SET THEORY

A DEFINITIONS

A.1 SETS

A.1.1 LISTING THE ELEMENTS

MCQ 1: List the elements of the set A, which includes all objects shown in this figure:

Choose one answer:

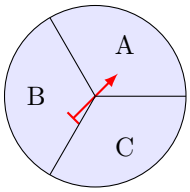
- ☐ $A =$ die, coin, duck
- ☐ $A = \{\text{duck, coin}\}$
- ☐ $A = \{\text{die, duck, coin}\}$

MCQ 2: List the elements of the set A, which includes all objects in this figure:

Choose one answer:

- ☐ $A =$ apple, cherry, lemon, orange
- ☐ $A = \{\text{apple, cherry}\}$
- ☐ $A = \{\text{apple, cherry, lemon, orange}\}$
- ☐ $A = \{\text{apple, cherry, lemon, orange, apple}\}$

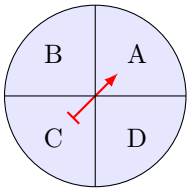
MCQ 3: List the elements of the set A, which includes all possible results the spinner can land on:



Choose one answer:

- ☐ $A = \{A, B, C\}$
- ☐ $A = \{A, B\}$
- ☐ $A = \{A, C\}$

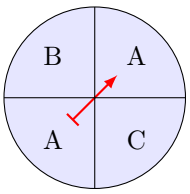
MCQ 4: List the elements of the set A, which includes all possible results the spinner can land on:



Choose two correct answers:

- ☐ $A = \{A, B, C, D\}$
- ☐ $A = \{A, B, C\}$
- ☐ $A = \{A, B\}$
- ☐ $A = \{D, B, C, A\}$

MCQ 5: List the elements of the set A, which includes all possible results the spinner can land on:



Choose one answer:

- ☐ $A = \{A, B, A, C\}$
- ☐ $A = \{A, B\}$
- ☐ $A = \{A, C\}$
- ☐ $A = \{A, B, C\}$

MCQ 6: Let A be the set of all possible combinations of two children in a family, where B means boy and G means girl (e.g., BG is a boy then a girl). List the elements of A.

Choose one answer:

- ☐ $A = \{BB, BG, GB, GG\}$
- ☐ $A = \{BB, GG\}$
- ☐ $A = \{B, G\}$

A.1.2 LISTING THE ELEMENTS IN ARITHMETIC

MCQ 7: What is the set A of all factors of 6?

Choose one answer:

- ☐ $A = \{1, 2, 3, 6\}$
- ☐ $A = \{0, 6, 12, 18, 24, \ldots\}$
- ☐ $A = \{0, 6, 12, 18, 24\}$
- ☐ $A = \{2, 3\}$

MCQ 8: What is the set A of all prime numbers between 1 and 10?

Choose one answer:

- ☐ $A = \{1, 2, 3, 5, 7\}$
- ☐ $A = \{2, 4, 6, 8, 10\}$
- ☐ $A = \{3, 5, 7, 9\}$
- ☐ $A = \{2, 3, 5, 7\}$

MCQ 9: What is the set A of all factors of 8?

Choose one answer:

- ☐ $A = \{1, 2, 4, 8\}$
- ☐ $A = \{0, 8, 16, 24, 32, \ldots\}$

☐ $A = \{2, 4, 6\}$

☐ $A = \{1, 3, 5, 7\}$

MCQ 10: What is the set A of all prime numbers between 10 and 20?
Choose one answer:

☐ $A = \{11, 13, 15, 17\}$

☐ $A = \{10, 12, 14, 16, 18\}$

☐ $A = \{13, 15, 17, 19\}$

☐ $A = \{11, 13, 17, 19\}$

A.1.3 CHECKING MEMBERSHIP

Ex 11: 2 ☐ $\in$ ☐ $\notin$ $\{1, 2, 3, 4, 5, 6\}$

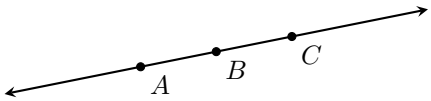
Ex 12: 7 ☐ $\in$ ☐ $\notin$ $\{1, 2, 3, 4, 5, 6\}$

Ex 13: d ☐ $\in$ ☐ $\notin$ $\{a, b, c, d\}$

Ex 14: z ☐ $\in$ ☐ $\notin$ $\{a, b, c, d\}$

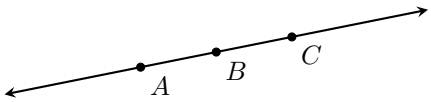
A.1.4 CHECKING MEMBERSHIP IN GEOMETRY

Ex 15:



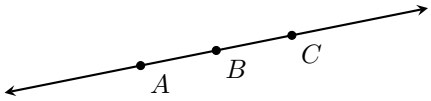
C ☐ $\in$ ☐ $\notin$ $\overleftrightarrow{AB}$

