PONY in Math

+ − × ÷

Primary 5

Lessons 2014

SECOND TERM

Unit **1**

Natural Numbers

Lesson 1 Revision on sets

The set

is a well-defined collection of objects.
Each object of a set is called a <u>member</u> or an <u>element</u> of the set.

- A pair of braces { } is used to designate a set with the elements listed or written inside the braces
- Capital letters are used to designate sets.
- Small letters may name elements of sets.
- The elements are written without repeating and the order of elements not important.

The set of digits of the number 56647 is $A = \{5, 6, 4, 7\}$

Types of sets

A null set or an empty set

A set containing no elements and is denoted by the symbol " Ø " or { }.

{Cats that can fly} = { } = Ø

A Finite set

A set that contains a countable number of elements.

{Letters in the word "Good"} = {G, o, d}

An infinite set.

A set that contains an uncountable number of elements.

{ Whole numbers } = {1, 2, 3, ... }

Equal sets are sets which contain exactly the same elements.

ex {4, 2, 3} and {3, 4, 2} are equal sets.

Equivalent sets are sets which contain the same number of elements.

ex {1, 2, 3, 4} and {1, 3, 5, 7} are equivalent sets.

The symbol " $\in$ " is used to denote that an object is an element of the set.

ex $4 \in \{2, 4, 6\}$

The symbol " $\notin$ " indicates that an object is not an element of the set.

ex $5 \notin \{2, 4, 6\}$

The universal set containing all the elements that can be used in a question is called the universal set. It is written as **U**.

The symbol " $\subset$ " is used to denote that a set is a subset of another set.

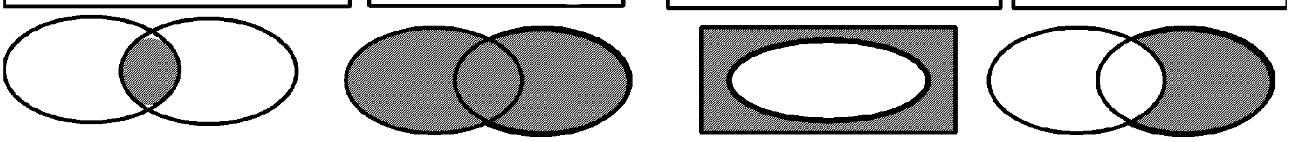
ex $\{2, 4\} \subset \{2, 4, 6\}$

The symbol " $\not\subset$ " is used to denote that a set is not a subset of another set

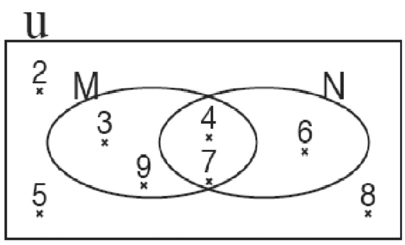
ex $\{2, 5\} \not\subset \{2, 4, 6\}$

Operations on sets

Intersection ($\cap$)	Union ($\cup$)	complement ($'$)	difference (-)



In the Venn diagram, u is the universal set.



U = ……………………………………………………

M = ……………………………………………………

N = ……………………………………………………

M \ = ………………………………………

N \ = ………………………………………

M U N = …………………………… M ? N = ……………………………

M – N = …………………………… N – M = ……………………………

Complete using (∈ , ∉ , ⊂ , ⊄)

5	……	**M**	**3**	……	**M**	**7**	……	**M**
8	……	**N**	**6**	……	**N**	**7**	……	**N**
{ 2 , 5 }	……	**M**	**{ 3 , 4 }**	……	**M**	**{ 2 , 3 }**	……	**M**
{ 3 , 5 }	……	**N**	**{ 4 , 7 }**	……	**N**	**{ 6 , 8 }**	……	**N**
N	……	**N**	**M**	……	**N**	**U**	……	**N**
M	……	**M**	**N**	……	**M**	**U**	……	**M**
U	……	**U**	**N**	……	**U**	**M**	……	**U**

