Secondary Two Express Mathematics

End of Year Examination Paper 2

Marks	
	50

1. **(a)** Make a the subject of the following expressions:

    (i) $ap = q$ [1]

    (ii) $R = m(a + g)$ [2]

    (b) Melanie's age is $\dfrac{3}{4}$ that of Joshua's. Two years ago, Melanie's age was $\dfrac{1}{2}$ of what Joshua's age will be in 4 years time. How old is Joshua now? [3]

2. **(a)** In a box, there are 36 blue discs and the rest are red discs. One disc is selected at random. Given that the probability of choosing a blue disc is $\dfrac{3}{4}$, find

    (i) the probability of selecting a red disc, [1]

    (ii) the probability of selecting a green disc, and [1]

    (iii) the number of red discs in the box. [2]

    (b) A box contains 12 coloured cubes. Half of the total number of cubes is white and one third of the cubes are yellow. The remaining cubes are red. Find the probability of drawing out

    (i) a red cube from the box, and [2]
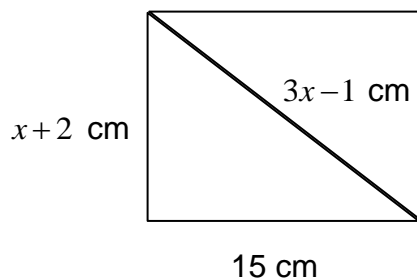
    (ii) a cube that is not yellow. [2]

3. The length of a rectangle is 15 cm, the breadth is $x+2$ cm and the diagonal is $3x-1$ cm.

(a) Form an equation in terms of x and show that it reduces to [2]

$$4x^2 - 5x - 114 = 0 \ ,$$

(b) Solve the equation to find the value of x, [2]

(c) Hence, find the area of the rectangle. [2]

$3x-1$ cm

$x+2$ cm

15 cm

4. (a) Solve the following simultaneous equations,

$$2x + 3y = 1.9$$

$$4x + 5y = 3.4$$ [4]

(b) At a games carnival, tickets are sold at $2.20 for adults and $1.20 for children. If 120 tickets were sold and $189 was collected, how many tickets [4] of each kind were sold?

5. It is given that $\varepsilon = \{x : x$ is an integer and $1 \le x \le 13 \}$,

$A = \{x : x$ is a factor of 12$\}$ and $B = \{x : x$ is a prime number$\}$.

(a) List the elements of ε, A and B'. [3]

(b) Illustrate with a Venn diagram, the sets ε, A and B. [2]

(c) Find

(i) $(A \cup B)'$, and [1]

(ii) $n(A \cap B)'$. [1]

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6. The table below lists the results of a Mathematics test of 10 students.

13	25	22	9	21	19	7	13	20	11

(a) Copy and complete the ordered stem-and-leaf diagram below to represent the scores of the 10 students. The first row of the stem-and-leaf diagram has been done for you. [2]

Stem	Leaf
0	7 9
1	
2	

(b) Find the

    (i) mean, [2]

    (ii) mode, and [1]

    (iii) median score. [2]

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7. *Answer the whole of this question on a single piece of graph paper.*

Below is a table of values for the equation $2y = 1 - 3x$.

x	-2	0	2
y	a	0.5	b

(a) Find the values of a and b. [2]

(b) Using a scale of 2 cm to represent 1 unit on both axes, draw the graph of [2]
$2y = 1 - 3x$.

(c) From the graph, find the value of y when

    (i) $x = 1.5$, [1]

    (ii) $x = -1$. [1]

(d) Draw the line $y = -2$, and write the coordinates of the point where $y = -2$

meets $2y = 1 - 3x$. [2]

END OF PAPER

Marking Scheme

1(a) (i) $ap = q$

$$a = \frac{q}{p} \quad \text{-----(B1)}$$

(ii) $R = m(a + g)$

$$\frac{R}{m} = a + g \quad \text{-----(M1)}$$

$$a = \frac{R}{m} - g \quad \text{-----(A1)}$$

1(b)

(a) Let Joshua's age be x, let Melanie's age be $\frac{3}{4}$ x. -----(M1)

$$\frac{3}{4} x - 2 = \frac{1}{2} (x + 4) \quad \text{-----(M1)}$$

3x -8 = 2x + 8

x = 16 -----(A1)

2(a)

(i) P(red disc) = 1 - $\frac{3}{4}$ = $\frac{1}{4}$ -----[A1]

(ii) P(green disc) = 0 -----[A1]

(iii) $\frac{3}{4}$ parts → 36 disc

$\frac{1}{4}$ part → $\frac{1}{3}$ X 36 -----[M1]

