

UNIT 1 *Logic*

Overhead Slides

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OS 1.1***3 × 3 Logic Puzzle 1***

Rana, Toni and Millie are sisters. You need to deduce which sister is 9 years old, which one is 12 and which one is 14.

You have two clues:

Clue 1 : Toni's age is not in the 4-times table.

Clue 2 : Millie's age can be divided exactly by the number of days in a week.

Use the logic table to solve this problem.

OS 1.2***3 × 3 Logic Puzzle 2***

Rachel, Emma and Hannah are sisters.

Their ages are 2 years, 7 years and 10 years.

Clue 1 Emma is older than Hannah.

Clue 2 Emma's age is a prime number.

Use the logic grid below to solve the problem

OS 1.3

 4×4 Logic Puzzle

In Bakers Row there are 4 houses, each numbered 1, 2, 3 or 4.

The following people live in Bakers Row, one in each house:

Ted, Alice, Ernie and Gita

Use these clues to find out who lives in which house, using the logic table below.

Clue 1 The number of Ted's house is an *even* number.

Clue 2 The number of Ernie's house is an *odd* number.

Clue 3 The number of Alice's house is greater than the number of Ted's house.

Clue 4 The number of Gita's house is less than the number of Ernie's house.

OS 1.4

Two Way Tables 1

Emma collected information about the cats and dogs that children in her class have. She filled in the table below, but missed out one number.

	<i>Has a dog</i>	<i>Does not have a dog</i>
<i>Has a cat</i>	8	4
<i>Does not have a cat</i>	12	

- (a) If there are 30 children in Emma's class, what is the missing number?
- (b) How many children own at least one of these pets?
- (c) Do more children own cats rather than dogs?
- (d) Could it be true that some of the children do not have any pets?

OS 1.5

Two Way Tables 2

The table below gives information about the children in a class.

	<i>Left-handed</i>	<i>Right-handed</i>
Boys	3	14
Girls	2	13

- (a) How many right-handed girls are there in the class?
- (b) How many left-handed boys are there in the class?
- (c) How many girls are there in the class?
- (d) How many of the children are left-handed?
- (e) How many children there are in the class?

OS 1.6*Constructing Two Way Tables*

In Ben's class there are 12 girls and 18 boys.

There are 6 children who bring packed lunches and the rest eat school lunches.

Ben and Adam are the only boys who bring packed lunches.

(a) How many children are there in the class?

(b) How many girls eat school lunches?

