AIMO 2026

Annual International Mathematics Olympiad

Mathematics Association, BITS Pilani

Classes 9 and 10: Question Paper

Held online on 24 October 2026 · Duration: 1 hour

Instructions

- This paper consists of 20 multiple-choice questions (MCQs). Each question has exactly one correct option.
- Each correct answer carries 4 marks. For every wrong answer, 1 mark will be deducted.
- No marks will be awarded or deducted for unanswered questions.
- Use of calculators or any electronic gadgets is strictly prohibited.
- The questions are in mixed order of difficulty. If a question looks hard, move on and come back to it later.
- Figures may not be drawn to scale.

Q1. Let a, b, c be the roots of the cubic equation

$$x^3 - 3x^2 + 2x - 5 = 0.$$

Determine the value of

$$(1-a)(1-b)(1-c).$$

(1) -5 (2) 5 (3) -7 (4) 7

Q2. A key is hidden in exactly one of four lockers (Locker 1, Locker 2, Locker 3 and Locker 4). Exactly two of the following four statements are true:

1. The key is in Locker 1.
2. The key is not in Locker 1.
3. The key is in Locker 3.
4. The key is in Locker 2 or Locker 3.

Where is the key?

(1) Locker 1 (2) Locker 2 (3) Locker 3 (4) Locker 4

Q3. If

$$x = \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} \qquad \text{and} \qquad y = \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}},$$

find the value of $x^3 + y^3$.

(1) 464 (2) 504 (3) 488 (4) 512

Q4. For a particular group of people, the share of time spent on different activities is described below:

- 10% of their time is spent playing video games.
- 15% of their time is spent reading.
- 25% of their time is spent listening to music.

The only other activity is sleeping. These four activities do not overlap and together account for all of their time. Each of the three percentages above has been rounded to the nearest whole number; a percentage of the form $(n + 0.5)\%$, where n is a positive integer, rounds up to $(n + 1)\%$. The percentage of time spent sleeping is not rounded: it is exactly the time that is left over.

What is the maximum possible percentage of time spent sleeping?

(1) 49.5% (2) 50.5% (3) 52.5% (4) 51.5%

Q5. A, B and C are three people. Exactly one of them is a Truth-teller, exactly one is a Liar, and exactly one is an Alternator. A Truth-teller always tells the truth, a Liar always lies, and an Alternator alternates between true and false statements, starting with a true one. Each person makes exactly one statement, in the order A, B, C:

- A says, "B is a liar."
- B says, "C is a truth-teller."
- C says, "A is a liar."

Who is the Alternator?

(1) A
(2) B
(3) C
(4) The information is insufficient.

Q6. A says to B: "If this statement is false, then I can only tell lies."

B responds: "If this statement is true, then I can only utter the truth."

It is known that each of them either always tells the truth or always lies. They now play a game in which they make statements alternately, starting with A (every statement made by someone who always tells the truth is true, and every statement made by someone who always lies is false). A pile of coins lies in front of them. Whenever a true statement is spoken, the number of coins in the pile halves, and whenever a lie is spoken, the number of coins doubles.

If, before a person's turn to make a statement, the number of coins in the pile is odd or exceeds 10000, that person loses. The initial number of coins is 32. What happens?

(1) B loses.
(2) A loses.
(3) The game lasts forever.
(4) None of these.

Q7. A polynomial $P(x)$ leaves remainder 2025 when divided by $x-1$ and remainder 1 when divided by $x-2025$. What is the remainder when $P(x)$ is divided by $(x-1)(x-2025)$?

(1) $2025-x$
(2) $x-2026$
(3) $2026-x$
(4) $x+2024$

Q8. Let a be a positive integer with $1 \leq a \leq 10000$ such that x^4+a can be written as a product of two quadratic polynomials, each with leading coefficient 1 and all coefficients integers. How many possible values of a are there?

(1) 8 (2) 6 (3) 5 (4) 7

Q9. It is well known that the Basic Proportionality Theorem can be used to divide a given line segment into any positive integral number of equal parts using a compass and straightedge, where a straightedge is a ruler without markings.

Suppose you are also given a tool called X. When activated, X chooses a positive real number y between 0 and 10^{100} (not inclusive) and displays it on a screen. You may then construct a line segment. If the absolute difference between its length and your desired length is less than y, then X changes the segment into one of exactly the desired length. The displayed value of y stays the same throughout this construction and correction.

You are given a line segment of unit length. Which of the following is guaranteed to be true for every possible displayed value of y?

(1) Using only a compass and a straightedge, the only lengths you can construct from the unit segment are the positive rational lengths.
(2) You can construct a line segment of any positive real length using a compass, a straightedge and X.
(3) There are infinitely many positive real lengths that cannot be constructed using a compass, a straightedge and X.
(4) None of these.

Q10. An equilateral triangular sheet of area 1 square unit lies on a table. Two players, A and B, take turns, with A going first, for a total of N turns. The number N is chosen uniformly at random from $\{1, 2, \ldots, 100\}$ and is announced to both players before play begins. Both players start with score 0.

On each turn, the current player does the following:

1. Cuts every triangle of non-zero area on the table along one of its altitudes, into two pieces. (In a right-angled triangle an altitude can lie along a side; cutting along it leaves the triangle unchanged and gives a piece of area 0.)
2. For each triangle that was cut, the current player adds the area of the smaller of its two pieces to their own score, and the other player adds the area of the larger piece to their score. If the two pieces have equal areas, each player adds that common area to their score.
3. All the pieces stay on the table and are cut again on the next turn. (Pieces of area 0 are ignored.)

Both players play optimally to maximise their own final scores, knowing that the other player does the same. After N turns, which of the following statements is true?

