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MTSE 2026

Mathematics Talent Search Examination 2026

Class 9–10 | 2 hours



NAME _____

CLASS / SECTION _____ ROLL NO. _____ DATE _____

General Instructions

1. This paper has **25 questions** in total, arranged in **6 sections** (A to F). Sections A and B begin with a case study.
2. Time allowed: **2 hours**. Each question carries **4 marks** (maximum **100 marks**). There is **no negative marking**.
3. Read each case study carefully before answering the questions that follow it. **Calculators are not allowed.**
4. Each question has four options (A, B, C and D), and **only one is correct**.
5. Mark your answers on the **OMR sheet provided**. Fill in the circle for the correct option completely.
6. Write your name and details on the paper and the OMR sheet.

SECTION A The Valuation Story Q 1 – 5	**SECTION B** A Triangle Locked Between Two Circles Q 6 – 9	**SECTION C** Algebra Q 10 – 13
SECTION D Counting, Patterns & Structure Q 14 – 17	**SECTION E** Euclidean Geometry Q 18 – 20	**SECTION F** Number Theory Q 21 – 25

SECTION A · CASE STUDY

The Valuation Story



QUESTIONS
1 – 5
5 × 4 = 20 marks

Mr. Amit is the sole owner of a company called Inspire Pvt. Ltd. He owns 100% of the company. At present, the company is valued at ₹1,000 crore. Therefore, Mr. Amit's 100% ownership represents a value of ₹1,000 crore.

Mr. Bhushan is interested in becoming a shareholder in Inspire Pvt. Ltd. He has two different ways of investing his money:

Situation A — Buying shares from Mr. Amit

If Mr. Bhushan pays money directly to Mr. Amit's personal bank account, he is purchasing a portion of Mr. Amit's existing ownership. The money goes to Mr. Amit, not to the company. Therefore, the company receives no new money and its valuation remains ₹1,000 crore.

For example, if Mr. Bhushan pays ₹500 crore to Mr. Amit, he purchases shares worth ₹500 crore out of the existing ₹1,000 crore company value.

Situation B — Investing fresh money into the company

If Mr. Bhushan pays money directly into Inspire Pvt. Ltd.'s bank account, the company receives fresh capital. This increases the total value of the company.

For example, if Mr. Bhushan invests ₹1,000 crore into the company:

- Existing company value = ₹1,000 crore
- New investment = ₹1,000 crore
- New company value = ₹2,000 crore
- Mr. Amit's existing value = ₹1,000 crore
- Mr. Bhushan's investment = ₹1,000 crore

Therefore, after the investment, Mr. Amit and Mr. Bhushan each own 50% of the ₹2,000 crore company.

Your Challenge

Using the above mechanism, answer the following questions.

Questions

1 **Buying an Existing Stake**

Mr. Bhushan pays ₹500 crore directly to Mr. Amit's personal bank account to purchase part of his ownership. The company does not receive any money, so its valuation remains ₹1,000 crore. What will be the shareholding of Mr. Amit and Mr. Bhushan after the transaction?

A. Mr. Amit – 25%, Mr. Bhushan – 75%

B. Mr. Amit – 50%, Mr. Bhushan – 50%

C. Mr. Amit – 60%, Mr. Bhushan – 40%

D. Mr. Amit – 75%, Mr. Bhushan – 25%

2 **Fresh Investment into the Company**

Instead of paying Mr. Amit, Mr. Bhushan invests ₹500 crore directly into Inspire Pvt. Ltd. What will be the new valuation of the company and the shareholding of the two investors?

A. Valuation = ₹1,500 crore; Amit = 66.67%, Bhushan = 33.33%
B. Valuation = ₹1,500 crore; Amit = 50%, Bhushan = 50%
C. Valuation = ₹2,000 crore; Amit = 75%, Bhushan = 25%
D. Valuation = ₹1,000 crore; Amit = 50%, Bhushan = 50%

3 **Becoming a 20% Owner Through Fresh Investment**

Mr. Bhushan wants to become a 20% owner of Inspire Pvt. Ltd. by investing fresh money directly into the company. The company's current valuation is ₹1,000 crore. How much should Mr. Bhushan invest?

A. ₹125 crore **B.** ₹150 crore **C.** ₹200 crore **D.** ₹250 crore

4 **Buying a 20% Stake from Mr. Amit**

Mr. Bhushan instead wants to become a 20% owner by purchasing shares directly from Mr. Amit. The company's valuation remains ₹1,000 crore because the company receives no new money. How much should Mr. Bhushan pay Mr. Amit?

A. ₹100 crore **B.** ₹150 crore **C.** ₹200 crore **D.** ₹250 crore

5 Mr. Bhushan has ₹300 crore available. He can either:

Option 1: Pay ₹300 crore to Mr. Amit personally, or
Option 2: Invest ₹300 crore directly into Inspire Pvt. Ltd.

