



RADLEY

Academic Scholarship Examination Paper

MATHEMATICS I

25th January 2022

Time allowed – 1 hour

There are 9 questions in total

You may try the questions in any order, the last part of each question is generally the most difficult part

No calculating aids may be used

Show all working.

Answer the questions on separate sheets of paper, numbering each page

1. Find the value of

a. 16^2 (1 mark)

b. 1.6^2 (1 mark)

c. 0.0016^2 (1 mark)

d. $16^2 \div 1.6$ (2 mark)

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

a. $4\frac{2}{9} \div \frac{8}{3}$ (3 marks)

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

3. To approximately convert temperature from Fahrenheit to Celsius the following formula can be used.

$$C = \frac{5}{9}(F - 32)$$

Using the formula provided,

a) Convert 59°F into Celsius. (1 mark)

b) Convert 98°F into Celsius giving your answer as a mixed fraction (2 marks)

c) Convert 28°C into Fahrenheit giving your answer as a decimal (2 marks)

4. Multiply out and simplify,

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

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

5. Factorise completely.

a. $8a^4b^5 - 28a^5b^3$ (3 marks)

b. $6x + 6y + 12xz + 12yz$ (3 marks)

c. $4p^6 - 16x^2$ (3 marks)

d. $x^2 - 5x - 6$ (2 marks)

e. $3x^3 + 10x^2 - 8x$ (4 marks)

By first factorising or otherwise,

6. Find the values of

a. $17^2 - 7^2$ (2 marks)

b. $\frac{28^2+56}{84}$ (3 marks)

c. $\frac{28^3-2\times 28^2-28\times 2^3}{56}$ (6 marks)

7. Solve each of these pairs of equations for x and y

a. $2x + y = 7$
 $3x - 2y = 21$ (3 marks)

b. I have 80 British coins. Some are 2 pence pieces and the rest are 5 pence pieces. The total amount I have is £3.52.

By forming your own simultaneous equations, find how many 5 pence pieces I have. (5 marks)

c. $4x - 3y = 10$

$\frac{6}{x} - \frac{7}{y} = -2$ (6 marks)

8. Solve each of these equations for x

a. $\frac{2x-3}{6} + 1\frac{1}{30} = \frac{3x-4}{5}$ (5 marks)

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

c. $\frac{2+x}{x+a} - \frac{x-3}{x-a} = \frac{4}{a^2-x^2}$ (6 marks)

9. Solve each of these equations for x

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

b. $x^2 - 13x + 42 = 0$ (3 marks)

c. $12x^2 - 31x + 20 = 0$ (3 marks)

d. $5 + \frac{24}{x} = x$ (4 marks)

e. $(x^2 + 4x)^2 - 2(x^2 + 4x) - 15 = 0$ (7 marks)

Total 100 marks