

# EQUITY

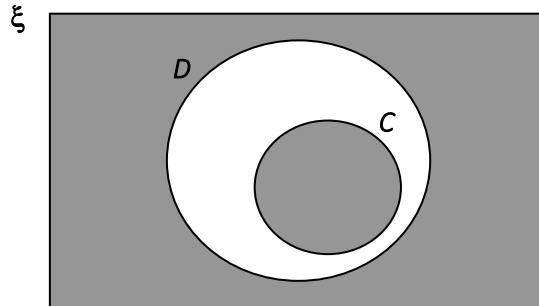
## LEARNING PLACE

### Elementary Math Topical (Sets)

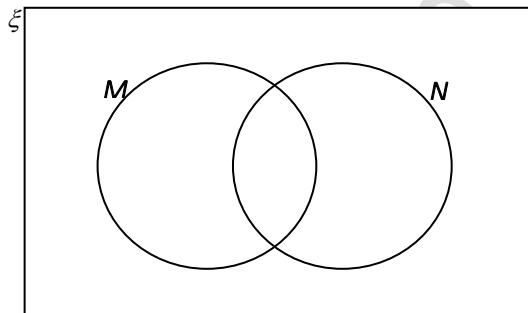
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#### Question 1:

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



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



#### 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  $\xi$ ,  $M$ , and  $N$

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#### Question 3:

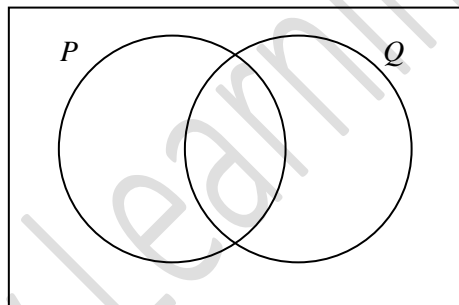
$$\xi = \{\text{integers } x : 1 \leq x \leq 10\}$$

$$P = \{\text{factors of } 8\}$$

$$Q = \{\text{integers that are perfect squares}\}$$

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

- List the elements in  $R$ .
- List the elements in  $P \cup R$ .
- List the elements in  $P \cap Q'$ .
- On the Venn diagram, shade the region which represent  $P' \cup Q'$ .



#### Question 4:

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

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

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

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

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

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#### Question 5:

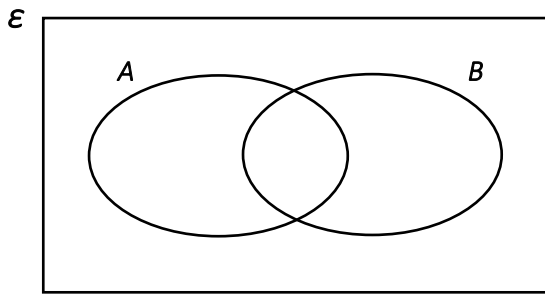
It is given that

$$\epsilon = \{x : 6 \leq x \leq 18\}$$

$$A = \{x : x \text{ is an even number}\}$$

$$B = \{x : x \text{ is a multiple of } 3\}$$

a) Fill in the elements of  $\epsilon$ ,  $A$  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  $A \cap B$ .

#### Question 6:

The universal set,  $\epsilon$ , 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.

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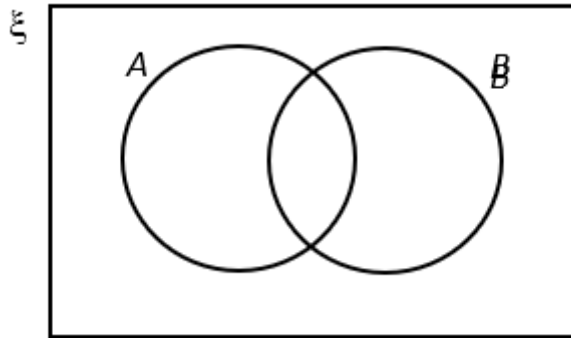
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#### Question 7:

a) On the Venn diagram shown in the answer space, shade the set  $B' \cap (A \cup B)$ .



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

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

c) Is  $(1, 13) \in P$ ? Explain.

#### Question 8:

Suppose  $\xi = \{\text{students in a secondary 4 class}\}$

$C = \{\text{students who like nasi lemak}\}$

$D = \{\text{students who like milo}\}$

Describe the following in words.

