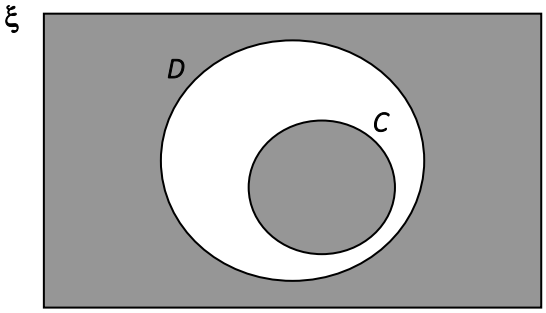
EQUITY
LEARNING PLACE

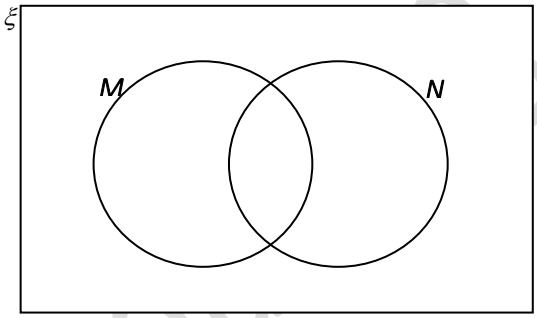
Elementary Math Topical (Sets)

Question 1:

a) Express the shaded region using set notation in the Venn diagram.

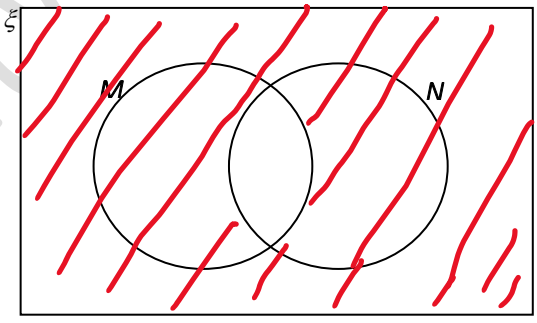


b) On the Venn diagram, shade the region which represents $(M \cap N)'$



a) $C \cup D'$

b)



Elementary Math Topical (Sets)

Question 2:

$\xi = \{x \text{ is an integer} : -3 < x < 8\}$

$M = \{x : -2x + 2 < 5\}$

$N = \{x : x \text{ is a factor of } 12\}$

a) List the elements in the set *M*.

b) Draw a Venn diagram to represent the sets ξ, *M*, and *N*

a)

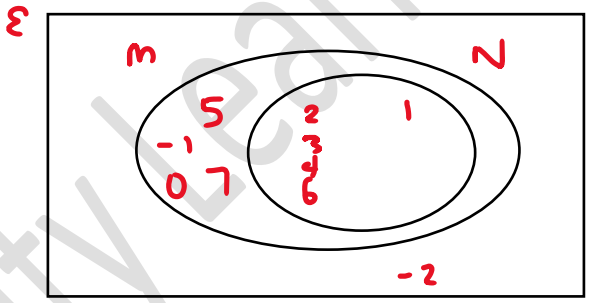
$$-2x + 2 < 5$$

$$-2x < 3$$

$$x > -\frac{3}{2}$$

$$M = \{-1, 0, 1, 2, 3, 4, 5, 6, 7\}$$

b)



Elementary Math Topical (Sets)

Question 3:

ξ = {integers x :$1 \leq x \leq 10$}

P = {factors of 8}

Q = {integers that are perfect squares}

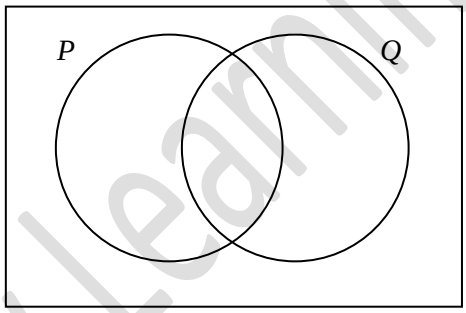
$R = \{x : \frac{20-7x}{3} < x \leq 5\}$

a) List the elements in R.

b) List the elements in $P \cup R$.

c) List the elements in $P \cap Q'$

d) On the Venn diagram, shade the region which represent $P' \cup Q'$.



a)

