

## SEC 4 ELEMENTARY MATHEMATICS

## UNIT 1: SETS

CLICK TO START  
VIDEO LESSONS

## 1.1 INTRODUCTION TO SET NOTATIONS

## 1.1 CONCEPTUAL BRIDGING: INTRODUCTION TO SET NOTATIONS

- **Universal set**  $\xi$  is the set of all elements.
- $\in$  means 'is an element of'.
- $\notin$  means 'is not an element of'.
- Listing all elements in set notation, e.g.  $A = \{1, 3, 4, 5\}$ .
- $n(A)$  means the number of the elements in the set  $A$ .
- **Equal set** contain exactly the same elements. E.g.  $A = \{1, 3, 4, 5\}$ ,  $B = \{5, 3, 4, 1\}$ , thus  $A = B$  and  $n(A) = n(B)$ .
- The **empty** or **null** set is the set containing no element. E.g.  $A = \{ \}$  or  $A = \phi$ .

TIMGANMATH  
WHERE PASSIONATE TEACHING INSPIRES  
www.timganmath.comTIMGANMATH  
WHERE PASSIONATE TEACHING INSPIRES  
www.timganmath.com

**1.1 WORKED EXAMPLE 1**

$A$  is the set of odd positive integers less than 12.

- (a) List all the elements of  $A$  in set notation.
- (b) State whether each of the following statements is true or false.
- (i)  $5 \in A$
  - (ii)  $9 \notin A$
  - (iii)  $0 \in A$
  - (iv)  $13 \notin A$

**1.1 PRACTICE NOW 1****QUESTION 1**

$X$  is a set of all perfect cubes bigger than 1 and less than 60.

- (i) Is  $16 \in X$ ?
- (ii) List all the elements of  $X$  in set notation.

**1.1 WORKED EXAMPLE 2**

$Y$  is the set of numbers that are multiples of 3 and less than 20.

- (a) Write down all the elements of the set  $Y$ .
- (b) Find the value of  $n(Y)$ .

www.timganmath.com

TIMGANMATH

WHERE PASSIONATE TEACHING INSPIRES

www.timganmath.com

**1.1 WORKED EXAMPLE 3**

It is given that

$$A = \{x : x \text{ is a positive integer such that } -2 < x \leq 5\}$$

$$B = \{x : x \text{ is a positive integer between 2 and 8 exclusive}\}$$

- (a) List all the elements in  $A$  and in  $B$  in set notation.
- (b) Are  $A$  and  $B$  equal sets? Why?

TIMGANMATH

WHERE PASSIONATE TEACHING INSPIRES

www.timganmath.com

**1.1 PRACTICE NOW 2****QUESTION 1**

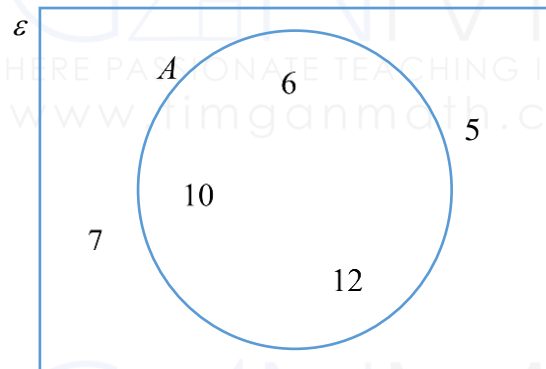
$X$  is the set of numbers that are factors of 18. Write down all the elements of the set  $X$ .

**QUESTION 2**

List all the elements of the set  $C = \{x : x \text{ is an integer such that } 4x - 7 < x \leq 2x + 3\}$ .

## 1.2 VENN DIAGRAMS, UNIVERSAL SETS AND COMPLEMENT OF A SET

## 1.2 CONCEPTUAL BRIDGING: VENN DIAGRAMS, UNIVERSAL SETS AND COMPLEMENT OF A SET



- ✓ Rectangle represents the set of all the elements.  $\varepsilon = \{5, 6, 7, 10, 12\}$
- ✓ The circle represents the set  $A = \{6, 10, 12\}$
- ✓ The elements outside the circle but inside the rectangle is the complement of  $A \rightarrow A' = \{5, 7\}$

## 1.2 WORKED EXAMPLE 1

$$\varepsilon = \{x : x \text{ is an integer and } 1 < x \leq 18\}$$

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

List the elements of

(a)  $\varepsilon$ ,

(b)  $A$ ,

(c)  $A'$ .

## 1.2 PRACTICE NOW 1

## QUESTION 1

$$\varepsilon = \{x : x \text{ is an integer and } 2 \leq x \leq 20\}$$

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

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

List the elements of

(a)  $\varepsilon$ ,

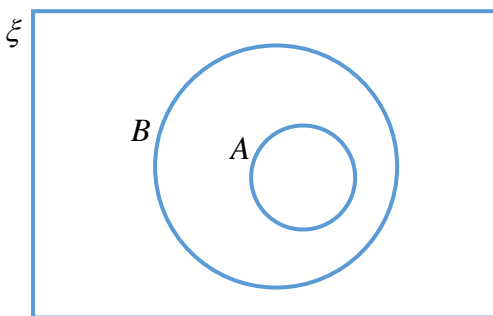
(b)  $A'$ ,

(c)  $B'$ .

## 1.3 PROPER SUBSETS

## 1.3 CONCEPTUAL BRIDGING: PROPER SUBSETS

$A \subset B$ ,  $A$  is a proper subset of  $B$  if all elements of  $A$  are elements of  $B$ .



Consider the set  $B = \{2, 4, 6, 8, 10\}$  and

$$A = \{4, 8\}$$

✓ Every element of  $A$  is an element of  $B$   
**BUT**  $B \neq A$ .

$\therefore A$  is a proper subset of  $B$ .

**1.3 WORKED EXAMPLE 1**

List all the proper subsets of  $X = \{2, 3, 4\}$ .

WHERE PASSIONATE TEACHING INSPIRES  
www.timganmath.com

WHERE PASSIONATE TEACHING INSPIRES  
www.timganmath.com

**1.3 PRACTICE NOW 1****QUESTION 1**

List all the proper subsets of  $Z = \{a, b, c, d\}$ .

WHERE PASSIONATE TEACHING INSPIRES  
www.timganmath.com

WHERE PASSIONATE TEACHING INSPIRES  
www.timganmath.com