	<i>Boys</i>	<i>Girls</i>	
Packed lunch			
School lunch			

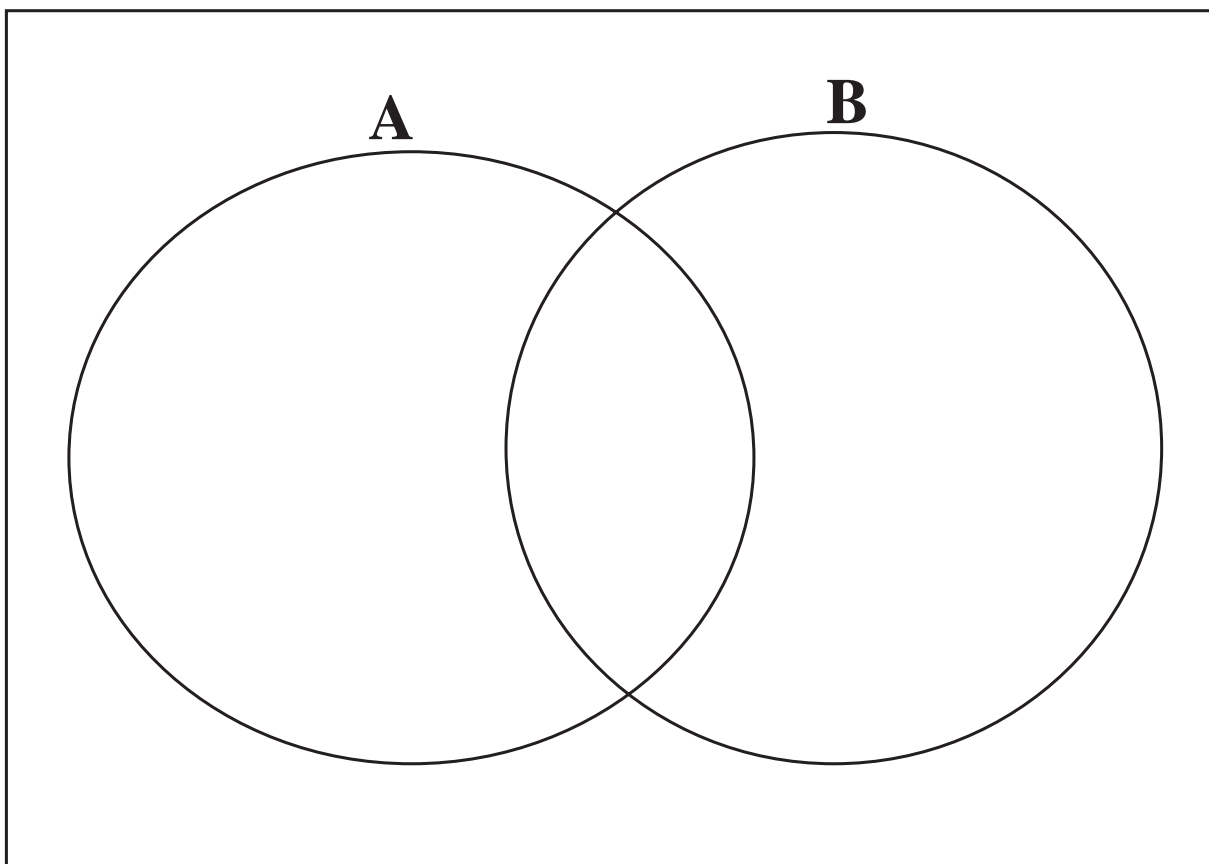
OS 1.7*Illustrating Sets*

The sets A and B consist of numbers taken from the whole numbers 0, 1, 2, 3, . . . , 9, so that

$$\text{Set A} = \{ 4, 7, 9 \}$$

$$\text{Set B} = \{ 1, 2, 3, 4, 5 \}$$

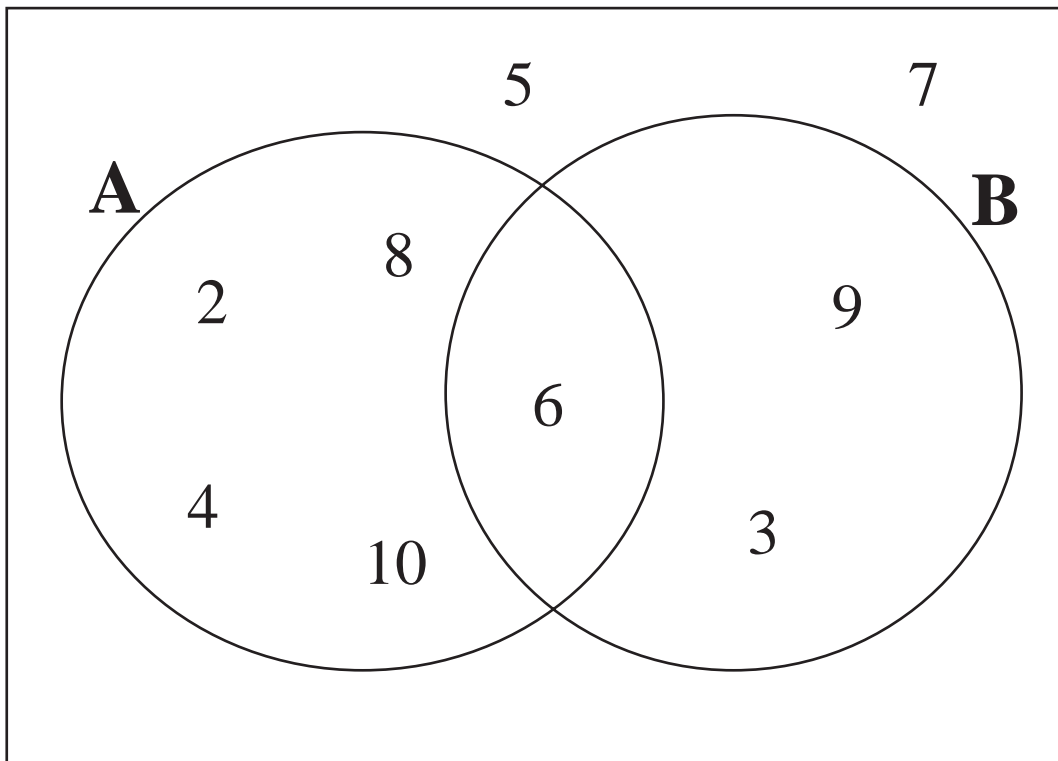
Illustrate these sets in a Venn diagram.



OS 1.8

Identifying Sets

The whole numbers from 1 to 10 are placed in a Venn diagram.



(a) Write down the members of the sets.

$$A = \{ \dots \}$$

$$B = \{ \dots \}$$

(b) Describe the sets A and B in words.

OS 1.9*Identifying and Illustrating Sets*

Set A contains the whole numbers greater than 6 but less than 12.

