and the second man in 12 hours. Working together, what part of the wall can they repaint in 2 hours? [11/30]
11. What is the center of the circle with equation $x^2 + y^2 - 4y = 10$? [(0, 2)]

30-Second Questions [3 points each]

1. The first term of a geometric sequence is 10, and its third term is 20. What is its fifth term? [40]
2. The legs of a right triangle are 2 and $2\sqrt{2}$ cm long. What is the radius of the circle that circumscribes the triangle? [$\sqrt{3}$ cm]
3. What is the range of the function $f(x) = 2x + 4 - 2x^2$? [$(-\infty, 9/2]$]
4. What is the sum of $1 - 2 + 3 - 4 + 5 - 6 + \dots + 2017$? [1009]
5. Find the solution set of the inequality $x(x - 4)(x + 2)^2 \leq 0$. [$\{-2\} \cup [0, 4]$]
6. Two factors of a third-degree polynomial $P(x)$ are $x + 2$ and $x - 4$. If $P(0) = 8$ and $P(1) = -9$, find the remaining factor of $P(x)$. [$2x - 1$]

1-Minute Questions [5 points each]

1. The larger of two concentric circles has radius 8 cm. If a chord of the larger circle that is tangent to the smaller circle has length $4\sqrt{14}$ cm, what is the radius of the smaller circle? [$2\sqrt{2}$ cm]
2. If $0^\circ \leq \theta \leq 180^\circ$ and $\cos \theta = -\frac{1}{3}$, what is $\sin \theta + \tan \theta$? [$-4\sqrt{2}/3$]
3. Solve for x in the equation $\frac{\sqrt{x+1} + \sqrt{x-1}}{\sqrt{x+1} - \sqrt{x-1}} = 3$. [5/3]
4. Find all ordered pairs (x, y) that satisfy both equations $x + y = 4$ and $y = 2x^2 - x + 2$. [$(-1, 5), (1, 3)$]
5. An equilateral triangle and a square have equal perimeters. If the area of the square is 45 cm^2 , what is the area of the triangle? [$20\sqrt{3} \text{ cm}^2$]
6. From a given convex quadrilateral, a second quadrilateral is formed by joining the midpoints of its adjacent sides with a segment. If the sum of the lengths of the diagonals of the given quadrilateral is 24 cm, what is the perimeter of the second quadrilateral? [24 cm]

Clincher Questions

- C.1. A line has slope 2 and passes through the point (4, 1). What is its y -intercept? [-7 or (0, -7)]
- C.2. If $a_1 = 2$ and $a_n = 3a_{n-1} + 2$ for $n \geq 2$, what is a_4 ? [80]
- C.3. A number is reduced by p percent. How many percent should it be raised then to go back to the original number? [$100p/(100 - p)$]

Do-or-Die Question

- DoD. Find three positive integers that form a geometric sequence, given that their sum is 21 and the sum of their reciprocals is $\frac{7}{12}$. [3, 6, 12]