$\frac{20-7x}{3} < x$ And $x \leq 5$

$20 - 7x < 3x$

$20 < 10x$

$2 < x$

$\therefore 2 < x \leq 5$

$R = \{3, 4, 5\}$

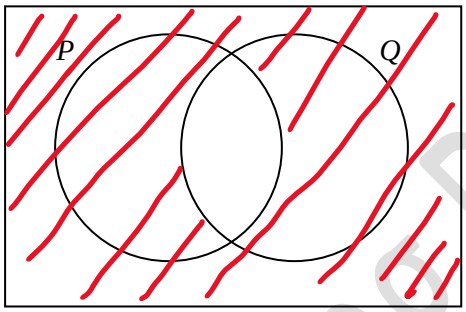
b)

$$P \cup R = \{1, 2, 3, 4, 5, 8\}$$

c)

$$P \cap Q' = \{2, 8\}$$

d)



Question 4:

Given $\mathcal{E} = \{x : x$ is an integer and $11 < x < 25\}$,

$A = \{x : x$ is a prime number$\}$,

$B = \{x : x$ is divisible by 3$\}$ and

$C = \{x : 3x + 3 > 60\}$,

Find the elements x such that $x \in (B \cup C)'$ and that $x \notin A$.

$$3x + 3 > 60$$

$$3x > 57$$

$$x > 19$$

$$x = 14, 16$$

Elementary Math Topical (Sets)

Question 5:

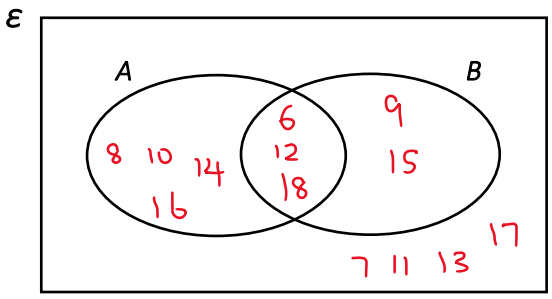
It is given that

ε = { x : $6 \leq x \leq 18$ }

A = { x : x is an even number }

B = { x : x is a multiple of 3 }

a) Fill in the elements of ε, A and B in the Venn diagram.



b) List the elements of $(A \cup B)'$.

c) Describe as simply as possible, in words, the elements contained in $A \cap B$.

b)

$$(A \cup B)' = \{7, 11, 13, 17\}$$

c) The elements is $A \cap B$ are multiples of 6.

Elementary Math Topical (Sets)

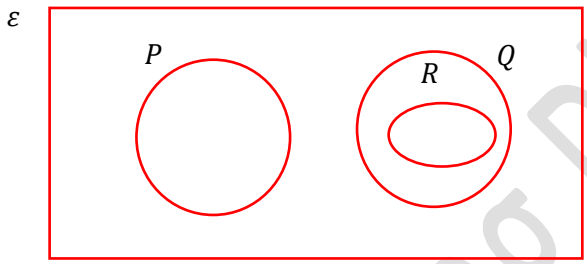
Question 6:

The universal set, ε, contains three sets, *P*, *Q* and *R*.

The three sets satisfy the following conditions:

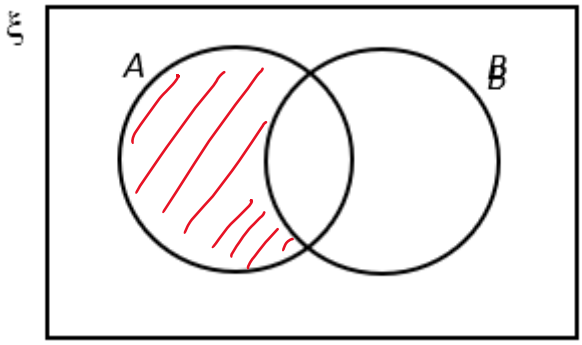
$$P \cap Q = \emptyset \quad \text{and} \quad R \subset Q$$

Draw the Venn diagram to illustrate these sets.



Question 7:

a) On the Venn diagram shown in the answer space, shade the set B' ∩ (A ∪ B).



