

# 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)  $60.9 \times 2.74$  (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)  $\frac{x^2 - y^2}{xz + yz}$  (3 marks)

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

4. Solve each of these equations for  $x$

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

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

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

Rearrange the following formula to make  $x$  the subject

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

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

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

b)  $\frac{1}{4}x - \frac{1}{3}y = 6$   
 $\frac{2}{3}x - \frac{3}{5}y = 29$  (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)  $\frac{15}{x-2} + \frac{16}{x-3} = 7$  (8 marks)

Total 100 marks