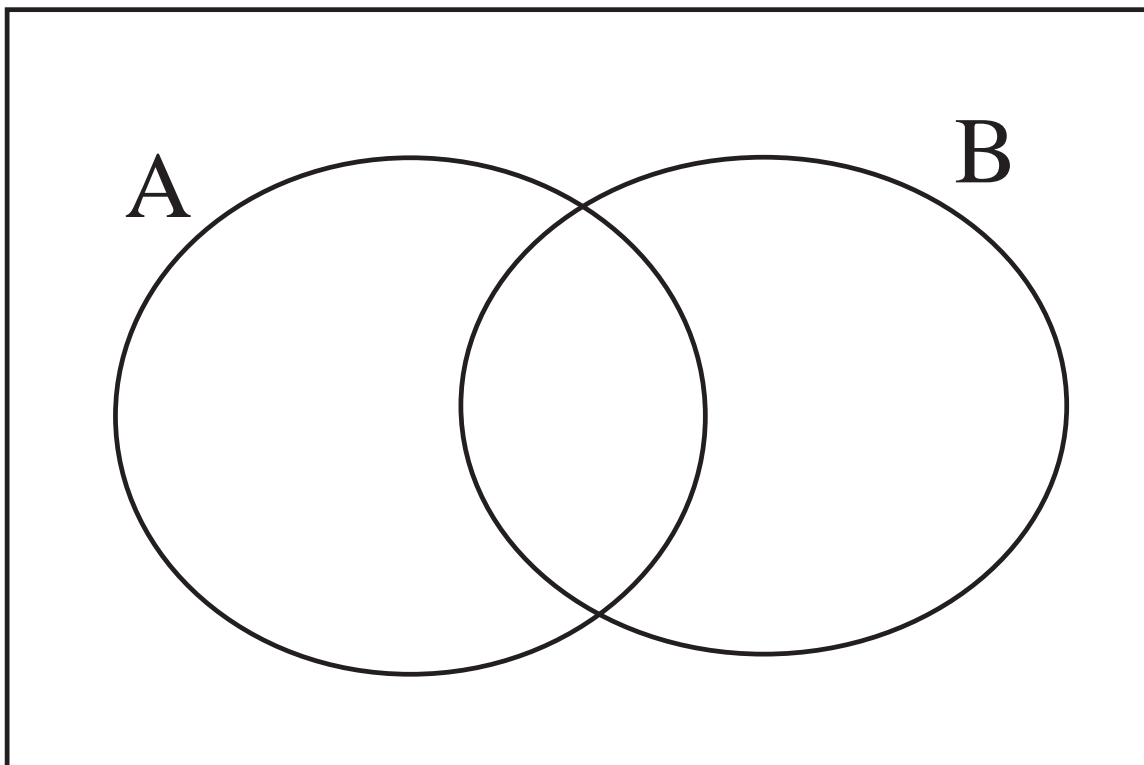
Set B contains the whole numbers greater than 2 but less than 10.

- (a) List set A and set B.

$$A = \{ \dots\dots\dots \}$$

$$B = \{ \dots\dots\dots \}$$

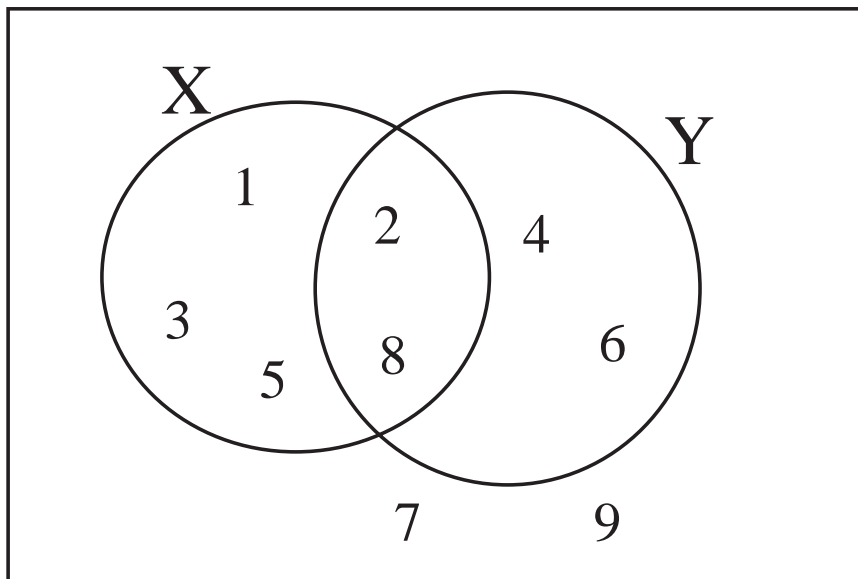
- (b) Illustrate the sets A and B on the Venn diagram below, including all the whole numbers from 1 to 15.



OS 1.10

Intersection and Union

The sets X and Y are shown in this Venn diagram.

