RADLEY COLLEGE
Entrance Scholarships

MATHEMATICS I

March 2009

Time allowed 1 hour

You may try the questions in any order.

No calculating aids may be used.

Show all working.

1. a) Work out exactly

i) 38.4×4.09 *(3 marks)*

ii) $6.6728 \div 0.38$ *(3 marks)*

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

i) $\frac{19}{24} - \frac{1}{8}$ *(3 marks)*

ii) $4\frac{3}{5} \div 6\frac{4}{7}$ *(3 marks)*

iii) $\left(3\frac{1}{7} + 4\frac{2}{3}\right) \times 7\frac{7}{8}$ *(4 marks)*

2. Work out as simply as possible

a) $824^2 - 176^2$ *(4 marks)*

b) $(94 \times 67) + 67^2 - (67 \times 61)$ *(4 marks)*

c) $(42 \times 73) + (27 \times 56) + (73 \times 31) - (83 \times 27)$ *(4 marks)*

d) $\frac{463^2 + (463 \times 137)}{4.63 \times 24}$ *(5 marks)*

3. a) Multiply out and simplify

i) $(3a - b)^2$ *(3 marks)*

ii) $(20x^2 + 10xy + 5y^2)(2x - y)$ *(3 marks)*

b) Factorise fully

i) $14a^2b + 21ab^2$ *(3 marks)*

ii) $45x^2 - 20y^2$ *(3 marks)*

iii) $x^2 + 3x - 18$ *(3 marks)*

c) Simplify

i) $\dfrac{5x^4}{15x^3 - 25x}$ *(3 marks)*

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

4. Solve each of these equations for x

a) $8(2x + 3) - 5(x + 3) = 53$ *(3 marks)*

b) $\dfrac{3x - 4}{7} + \dfrac{2x + 3}{3} = 7$ *(4 marks)*

c) $(x + 6)^2 - (x + 4)(x - 1) = 58$ *(5 marks)*

Rearrange the following formula to make x the subject

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

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

a) $\begin{aligned} 2x + 7y &= 33 \\ 5x - 2y &= 24 \end{aligned}$ *(6 marks)*

b) $\begin{aligned} \frac{1}{2}x - \frac{2}{3}y &= 1 \\ \frac{2}{3}x + \frac{3}{4}y &= 21 \end{aligned}$ *(6 marks)*

6. Solve each of these equations for x

a) $x^2 + 7x + 12 = 0$ *(4 marks)*

b) $3x^2 - 14x + 15 = 0$ *(6 marks)*

c) $\dfrac{30}{x - 2} - \dfrac{12}{x + 5} = 5$ *(8 marks)*

Total 100 marks