St Paul's School Entrance Scholarship

Mathematics Paper 1: Specimen Paper A

Time: 90 minutes

Calculators are NOT allowed.

1   Find the value of the following. Give your answers in their simplest form.

    (i) $2\frac{1}{7} \times 4\frac{1}{5}$

    (ii) $1\frac{1}{3} - 2\frac{1}{4} + 3\frac{1}{6}$

2   Given that $a = -3$, $b = -4$ and $c = -5$, find the value of:

    (i) $a^2 + 2b^2$

    (ii) $bc - 4a$

    (iii) $a - b(c + 8)$

3   Solve the equation $x(x + 2) = x(x - 3) + 15$

4   (i)   Factorise   (a) $x^2 + 2xy$

                           (b) $xy + 2y^2$.

    (ii)   Hence simplify as far as possible $\dfrac{x^2 + 2xy}{xy + 2y^2}$.

5   Find a formula for the nth term of these sequences.

    (i) $\dfrac{1}{2}, \dfrac{1}{3}, \dfrac{1}{4}, \dfrac{1}{5}, \dfrac{1}{6}, \ldots$

    (ii) $2.3, 2.4, 2.5, 2.6, \ldots$

    (iii) $28, 25, 22, 19, \ldots$

6   A company makes three models of television, A, B and C.
The rectangular screens in all three models are similar.
The screen of model A has width 44 cm and height 32 cm.

    (a)   The width of the screen of Model B is 55 cm. Find its height.

    (b)   The ratio of the width of screens of Model A to Model C is 3 : 2.
              Find the area of the screen of Model C.

7   A fair 4-sided dice (faces numbered 1, 2, 3, 4) and an fair 6-sided dice (faces numbered 1, 2, 3, 4, 5, 6) are thrown simultaneously.

    (i)   Draw a diagram to illustrate all the possible outcomes.

    (ii)   In how many of these outcomes is the sum of the two scores a prime number?

8   The coordinates of points A, B and C are $(3, 2)$, $(10, 3)$ and $(8, -3)$ respectively.
    Use Pythagoras's Theorem to show that the triangle is isosceles.

9   On squared paper, draw the axes for x and y from 0 to 10.
    Draw on your diagram the line $y = x + 1$.
    Draw on your diagram the triangle PQR where $P = (4, 4)$, $Q = (4, 1)$ and $R = (6, 2)$.
    Draw the reflection of triangle PQR in the line $y = x + 1$.

10 Solve the inequality $\frac{2}{3}(x-1) < 8$.

11 The triangle ABC is equilateral.
    The bearing of B from A is $038°$.
    Find

    (i)   the bearing of C from B,

    (ii) the bearing of A from C.