Ex 16:



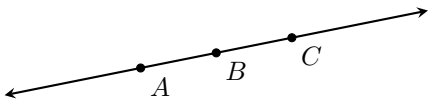
C ☐ $\in$ ☐ $\notin$ $\overline{BA}$

Ex 17:



B ☐ $\in$ ☐ $\notin$ $\overline{AC}$

Ex 18:



A ☐ $\in$ ☐ $\notin$ $\overleftrightarrow{BC}$

A.1.5 CHECKING SET EQUALITY

MCQ 19: Is this statement true or false?
$\{a, b, c\} = \{b, a, c\}$
Choose one answer:

☐ True

☐ False

MCQ 20: Is this statement true or false?
$\{a, b, c, d\} = \{a, b, c, d, e\}$
Choose one answer:

☐ True

☐ False

MCQ 21: Is this statement true or false?
$\{1, 2, 3\} = \{2, 1, 3\}$
Choose one answer:

☐ True

☐ False

MCQ 22: Is this statement true or false?
$\{1, 2, 3, 4\} = \{1, 2, 3, 4, 5\}$
Choose one answer:

☐ True

☐ False

A.2 NATURAL NUMBERS

A.2.1 CHECKING MEMBERSHIP

Ex 23: 2 ☐ $\in$ ☐ $\notin$ $\mathbb{N}$

Ex 24: -2 ☐ $\in$ ☐ $\notin$ $\mathbb{N}$

Ex 25: $\frac{1}{2}$ ☐ $\in$ ☐ $\notin$ $\mathbb{N}$

Ex 26: $10^{10^{1000}}$ ☐ $\in$ ☐ $\notin$ $\mathbb{N}$

Ex 27: 0 ☐ $\in$ ☐ $\notin$ $\mathbb{N}$

A.3 SUBSETS

A.3.1 CHECKING SUBSETS

MCQ 28: Given $A = \{1, 3, 5\}$ and $B = \{1, 2, 3, 4, 5\}$, is $A \subseteq B$?

☐ Yes

☐ No

MCQ 29: Given $A = \{4, 9\}$ and $B = \{1, 2, 3, 4, 5, 6, 7\}$, is $A \subseteq B$?

☐ Yes

☐ No

MCQ 30: Given $A = \{7, 8\}$ and $B = \{6, 7, 8, 9, 10\}$, is $A \subseteq B$?

☐ Yes

☐ No

MCQ 31: Given $A = \{2, 7, 10\}$ and $B = \{1, 2, 3, 4, 5, 6\}$, is $A \subseteq B$?

☐ Yes

☐ No

A.4 SET-BUILDER NOTATION

A.4.1 CHECKING MEMBERSHIP

MCQ 32: Does "triangle" belong to the set $\{x \mid x \text{ is a polygon}\}$?

☐ Yes

☐ No

MCQ 33: Does "January" belong to the set $\{x \mid x \text{ is a day of the week}\}$?

☐ Yes

☐ No

MCQ 34: Does "red" belong to the set $\{x \mid x \text{ is a color in the rainbow}\}$?

☐ Yes

☐ No

MCQ 35: Does 9 belong to the set $\{n \in \mathbb{N} \mid n \text{ is a prime number}\}$?

