

## MATHEMATICS 2

**Question 1. (a)**

$$x = \{4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$$

$$y = \{3, 6, 9, 12, 15, 18\}$$

$$X \cap Y = \{6, 9, 12\}$$

(b) The LCM is the smallest positive number that all of the numbers divide into evenly.  
We solve this question by;

1. List the prime factors of each number.
2. Multiply each factor the greatest number of times it occurs in either number.

Since 3 has no factors besides 1 and 3. 3 is a prime number

Since 5 has no factors besides 1 and 5. 5 is a prime number

9 has factors of 1, 3 and  $3^2$ .

The LCM of 3, 5, 9 is the result of multiplying all prime factors the greatest number of times they occur in either number.

The LCM of 3, 5, 9 is  $3^2 \times 5 = 45$ .

C.

$$\frac{p+2q}{p} = \frac{7}{5},$$

simplifying

$$p + 2q = \frac{7p}{5},$$

$$5p + 10q = 7p,$$

$$10q = 7p - 5p$$

$$10q = 2p$$

$$\frac{q}{p} = \frac{2}{10}$$

$$\frac{q}{p} = \frac{1}{5}$$

**Question 2(a)**

Find the LCM of 5 and 4 which is 20.

Multiply all terms by 20 and simplify

$$\frac{4x+5}{5} + \frac{x-3}{4} = -1.$$

$$20 \times \frac{4x+5}{5} + 20 \times \frac{x-3}{4} = 20 \times -1$$

$$4 \times (4x + 5) + 5 \times (x - 3) = 20 \times -1$$

$$16x+20+5x-15=-20$$

$$21x+5=-20$$

$$21x=-20-5$$

$$21x=-25$$

$$x = -\frac{25}{21}$$

(b) (i)

Boys : Girls = 12:25,

If there are 120 boys, let  $x$  be the number of girls

120 boys :  $x$  girls

$$12:25 = 120:x$$

If more, less divides

Therefore

$$x = \frac{25}{12} \times 120 = 250$$

Hence there are 250 girls in the class

(ii) the total number of people in the school = Number of boys + number of girls

$$= 250 + 120$$

$$= 370$$

(c) Simplify:  $(8x^2y^3) \left(\frac{3}{8}xy^4\right)$ .

To solve, start by grouping exponential terms

$$(8 \times \frac{3}{8}) \cdot (x^2 \times x) \cdot (y^3 \times y^4)$$

Simplifying..

$$3x^3y^7$$

### Question 3

(a) Let  $U$  be the universal set

$X$  – Number of students who passed integrated science

$Y$  – Number of students who passed Mathematics

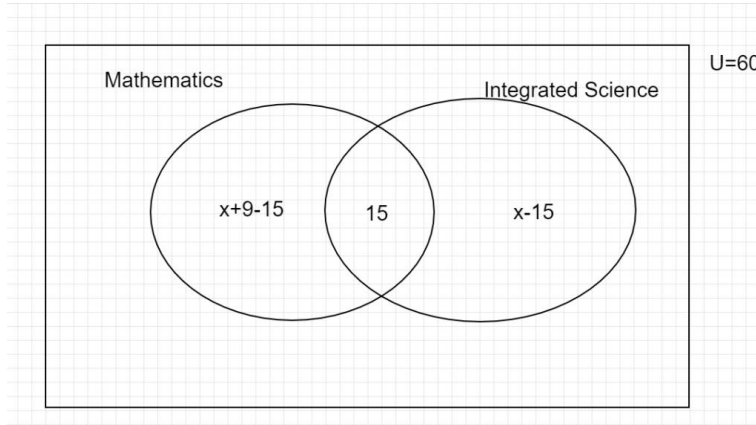
Solving this question requires the use of venn diagrams.

From the information given

$$X \cap Y = 15$$

9 more students passed mathematics than integrated science

$$\text{Hence } Y = x+9$$



Solving for  $x$

$$x+9-15+15+x-15=60$$

$$2x-6=60$$

$$2x=66$$

$$X = 33$$

Number of students who passed math only =  $x+9-15 = 27$

Number of students who passed science =  $33-15 = 18$

Probability of passing only one subject =  $(18+27)/60 = 3/4$

(b) Factorize:  $xy+6x+3y+18$ .