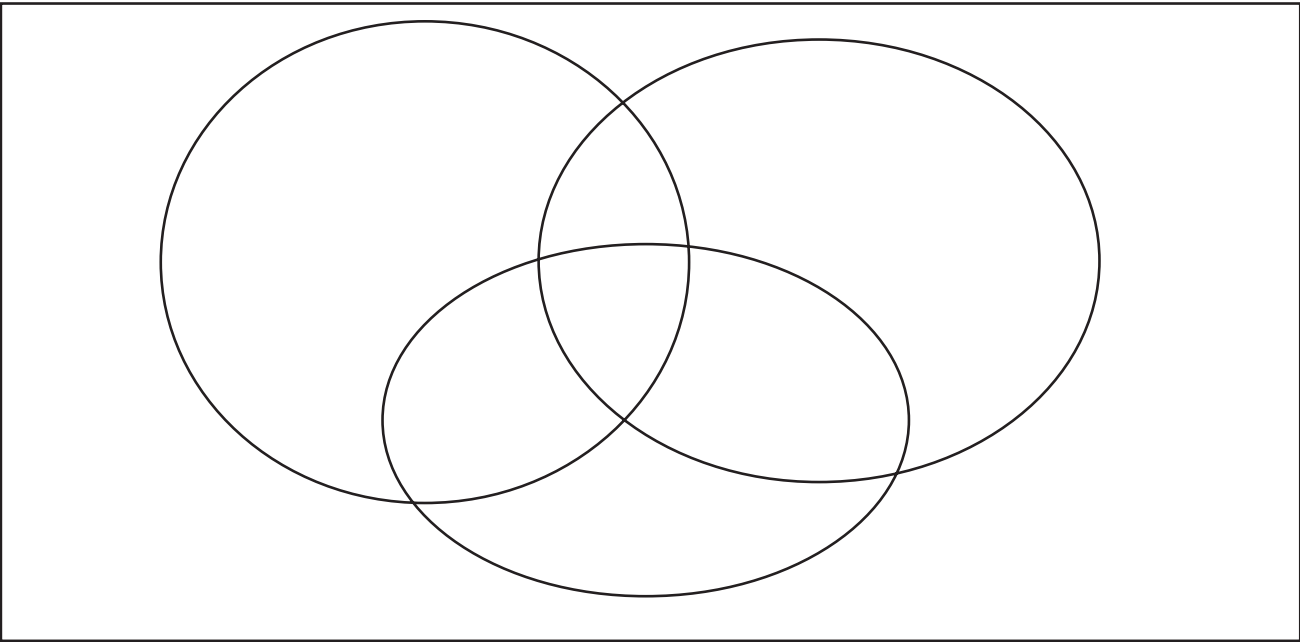
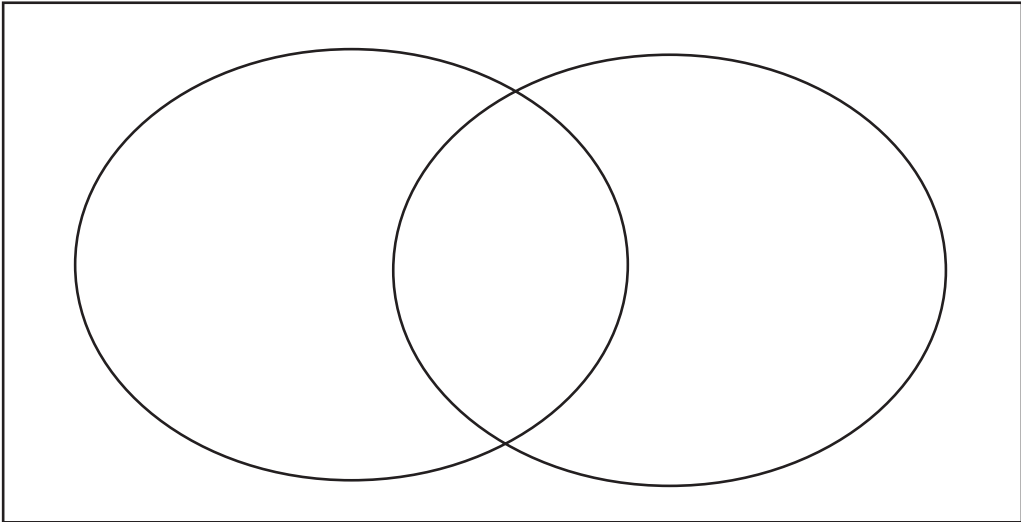
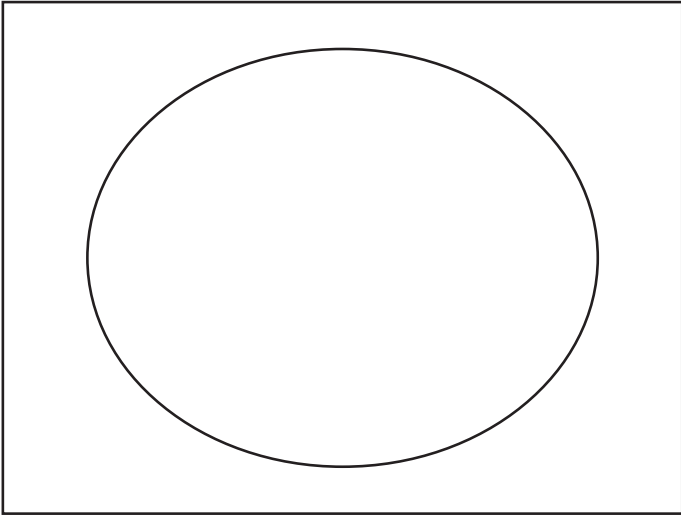