Suppose *P* = {points on the line *y* = 4*x* + 9}, *Q* = {points on the line with gradient = 4}

b) Describe, using set notation, the relationship between the sets *P* & *Q*.

c) Is (1, 13) ∈ *P*? Explain.

b) $P \subset Q$

c) Yes, when $x = 1, y = 13$. So $(1\ , 13) \in P$

Question 8:

Suppose ξ = {students in a secondary 4 class}

C = {students who like nasi lemak}

D = {students who like milo}

Describe the following in words.

a) $C \cap D \neq \emptyset$

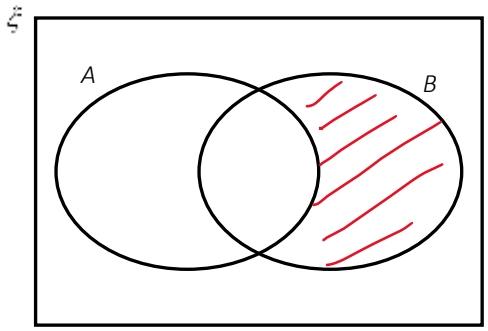
b) $C' \subset D'$

a) There is student who like nasi lemak and milo.

b) Students who do not like nasi lemak also does not like milo.

Question 9:

a) On the Venn diagram below, shade the region which represents $A' \cap B$.

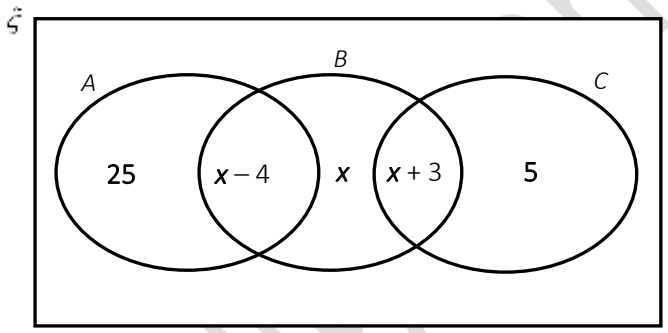


The number of students studying geography, history and literature in a class are shown in the Venn diagram.

A = {students studying geography}

B = {students studying history}

C = {students studying literature}



b) If 20 students study history, find the value of ***x***.

c) Find the fraction of students who study literature in the class.

b)

$$x - 4 + x + x + 3 = 20$$

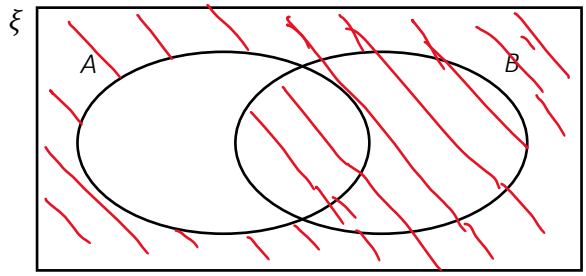
$$3x - 1 = 20$$

$$x = 7$$

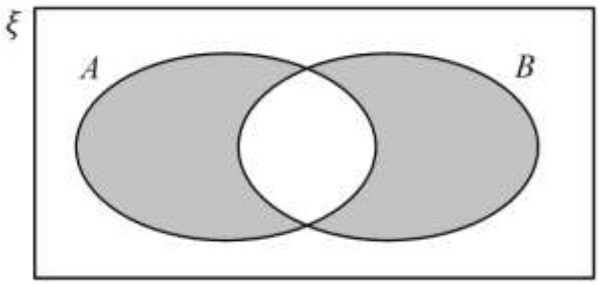
c) $\frac{15}{50} = \frac{3}{10}$

Question 10:

a) On the Venn diagram, shade the region which represents $A' \cup B$.



b) Write down the set notation for the shaded region below.



$M = \{m: \ m \text{ is a multiple of } 6\}$

$N = \{n: \ n \text{ is a multiple of } 12\}$

c) Explain why $N \subset M$.

b) $(A' \cap B) \cup (B' \cap A)$

c) All elements in N are in M

Question 11:

A universal set $\mathcal{E}$ and its subset *A* and *B* are given by

$\varepsilon = \{x : x \text{ is an integer such that } 2 \le x \le 10\}$

$A = \{x : x^2 \le 40\}$

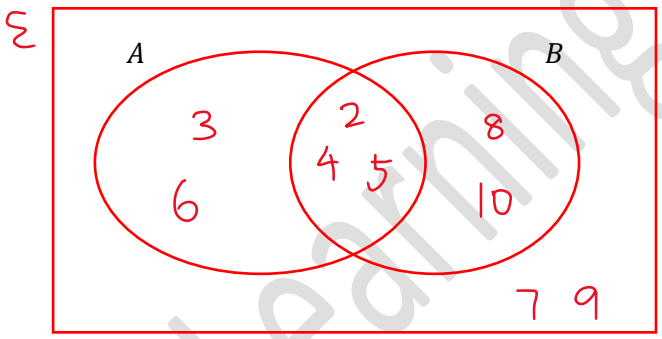
B = {*x* : *x* is a factor of 40}

a) Illustrate with a Venn diagram, the sets $\mathcal{E}$, *A* and *B*.