=12 red disc -----[A1]

2(b)

(i) P(red cube) = 1- $\frac{1}{2}$ - $\frac{1}{3}$ -----[M1]

$$= \frac{1}{6} \quad \text{-----[A1]}$$

(ii) P(not yellow cube) = P(white cube) + P(red cube)

$$= \frac{1}{2} + \frac{1}{6} \quad \text{-----[M1]}$$

$$= \frac{2}{3} \quad \text{-----[A1]}$$

OR

12 cubes → 6 white, 4 yellow, 2 red

(i) P(red) = $\frac{2}{12}$ -----(M1)

$$= \frac{1}{6} \quad \text{-----(A1)}$$

(ii) P(not yellow) = $\frac{6+2}{12}$ -----(M1)

$$= \frac{2}{3} \quad \text{-----(A1)}$$

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3   (a) $(x+2)^2 + 15^2 = (3x-1)^2$ -----(M1)
        $x^2+4x+4+225=9x^2-6x+1$
 $8x^2-10x-228=0$
        $4x^2-5x-114=0$ -----(A1)

     (b) $(4x+19)(x-6)=0$ -----(M1)
         $x=-4.75$ (rej) or $x=6$ -----(A1)

     (c) Area of rectangle $= (x+2)$ X 15   -----(M1)
                          $= (6 + 2)$ X 15
                          $= 8$ X $15 = 120$ cm^2 -----(A1)

4   (a) $2x + 3y = 1.9$ ----(1)
         $4x + 5y = 3.4$ ----(2)
         (1)X2: $4x + 6y = 3.8$ ----(3)
         (3)-(2): $4x+6y - 4x-5y=3.8-3.4$ ----[M1]
                      $y= 0.4$ ----[A1]
         Sub y=0.4 into (1): $2x + 3(0.4) =1.9$ -----[M1]
                          $2x = 1.9 - 1.2 = 0.7$
                          $x = 0.35$ -----[A1]

     (b) Let the number of adult tickets be x, and number of children tickets be y.
         $x + y = 120$ ----(1)
         $2.2x + 1.2y = 189$ ----(2)
         From (1): $x = 120 - y$ ---(3)
         Sub (3) into (2): $2.2(120-y) +1.2y =189$ -----[M1]
                          $264 - 2.2y +1.2y = 189$
                          $y = 264 - 189 = 75$ -----[A1]
         Sub y = 75 into (3): $x = 120 - 75$ -----[M1]
                          $x = 45$ -----[A1]

5   (a) $\varepsilon = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$ -----[B1]

        $A = \{1,2,3,4,6,12\}$ -----[B1]

        $B' = \{1,4,6,8,9,10,12\}$ -----[B1]

(b) ε
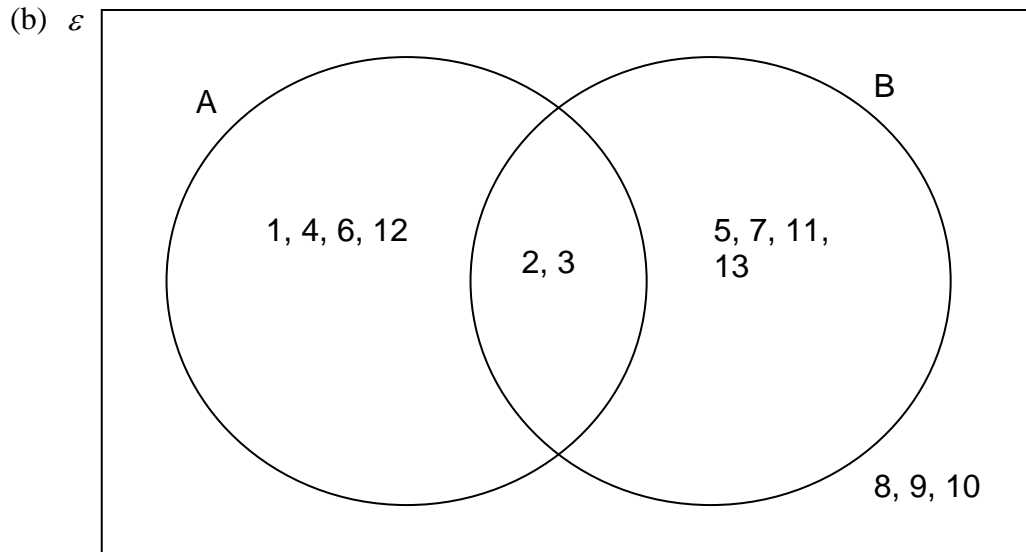
Correct diagram ---[A1], Correct elements ---[A1]