Find:

- (a) the intersection of X and Y : {
- (b) the union of X and Y ; {
- (c) the complement of X : {

OS 1.11

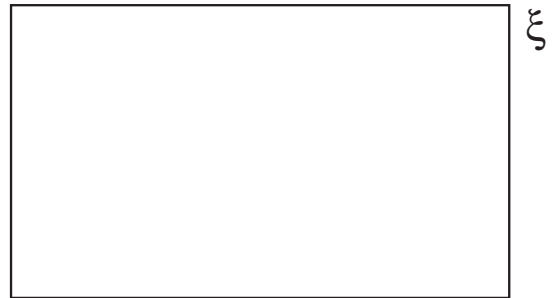
Sets and Venn Diagrams



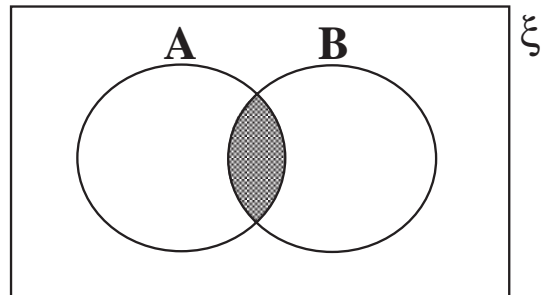
OS 1.12

Definitions

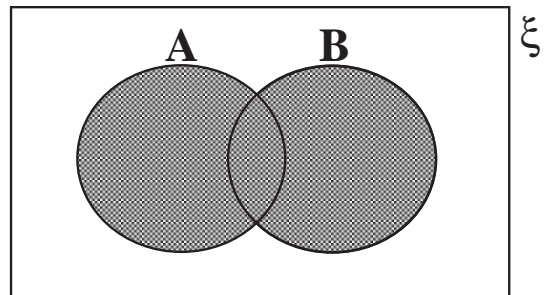
ξ : *universal set*



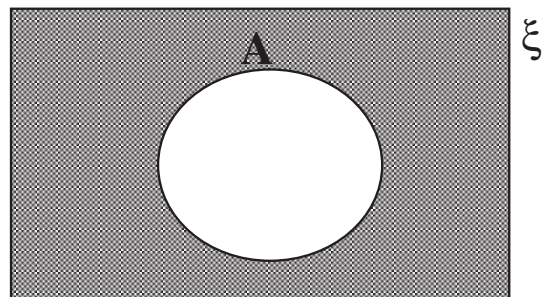
$A \cap B$: the *intersection* of A and B