Complete using (∈ , ∉ , ⊂ , ⊄)

5	….	**{ 5 , 4 }**	**{ 5 , 4 }**	……	**{ 5 , 4 }**	**{ 1 , 2 }**	……	**{ 1 , 2 }**
4	….	**{ 54 }**	**{ 3 , 7 }**	……	**{ 6 ,4 }**	**{ 2 , 3 }**	……	**{ 1,2,3 }**
9	….	**{ 4 , 5 , 9 }**	**{ }**	……	**{ 65,45 }**	**{ 2 }**	……	**{ 2 , 3 , 4 }**
7	….	**{ 37 , 73 }**	**∅**	……	**{ 6 , 2 }**	**2**	……	**{ 2 , 3 , 4 }**
2	….	**{ 22 , 32 }**	**{ 1 , 2 }**	……	**{ 12 , 21 }**	**12**	……	**{ 1 , 2 }**
0	….	**{ 10,50,20 }**	**{ 2 , 4 }**	……	**{ 2 , 3 , 4 }**	**12**	……	**{ 12 , 21 }**
1	….	**{ 1 , 2 , 3 }**	**{ 2 , 3 , 4 }**	……	**{ 2 , 4 }**	**0**	……	**{ }**

Lesson 2 The set of natural numbers

Representing natural numbers on the number line

The set of counting numbers = { 1 , 2 , 3 , 4 , 5 , ... }

The set of Natural numbers N = { 0 , 1 , 2 , 3 , 4 , 5 ,... }

(1) Mark ☑ for the correct statements and ☒ for the incorrect ones.

(a) $0 \in N$ ☐

(b) $\frac{2}{3} \in N$ ☐

(c) $1.5 \notin N$ ☐

(d) $475612 \in N$ ☐

(e) $\{0\} \subset N$ ☐

(f) $\varnothing \not\subset N$ ☐

(g) $\{1 , 4 , 5\} \subset N$ ☐

(h) $\{0 , 1 , 2 , 3 , ... , 100\} \subset N$ ☐

(2) Tell whether each statement is true [T] or false [F].

(a) The natural number between 37 and 39 is 38 ☐

(b) There is only one natural number between 99 and 101 ☐

(c) There is no natural number between 999 and 1001 ☐

(d) There are exactly two natural numbers between 3 and 5 ☐

(e) The least natural number that is greater than 7 but less than 24 is 23 ☐

(3) Which of the following questions has answers of natural numbers.

(a) How many oranges are there in this basket?

(b) What is your weight in kilograms?

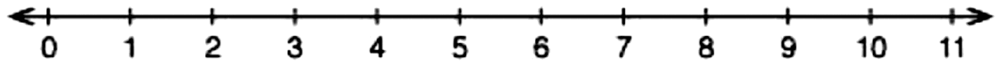
(c) How many cities are there in Egypt?

(4) Underline the natural numbers from the following numbers:

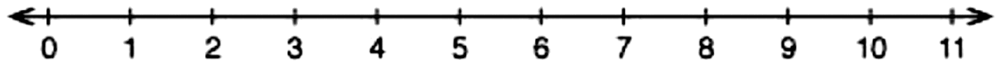
15 6.2 0 417 $\frac{4}{5}$ 0.7 91 328

(5) Make graphs for each of the following.

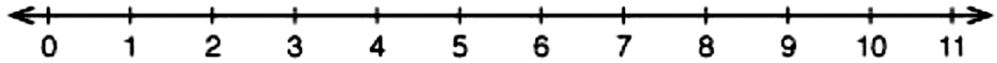
(a) The natural numbers between 4 and 8



(b) The even numbers between 2 and 6



(c) The natural numbers less than 7



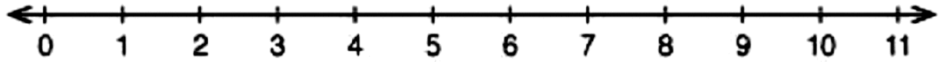
(6) Make a number - line graph for each set of natural

