RADLEY

Academic Scholarship Examination Paper

MATHEMATICS I

22nd January 2025

Time allowed – 1 hour

There are 11 questions in total

The last part of each question is generally the most difficult part

No calculating aids may be used

Show all working.

Answer the questions in the spaces provided. If you run out of space please add your solutions on the end, numbering the pages.

Name	
School	

1. Find the value of

a. 14^2 *(1 mark)*

b. 1.4^2 *(1 mark)*

c. 0.014^2 *(1 mark)*

d. $14^2 \div 0.14^2$ *(2 marks)*

2. Give the answers to the following as fractions.

a. $4\frac{2}{3} \div 1\frac{2}{5}$ *(3 marks)*

b. $5\frac{1}{4} - 2\frac{2}{5}$ *(3 marks)*

3. Multiply out and simplify where possible.

a. $3(x + 4) - 5(x - 3) + 7$ *(2 marks)*

b. $(x - 2y)(2xy - 3xy^2 + x^2)$ *(4 marks)*

b. $(3x - 2y)^3$ *(4 marks)*

4. Factorise completely.

a. $8x - 24x^2$ *(2 marks)*

b. $3x^2y^3 - 6xy^4 + 12x^3y^2$ *(3 marks)*

c. $x^2 - 36$ *(2 marks)*

d. $4y^2 - 100$ *(2 marks)*

e. $4x^2 - 100x$ *(2 marks)*

f. $x^2 - 12x + 32$ *(3 marks)*

g. $6x^2 + 5x - 4$ *(3 marks)*

5. Give the following as powers of 2.

a. 8×4^2 *(2 marks)*

b. $\dfrac{4^{3x}}{8^{x-4}}$ *(3 marks)*

c. Solve $4^{2x-3} = 2^{x-4}$ *(3 marks)*

By **first factorising** or otherwise,

6. Find the values of

a. $21^2 - 19^2$ *(2 marks)*

b. $103^2 - 97^2$ *(2 marks)*

c. $\frac{6^4}{216-6^2} \times \frac{5}{18}$ *(3 marks)*

7. Solve the following equations.

a. $x^2 = 8x$ *(2 marks)*

b. $3x^2 = 8 - 10x$ *(3 marks)*

c. $x - 2 + \frac{12}{x-2} = 7$ *(4 marks)*

8.

a. A **rectangular** field is x m long, and it is 18 m wider than it is long. Given the perimeter of the field is 160m, write down an **equation** satisfied by x and solve it to find the **width** of the field. *(3 marks)*

b. Chris has 5 more than three times the number of marbles Dave has. Together they have 41 marbles.
By first forming an equation, find how many marbles Chris has. *(3 marks)*

9.

a. I have 4 integers. The Mean of them is 6. The Median is 7. The Mode is 8.

Find the 4 integers. *(3 marks)*

b. I have 4 different integers. The range is 8. The Mean and the Median of them is 11.

Find all possible solutions.

(4 marks)

10.

a. Solve the following equations to find $x \; and \; y$.

$$3x - 7y = 21$$

$$5x + 4y = 6$$

(5 marks)

b. I have a bag full of 10pence and 2pence pieces.

In total I have 48 coins and a total amount of £3.12.

By forming and solving algebraic equations, find the number of 10pence and 2pence pieces.

(4 marks)

11.

a. Solve this equation to find x.

$$\frac{4x-1}{5}-\frac{3-x}{4}=\frac{8x-7}{8}$$

(4 marks)

b. Solve the following equation.

$$1-\frac{5}{\sqrt{x}}=\frac{24}{x}$$

(4 marks)

c. Solve this equation to find x.

$$(x^2 + 9)(x^2 - 9) = 7x^2 + 63$$

(3 marks)

d. Solve this equation to find x.

$$\frac{x}{x+4} - \frac{4-x}{x+2} = \frac{8}{35}$$

(5 marks)

END OF QUESTIONS.