Entrance Scholarships

MATHEMATICS I

March 2012

Time allowed 1 hour

You may try the questions in any order.

No calculating aids may be used.

Show all working.

RADLEY

1. a) Work out exactly

i) 60.9×2.74 *(3 marks)*

ii) $285.156 \div 8.9$ *(3 marks)*

b) Give the answers to the following as fractions in their simplest form

i) $\frac{13}{28} + \frac{2}{7}$ *(3 marks)*

ii) $2\frac{7}{9} \times 4\frac{1}{5}$ *(3 marks)*

iii) $2\frac{7}{10} \div \left(2\frac{13}{15} - 1\frac{2}{3}\right)$ *(4 marks)*

2. Work out as simply as possible

a) $657^2 - 343^2$ *(4 marks)*

b) $(83 \times 59) + 59^2 - (59 \times 42)$ *(4 marks)*

c) $(43 \times 64) + (35 \times 36) + (64 \times 21) - (36 \times 71)$ *(4 marks)*

d) $\frac{721^2 - (261 \times 721)}{7.21 \times 23}$ *(5 marks)*

3. a) Multiply out and simplify

i) $(a + 5b)^2$ *(3 marks)*

ii) $(2a + b)(24a^2 - 12ab + 6b^2)$ *(3 marks)*

b) Factorise fully

i) $12x^2y^3 + 16xy^4$ *(3 marks)*

ii) $12a^2 - 27b^2$ *(3 marks)*

iii) $x^2 + 21x + 38$ *(3 marks)*

c) Simplify

i) $\dfrac{x^2 - y^2}{xz + yz}$ *(3 marks)*

ii) $\dfrac{x^5}{y^2} \div x^2 y^3$ *(3 marks)*

4. Solve each of these equations for x

a) $3(x+5) + 4(3x-9) = 99$ *(3 marks)*

b) $\dfrac{7x+3}{4} - \dfrac{5x-7}{6} = 12$ *(4 marks)*

c) $(2x+3)(2x+9) - 4x^2 = 123$ *(5 marks)*

Rearrange the following formula to make x the subject

d) $\dfrac{a}{x+b} = \dfrac{c}{x}$ *(4 marks)*

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

a) $3x + 5y = 36$
$7x + 2y = 55$ *(6 marks)*

b) $\dfrac{1}{4}x - \dfrac{1}{3}y = 6$
$\dfrac{2}{3}x - \dfrac{3}{5}y = 29$ *(6 marks)*

6. Solve each of these equations for x

a) $x^2 + 3x - 18 = 0$ *(4 marks)*

b) $6x^2 - 17x - 14 = 0$ *(6 marks)*

c) $\dfrac{15}{x-2} + \dfrac{16}{x-3} = 7$ *(8 marks)*

Total 100 marks