☐ Yes

☐ No

A.4.2 LISTING THE ELEMENTS

MCQ 36: List the elements in the set

$$A = \{n \in \mathbb{N} \mid n \text{ is a factor of } 6\}$$

☐ $A = \{1, 2, 3, 6\}$

☐ $A = \{0, 6, 12, 18, 24, \ldots\}$

☐ $A = \{0, 6, 12, 18, 24\}$

☐ $A = \{2, 3\}$

MCQ 37: List the elements in the set

$$A = \{n \in \mathbb{N} \mid n \text{ is a multiple of } 5\}$$

☐ $A = \{1, 2, 3, 5\}$

☐ $A = \{0, 5, 10, 15, 20\}$

☐ $A = \{2, 3\}$

☐ $A = \{0, 5, 10, 15, 20, \ldots\}$

MCQ 38: List the elements in the set

$$A = \{n \in \mathbb{N} \mid n \text{ is a multiple of } 6\}$$

☐ $A = \{1, 2, 3, 6\}$

☐ $A = \{0, 6, 12, 18, 24, \ldots\}$

☐ $A = \{0, 6, 12, 18, 24\}$

☐ $A = \{2, 3\}$

MCQ 39: List the elements in the set

$$A = \{n \in \mathbb{N} \mid n \text{ is a factor of } 20\}$$

☐ $A = \{0, 20, 40, 60, \ldots\}$

☐ $A = \{0, 10, 20, 30\}$

☐ $A = \{1, 2, 4, 5, 10, 20\}$

☐ $A = \{2, 5\}$

MCQ 40: List the elements in the set

$$A = \{n \in \mathbb{N} \mid n \text{ is a prime number less than } 20\}$$

☐ $A = \{2, 3, 5, 7, 11, 13, 17, 19\}$

☐ $A = \{1, 3, 5, 7, 9, 11, 13, 15, 17, 19\}$

☐ $A = \{2, 4, 6, 8, 10, 12, 14, 16, 18\}$

☐ $A = \{2, 3, 5, 7\}$

MCQ 41: List the elements in the set

$$A = \{n \in \mathbb{N} \mid n \text{ is an even number}\}$$

☐ $A = \{1, 3, 5, 7, 9, \ldots\}$

☐ $A = \{0, 2, 4, 6, 8, \ldots\}$

☐ $A = \{0, 2, 4, 6, 8\}$

☐ $A = \{2, 4\}$

A.4.3 WRITING IN SET-BUILDER FORM

MCQ 42: Given the set

$$A = \{0, 2, 4, 6, 8, \ldots\}$$

Choose correct answers:

☐ $A = \{n \in \mathbb{N} \mid n \text{ is an even number}\}$

☐ $A = \{n \in \mathbb{N} \mid n \text{ is an odd number}\}$

☐ $A = \{n \in \mathbb{N} \mid n \text{ is a prime number}\}$

☐ $A = \{n \in \mathbb{N} \mid n \text{ is a multiple of } 2\}$

MCQ 43: Given the set

$$A = \{1, 2, 4, 8\}$$

Choose correct answers:

☐ $A = \{n \in \mathbb{N} \mid n \text{ is an even number}\}$

☐ $A = \{n \in \mathbb{N} \mid n \text{ is an odd number}\}$

☐ $A = \{n \in \mathbb{N} \mid n \text{ is a prime number}\}$

☐ $A = \{n \in \mathbb{N} \mid n \text{ is a factor of } 8\}$

MCQ 44: Given the set

$$A = \{1, 3, 5, 7, \ldots\}$$

Choose correct answers:

☐ $A = \{n \in \mathbb{N} \mid n \text{ is an even number}\}$

☐ $A = \{n \in \mathbb{N} \mid n \text{ is an odd number}\}$

☐ $A = \{n \in \mathbb{N} \mid n \text{ is a prime number}\}$

☐ $A = \{n \in \mathbb{N} \mid n \text{ is a multiple of } 2\}$

A.4.4 CHECKING SUBSETS

MCQ 45: Given

$A = \{n \in \mathbb{N} \mid n \text{ is a prime number greater than } 2\}$
$B = \{n \in \mathbb{N} \mid n \text{ is an odd number}\}$

Is $A \subseteq B$?

☐ Yes

☐ No

MCQ 46: Given

$A = \{x \mid x \text{ is a person who owns a driver's license}\}$
$B = \{x \mid x \text{ is a person who owns a car}\}$

Is $A \subseteq B$?

☐ Yes

☐ No

MCQ 47: Given

$A = \{n \in \mathbb{N} \mid n \text{ is divisible by } 9\}$
$B = \{n \in \mathbb{N} \mid n \text{ is divisible by } 3\}$

Is $A \subseteq B$?

☐ Yes

☐ No

MCQ 48: Given

$A = \{x \mid x \text{ is a person who is a vegetarian}\}$
$B = \{x \mid x \text{ is a person who does not eat meat}\}$

Is $A \subseteq B$?

☐ Yes

☐ No

MCQ 49: Given

$A = \{n \in \mathbb{N} \mid n \text{ is divisible by } 4\}$
$B = \{n \in \mathbb{N} \mid n \text{ is divisible by } 2\}$

Is $A \subseteq B$?

☐ Yes

☐ No

A.5 ORDERED PAIRS/N-TUPLES

A.5.1 COMPARING PAIRS AND SETS

MCQ 50: A teacher picks one student to present on Monday and another to present on Tuesday from Louis and Hugo. The pair $(Louis, Hugo)$ means Louis presents on Monday and Hugo on Tuesday. Is this the same as $(Hugo, Louis)$?
Choose one answer:

☐ True

☐ False

MCQ 51: A teacher selects Louis and Hugo for a presentation. The set $\{Louis, Hugo\}$ shows both are chosen. Does $\{Louis, Hugo\}$ equal $\{Hugo, Louis\}$?
Choose one answer:

☐ True

☐ False

MCQ 52: A club picks two helpers, Zoe and Eli, for an event. The set $\{Zoe, Eli\}$ shows both are chosen. Does $\{Zoe, Eli\}$ equal $\{Eli, Zoe\}$?
Choose one answer:

☐ True

☐ False

MCQ 53: A coach assigns two players, Mia and Sam, to shoot baskets: one goes first, the other second. The pair (Mia, Sam) means Mia shoots first and Sam second. Is this the same as (Sam, Mia)?
Choose one answer:

☐ True

☐ False

A.5.2 CHOOSING BETWEEN ORDERED PAIRS AND SETS

MCQ 54: A teacher picks one student to present on Monday and another to present on Tuesday. This week, Louis presents on Monday and Hugo presents on Tuesday. The teacher wants to write this selection on the board.
Choose the correct way to write this:

☐ $(Louis, Hugo)$

☐ $\{Louis, Hugo\}$

MCQ 55: A teacher picks two students to do a presentation together. This week, Louis and Hugo are chosen. The teacher wants to write this selection on the board.
Choose the correct way to write this:

☐ $(Louis, Hugo)$

☐ $\{Louis, Hugo\}$

MCQ 56: A coach chooses one player to start the basketball game and another to substitute in the second half. Mia starts the game and Zoe comes in later. The coach wants to write this decision on the board.
Choose the correct way to write this:

☐ (Mia, Zoe)

☐ $\{Mia, Zoe\}$

MCQ 57: A school committee selects two parents to organize the end-of-year party. This year, Mr. Dupont and Ms. Lee are chosen. The committee writes their names on the announcement. **Choose the correct way to write this:**

☐ $(Mr.\ Dupont, Ms.\ Lee)$

☐ $\{Mr.\ Dupont, Ms.\ Lee\}$

A.6 CARDINALITY

A.6.1 COUNTING

Ex 58: $n(\{1, 2, 3\}) =$ ☐

Ex 59: $n(\{a, b, c, d, e\}) =$ ☐

Ex 60: $n(\{\text{apple, cherry, lemon, orange}\}) =$ ☐

Ex 61: Let $A = \{\text{die, duck, coin}\}$. Find the number of elements in A.

$$n(A) = \square$$

Ex 62: Let $A = \{1, 2, 3, 4, 5\}$. Find the number of elements in A.

$$n(A) = \square$$

A.6.2 COUNTING WAYS

Ex 63: Three friends run a sprint race. How many different podiums (1st, 2nd, 3rd) are possible?

☐ podiums

Ex 64: You pick 2 flavors from 3 ice cream options (chocolate, vanilla, and strawberry). Order doesn't matter. How many different ice creams can you make?

☐ ice creams

Ex 65: Three students enter an art contest. How many different ways can the judges award 1st, 2nd, and 3rd place prizes?

☐ ways

Ex 66: You choose 2 toppings from 3 pizza options (pepperoni, cheese, olives). Order doesn't matter. How many different pizzas can you make?

☐ pizzas

A.6.3 CLASSIFYING SETS AS FINITE OR INFINITE SETS

MCQ 67: Is the set $A = \{n \in \mathbb{N} \mid n \text{ is a multiple of } 10\}$ finite or infinite?

☐ Finite

☐ Infinite

MCQ 68: Is the set $A = \{x \mid x \text{ is a distinct letter in the word 'BANANA'}\}$ finite or infinite?

☐ Finite

☐ Infinite

MCQ 69: Is the set $A = \{n \in \mathbb{N} \mid n \text{ is an even number}\}$ finite or infinite?

☐ Finite

☐ Infinite

MCQ 70: Is the set $A = \{n \in \mathbb{N} \mid n \text{ is a factor of } 1000\}$ finite or infinite?

☐ Finite

☐ Infinite

A.6.4 COUNTING IN SET-BUILDER

Ex 71: Dr. Tariel has two sons, Hugo and Louis. Find the number of elements in the set $A = \{x \mid x \text{ is a son of Dr Vincent}\}$.

$$n(A) = \square$$

Ex 72: Let $A = \{x \mid x \text{ is a day of the week}\}$.

$$n(A) = \square$$

Ex 73: Let $A = \{n \in \mathbb{N} \mid n \text{ is a factor of } 18\}$.

$$n(A) = \square$$

Ex 74: Let $A = \{n \in \mathbb{N} \mid n \text{ is a prime number less than } 20\}$.

$$n(A) = \square$$

Ex 75: Let $A = \{n \in \mathbb{N} \mid n \text{ is a two-digit number which contains the digit } 4\}$.

$$n(A) = \square$$

B OPERATIONS

B.1 INTERSECTION AND UNION

B.1.1 FINDING THE INTERSECTION/UNION: LEVEL 1

Ex 76:

$$\{1,2,3\} \cap \{2,3,4\} = \begin{array}{l} \square\ \{1,2,3,4\} \\ \square\ \{2,3\} \\ \square\ \{2\} \\ \square\ \{1,2,3\} \end{array}$$

Ex 77:

$$\{1,2\} \cup \{2,3,4\} = \begin{array}{l} \square\ \{2,3,4\} \\ \square\ \{1,2,3,4\} \\ \square\ \{1,4\} \\ \square\ \{1,2\} \end{array}$$