(a) {2 , 3}

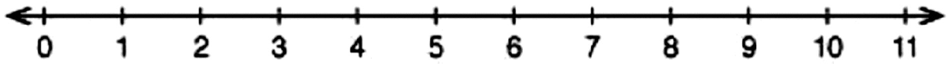
(b) {2 , 3 , 4 , 5 , 6, 7}

(c) {0 , 1 , 2 , 3}

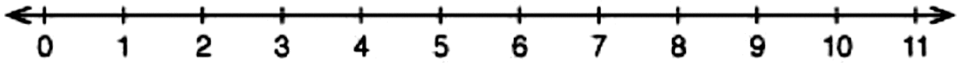
A.



B.



C.

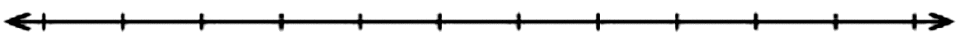


(a) {3 , 4 , 5 , 6 , ...}

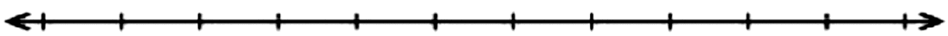
(b) {3 , 6 , 9 , 12 , ...}

(c) {4 , 5 , 6 , 7 , ...}

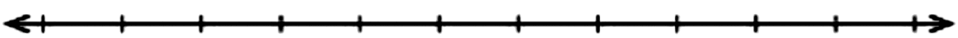
A.



B.



C.



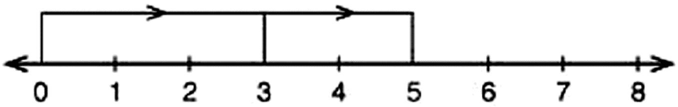
Lesson 3 Addition of natural numbers

For Example

3 + 2 = 5 will be shown as:

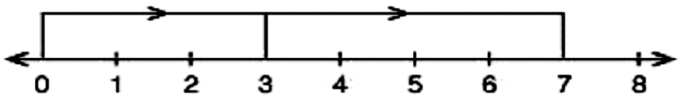
Start at 0 and move 3 units to the right. From 3 move 2 more units to the right.

This gives the answer 5



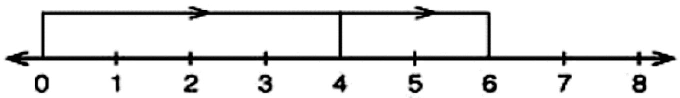
Complete:

(a) 3 + ... = 7

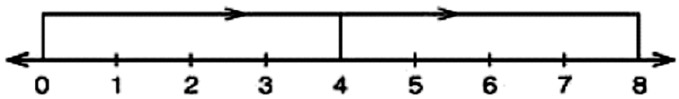


(b) 2 + ... = 5

(c) .... + ... = ...

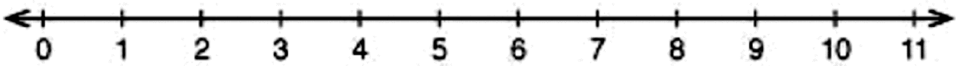


(d) .... + ... = ...

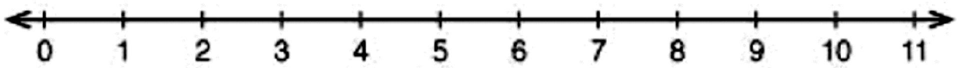


Use the number line to add the following natural numbers.

(a) 5 + 3



(b) 1 + 6



(c) 5 + 1

Properties of addition of natural numbers

1. Closure property :

The sum of any two natural numbers is a natural number.

i.e. the addition operation is always possible in $\mathbb{N}$ or $\mathbb{N}$ is closed under addition.