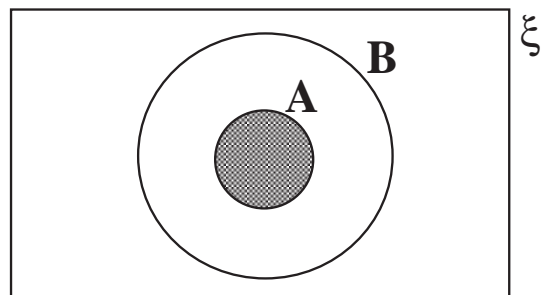
$A \cup B$: the *union* of A and B



A' : the *complement* of A and B



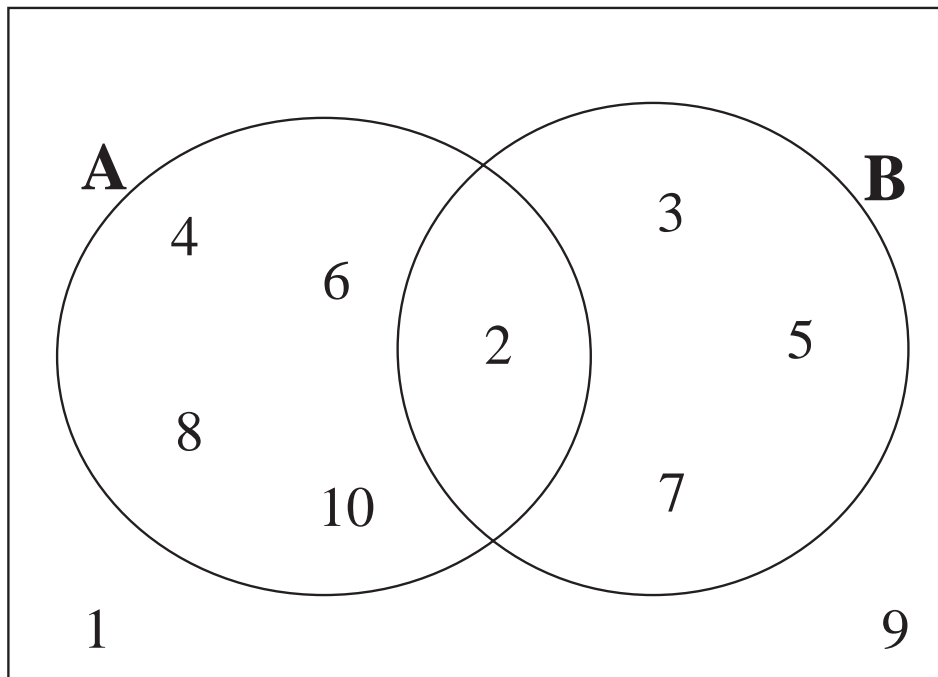
$A \subset B$: A is a *subset* of B



\emptyset : *empty set*

OS 1.13

Using Set Notation



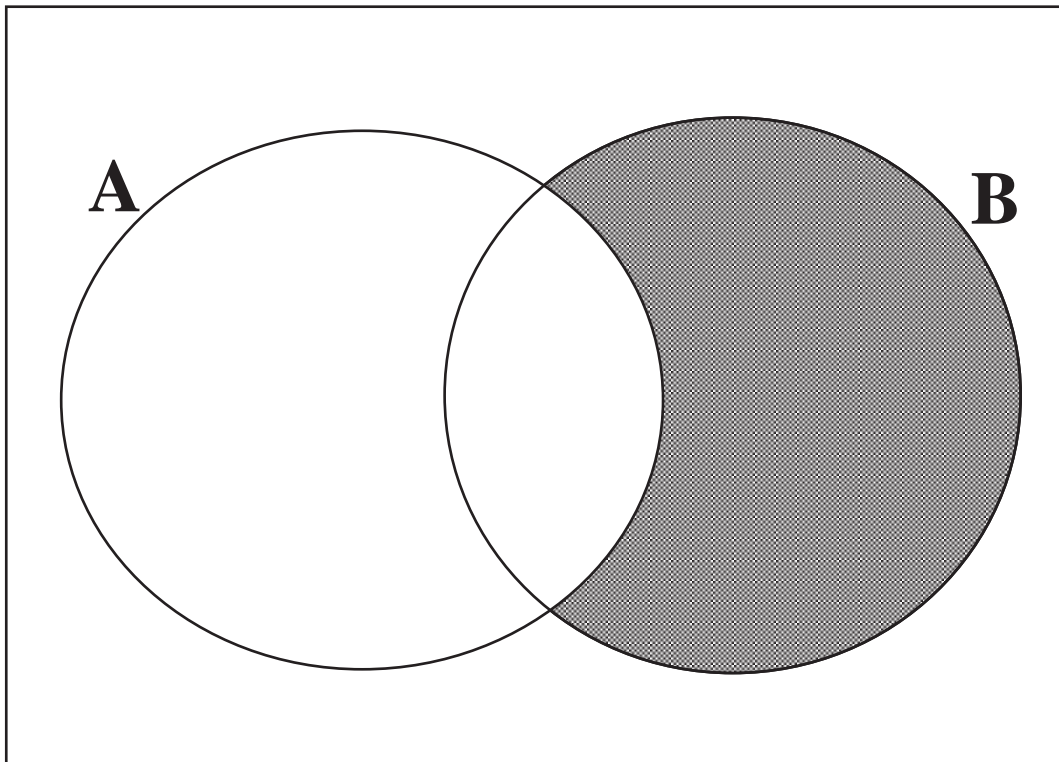
1. Describe in words, set A and set B.

2. Find
 - (a) $A = \{ \dots \}$
 - (b) $\xi = \{ \dots \}$
 - (c) $A \cap B = \{ \dots \}$
 - (d) $A \cup B = \{ \dots \}$
 - (e) $A' = \{ \dots \}$
 - (f) $A \cap A' = \{ \dots \}$
 - (g) $(A \cap B)' = \{ \dots \}$
 - (h) $A \cap B' = \{ \dots \}$
 - (i) $A \cup B' = \{ \dots \}$