Which option gives Mr. Bhushan the larger percentage ownership of the company?

A. Investing in the company
B. Paying Mr. Amit personally
C. Both give exactly the same ownership
D. It cannot be determined

SECTION B · CASE STUDY

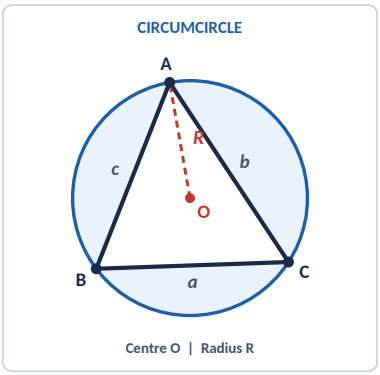
A Triangle Locked Between Two Circles



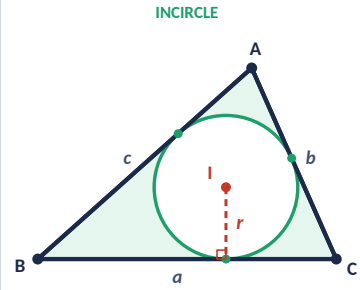
QUESTIONS
6 – 9
4 × 4 = 16 marks

Triangles are one of the most important shapes in geometry. They are closely connected with circles in two interesting ways.

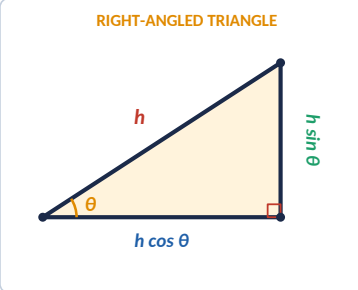
A circle passing through all three vertices of a triangle is called its **circumcircle**. The centre of this circle is called the **circumcentre**, and its radius is called the **circumradius**, denoted by *R*.



A circle that touches all three sides of a triangle is called its **incircle**. Its centre is called the **incentre**, and its radius is called the **inradius**, denoted by r.



Before attempting the questions, remember that in a right-angled triangle, if the hypotenuse has length h and one of the acute angles is θ, then the side opposite to θ is h sin θ, while the side adjacent to θ is h cos θ.



Use the information given below to answer the following questions.

Questions

6 **A Triangle with Two Known Sides**

A triangle, which is not necessarily a right-angled triangle, has two of its side lengths as x and y. The angles opposite to these two sides are 40° and 80°, respectively. What is the area of the triangle?

A. ½xy **B.** ½xy sin 40° **C.** ½xy sin 80° **D.** ½xy sin 60°

7 **The Mystery of the Circumcircle**

A circle passing through all three vertices of a triangle is called its circumcircle. Its centre is O and its radius is R. The lengths of the sides opposite to angles A, B, and C are a, b, and c, respectively. It is observed that a / sin A = b / sin B = c / sin C and all three ratios have the same constant value. What is the value of this constant?

A. R / 2 **B.** R **C.** 2R **D.** R^2

8 **The Circle Inside the Triangle**

A circle touches all three sides of a triangle. Its radius is r. The three sides of the triangle are a, b, and c. What is the area of the triangle in terms of a, b, c, and r?

A. $r(a + b + c)$
B. $r(a + b - c) / 2$
C. $rabc / 2$
D. $r(a + b + c) / 2$

9 **Two Circles Meet**

In the same triangle, let R be the radius of the circumcircle and r be the radius of the incircle. Using the information from the previous questions, find the value of $(R + r)^2 - (R - r)^2$ in terms of the three sides a, b, and c.

A. $4abc / (a + b + c)$
B. $2abc / (a + b + c)$
C. $abc / (a + b + c)$
D. $abc / [2(a + b + c)]$

SECTION C

Algebra



QUESTIONS
10 – 13
4 × 4 = 16 marks

Discover the power of variables, equations, identities, and patterns to solve intriguing mathematical problems. The following four problems will challenge your logical thinking, algebraic skills, and ability to uncover hidden relationships.

Questions

10 Let x be the number 0.000...01, which has 2019 zeroes after the decimal point. Then which of the following numbers is the greatest?

A. $10000 + x$ **B.** $\frac{1}{x^2}$ **C.** $\frac{10000}{x}$ **D.** $10000 \cdot x$

11 The number of perfect cubes that lie between $2^9 + 1$ and $2^{18} + 1$ is

A. 54 **B.** 55 **C.** 56 **D.** 57

12 The remainder of $f(x) = x^{100} + x^{50} + x^{10} + x^2 - 6$ when divided by $x^2 - 1$ is:

A. -2 **B.** 0 **C.** 2 **D.** $x + 1$

13 The coefficient of x^{90} in $(1 + x + x^2 + \cdots + x^{60})(1 + x + x^2 + \cdots + x^{120})$ is

A. 60 **B.** 61 **C.** 90 **D.** 91

SECTION D

Counting, Patterns & Structure

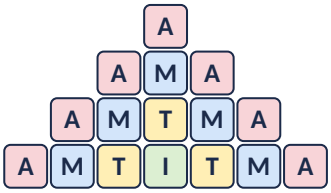


QUESTIONS
14 – 17
4 × 4 = 16 marks

Explore the art of counting, uncovering patterns, and recognizing the structures hidden within seemingly simple problems. The following four questions will challenge your observation, reasoning, and ability to find elegant mathematical patterns.