Ex 78:

$$\{5,6,7\} \cap \{6,8,9\} = \begin{array}{l} \square\ \{5,6,7,8,9\} \\ \square\ \{5,6\} \\ \square\ \{7,8\} \\ \square\ \{6\} \end{array}$$

Ex 79:

$$\{a,b\} \cup \{b,c,d\} = \begin{array}{l} \square\ \{a,b\} \\ \square\ \{b,c\} \\ \square\ \{a,c,d\} \\ \square\ \{a,b,c,d\} \end{array}$$

Ex 80:

$$\{1,2,3\} \cap \{4,5,6\} = \begin{array}{l} \square\ \{1,2,3,4,5,6\} \\ \square\ \emptyset \\ \square\ \{3,4\} \\ \square\ \{1,4\} \end{array}$$

Ex 81:

$$\{3,4,5\} \cap \{5,4,3\} = \begin{array}{l} \square\ \{3,4,5,6,7\} \\ \square\ \{5\} \\ \square\ \{4,5\} \\ \square\ \{3,4,5\} \end{array}$$

Ex 82:

$$\{5,6,7\} \cup \emptyset = \begin{array}{l} \square\ \{5,6,7\} \\ \square\ \emptyset \\ \square\ \{5,7\} \\ \square\ \{5,6\} \end{array}$$

Ex 83:

$$\{a,b,c\} \cap \emptyset = \begin{array}{l} \square\ \{a\} \\ \square\ \{b,c\} \\ \square\ \{a,b,c\} \\ \square\ \emptyset \end{array}$$

B.1.2 FINDING THE INTERSECTION/UNION: LEVEL 2

Ex 84: Given the sets:

- $A = \{2,4,6,8\}$
- $B = \{4,5,6\}$
- $C = \{6,7,9\}$

Find the intersection $A \cap B \cap C$.

$$A \cap B \cap C = \begin{array}{l} \square\ \{4\} \\ \square\ \{4,6\} \\ \square\ \{6\} \end{array}$$

Ex 85: Given the sets:

- $A = \{2,4,6,8,9\}$
- $B = \{4,5,6\}$
- $C = \{6,7,9\}$

Find the set $A \cap (B \cup C)$.

$$A \cap (B \cup C) = \begin{array}{l} \square\ \{6,9\} \\ \square\ \{4,6\} \\ \square\ \{4,5,6,7,9\} \\ \square\ \{4,6,9\} \end{array}$$

Ex 86: Given the sets:

- $A = \{2,4,6,8,9\}$
- $B = \{4,5,6\}$
- $C = \{6,7,9\}$

Find the set $(A \cup B) \cap C$.

$$(A \cup B) \cap C = \begin{array}{l} \square\ \{4,6,9\} \\ \square\ \{6,9\} \\ \square\ \{6,7,9\} \\ \square\ \{4,5,6\} \end{array}$$

Ex 87: Given the sets:

- $A = \{2,4,6,8,9\}$
- $B = \{4,5,6\}$
- $C = \{6,7,9\}$

Find the set $A \cup B \cup C$.

$$A \cup B \cup C = \begin{array}{l} \square\ \{4,5,6,7,9\} \\ \square\ \{2,4,6,8,9\} \\ \square\ \{2,4,5,6,7,8,9\} \\ \square\ \{4,5,6\} \end{array}$$

B.2 COMPLEMENT

B.2.1 FINDING THE COMPLEMENT

MCQ 88: You are given the universe $U = \{1, 2, 3, 4, 5, 6\}$ and the set $A = \{1, 3, 5\}$. What is the complement A'?
Choose one answer:

- ☐ $A' = \{2, 4, 6\}$
- ☐ $A' = \{1, 2, 4, 6\}$
- ☐ $A' = \{1, 2, 3, 4, 5, 6\}$
- ☐ $A' = \{3, 5\}$

MCQ 89: You are given the universe $U = \{a, b, c, d, e, f\}$ and the set $B = \{a, c, e\}$. What is the complement B'?.
Choose one answer:

- ☐ $B' = \{a, b, d, f\}$
- ☐ $B' = \{a, b, c, d, e, f\}$
- ☐ $B' = \{c, e\}$
- ☐ $B' = \{b, d, f\}$

MCQ 90: You are given the universe $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ and the set $C = \{2, 4, 6, 8\}$. What is the complement C'?. Find the complement of C.
Choose one answer:

- ☐ $C' = \{1, 2, 3, 5, 7\}$
- ☐ $C' = \{1, 3, 5, 7\}$
- ☐ $C' = \{2, 4, 6, 8\}$
- ☐ $C' = \{1, 2, 3, 4, 5, 6, 7, 8\}$

MCQ 91: The universe $U = \{BB, BG, GB, GG\}$ lists all two-child family combinations (B = boy, G = girl; e.g., BG = boy then girl). The set $A = \{BB\}$ includes only families with two boys. What is A'?
Choose one answer:

- ☐ $A' = \{BG, GB, GG\}$
- ☐ $A' = \{BB, BG\}$
- ☐ $A' = \{BG, GB\}$
- ☐ $A' = \{BB, GG\}$

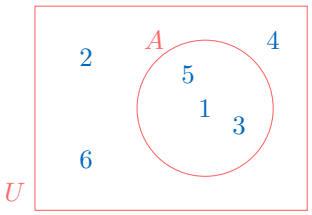
MCQ 92: The universe $U = \{BB, BG, GB, GG\}$ lists all two-child family combinations (B = boy, G = girl; e.g., BG = boy then girl). The set $A = \{BG, GB\}$ includes families with one boy and one girl. What is A'?
Choose one answer:

- ☐ $A' = \{BG, GB, GG\}$
- ☐ $A' = \{BB, BG\}$
- ☐ $A' = \{BG, GB\}$
- ☐ $A' = \{BB, GG\}$

B.3 VENN DIAGRAMS

B.3.1 IDENTIFYING ELEMENTS USING VENN DIAGRAMS

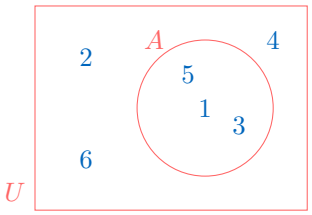
MCQ 93: For this Venn diagram:



Find A.

- ☐ $A = \{2, 4, 6\}$
- ☐ $A = \{1, 3, 5\}$
- ☐ $A = \{1, 2, 3, 4, 5, 6\}$

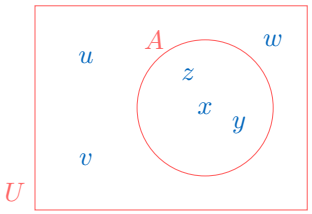
MCQ 94: For this Venn diagram:



Find A'.

- ☐ $A' = \{2, 4, 6\}$
- ☐ $A' = \{1, 3, 5\}$
- ☐ $A' = \{1, 2, 3, 4, 5, 6\}$

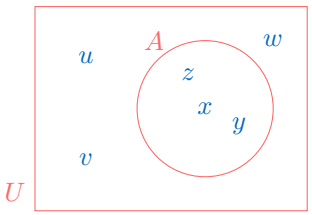
MCQ 95: For this Venn diagram:



Find A'.

- ☐ $A' = \{u, v, w\}$
- ☐ $A' = \{x, y, z\}$
- ☐ $A' = \{u, v, w, x, y, z\}$

MCQ 96: For this Venn diagram:



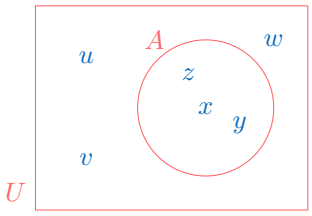
Find the universal set U.

☐ $U = \{u, v, w\}$

☐ $U = \{x, y, z\}$

☐ $U = \{u, v, w, x, y, z\}$

MCQ 97: For this Venn diagram:



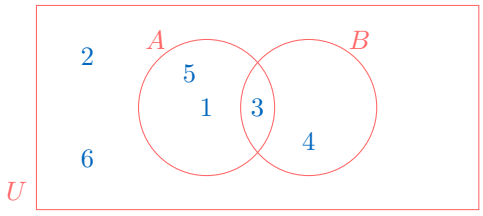
Find A.

☐ $A = \{u, v, w\}$

☐ $A = \{x, y, z\}$

☐ $A = \{u, v, w, x, y, z\}$

MCQ 98: For this Venn diagram:



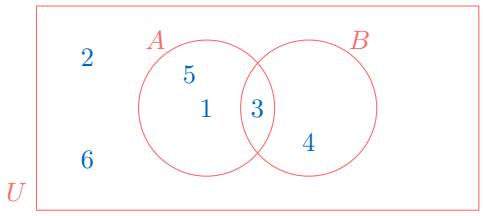
Find A.

☐ $A = \{2, 4, 6\}$

☐ $A = \{1, 3, 5\}$

☐ $A = \{1, 2, 3, 4, 5, 6\}$

MCQ 99: For this Venn diagram:



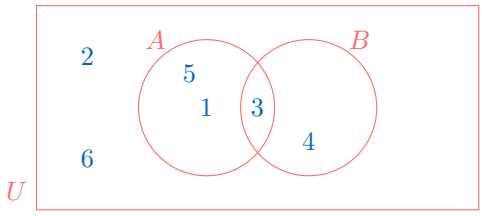
Find A'.

☐ $A' = \{2, 4, 6\}$

☐ $A' = \{1, 3, 5\}$

☐ $A' = \{1, 2, 3, 4, 5, 6\}$

MCQ 100: For this Venn diagram:



Find B.