For example :

- $2 + 3 = 5 \in \mathbb{N}$
- $6 + 4 = 10 \in \mathbb{N}$

2. Commutative property :

For any two natural numbers a and b , we have : $a + b = b + a$

For example :

- $3 + 4 = 4 + 3 = 7$
- $6 + 8 = 8 + 6 = 14$

3. Associative property :

For any three natural numbers a , b and c , we have : $(a + b) + c = a + (b + c)$

For example :

$7 + 3 + 5 = (7 + 3) + 5 = 10 + 5 = 15$

also : $7 + 3 + 5 = 7 + (3 + 5) = 7 + 8 = 15$

i.e. $7 + 3 + 5 = (7 + 3) + 5 = 7 + (3 + 5)$

4. The existence of the additive neutral (identity) element in $\mathbb{N}$:

For any natural number a , we have : $a + 0 = 0 + a = a$

i.e. zero is the additive neutral element in $\mathbb{N}$

For example :

- $0 + 6 = 6$
- $3 + 0 = 3$

Find the numbers that will make the following statements true.

(a) 17 + ... = ... + 17 = 17

(b) 901 + ... = 91 + ...

(c) (6 + 8) + 9 = 6 + (....... + 9)

(d) (22 + ...) + 16 = 22 + (8 + 16)

Use the properties of addition to find the result.

Example: 53 + 28 + 47	= (28 + 53) + 47	commutation
	= 28 + (53 + 47)	association
	= 28 + 100 = 128	addition

(a) 34 + 48 + 66 = ...

= ....

= ....

(b) 576 + 637 + 424 + 863

= ....

= ....

= ....

(c) 218 + 125 + 782 + 375

= ....

= ....

= ....

Complete :

213 + 57 = 57 + ... (.................................. property)

149 + 673 = 673 + ... (.................................. property)

17 + ... = ... + 17 = 17 (.................................. property)

(6 + 8) + 9 = 6 + (.......... + 9) (.................................. property)

(61 + 715) + 3 547 = ... + (715 + 3 547) (.................................. property)

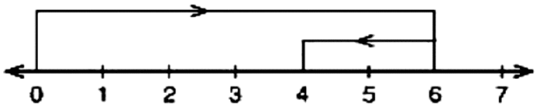
Lesson 4 Subtraction of natural numbers

Example (1)

6 – 2 = 4 will be shown as:

Start at 0 and move 6 units to the right. From 6 move 2 units to the left.

This gives the answer 4



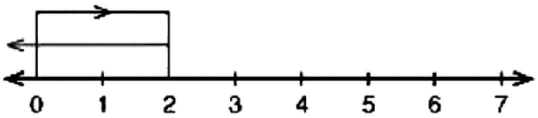
Example (2)

2 – 6 =

Start at 0 and move 2 units to the right. From 2 move 6 units to the left.

This does not give an answer in N,

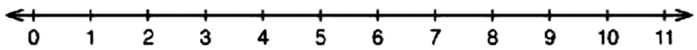
Therefore 2 – 6 is impossible in N.



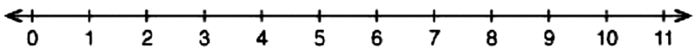
Subtraction is not always possible in N

Mention, stating reasons, which of the following subtractions are possible in N.

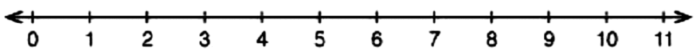
(a) 7 – 1



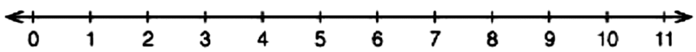
(b) 1 – 11



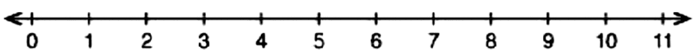
(c) 5 – 9



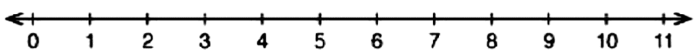
(d) 4 – 4



(e) 0 – 0



(f) 3 – 8



Lesson 5 Multiplication of natural numbers

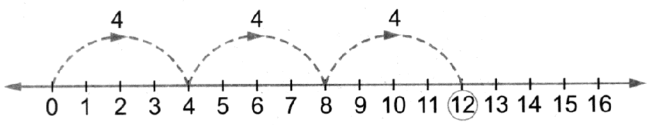
the multiplication operation is a repeated addition operation.