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

b)  $C' \subset D'$

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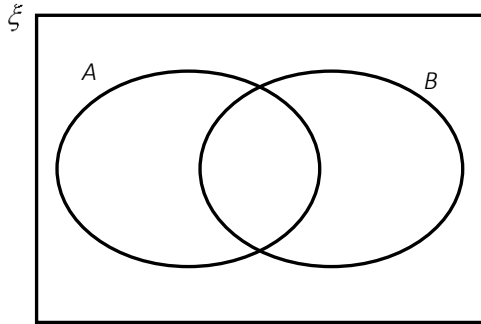
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Question 9:

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

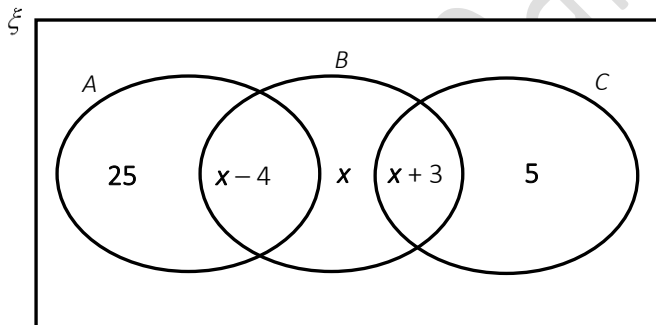


The number of students studying geography, history and literature in a class are shown in the Venn diagram.

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.

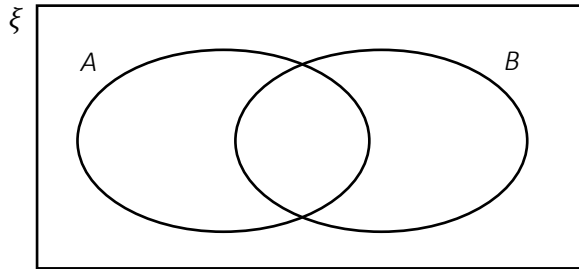
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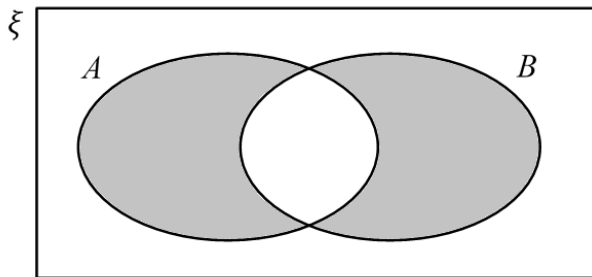
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Question 10:

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  $N \subset M$ .

Question 11:

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

$$\mathcal{E} = \{x : x \text{ is an integer such that } 2 \leq x \leq 10\}$$

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

$$B = \{x : x \text{ is a factor of } 40\}$$

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

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

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

Question 12:

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

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

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

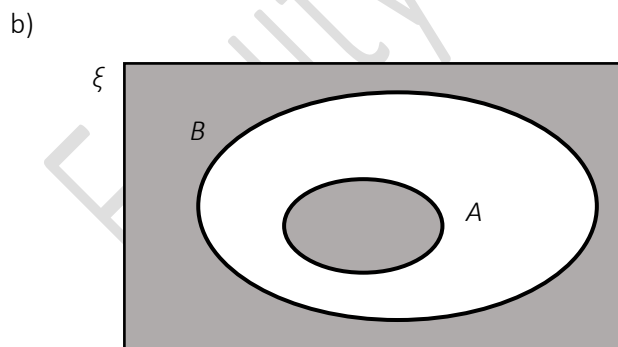
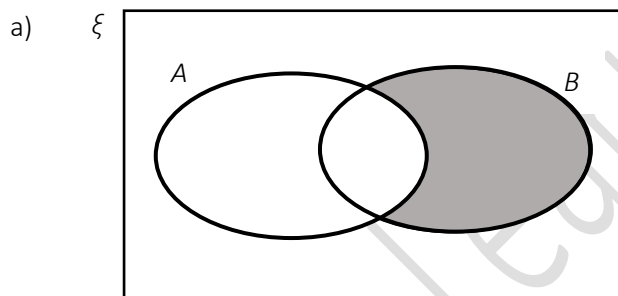
a) Draw a Venn diagram showing,  $\varepsilon$ ,  $A$  and  $B$ .

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

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

Question 13:

Write down the sets represented by the following shaded regions.



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Question 14:

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

$$P = \{\text{factors of } 180\}$$

$$Q = \{\text{prime numbers}\}$$

List the elements in

a)  $Q$

b)  $P \cap Q$

Question 15:

It is given that

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

$$A \subset \xi \text{ and } B \subset \xi$$

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

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  $A \cap B$ .