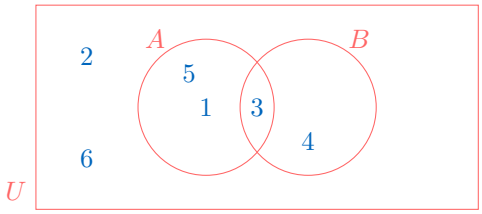
☐ $B = \{4\}$

☐ $B = \{3, 4\}$

☐ $B = \{1, 3, 4, 5\}$

☐ $B = \{2, 6\}$

MCQ 101: For this Venn diagram:



Find B'.

☐ $B' = \{4\}$

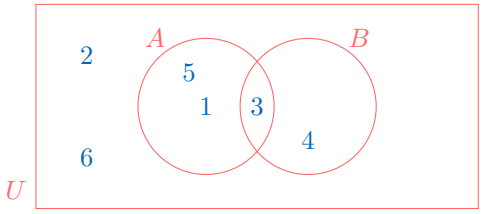
☐ $B' = \{3, 4\}$

☐ $B' = \{1, 2, 5, 6\}$

☐ $B' = \{2, 6\}$

B.3.2 IDENTIFYING ELEMENTS USING VENN DIAGRAMS

MCQ 102: For this Venn diagram:



Find $A \cup B$.

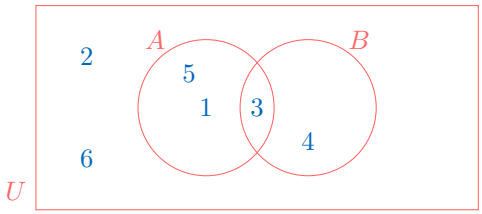
☐ $A \cup B = \{1, 3, 4, 5\}$

☐ $A \cup B = \{1, 2, 3, 4, 5, 6\}$

☐ $A \cup B = \{2, 4, 6\}$

☐ $A \cup B = \{1, 3, 4\}$

MCQ 103: For this Venn diagram:



Find $A \cap B$.

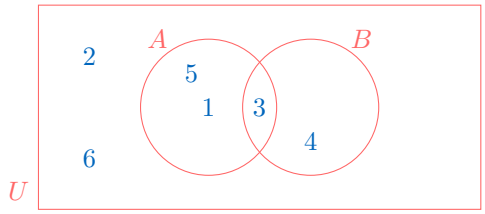
☐ $A \cap B = \{1, 3, 5\}$

☐ $A \cap B = \{3\}$

☐ $A \cap B = \{3, 4\}$

☐ $A \cap B = \{2, 6\}$

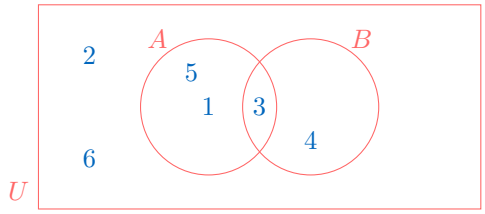
MCQ 104: For this Venn diagram:



Find $A' \cap B$.

- ☐ $A' \cap B = \{2, 6\}$
- ☐ $A' \cap B = \{4\}$
- ☐ $A' \cap B = \{4, 3\}$
- ☐ $A' \cap B = \{1, 3, 4, 5\}$

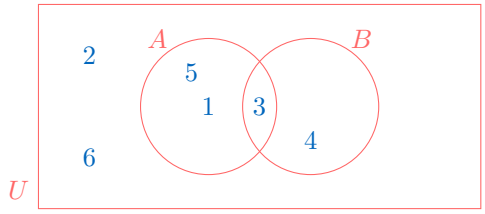
MCQ 105: For this Venn diagram:



Find $A \cup B'$.

- ☐ $A \cup B' = \{1, 2, 5, 6\}$
- ☐ $A \cup B' = \{2, 4, 6\}$
- ☐ $A \cup B' = \{1, 2, 3, 5, 6\}$
- ☐ $A \cup B' = \{1, 3, 4, 5\}$

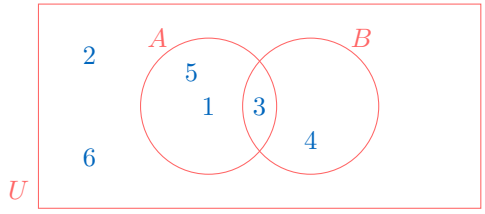
MCQ 106: For this Venn diagram:



Find $A \cap B'$.

- ☐ $A \cap B' = \{1, 5\}$
- ☐ $A \cap B' = \{2, 6\}$
- ☐ $A \cap B' = \{3, 4\}$
- ☐ $A \cap B' = \{1, 3, 4, 5\}$

MCQ 107: For this Venn diagram:

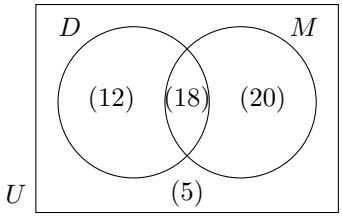


Find $A' \cup B$.