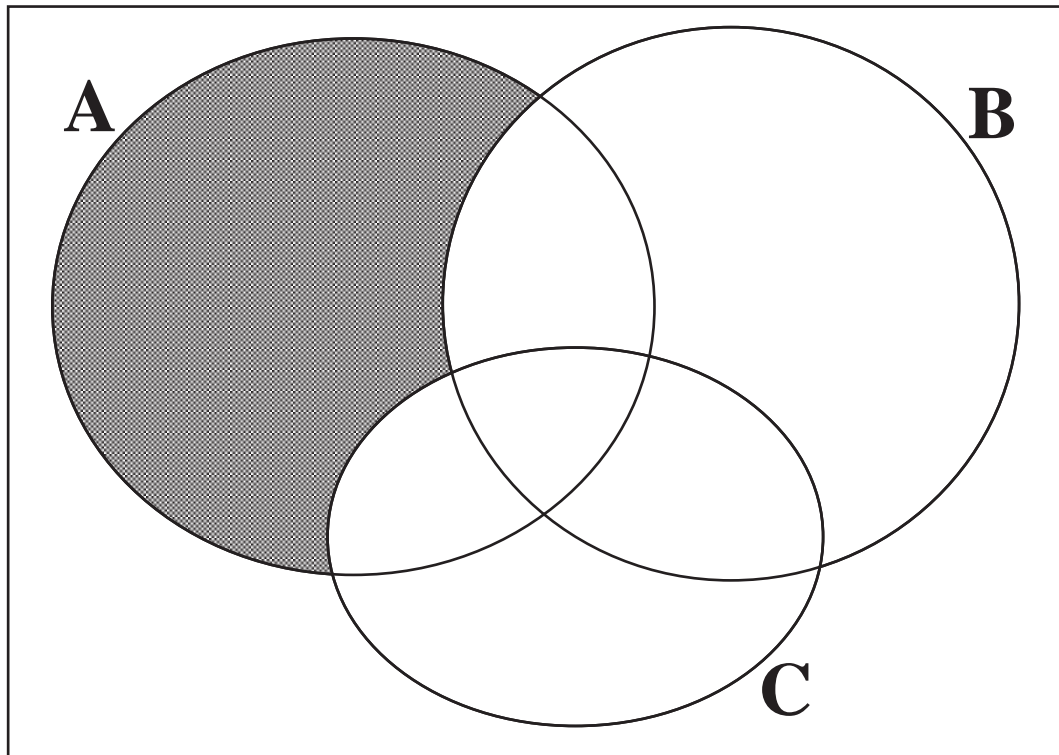
OS 1.14*Describing Sets 1*

Use set notation to describe the shaded regions of these diagrams.

(a)



(b)

