

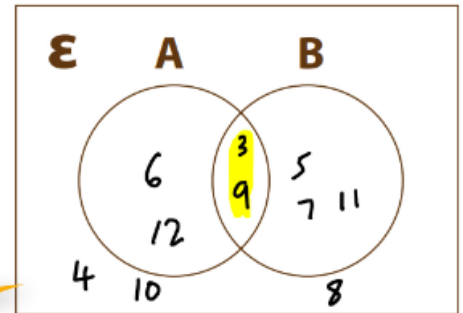
Question 1

$$\mathcal{E} = \{3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$$

$$A = \{\text{Odd Numbers between 3 and 12}\}$$

$$B = \{\text{Multiples of 3 between 3 and 12}\}$$

a) Complete the Venn diagram to represent this information.



STEP 1
Complete Venn

b) A number is chosen at random from the universal set $\mathcal{E}$.
Find the probability that the number is in the set $A \cap B$

$$\frac{2}{10} = \frac{1}{5}$$

STEP 2
Apply

Question 2

a) Solve $3n - 5 > 22$

$$\begin{aligned} 3n - 5 &= 22 \\ 3n &= 22 + 5 \\ 3n &= 27 \quad \therefore n = 9 \Rightarrow \underline{n > 9} \end{aligned}$$

b) Solve $9n \leq 3n + 12$

$$\begin{aligned} 9n &= 3n + 12 \\ 9n - 3n &= 12 \\ 6n &= 12 \Rightarrow n = 2 \Rightarrow \underline{n \leq 2} \end{aligned}$$

c) Solve $7n - 2 \geq 4n + 7$

$$\begin{aligned} 7n - 2 &= 4n + 7 \\ 7n - 4n &= 7 + 2 \\ 3n &= 9 \Rightarrow n = 3 \Rightarrow \underline{n \geq 3} \end{aligned}$$

Question 3

a) Factorise $3x^2 + 4x - 4$

$ax^2 + bx + c$

Step 1: Quad Box
(+ insert)

$$\begin{array}{r} 6x - 2 = +2 \\ 6 + -2 = 4 \end{array}$$

$3x^2 + 6x - 2x - 4$

Step 2: Split + factorise

$3x^2 + 6x - 2x - 4$
 $3x(x+2) - 2(x+2)$

Step 3: Combine

$(3x-2)(x+2)$

Hence solve $3x^2 + 4x - 4 = 0$

$(3x-2)(x+2) = 0$

$3x-2=0 \quad x+2=0$

$3x = 2 \quad x = -2$

$x = \frac{2}{3} \quad x = -2$

b) Solve $6x^2 - 7x - 3 = 0$

(1)

$$\begin{array}{r} -9 \times 2 = -18 \\ -9 + 2 = -7 \end{array}$$

$6x^2 - 9x + 2x - 3$

(2)

$6x^2 - 9x + 2x - 3$

$3x(2x-3) + 1(2x-3)$

(3)

$(3x+1)(2x-3)$

c) Solve $8x^2 - 12x$

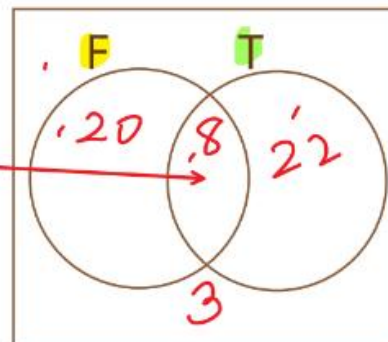
$4x(2x-3) = x=0, \quad 2x-3=0$
 $2x = 3$
 $x = \frac{3}{2}$

Question 4

Here is a Venn diagram.

There are 55 pupils enrolled for a sports club. 28 are enrolled for Football and 30 are enrolled for Tennis. 8 are enrolled for both of these sports.

(a) By using a Venn diagram, find the number of pupils who choose neither sport.



b) In a class of 50 students, 15 students enjoy reading, 30 enjoy sports and 10 enjoy neither.

(i) Represent this information in a Venn diagram.

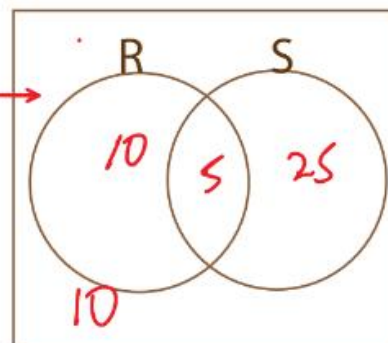
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$40 = 15 + 30 - x$

$\therefore x = 5$

Using part b (i) find;

(ii) the number of students enjoying both subjects



Silver

Question 5

Here is a Venn diagram.