b) List the elements of $(A \cup B)' \cup (A \cap B)$.

c) State the value of $\mathrm{n}[(A' \cap B) \cup (A \cap B')]$.

a)



b) 2, 4, 5, 7, 9

c) 4

Question 12:

$\varepsilon = \{x : x \text{ is an integer and } 10 < x < 20\}$

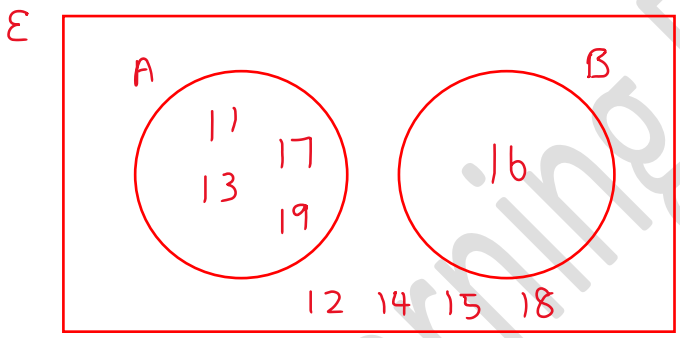
$A = \{x : x \text{ is a prime number}\}$

$B = \{x : x \text{ is an integer that is a perfect square}\}$

a) Draw a Venn diagram showing, ε, A and B.

b) List the elements in $A \cap B'$.

c) Write down $\mathrm{n}(A \cup B)'$

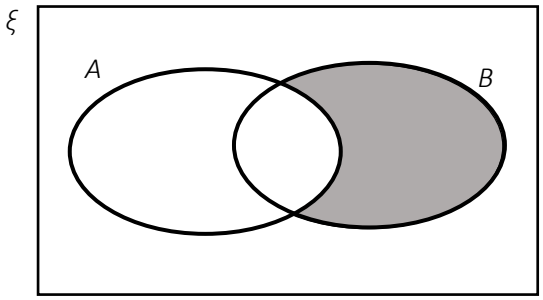


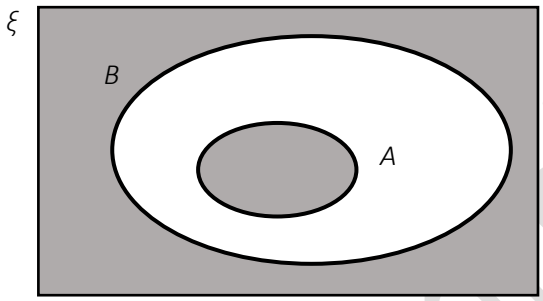
b) $11, 13, 17, 19$

c) 4

Question 13:

Write down the sets represented by the following shaded regions.

a) 

b) 

a) $A' \cap B$

b) $A \cup B'$

Question 14:

$\mathcal{E} =$ {odd integers: $2 \le x \le 20$ }

P = {factors of 180}

Q = {prime numbers}

List the elements in

a) Q

b) $P \cap Q$

a) $3, 5, 7, 11, 13, 17, 19$

b) $3, 5$

Question 15:

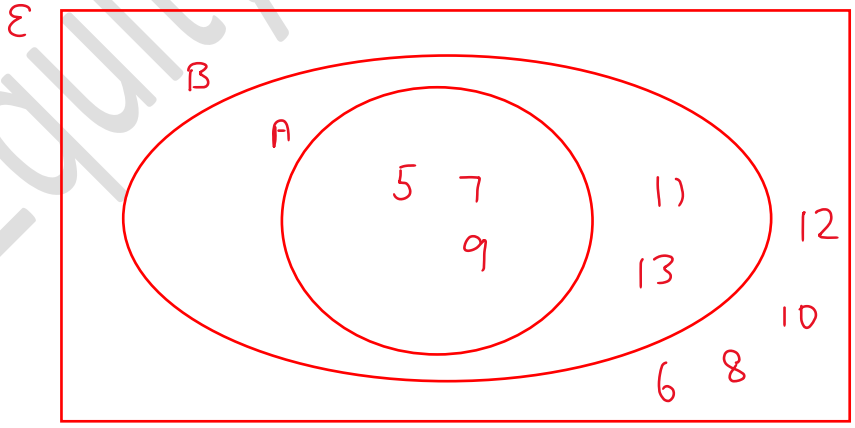
It is given that

$\xi =$ {x: x is an integer between 5 and 13 inclusive},

$A \subset \xi$ and $B \subset \xi$

$\{5,7,9\} \subset (A \cap B)$, $6, 8, 10, 12 \in (A \cup B)'$ and $\{11,13\} \subset (A \cup B')'$

Draw a Venn diagram to represent the given information.



Question 16:

It is given that $\xi = \{x : -3 \leq x \leq 3, x \text{ is an integer}\}$,

$A = \{x : x^4 - 16 = 0\}$

$B = \{x : 2x^2 + 7x + 6 = 0\}$.

a) List the elements of *A*.

b) List the element of *B*.

c) Hence, write down the elements of $A \cup B$ and and $A \cap B$.

d) In the space below, draw a Venn Diagram to represent the relationship between sets ξ, *A* and *B*.

a)

$$(x^2 - 4)(x^2 + 4) = 0$$

$$(x + 2)(x - 2)(x^2 + 4) = 0$$

$$x = -2 \text{ or } x = 2$$

$A = \{-2, 2\}$

b)

$$2x^2 + 7x + 6 = 0$$

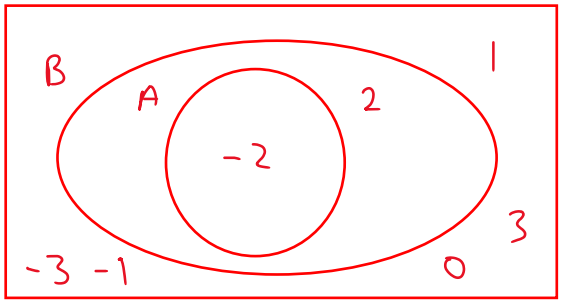
$$(2x + 3)(x + 2) = 0$$

$$x = -\frac{3}{2} \text{ or } x = -2$$

$B = \{-2\}$

c) $A \cup B = \{-2, 2\}$ and $A \cap B = \{-2\}$

d)



Elementary Math Topical (Sets)

Question 17:

ξ = {integers x : $1 \leq x \leq 16$}

A = {integers that are perfect squares}

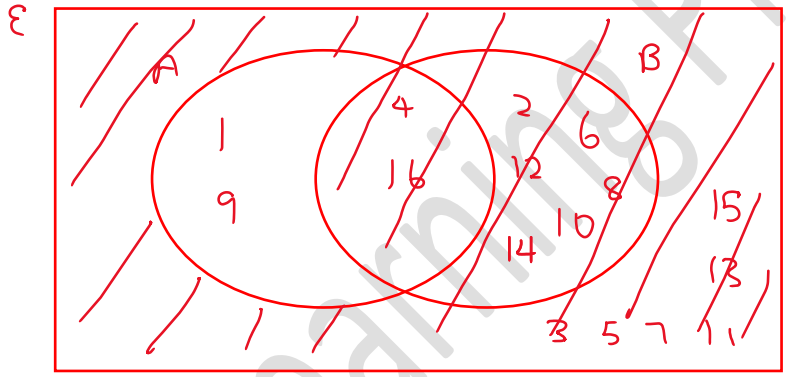
B = {integers that are divisible by 2}

a) Draw a Venn diagram to illustrate the above information and shade the set $A' \cup B$. (You are not required to state the elements

b) List the elements in the set $A \cap B'$.

c) A number k is chosen from ε. Find the probability that $k \in A \cup B$.

a)



b) $1, 9$

c) $\mathrm{P}(k \in A \cup B) = \frac{10}{16} = \frac{5}{8}$

Question 18:

$\varepsilon = \{\text{integers } x : 2 < x \leq 12\}$

$A = \{x : x \text{ is a prime number}\}$

$B = \{x : x \leq 5\}$

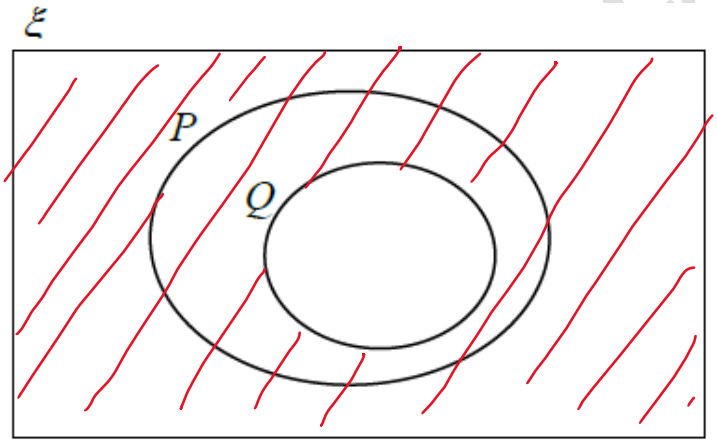
$C = \left\{x : \frac{60}{x} < 8\right\}$

Find the element x such that $x \notin A, x \notin B$ and $x \notin C$.

$x = 7$

Question 19:

On the Venn diagram below, shaded the region which represents $P' \cup Q'$



Question 20:

$\varepsilon = \{x : x \text{ is an integer such that } 1 \leq x < k\}$

$P = \{x : x \text{ is a prime numner}\}$

$Q = \{x : x \text{ is a number where its unit digit is } 3\}$

a) Given that there are 4 elements in $P \cap Q$, state the maximum integer value of k.

b) Is the following statement true? Explain your answer

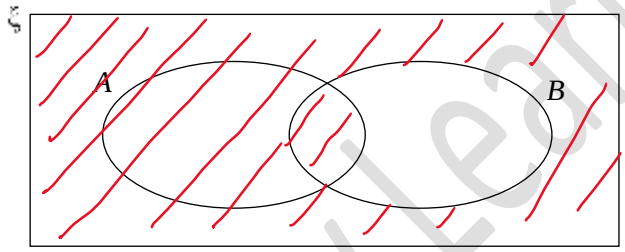
$$\{2\,,3\,,5\} \in P$$

a) max $k = 53$

b) No, $\{2,3,5\} \subset P$

Question 21:

a) On the Venn diagram, shade the region which represents $A \cup B'$.



b) ξ = {integers from –2 to 4}

A = {x : x is an integer such that (2 – 3x) is greater than or equal to -8}

B = {x : x is a prime number}

List down the element in $A \cap B$.

b) $2 - 3x \geq -8$

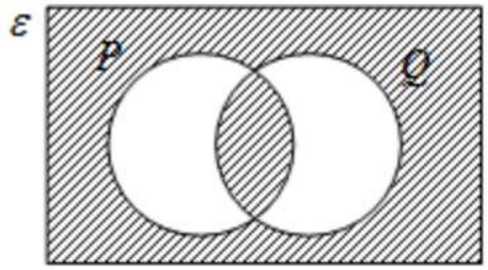
$10 \geq 3x$

$x \leq \frac{10}{3}$

$A \cap B = \{2,3\}$

Question 22:

a) Describe the shaded region in set notation.



Given that

$\xi = \{x$ is a positive integer and $0 < x < 10\}$

$A = \{x : x$ is a prime number$\}$

$B = \{x : x$ is a factor of $12\}$

$C = \{x : \frac{50}{x} < 8\}$

b) Find $B \cap C$

c) List the elements of $(A \cup B)'$.

a) $(P \cap Q) \cup (P \cup Q)'$

b) $B \cap C = \{1, 2, 3, 6\}$

c) $8, 9$

Question 23:

$\varepsilon = \{x : x \text{ is an integer and } 1 \leq x < 10\}$
A = {prime numbers}

B = {factors of 6}

a) List the elements in $A \cap B'$.

