A graph enables us to represent the relation between two variables diagrammatically.

A setsquare enables us to draw or test a right angle.

Now make similar sentences using the diagrams in exercise 1.

Section 2 Development

3. Read this:

Relations between sets

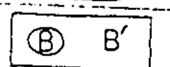
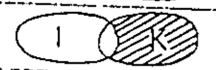
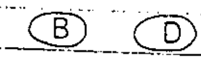
A set is any collection of things which we want to consider together. We use braces, { }, when we want to describe, or make a list of, the elements of a set, and we use capital letters to denote sets. For example:

Let set A be {all animals}
Let set B be {lions}
Let set C be {all animals except lions}
Let set D be {all human beings}
Let set E be {all solid figures}
Let set F be {all geometrical figures}

Let set G be {positive integers < 10}
Let set H be {1, 2, 3, 4, 5, 6, 7, 8, 9}
Let set I be {1, 2, 3}
Let set J be {∅} (This set is called the *empty* set)
Let set K be {3, 4, 5}

4. Look and read:

We can use *Venn diagrams* or *set notation* to show the relations between sets. Look at the examples in this table:

Relation	Venn diagram	Set notation
Set B is a proper subset of set A. Set B is contained in set A.		B ⊂ A
Set G is a subset of set H and set H is a subset of set G.		G ⊆ H H ⊆ G
Set C is the complement of set B		C = B′
Set I added to set K is the *union* of I and K.		I ∪ K = {1, 2, 3, 4, 5}
Set I subtracted from set K is the *difference* between K and I		K − I = {4, 5}
The members common to set I and set K form the *intersection* of K and I.		K ∩ I = {3}
Sets B and D are *disjoint*.		B ∩ D = {∅}

Now make a similar table to express the following relations:

a) A and D
b) E and F
c) H − I
d) H ∪ I
e) H ∩ I
f) All triangles are plane figures.
g) No triangles are solid figures.
h) The set {figures with straight sides} and the set {figures with curved sides} have some members in common.

5. Using the following table, write definitions of the above relations between sets:

The union of two sets	is	a set which contains all the members which do not belong to A.
The intersection of two sets		a third set which contains all the members of both sets.
The difference between two sets		a set in which every member of A is also in B, but there is at least one member in B but not in A.
The complement of a set A		a third set which contains all the members of one set which are not common to both sets.
The subset A of a set B		a third set which contains all the members common to both sets.
The proper subset A of a set B		a set in which every member of A is also in B.

6. Read this:

The sign ∪ is used to symbolise union. A ∪ B is read as 'A union B'.

Now write similar sentences about the following signs:

a) ∩ b) − c) d) ⊂ e) ⊃ f) > g) ⩽ h) ∈

Section 3 Reading

7. Look and read:

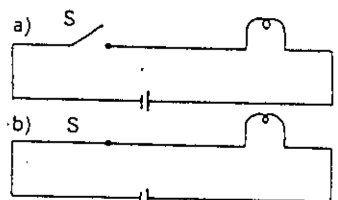


Fig. 5.1

Figure 5.1 shows a simple electric circuit with a power source, a switch and a light. In (a), the switch is open, so the light is off. In (b), the switch is closed, so the light is on.

Section 4 Listening

Sets of numbers

11. Listen to the passage and write down these words in the order in which you hear them:

common	frequently	referred to
differs	includes	usually
enables	oblique	whereas

12. Listen to the passage again and write down the symbols for the following sets as you hear them:

a) the empty set
b) the universal set
c) all integers
d) all rational numbers
e) all natural numbers
f) all real numbers

13. Draw a Venn diagram representing the relations between the four sets (c), (d), (e) and (f) in exercise 12.

Using your diagram, say whether the following statements are true or false. Correct the false statements.

a) $N \subset R$
b) $N \subseteq R$
c) $N \subseteq Z^+$
d) $N \subset Z^+$
e) $Q \supset R$
f) $R - Q$ = the set of all imaginary numbers
g) There are no disjoint sets in the diagram

Unit 5

Sets of numbers

Several sets of numbers are used frequently in mathematics and the use of standard abbreviations or symbols to refer to them enables us to save time and space. Capital letters are usually used for this notation. The set of natural numbers is denoted by N. Z denotes the set of all integers. R represents all real numbers and Q all rational numbers.

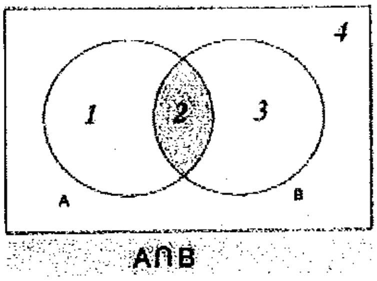
Note that Z^+ means all positive integers, R^- all negative real numbers, and so on. Z^+ differs from N in that Z^+ consists of all positive integers, whereas N consists of all non-negative integers and therefore includes the element zero in addition to the elements of Z^+. We can see from this that a set which contains only the element *zero* is not the same as the empty set, which contains no elements. Thus $N - Z^+ = \{0\}$, but $Z^+ \cap Z^- = \varnothing$. intersection

Some other sets are also referred to by abbreviations. We use a capital U to refer to the universal set, while the empty set is denoted by a symbol which consists of a zero bisected by an oblique line. This may also be read as the null or void set. For example, if two sets, A and B are disjoint (that is, they have no elements in common), then $A \cap B = \varnothing$.

NUCLEUS MATHEMATICS, D. HALL, LONGMAN 1980

Set Notation R.2

http://www.youtube.com/watch?v=7qD1womrIps



Pre-listening.

1. **What is a set?**
2. **What are possible relations between two sets?**
3. **How do denote sets of numbers?**

Listening.

1) What does the speaker say about the relation between natural and whole numbers?

   ……………………………………………………………………………………

2) What does it mean when two sets are equal? ……………………………………
3) What is the difference between a subset and a proper subset?

   ……………………………………………………………………………………

4) How do we denote the empty set? …………………………………………………
5) What is interesting about the empty set? ……………………………………………
6) How do we denote a number which is not an element in some set?

   ……………………………………………………………………………………

7) Why is an example a true? ……………………………………………………………
8) Why is an example b false? ……………………………………………………………