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

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Question 17:

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

$$A = \{\text{integers that are perfect squares}\}$$

$$B = \{\text{integers that are divisible by 2}\}$$

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  $\xi$ . Find the probability that  $k \in A \cup B$ .

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  $x \notin C$ .

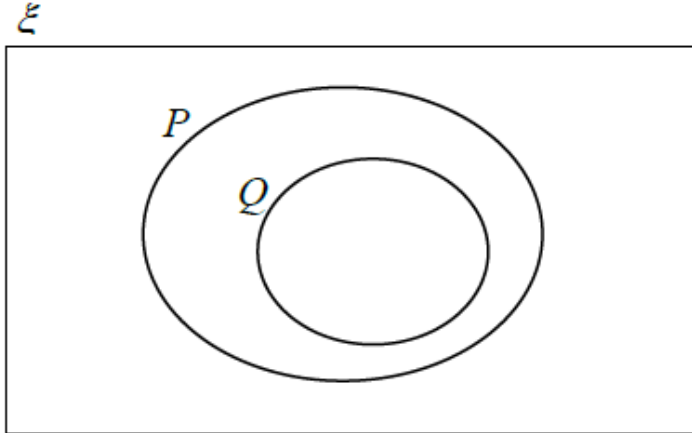
Question 19:

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

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Question 20:

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

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

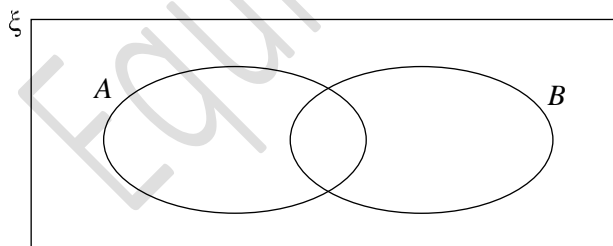
$$Q = \{x : x \text{ is a number where its unit digit is } 3\}$$

- 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

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

Question 21:

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



b)  $\xi = \{\text{integers from } -2 \text{ to } 4\}$

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

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

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

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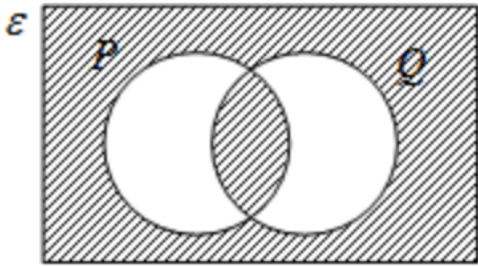
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Question 22:

a) Describe the shaded region in set notation.



b) Given that

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

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

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

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

b) Find  $B \cap C$

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

Question 23:

$$\mathcal{E} = \{x : x \text{ is an integer and } 1 \leq x < 10\}$$

$$A = \{\text{prime numbers}\}$$

$$B = \{\text{factors of } 6\}$$

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  $\mathcal{E}$ ,  $A$  and  $B$ .

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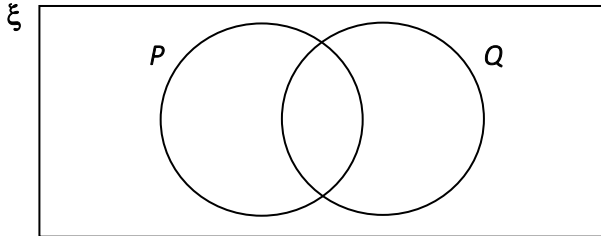
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#### Question 24:

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



b) It is given that

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

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

$$B = \{x : x \text{ is a factor of } 18\}$$

Describe the elements contained in the set  $A' \cap B$  by completing the set builder notation below.

#### 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  $B \cap C = \emptyset$ .

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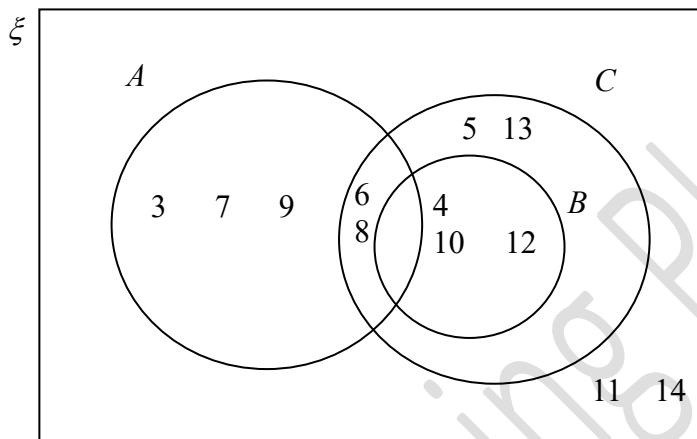
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Question 26:

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

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



Use one of the symbols below to complete each statement.