Write down the numbers that are in the set

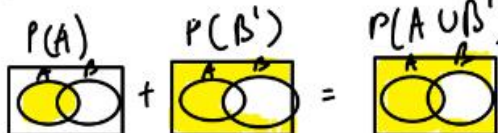
a) $A \cap B$ $n(A \cap B) = 2, 9$

b) $A \cup B$ $1, 3, 5, 2, 9, 7, 4, 8$

c) B' $1, 3, 5, 6, 10$

d) $A \cap B'$ $1, 3, 5$ $P(A) + P(B') = P(A \cup B')$

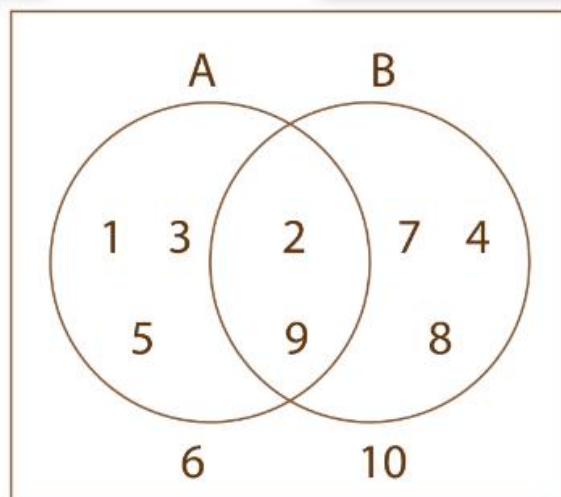
e) $A \cup B'$



A number is chosen at random.

f) Find $P(A' \cap B')$ $1 - P(A \cup B) = 1 - \frac{8}{10} = \frac{2}{10}$

g) Find $P(A' \cup B')$ $1 - P(A \cap B) = 1 - \frac{2}{10} = \frac{8}{10}$



Question 6

Here is a Venn diagram.

In a certain school, 36 students were asked whether they would choose Physics or Maths for advanced studies. The number of students who chose Physics and Maths was double the number of students that chose Physics only. Furthermore, the number of students who chose Maths was 4 more than triple the number of students that chose Physics. However, 2 students chose neither Physics or Maths.

a) Represent this information on a Venn diagram, letting x be the number of students that chose Physics only.

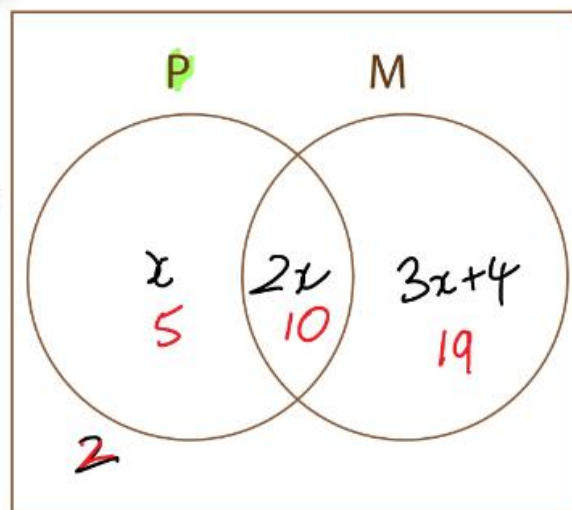
b) Use the results obtained in part (a) to determine a student selected at random likes;

(i) Maths only 19

(ii) Physics and Maths 10

(iii) Physics or Maths 34

$$\begin{aligned} x + 2x + 3x + 4 + 2 &= 36 \\ 6x + 6 &= 36 \\ 6x &= 30 \\ x &= 5 \end{aligned}$$



Gold

Question 9

a) Factorise $5x^2 + 3xy - 2y^2$

$$5x^2 + 5xy - 2xy - 2y^2$$

$$5x(x+y) - 2y(x+y)$$

$$(5x-2)(x+y)$$

b) $9 - (2x-1)^2$

$$3^2 - (2x-1)^2$$

$$x^2 - y^2 = (x+y)(x-y)$$

$$x = 3, y = (2x-1)$$

$$(3 + (2x-1))(3 - (2x-1))$$

$$(2+2x)(4-2x)$$

$$= 8 - 4x - 8x - 4x^2$$

$$= -4x^2 - 12x + 8$$

Platinum