- ☐ $A' \cup B = \{1, 2, 3, 4, 5, 6\}$
- ☐ $A' \cup B = \{1, 3, 4, 5\}$
- ☐ $A' \cup B = \{2, 4, 6\}$
- ☐ $A' \cup B = \{2, 3, 4, 6\}$

B.3.3 SOLVING WORD PROBLEMS WITH VENN DIAGRAMS

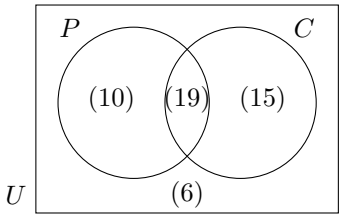
Ex 108: The Venn diagram shows the number of students in a school who participate in the drama club (D) and the music club (M).



How many students:

- are in the school? ☐ students
- participate in the music club? ☐ students
- participate in both clubs? ☐ students
- do not participate in either club? ☐ students
- participate in at least one club? ☐ students

Ex 109: The Venn diagram shows the number of participants in a community center attending painting (P) and cooking (C) classes.



How many participants:

- attend the community center? ☐ participants
- attend cooking classes? ☐ participants
- attend both classes? ☐ participants
- attend neither class? ☐ participants
- attend at least one class? ☐ participants

Ex 110: In a class of 40 students, 22 like mathematics (M), 18 like physics (P), and 10 like both. How many students:

- like at least one subject? ☐
- like mathematics but not physics? ☐
- like exactly one subject? ☐
- like neither subject? ☐

Ex 111: In a group of 40 employees, 25 work in sales (S), 20 in marketing (M), and 12 in both. How many employees:

- work in at least one department? ☐
- work in sales but not marketing? ☐
- work in exactly one department? ☐
- work in neither department? ☐

C NUMBER SETS

C.1 NUMBER SETS

C.1.1 CHECKING MEMBERSHIP

Ex 112: $6 \begin{array}{l}\square \in \\ \square \notin\end{array} \mathbb{Z}$

Ex 113: $-2 \begin{array}{l}\square \in \\ \square \notin\end{array} \mathbb{N}$

Ex 114: $-\frac{2}{3} \begin{array}{l}\square \in \\ \square \notin\end{array} \mathbb{Q}$

Ex 115: $0.1 \begin{array}{l}\square \in \\ \square \notin\end{array} \mathbb{R}$

Ex 116: $3 \begin{array}{l}\square \in \\ \square \notin\end{array} \mathbb{Q}$

Ex 117: $\sqrt{2} \begin{array}{l}\square \in \\ \square \notin\end{array} \mathbb{Q}$

C.2 INTERVALS

C.2.1 CONVERTING SETS TO INTERVAL NOTATION

Ex 118: Express the set $\{x \in \mathbb{R} \mid -1 < x\}$ using interval notation.

Ex 119: Express the set $\{x \in \mathbb{R} \mid 2 \leq x \leq 3\}$ using interval notation.

Ex 120: Express the set $\{x \in \mathbb{R} \mid x \leq 2\}$ using interval notation.

Ex 121: Express the set $\{x \in \mathbb{R} \mid 2 < x \leq 3\}$ using interval notation.

C.2.2 CONVERTING NUMBER LINE GRAPHS TO INTERVAL NOTATION

Ex 122: Express the interval shown on the number line below using interval notation:

Ex 123: Express the interval shown on the number line below using interval notation:

Ex 124: Express the interval shown on the number line below using interval notation:

Ex 125: Express the interval shown on the number line below using interval notation:

C.2.3 CHECKING MEMBERSHIP

Ex 126: $2 \begin{array}{l}\square \in \\ \square \notin\end{array} (2,3)$

Ex 127: $-0.5 \begin{array}{l}\square \in \\ \square \notin\end{array} (-1,1)$

Ex 128: $\frac{3}{2} \begin{array}{l}\square \in \\ \square \notin\end{array} [1,2]$

Ex 129: $-3 \begin{array}{l}\square \in \\ \square \notin\end{array} (-\infty,2)$

C.2.4 SOLVING LINEAR INEQUALITIES

Ex 130: Find the solution set S of the inequality:

$$2x - 1 \geq 0$$

Express your answer in interval notation.

Ex 131: Find the solution set S of the inequality:

$$-2x - 1 \geq 0$$

Express your answer in interval notation.

Ex 132: Find the solution set S of the inequality:

$$-2x + 4 < 2$$

Express your answer in interval notation.

Ex 133: Find the solution set S of the inequality:

$$3x + 2 < -2x + 12$$

Express your answer in interval notation.