RADLEY

Entrance Scholarships

MATHEMATICS I

March 2016

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) 4.93×60.9 *(3 marks)*

ii) $262.65 \div 8.5$ *(3 marks)*

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

i) $\frac{3}{4} + \frac{1}{36}$ *(3 marks)*

ii) $6\frac{3}{7} \div 5\frac{5}{8}$ *(3 marks)*

iii) $6\frac{6}{7} \times \left(7\frac{3}{8} - 4\frac{11}{12}\right)$ *(4 marks)*

2. Work out as simply as possible

a) $781^2 - 219^2$ *(4 marks)*

b) $83^2 - (45 \times 83) + (83 \times 62)$ *(4 marks)*

c) $(53 \times 21) - (19 \times 47) + (32 \times 53) - (47 \times 28)$ *(4 marks)*

d) $\dfrac{829^2 - (669 \times 829)}{8.29 \times 80}$ *(5 marks)*

3. a) Multiply out and simplify

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

ii) $(18x^2 + 6xy + 2y^2)\ (3x - y)$ *(3 marks)*

b) Factorise fully

i) $36a^2\ b^4 + 27a^3\ b^3$ *(3 marks)*

ii) $75x^2 - 3y^2$ *(3 marks)*

iii) $x^2 + 15x + 36$ *(3 marks)*

c) Simplify

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

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

4. Solve each of these equations for *x*

a) $12\ (x-3)\ -\ 2\ (4x-5) = 22$ *(3 marks)*

b) $\frac{5x+1}{6} + \frac{8x+4}{5} = 18$ *(4 marks)*

c) $(x+9)\ (x+7)\ -\ (x+5)^2 = 62$ *(5 marks)*

Rearrange the following formula to make *x* the subject

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

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

a) $9x - 2y = 99$
$5x - 3y = 38$ *(6 marks)*

b) $\frac{3}{4}x - \frac{1}{3}y = 12$
$\frac{5}{6}x + \frac{1}{2}y = 29$ *(6 marks)*

6. Solve each of these equations for *x*

a) $x^2 - 13x - 48 = 0$ *(4 marks)*

b) $14x^2 - 25x + 6 = 0$ *(6 marks)*

c) $\frac{30}{x+2} + \frac{56}{x-5} = 9$ *(8 marks)*

Total 100 marks