For example : $4 \times 3 = 4 + 4 + 4 = 12$

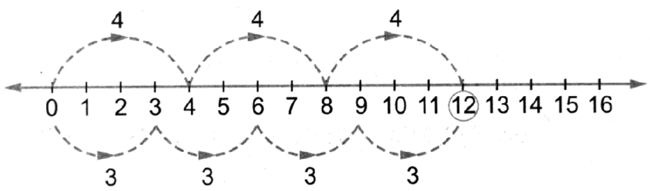
We can represent the product of two natural numbers on the number line.

For example : to multiply 4×3

Then, $4 \times 3 = 12$



* We can use the number line to show that $4 \times 3 = 3 \times 4 = 12$



Properties of multiplication of natural numbers

1. The closure property :

As addition is always possible in $\mathbb{N}$, therefore multiplication is also always possible in $\mathbb{N}$

i.e. multiplication operation is always possible in $\mathbb{N}$ or $\mathbb{N}$ is closed under multiplication.

For example : • $2 \times 5 = 10 \in \mathbb{N}$ • $4 \times 6 = 24 \in \mathbb{N}$

2. Commutative property :

For any two natural numbers a and b , we have : $a \times b = b \times a$

For example : • $5 \times 8 = 8 \times 5 = 40$ • $4 \times 7 = 7 \times 4 = 28$

3. Associative property :

For any three natural numbers a , b and c , we have :
$a \times b \times c = (a \times b) \times c = a \times (b \times c)$

For example : • $2 \times 5 \times 3 = (2 \times 5) \times 3 = 10 \times 3 = 30$

Also , $2 \times 5 \times 3 = 2 \times (5 \times 3) = 2 \times 15 = 30$

i.e. $2 \times 5 \times 3 = (2 \times 5) \times 3 = 2 \times (5 \times 3)$

4. The existence of the multiplicative neutral element in $\mathbb{N}$:

For any natural number a , we have : $1 \times a = a \times 1 = a$

i.e. the number "1" is the multiplicative identity element in $\mathbb{N}$

For example : • $1 \times 5 = 5 \times 1 = 5$ • $35 \times 1 = 1 \times 35 = 35$

5. Multiplication by zero :

The product of any natural number by zero equals zero.

For example : • $5 \times 0 = 0$ • $0 \times 100 = 0$

6. Distribution of multiplication over addition property :

If a , b and c $\in \mathbb{N}$, then $a \times (b + c) = a \times b + a \times c$ and $(b + c) \times a = b \times a + c \times a$

For example :

Since $2 \times 3 + 2 \times 5$

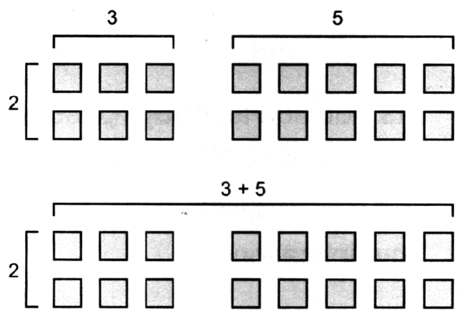
$= 6 + 10 = 16$

and

$2 \times (3 + 5)$

$= 2 \times 8 = 16$

• **Then,** $2 \times (3 + 5) = 2 \times 3 + 2 \times 5 = 16$



Find the numbers that will make the following statements true:

(a) $(12 \times 4) \times$ .... $= 12 \times (4 \times 7)$

(b) (........ $\times 10) \times 5 = 20 \times (10 \times 5)$

(c) $(20 \times 50) \times 30 =$ .... $\times (50 \times 30)$

(d) $7 \times (4 +$ ....$) = 7 \times 4 + 7 \times 5$

(e) $5 \times (1 + 4) = 5 \times$ .... $+ 5 \times$ ....

(f) $32 \times 9 + 32 \times 6 =$ .... $\times$ (........ + ...)

