



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