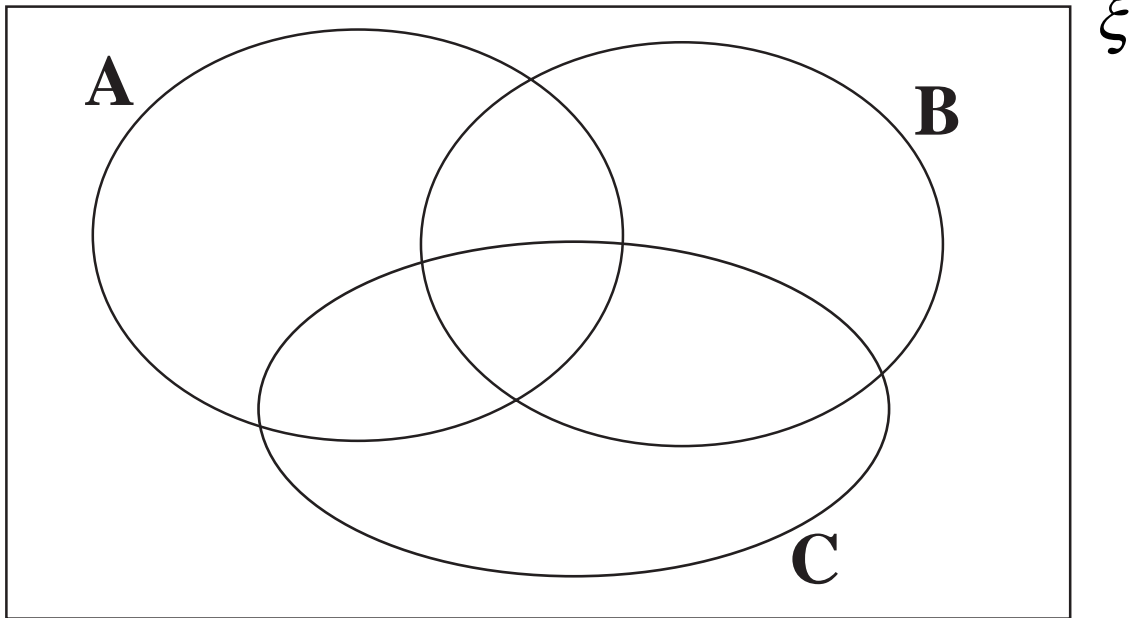


OS 1.15

Describing Sets 2

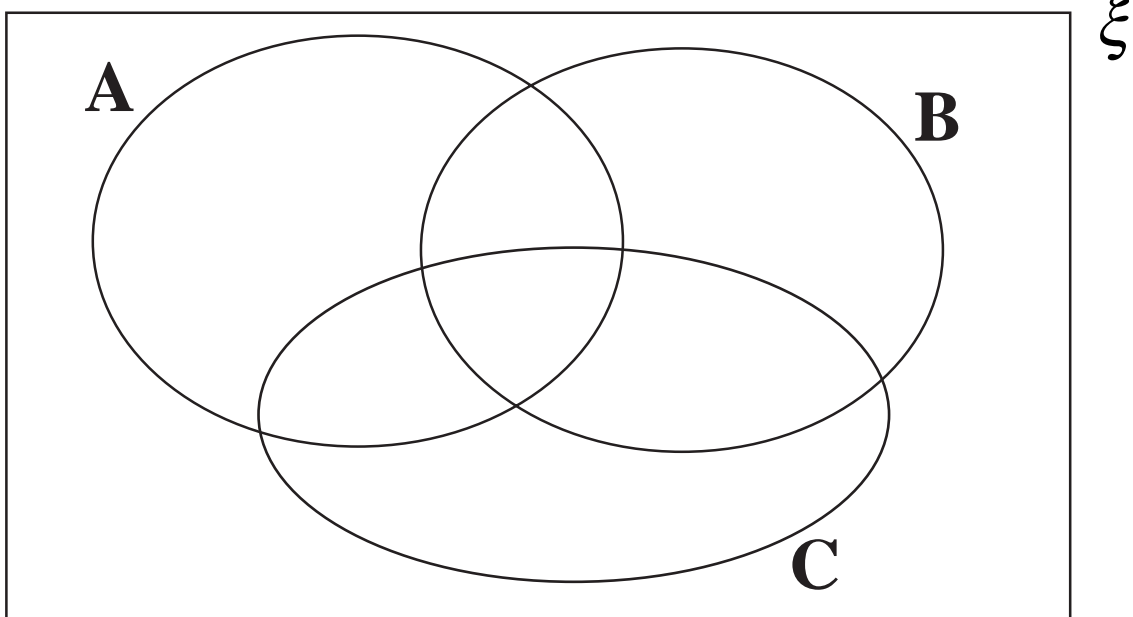
- (a) On this diagram, shade the region that represents

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



- (b) On this diagram, shade the region that represents

$$A \cap B \cap C'$$

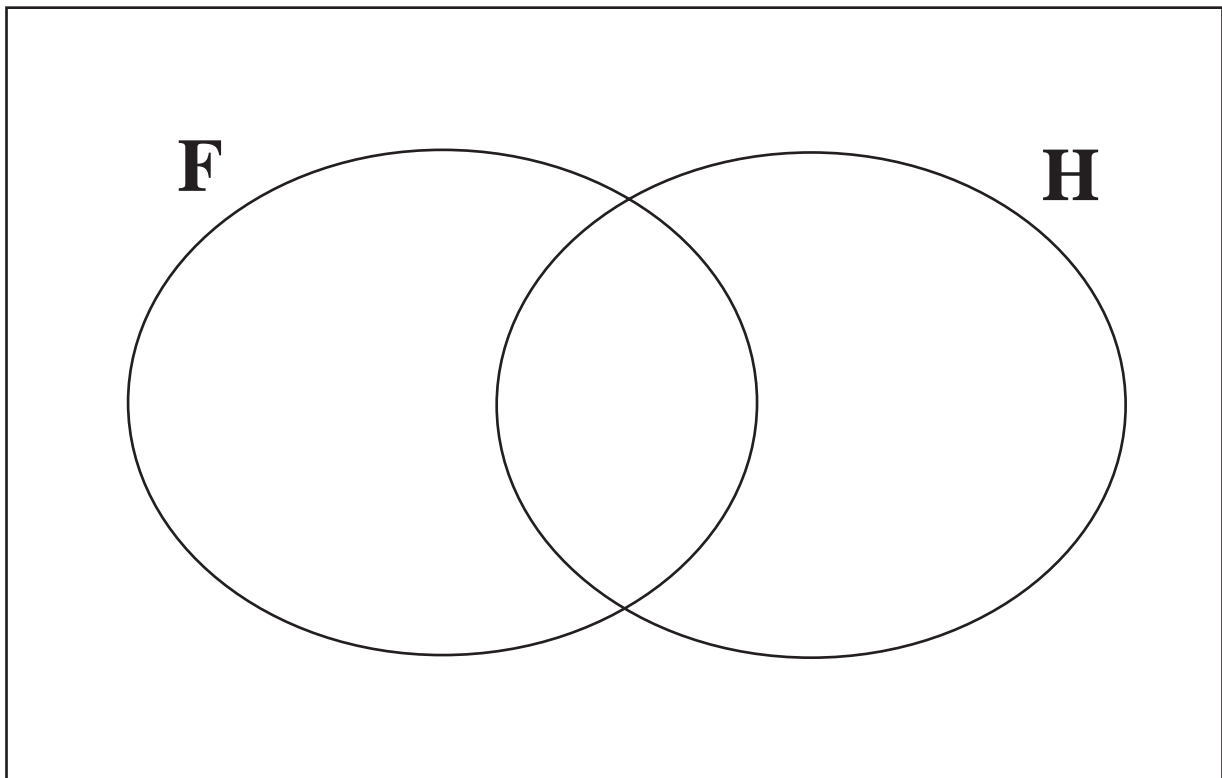


OS 1.16*Logic Problems and Venn Diagrams*

In a class there are

- 8 children who play football and hockey
- 7 children who do not play football or hockey
- 13 children who play hockey
- 19 children who play football.

Illustrate these facts on a Venn diagram, and find how many children there are in the class.



Total number of children in class =

OS 1.17

2 × 2 Logic Table

OS 1.18

3 × 3 Logic Table