(g) $50 \times (11 + 17) =$ .... $\times$ .... + ... $\times$ ....

Show how the distributive property is used in computing 3×23

Use the associative and commutative properties to simplify each of the following :

(a) $5 \times 37 \times 2$ = ...
= ....
= ....

(b) $25 \times 7 \times 9 \times 4$ = ...
= ....
= ....

Use the distributive property to find :

[a] $34 \times 75 + 34 \times 25$ = ...
= ....
= ....

[b] $48 \times 17 - 28 \times 17$ = ...
= ....
= ....

Use the distributive property to find :

[a] 103×25 = ...
= ....
= ....
= ....

[b] 37×98 = ...
= ....
= ....
= ....

[c] 15×742 = ...
= ....
= ....
= ....

Lesson 6 Division of natural numbers

- You know that $3 \times 8 = 24$

$24 \div 3 = 8 \in N$

If 8 is multiplied by 3, it gives 24

$24 \div 8 = 3 \in N$

If 3 is multiplied by 8, it gives 24

The division operation is possible in this case.

1 Since the division operation is not always possible in $\mathbb{N}$, then $\mathbb{N}$ is not closed under the division operation.

2 Since $12 \div 3 = 4$ while $3 \div 12$ is not possible in $\mathbb{N}$

i.e. $12 \div 3 \neq 3 \div 12$

Then division operation is not commutative in $\mathbb{N}$

3 Since $(24 \div 4) \div 2 = 6 \div 2 = 3$ while $24 \div (4 \div 2) = 24 \div 2 = 12$

i.e. $(24 \div 4) \div 2 \neq 24 \div (4 \div 2)$

Then the division operation is not associative in $\mathbb{N}$

4 The division operation in $\mathbb{N}$ has no identity element.

5 The division of any number ($\neq 0$) on zero has no meaning.

For example : $5 \div 0$ has no meaning, because there is no natural number, which when multiplied by zero gives 5

6 If we divide zero by any non-zero natural number , the result is zero.

For example : $\frac{0}{5} = 0$, $\frac{0}{3} = 0$, etc.

Divide:

(a) $12 \div 4$

(b) $4 \div 12$

(c) $36 \div 9$

(d) $9 \div 36$

(a) Does interchanging the dividend and divisor affect the quotient?

(b) Does the commutative property hold for division?

Which of the following statements are true?

(a) $49 \div 7 = 7 \div 49$

(b) $90 \div 15 = 15 \div 90$

(c) $(75 \div 15) \div 5 = 75 \div (15 \div 5)$

(d) $(28 \div 6) \in N$

Find the value of $(16 \div 8) \div 2$, $16 \div (8 \div 2)$.

Is the statement $(16 \div 8) \div 2 = 16 \div (8 \div 2)$ true?

Does the associative property hold for division?

....

....

....

Find the value of $24 \div (8 + 4)$, $(24 \div 8) + (24 \div 4)$.

Is the statement $24 \div (8 + 4) = (24 \div 8) + (24 \div 4)$ true?

Does the distributive property hold for division over addition?

....

....

....

....

....

....

Which of the following represents the number zero and which represents meaningless.

(a) $0 \div 10$ ....

(b) $90 \div 0$ ....

(c) $\frac{14 - 14}{21}$ ....

(d) $\frac{27 - 15}{5 - 5}$ ....

Unit test

1 **Name the property of addition and multiplication illustrated by each of the following statements**

(a) $2 + 3 = 3 + 2$ ....

(b) $3 + (2 + 5) = (3 + 2) + 5$ ....

(c) $(9 \times 4) \times 3 = 9 \times (4 \times 3)$ ....

(d) $7 \times 8 = 8 \times 7$ ....

(e) $25 \times 1 = 1 \times 25 = 25$ ....

(f) $11 + 0 = 0 + 11 = 11$ ....

2 **Express each of the following in the form of:**

(◯ × △) + (◯ × □) or (△ × ◯) + (□ × ◯).

(a) $3 \times (4 + 5)$ ....