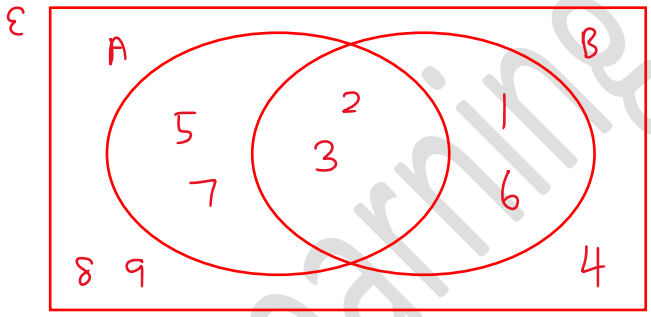
b) Is {2, 3} $\in$ A ? Justify your answer.

c) Draw a Venn diagram to represent the sets ε, A and B.

a) $5, 7$

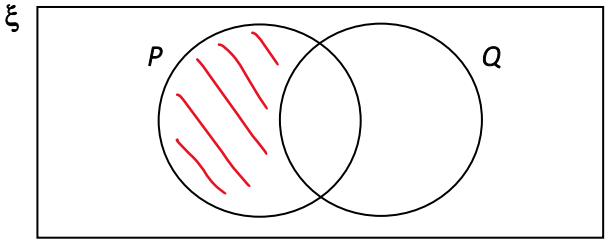
b) No, $\{2,3\} \subset A$

c)



Question 24:

a) In the Venn diagram given below, shade the region that represents $P \cap (P \cap Q)'$.



b) It is given that

ξ = {x : x is an integer and $1 \leq x < 13$},

A ={ 7, 8, 9, 10, 11},

B = {x : x is a factor of 18}

Describe the elements contained in the set $A' \cap B$.

b) $A' \cap B = \{x : x \text{ is factor of } 18 \text{ and } x \leq 6\}$

Question 25:

$A = \{\text{points lying on the line } 2x + y = 8\}$

$B = \{\text{points lying on the line } 3x - 4y = 12\}$

$C = \{\text{points lying on the line } mx - 4y = c\}$

a) Is (-1,6) $\in A$? Explain your answer clearly.

b) Find the element p such that $p \in (A \cap B)$.

c) Write down a possible value of m and of c such that $B \cap C = \emptyset$.

a) when $x = -1$

$$2(-1) + y = 8$$

$$y = 10$$

The element $(-1,10) \in A$ but $(-1,6) \notin A$.

b)

$$2x + y = 8$$

$$8x + 4y = 32$$

$$3x - 4y = 12$$

$$11x = 44$$

$$x = 4$$

$$y = 0$$

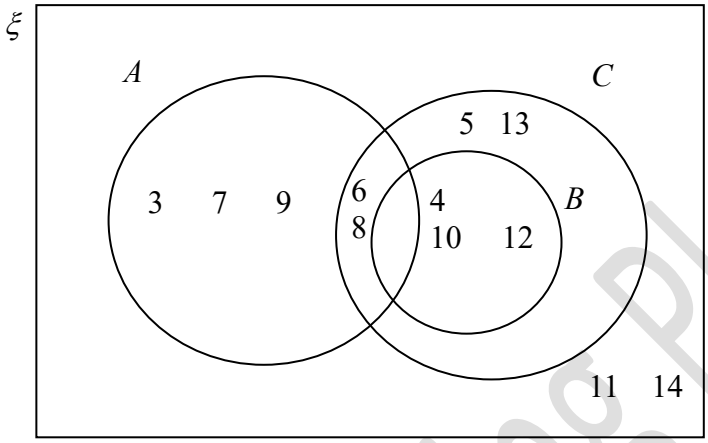
$$p = (4,0)$$

c) $m = 3, c = 11$

Question 26:

$\xi = \{\text{integers } x : 3 \le x \le 14\}$

The Venn diagram shows the elements of three sets *A*, *B* and *C*.



Use one of the symbols below to complete each statement.

$\varnothing \quad \subset \quad \not\subset \quad \in \quad \notin \quad \xi$

a) $\{3,6\}$ ..... *A*

b) 12 ..... *C*

c) $A \cap B =$ .....

a) $\subset$

b) $\in$

c) $\varnothing$

Question 27:

$\xi = \{\text{integers } x : 1 \le x \le 16\}$

$A = \{\text{factors of } 15\}$

$B = \{\text{multiples of } 3\}$

List the elements in

a) A'

b) $A' \cap B$

c) $A \cup B$

a) 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14

b) 6, 9, 12

c) 1, 3, 5, 6, 9, 12,15

Question 28:

ξ = {all triangles}

X = {right-angled triangles}

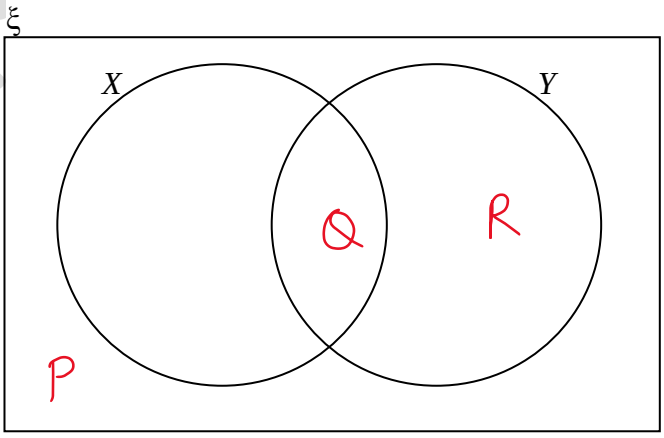
Y = {triangles with three unequal sides}

P is a triangle with all angles 60°.

Q is a triangle with sides 8 cm, 15 cm and 17 cm.

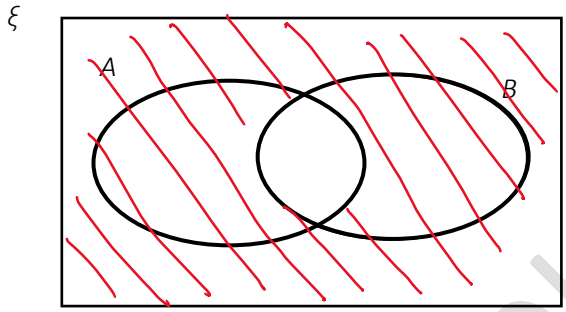
R is a triangle with sides 7 cm, 7 cm and 3 cm.

On the Venn diagram, below, write *P*, *Q* and *R* in the appropriate sets.



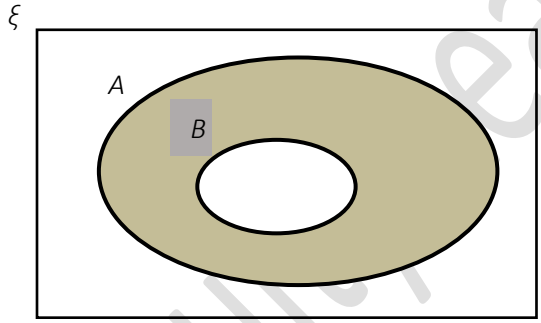
Question 29:

On the Venn diagram, shade the region which represents $A' \cup B'$



Question 30:

Write down the set represented by the following shaded region



$A \cap B'$

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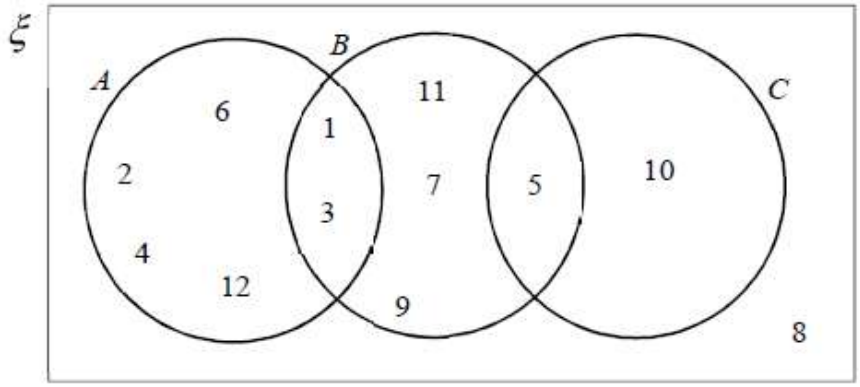
Elementary Math Topical (Sets)

Question 31:

$\varepsilon = \{\text{integers } x : 1 \leq x \leq 12\}$

The Venn diagram shows the elements of ε and three sets A, B and C



a) Use one of the symbols shown to complete the statement below

$\subset, \quad \not\subset, \quad \in, \quad \notin$

$\{3\} \ldots\ldots\ldots\ldots\ldots B$

b) List the elements in the set $B' \cap C'$

c) List the elements in the set $A' \cup B$

a) $\subset$

b) $2, 4, 6, 8, 12$

c) $1, 3, 5, 7, 8, 9, 10, 11$