RADLEY

13+ Entrance Scholarships

# MATHEMATICS I

January 2019

Time allowed – 1 hour

You may try the questions in any order

No calculating aids may be used

***Show all your working***

Total 100 marks

1 a. Work out exactly

i. $2.89 \times 60.7$ *(3 marks)*

ii. $274.55 \div 8.5$ *(5 marks)*

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

i. $\frac{19}{21} - \frac{3}{7}$ *(2 marks)*

ii. $2\frac{2}{7} \div \frac{3}{14}$ *(3 marks)*

2 Work out as simply as possible

a. $73^2 - (49 \times 73) + (73 \times 26)$ *(4 marks)*

b. $\frac{489^2 - 479^2}{489 + 479}$ *(4 marks)*

c. $(69 \times 13) - (31 \times 18) + (69 \times 56) - (31 \times 13)$ *(5 marks)*

3 a. Multiply out and simplify

i. $(4a - 3b)^2$ *(3 marks)*

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

b. Factorise fully

i. $32a^3b^2 - 48a^2b^4$ *(3 marks)*

ii. $5y^2 - 80x^4$ *(4 marks)*

iii. $x^2 + 14x + 48$ *(2 marks)*

c. Simplify

i. $\frac{4x^2-4y^2}{6xz-6yz}$ *(4 marks)*

ii. $(4xy^2)^2 \div \frac{2y^3}{x^2}$ *(3 marks)*

4 Solve each of these equations for *x*

a. $4(3 - x) - 3(2x - 2) = 8$ *(3 marks)*

b. $\frac{3x+4}{2} + \frac{2x+1}{3} = 11$ *(4 marks)*

c. $(x^2 + 2)(x + 2) + (3 - 5x) = 7$ *(6 marks)*

Rearrange the following formula to make *x* the subject

d. $\frac{3a-x}{b-x} = \frac{x}{x-a}$ *(5 marks)*

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

a. $6x - 5y = 38$
$4x = 20 + 2y$ *(5 marks)*

b. $\frac{3}{4}x - \frac{1}{2}y = \frac{5}{4}$

$\frac{1}{3}x - \frac{1}{4}y = \frac{1}{2}$ *(6 marks)*

6. Solve each of these equations for $x$ using algebraic methods.

a. $x^2 - 11x - 42 = 0$ *(4 marks)*

b. $6x^2 - 5x - 6 = 0$ *(5 marks)*

c. $\frac{x-3}{4} - \frac{3}{x-7} = 2$ *(6 marks)*

d. $\frac{20}{x-3} - \frac{42}{x+7} = 2$ *(7 marks)*

**Total 100 marks**