



**RADLEY**

**Academic Scholarship Examination Paper**

**STAGE ONE**

**MATHEMATICS I**

**26 January 2021**

Time allowed – 1 hour

There are 8 questions in total

You may try the questions in any order

Answer the questions on separate paper, numbering each page

No calculating aids may be used

**Show all working**

1. Find the value of

a.  $12^2$  *(1 mark)*

b.  $1.2^2$  *(1 mark)*

c.  $0.012^2$  *(1 mark)*

d.  $12^2 \div 1.2$  *(2 mark)*

2. Give the answers to the following as fractions in their simplest form

a.  $4\frac{2}{5} \div \frac{11}{15}$  *(3 marks)*

b.  $3\frac{1}{4} - 2\frac{1}{6}$  *(3 marks)*

3. Multiply out and simplify,

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

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

4. Factorise completely.

a.  $9a^3b^5 - 45a^7b^2$  (3 marks)

b.  $15x - 15y + 10xz - 10yz$  (3 marks)

c.  $9y^6 - 16x^2$  (3 marks)

d.  $x^2 - 7x + 12$  (2 marks)

e.  $2x^3 + 6x^2 - 20x$  (4 marks)

Simplify

f.  $(8x^3y^6)^{1/3} \div \frac{2x}{(3y)^2}$  (3 marks)

5. Find the values of

a.  $36^2 - 24^2$  (3 marks)

b.  $\frac{37^2 - 37}{74}$  (3 marks)

c.  $\frac{48^3 - 7 \times 48^2 - 3 \times 2^7}{7^2}$  (6 marks)

Hint, can you take out a large factor from the numerator?

6. Solve each of these pairs of equations for  $x$  and  $y$

a.  $3x - 2y = 18$   
 $5y = 9 - 6x$  (4 marks)

b.  $7\frac{1}{3}x + 2\frac{1}{2}y = \frac{7}{3}$   
 $3\frac{1}{4}x - 1\frac{1}{5}y = 5\frac{13}{20}$  (6 marks)

7. Solve each of these equations for  $x$

a.  $\frac{3x-4}{3} - \frac{5-7x}{4} = 4\frac{7}{24}$  (5 marks)

b.  $\frac{3x-4}{x-4} - \frac{2x-5}{x} = 10$  (5 marks)

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

8. Solve each of these equations for  $x$

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

b.  $x^2 - 13x - 48 = 0$  (3 marks)

c.  $8x^2 + 6x - 27 = 0$  (3 marks)

d.  $x - 8 = \frac{33}{x}$  (4 marks)

e.  $(x^2 - 10)^2 + 7(x^2 - 10) + 6 = 0$  (6 marks)

f.  $(x^2 - 9)(x - 6) + 3x(x + 3)^2 - 34(x + 3) = 0$  (7 marks)

**Total 100 marks**