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

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

b)  $12$  .....  $C$

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

Question 27:

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

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

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

List the elements in

a)  $A'$

b)  $A' \cap B$

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c)  $A \cup B$

Question 28:

$\xi = \{\text{all triangles}\}$

$X = \{\text{right-angled triangles}\}$

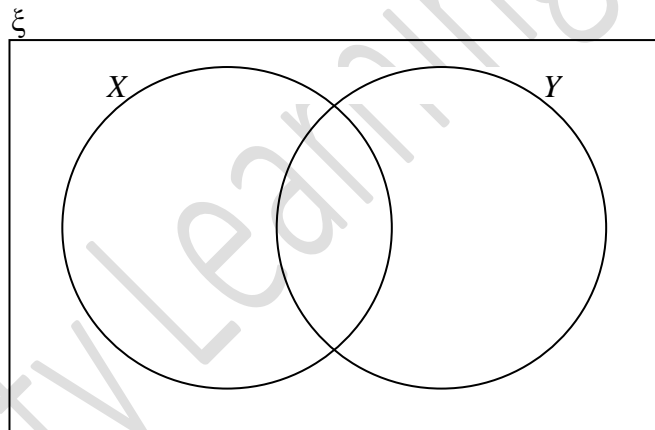
$Y = \{\text{triangles with three unequal sides}\}$

$P$  is a triangle with all angles  $60^\circ$ .

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

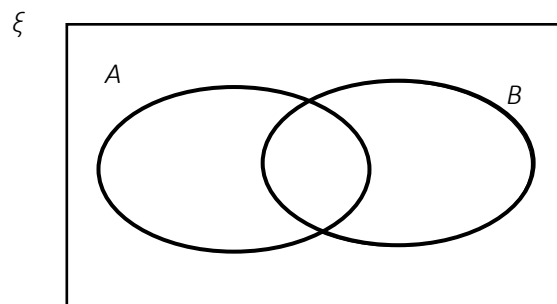
$R$  is a triangle with sides 7 cm, 7 cm and 3 cm.

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  $A' \cup B'$



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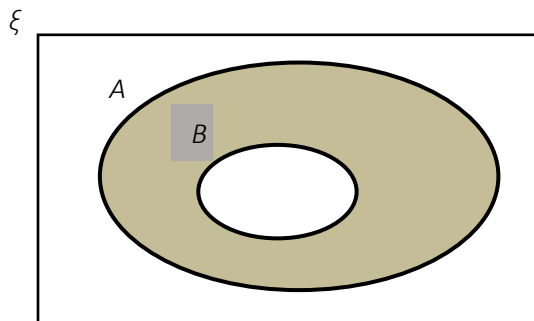
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Question 30:

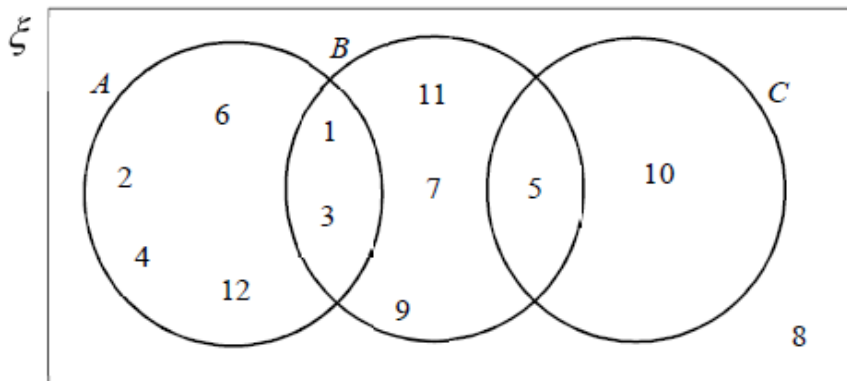
Write down the set represented by the following shaded region



Question 31:

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

The Venn diagram shows the elements of  $\varepsilon$  and three sets  $A$ ,  $B$  and  $C$



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

$\subset$ ,  $\emptyset$ ,  $\in$ ,  $\notin$

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{3} ..... B

- b) List the elements in the set  $B' \cap C'$
- c) List the elements in the set  $A' \cup B$

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