Questions

14 Given below is the triangular form of AMTI. The number of ways you can spell AMTI, top to bottom, right to left or left to right or a combination of these is:



A. 12 **B.** 16 **C.** 20 **D.** 15

15 A competition has 25 questions and is marked as follows:

(a) Five marks are awarded for each correct answer to Questions 1 to 15.
(b) Six marks are awarded for each correct answer to Questions 16 to 25.
(c) Each incorrect answer to Questions 16 to 20 loses 1 mark.
(d) Each incorrect answer to Questions 21 to 25 loses 2 marks.
A student may leave some questions unattempted; these score 0 marks.

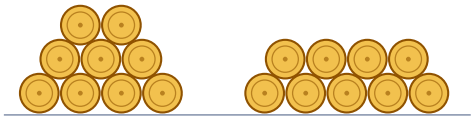
Which of the following scores is impossible to achieve?

A. 126 **B.** 127 **C.** 128 **D.** 129

16 An escalator moves up at a constant rate. John walks up the escalator at the rate of one step per second and reaches the top in twenty seconds. The next day John's rate was two steps per second, and he reached the top in sixteen seconds. The number of steps in the escalator is

A. 48 **B.** 60 **C.** 64 **D.** 80

17 In a stack of coins, each row has exactly one coin less than the row below. If we have nine coins, two such towers are possible. Of these, the tower on the left is the tallest. If you have 2015 coins, the height of the tallest tower is



A. 60 **B.** 61 **C.** 62 **D.** 63

SECTION E

Euclidean Geometry

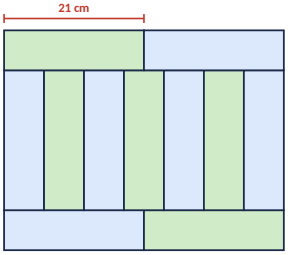


QUESTIONS
18 – 20
3 × 4 = 12 marks

Explore the world of points, lines, angles, triangles, and geometric relationships through logical reasoning and elegant proofs. The following three problems will test your visualization, deduction, and problem-solving skills.

Questions

18 A large rectangle is made up of eleven identical rectangles whose longer sides are 21 cm long. The perimeter of the large rectangle in cm is:



A. 150 **B.** 126 **C.** 108 **D.** 96

19 Which of the following geometric figures is possible to construct?

A. A pentagon with 4 right-angled vertices.

B. A parallelogram with 3 vertices of obtuse angle measures.

C. A hexagon with 4 reflex angles.

D. An octagon with all 8 sides equal and 4 angles each of measure 60° and the other four angles of measure 210°.

20 In a rhombus of side length 5, the length of one of the diagonals is at least 6, and the length of the other diagonal is at most 6. What is the maximum value of the sum of the diagonals?

A. 12 **B.** $5\sqrt{6}$ **C.** 14 **D.** $10\sqrt{2}$

SECTION F

Number Theory



QUESTIONS
21 – 25
5 × 4 = 20 marks

Explore the fascinating world of integers, divisibility, prime numbers, and patterns hidden within numbers. The following five problems are designed to challenge your logical thinking and mathematical creativity.

Questions

21 A number leaves a remainder 2 when divided by 6. Then the possible remainder(s) when the same number is divided by 9 is:

A. {1, 4, 7} **B.** {5, 8} **C.** {2, 5} **D.** {2, 5, 8}

22 Number of 5 digit multiples of 13 is

A. 6922 **B.** 6923 **C.** 7692 **D.** 7700

23 A teacher asks 10 of her students to guess her age. They guessed it as 34, 38, 40, 42, 46, 48, 51, 54, 57 and 59. The teacher said, "At least half of you guessed it too low and two of you are off by one. Also my age is a prime number." The teacher's age is

A. 47 **B.** 48 **C.** 49 **D.** 59

24 The number of 6 digit numbers of the form ABCABC, which are divisible by 13, where A, B and C are distinct digits, A and C being even digits is:

A. 128 **B.** 160 **C.** 200 **D.** 250

25 Sum of the odd numbers from 1 to 2019, both inclusive, is divisible by:

A. only 100 **B.** only 101 **C.** both 100 and 101 **D.** neither by 100 nor by 101

Space for Rough Work