(b) $3 \times (7 + 2)$ ....

(c) $3 \times (8 + 4)$ ....

(d) $(5 + 2) \times 4$ ....

(e) $(3 + 1) \times 7$ ....

(f) $(7 + 4) \times 11$ ....

3 (a) Find the value of $(18 - 5) - 2$, $18 - (5 - 2)$. Is the statement $(18 - 5) - 2 = 18 - (5 - 2)$ true? Does the associative property hold for subtraction?

....

....

....

(b) If N = {1, 4, 9, 16, 25, 36, 49, 64, 81}, which of the following statements is false?

① $25 \in N$ ④ $35 \notin N$

② $48 \in N$ ⑤ $100 \in N$

③ $81 \notin N$ ⑥ $64 \notin N$

4 Complete each sentence using all the numbers 1, 3, 5, 7, and 9

(a) $\square \times \square \div \square + \square - \square = 1$

(b) $(\square \times \square + \square) \div \square + \square = 5$

(c) $\square \div \square \times \square + \square - \square = 5$

5 (a) Use the distributive property to calculate the value of:

① 43×1005 ② 295×16

....

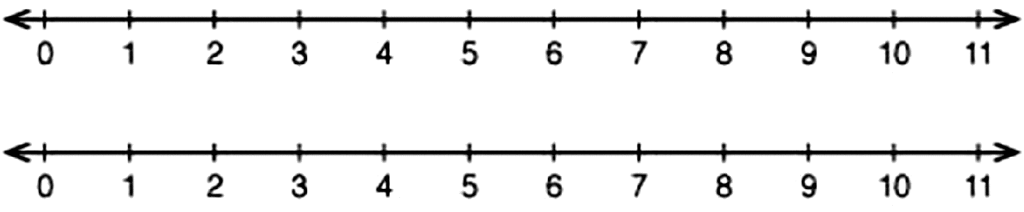
....

....

(b) Represent each of the following on the number line:

① Natural numbers that are less than or equal 3

② {3, 4, 5, ...}



6 (a) **Show the possible operations in N.**

① $30 \div 6$

② $8 - 80$

③ $5 \div$ zero, why?

④ zero $\div 100$, why?

⑤ $170 - 17$

⑥ 70×0

(b) **Find the result of each of the following**

① $(24 + 16) \div 4$, $(24 \div 4) + (16 \div 4)$

② $72 \div (6 + 3)$, $(72 \div 6) + (72 \div 3)$

Does division distribute over addition?

....

....

....

....

....

....

Lesson 4 Numerical patterns

is a sequence of numbers according to a particular rule.

N = {0, 1, 2, 3, 4, 5, ……….}

Natural numbers (N) represents a sequence of numbers according to a particular rule which is :

((Each number is more than its predecessor by one))

The set of odd numbers = {1, 3, 5, 7, ………}
The set of even numbers = {0, 2, 4, 6, ………}

both are also a sequence of numbers according to the rule:

((Each number is more than its predecessor by 2))

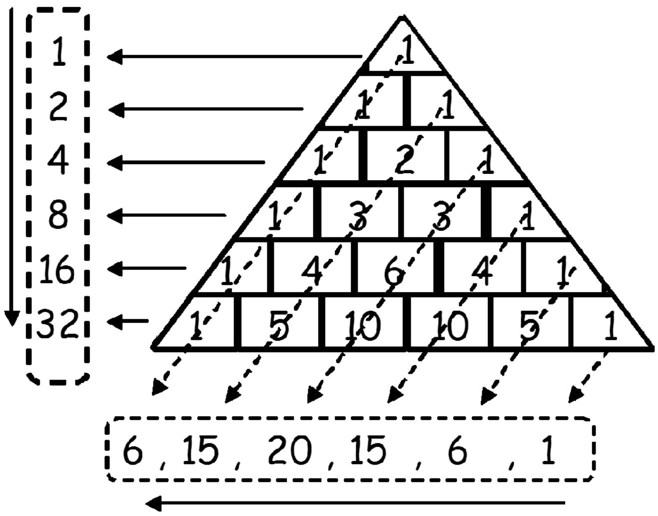
Pascal's triangle

In the Pascal's triangle figure, the pattern of each of :

(a) The sum of numbers of the rows
1 , 2 , 4 , 8 , 16 , 32 , …..

