

Set Notation and Venn Diagrams - 1

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Exercise A

1.

$$A = \{1, 2, 3, 4\}$$

$$B = \{1, 3, 5\}$$

(a) List the members of the set

(i)  $A \cap B$ ,

(ii)  $A \cup B$ .

.....

.....

(2)

(b) Explain clearly the meaning of  $3 \in A$ .

.....

(1)

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2.

$$E = \{\text{even numbers less than 19}\}$$

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

$$F = \{\text{factors of 12}\}$$

(a) (i) Explain why it is **not** true that  $9 \in M$ .

.....

(ii) List the members of  $M$ .

.....

(2)

(b) List the members of  $M \cap F$ .

.....

(2)

3.

$\mathcal{E} = \{\text{positive whole numbers}\}$

$A = \{\text{factors of } 27\}$

$B = \{\text{factors of } 9\}$

$C = \{\text{first four even numbers}\}$

(a) List the members of  $A \cup B$ .

.....  
(2)

(b) (i) Is it true that  $A \cap C = \emptyset$ ?

Tick (✓) the appropriate box.

Yes

No

(ii) Explain your answer.

.....  
.....  
(1)

(c) Complete the Venn Diagram to show the relationship between the sets  $A$ ,  $B$  and  $C$ .



(2)

4.

(a)  $S = \{1, 3, 5, 7\}$

$T = \{2, 3, 7, 11\}$

How many members are there in  $S \cup T$ ?

.....  
(1)

- (b)  $U = \{3, 4, 5\}$   
 $U \cup V = \{1, 2, 3, 4, 5\}$

The set  $V$  has as few members as possible.  
List the members of the set  $V$ .

.....  
(1)

- (c)  $A = \{\text{Cats}\}$   
 $B = \{\text{Black animals}\}$

Describe the members of  $A \cap B$ .

.....  
(1)

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5.

- (a)  $A = \{2, 3, 4, 5\}$

$$B = \{4, 5, 6, 7\}$$

- (i) List the members of  $A \cap B$ .

.....

- (ii) How many members are in  $A \cup B$ ?

.....

(2)

- (b)  $\mathcal{E} = \{3, 4, 5, 6, 7\}$

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

Two other sets,  $Q$  and  $R$ , each contain exactly three members.

$$P \cap Q = \{3, 4\}$$

$$P \cap R = \{3, 4\}$$

Set  $Q$  is not the same as set  $R$ .

- (i) Write down the members of a possible set  $Q$ .

.....

- (ii) Write down the members of a possible set  $R$ .

.....

(2)

6.

- (a)  $\mathcal{E} = \{\text{Students in Year 12}\}$   
 $G = \{\text{Students who study German}\}$   
 $F = \{\text{Students who study French}\}$   
 $M = \{\text{Students who study Maths}\}$

(i)  $G \cap M = \emptyset$

Use this information to write a statement about the students who study German in Year 12

- 
- (ii) Preety is a student in Year 12  
Preety  $\notin F$ .

Use this information to write a statement about Preety.

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(2)

- (b)  $A = \{2, 4, 6, 8, 10\}$   
 $A \cap B = \{2, 4\}$   
 $A \cup B = \{1, 2, 3, 4, 6, 8, 10\}$

List all the members of set  $B$ .

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(2)

7.

A garage tests cars for faults.

There are three types of fault – braking, steering and lighting.

A car fails the test if it has one or more of these three types of fault.

Last week, 11 cars had braking faults

9 cars had steering faults

7 cars had lighting faults

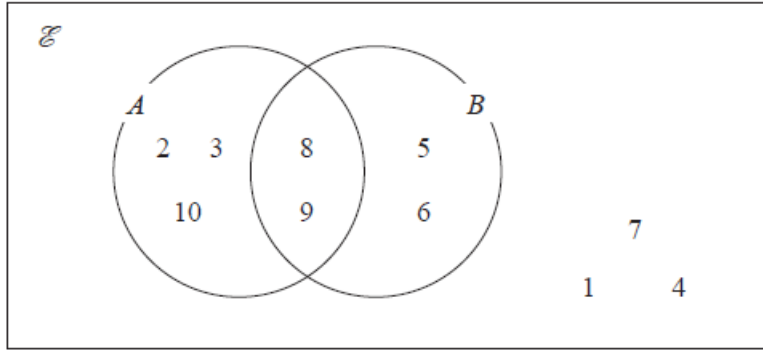
no car had both steering faults and lighting faults

2 cars had both braking faults and steering faults

3 cars had both braking faults and lighting faults.

By drawing a Venn Diagram, or otherwise, find the number of cars which failed the test last week.

8.



The Venn diagram shows all of the elements in sets  $A$ ,  $B$  and  $\mathcal{E}$ .

(a) Write down the elements in  $A'$

.....  
(1)

(b) Find  $n(A \cap B)'$

.....  
(1)

(c) Find the elements in  $(A \cap B) \cup (A \cup B)'$

.....  
(1)

$$A \cap C = \emptyset$$

$$B \cup C = \{5, 6, 7, 8, 9\}$$

$$n(C) = 3$$

(d) Write down the elements in  $C$ .

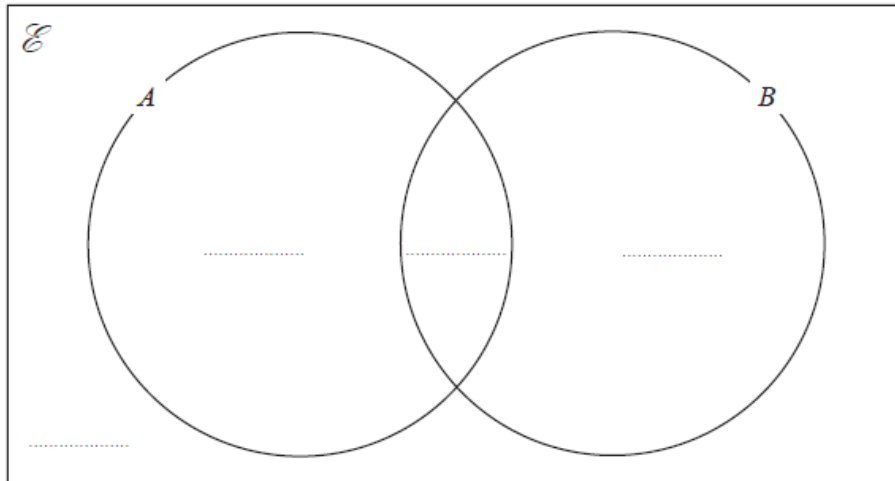
.....  
(1)

9.

$A$  and  $B$  are two sets.

$$\begin{aligned}n(\mathcal{E}) &= 36 \\n(B) &= 21 \\n(A \cap B) &= 8 \\n(A') &= 18\end{aligned}$$

(a) Complete the Venn diagram to show the **number of elements** in each region of the Venn diagram.



(3)

(b) Find  $n(A \cup B)$

.....  
(1)

(c) Find  $n(A \cap B')$

.....  
(1)