(1) The probability that A and B have equal scores is $\frac{1}{3}$.
(2) The probability that A's score is less than B's score is $\frac{1}{2}$.
(3) The probability that A's score is greater than B's score is $\frac{1}{2}$.
(4) None of these.

Q11. Six numbers a, b, c, d, e, f are each chosen from $\{1, 2, 3, 4, 5\}$. Repetition is allowed, and different orderings of the values count as different assignments.

For how many assignments do the equations

$$ax + by + c = 0 \quad \text{and} \quad dx + ey + f = 0$$

have infinitely many solutions (x, y)?

(1) 157 (2) 149 (3) 165 (4) 173

Q12. A right circular cone has an axial cross-section (the triangle obtained by cutting the cone through its axis) that is an isosceles triangle with base 5 units and base angles $30°$. The top half of the cone (by height) is cut off by a plane parallel to the base, and a circular lid is attached to the cut face of the remaining part, forming a closed bucket.

What is the total outer surface area of this bucket?

(1) $\frac{25\pi}{16}(5 + \sqrt{3})$ (2) $\frac{25\pi}{16}(5 + 2\sqrt{3})$ (3) $\frac{25\pi}{16}(5 + 3\sqrt{3})$ (4) $\frac{25\pi}{16}(5 + 4\sqrt{3})$

Q13. A solid metallic sphere of radius 6 cm is melted and recast into a right circular cone of height 12 cm. What is the radius of the largest sphere that fits completely inside this cone?

(1) $6(\sqrt{2} - 1)$ cm (2) $3\sqrt{2}$ cm (3) $4(\sqrt{3} - 1)$ cm (4) None of these

Q14. Two circles with radii 9 cm and 4 cm touch each other externally. A third circle of radius r touches both of these circles externally and also touches their direct common tangent (a line that touches both circles and has both circles on the same side of it). Find the smallest possible value of r.

(1) $\frac{6}{5}$ cm (2) $\frac{18}{13}$ cm (3) $\frac{36}{25}$ cm (4) 2.5 cm

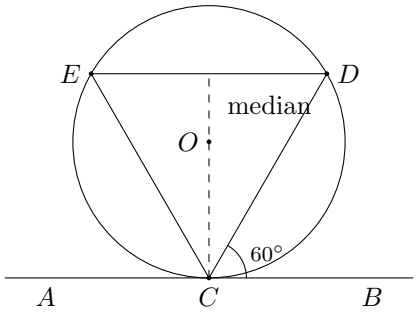
Q15. Let a student's percentile in an examination be defined as the proportion of students, including the student themselves, whose scores are less than or equal to that student's score.

Students A and B took the examination. A's percentile was exactly $0.\overline{9990}$ and B's percentile was exactly $0.\overline{993006}$, where the overlines indicate recurring decimal blocks. What is the minimum possible number of students who took the examination?

(1) 14443 (2) 14342 (3) 14430 (4) 14586

Q16. In the figure, a horizontal line is tangent at C to a circle with centre O, and the circle lies above the line. The points A, C, B lie on the line in this order from left to right. D and E are distinct points on the circle: D has a larger x-coordinate than C, and E has a smaller x-coordinate than C. The angle DCB measures $60°$, and the median of triangle ECD from C (to the midpoint of ED) is also the bisector of angle ECD.

If the length of that median is 1 unit, find the perimeter of triangle EDC.



(1) $3\sqrt{3}$ (2) $4\sqrt{3}$ (3) $2\sqrt{3}$ (4) $\sqrt{3}$

Q17. In triangle ABC, the lengths of the sides AB and BC are given, together with the measure of $\angle CAB$. Depending on the given values, different numbers of triangles may satisfy these conditions (triangles that are congruent count as the same triangle). Which of the following statements is **FALSE**?

(1) For some given values, exactly one triangle satisfies the conditions.
(2) For some given values, exactly two triangles satisfy the conditions.
(3) For some given values, no triangle satisfies the conditions.
(4) For some given values, infinitely many triangles satisfy the conditions.

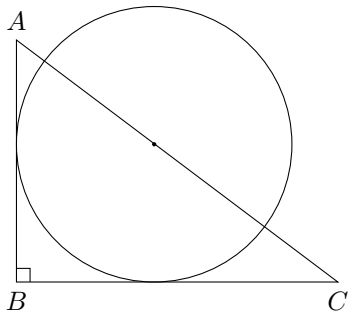
Q18. A man wants to build a straight ladder connecting two opposite corners (the two corners that are farthest apart) of a cuboid-shaped room with dimensions 5 units, 6 units and 7 units. The total cost of building the ladder depends on its length, L units, according to the following pricing rules:

- Every complete unit of length costs an amount equal to its position in the sequence: \$1 for the first unit, \$2 for the second unit, and so on.
- If a fractional piece of length strictly between 0 and 1 unit remains at the end, it costs a flat amount of \$1.

If the total cost of building the ladder is at most $8n$ dollars, where n is an integer, what is the smallest possible value of n?

(1) 6 (2) 7 (3) 8 (4) 9

Q19. In right-angled triangle ABC, $\angle B = 90^\circ$, $AB = 15$ and $BC = 20$. A circle has its centre on the hypotenuse AC and is tangent to both legs AB and BC. Find the radius of this circle.



(1) 5 (2) 10 (3) 12 (4) $\frac{60}{7}$

Q20. Real numbers a, b, c satisfy

$$a + b + c = 6, \qquad ab + bc + ca = 11, \qquad abc = 6.$$

Find $a^4 + b^4 + c^4$.

(1) 98 (2) 100 (3) 84 (4) 90