    (d) (i) $(A \cup B)' = \{8,9,10\}$ -----[A1]

        (ii) $n(A \cap B)' = 11$ -----[A1]

6   (a)

Stem	Leaf	
0	7 9	
1	1 3 3 9	-----[A1]
2	0 1 2 5	-----[A1]

(bi) Mean $= \dfrac{7 + 9 + 11 + 13 + 13 + 19 + 20 + 21 + 22 + 25}{10}$ -----[M1]

          $= 16$ -----[A1]
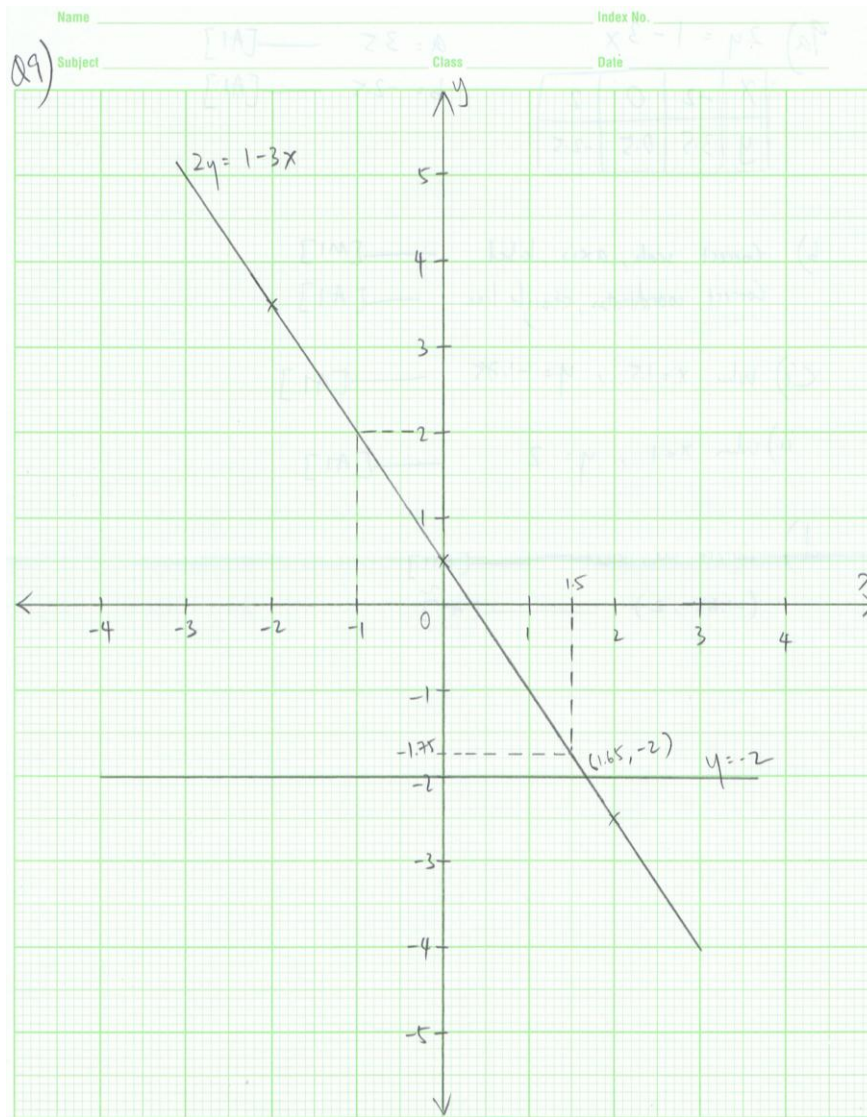
(bii) Mode $= 13$ -----[A1]

(biii) Middle position $= \dfrac{10 + 1}{2} = 5.5^{\text{th}}$ position   -----[M1]

$$\text{Median score} = \frac{13+19}{2} = 16 \qquad\qquad \text{-----[A1]}$$

9

9

(a) 2y = 1-3x

a=3.5 -----[A1]
b=-2.5 -----[A1]

x	-2	0	2
y	3.5	0.5	-2.5

(b) Correct scale, axis, label -----[M1]
   Correct coordinates, straight line -----[M1]

(c) From the graph,
   When x = 1.5, y = -1.75 (acceptable range $=\pm0.1$) -----[A1]
   When x = -1, y = 2   -----[A1]

(d) Correct line, label -----[M1]

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(1.65, -2) <mark>(acceptable range $= \pm 0.1$)</mark> -----[A1]