$$xy+6x+3y+18$$

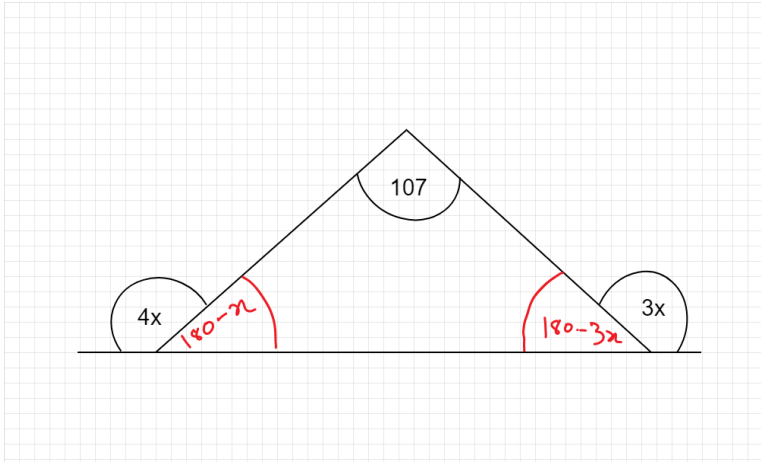
$$x(y+6)+3(y+6)$$

$$(x+3)(y+6)$$

### Question. 4

a.  $250\% = \frac{250}{100} = \frac{25}{10} = \frac{5}{2}$

b. Using the knowledge that angles on a straight-line sum to 180, write an equation for the missing internal angles



we solve this question by using a least known property of triangles shown in the image below.

Hence

$$3x = (180 - 4x) + 107$$

$$7x = 287$$

$$\frac{7x}{7} = \frac{287}{7}$$

$$x = 41$$

C.

$$2 \div \left( \frac{15}{64} + \frac{6}{7} \right)$$

simplifying the term in the brackets, by first finding the LCM of denominators

$$2 \div \left( \frac{7(15) + 64(6)}{448} \right)$$

$$2 \div \left( \frac{105 + 384}{448} \right)$$

$$2 \div \left( \frac{489}{448} \right)$$

applying the fraction rule

$$2 \times \left( \frac{448}{489} \right)$$

$$\left( \frac{896}{489} \right)$$

$$q = \begin{pmatrix} 7 \\ -1 \end{pmatrix} r = \begin{pmatrix} 4 \\ -5 \end{pmatrix} \text{ and}$$

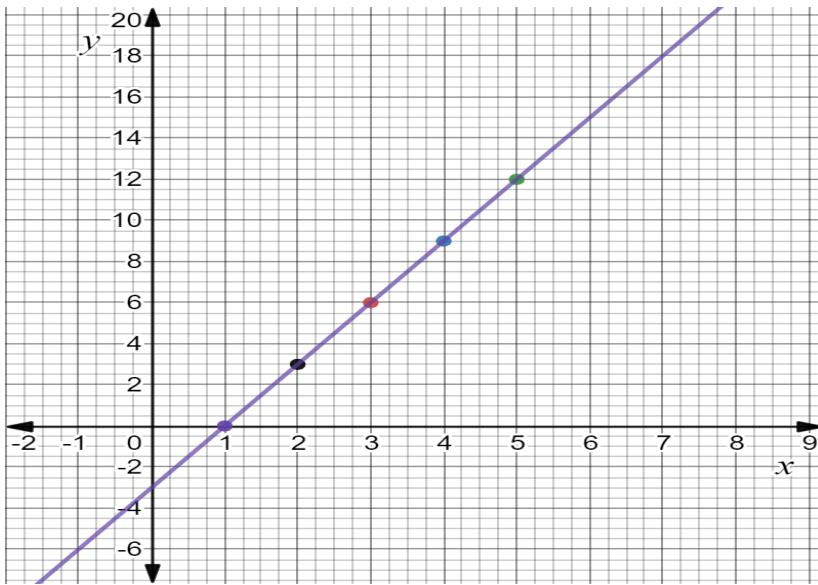
$$(q+r) = \begin{pmatrix} 7+4 \\ -1+(-5) \end{pmatrix}$$

$$(q+r) = \begin{pmatrix} 11 \\ -6 \end{pmatrix}$$

D.

## Question . 5

The relation is plotted on a graph sheet as shown below.



(iv) gradient

the gradient can be found from the graph using the formula below, choosing any 2 points on the line

$$\begin{aligned} &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{12 - 0}{5 - 1} = \frac{12}{4} = 3 \end{aligned}$$

Equation of a line is given as

$$Y = mx + C$$

Where  $m$  is the gradient

$C$  is  $y$  intercept

From the graph the  $y$  intercept is  $-3$

So the equation of the line

$$Y = 3x - 3$$

(b) Simplify:  $32 \times 8 \times 4 \times 2$ , leaving your answer in the form  $2^n$ .

$$32 = 2^5$$

$$8 = 2^3$$

$$4 = 2^2$$

$$2 = 2^1$$

$$32 \times 8 \times 4 \times 2 = 2^{5+3+2+1} = 2^{11}$$

**Question. 6 (a).**

<b>Marks</b>	<b>frequency</b>	<b>cumulative frequency</b>
1	1	1
2	4	5
3	3	8
4	4	12
5	2	14
6	1	15
7	7	22
8	3	25

(b) Find the:

(i) mode of the distribution = 7

(ii) median mark of the test = 5

(iii) mean mark = 4.92