(b) the diagonals

1 , 6 , 15 , 20 , 15 , 6 , …..



Complete each of the following patterns :

[a] 90 , 85 , 80 , ………. , ……….

[b] 5 , 10 , 20 , 40 , ………. , ……….

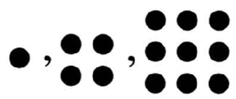
[c] 1 , 2 , 4 , 7 , ………. , ……….

[d] 5 , 55, 555 , 5555 , ………. , ……….

[e] 3 , 6 , 9 , 12 , ………. , ……….

[f] 3 , 6 , 12 , 24 , ………. , ……….

[g] 2 , 4 , 7 , 11 , ………. , ……….

[h]  , ……….

Hany has 3 test rabbits in his lab. If the number of rabbits is doubled each certain period. How many rabbits will be there in 5 periods ?

……………………………………………………………………………………………….

……………………………………………………………………………………………….

Unit 2

Equations

Lesson 1 Mathematical expressions

1 Numerical expressions

contains only numbers and operations.

2 + 4 , 5 – 3

2 Symbolic expressions

contains numbers , symbols and operations.

x + 4 , 5 – y

+	–	x	÷
Add , plus , sum , increased by	Subtract , minus , difference , less than	Mulitiply , times , product	Divided by , quotient

Write a symbolic expression for each of verbal expression :

a. Five more than the number x ....

b. Three less than the number y ....

c. Four times a number x ....

d. A number y divided by 6 ....

e. Twice of a number b ....

f. Six less than half a number x ....

g. Eight decreased by three times a number x ....

h. Twice the sum of a number m and seven ....

If Sally is x years old now ، use x to write an expression for each of the following numbers :

[a] The age of Sally after nine years. ....

[b] The age of Sally five years ago. ....

Complete using a suitable symbolic expressions :

[a] Add 5 to the number y, the symbolic expression is ....

[b] Add 3 to four times x, the symbolic expression is ....

[c] Subtract 4 from the half of the number x , the symbolic expression is ....

[d] The quotient of k by 2 , the symbolic expression is ....

Lesson 2 The constant and the variable

● **Constant and variable:**

If the price of one book is 3 pounds, complete:

- The price of two books = 2 × 3 = 6 pounds.
- The price of three books = 3 × 3 = 9 pounds.
- The price of four books = 4 × 3 = 12 pounds.
- The price of five books = 5 × 3 = 15 pounds.

(variable) (constant) (variable)

We can express that by

$$y = 3\chi$$

(y: variable) (3: constant) (χ: variable)

● The mathematical expression $y = 3\chi$ is called (equation)

such that χ, y are variables, 3 is constant.

A restaurant represents meal food of cost L.E. 25 with L.E. 7 for home service. Write the relation between the total cost.

Solution:

The price of one meal = ...

The price of two meals = ...

The price of three meals = ...

The price of χ meals = ...

Then the relation is y = ...

1) If the sallary of a worker is 30 pounds and 10 pounds for each hour for the extra time. Write the relation of the total daily sallary.

....

....

2) An isosceles triangle, its base length is 13 cm. Use the mathematical expressions to find the relation between the perimeter of the triangle and its sides.

....

....

Lesson 3 Equations

The relation $x + 2 = 5$ is called an equation. The symbol x is called the unknown or (the variable) in the equation.

Solving equation means finding the value of the unknown (symbol) included in the equation.

Solve each of the following equations :

$x - 3 = 5$ ....

....

....

....

....

$x + 2 = 4$ ....

....

....

....

....

$2x = 8$ ....

....

....

....

....

....

$\frac{1}{3}x = 6$ ....

....

....

....

....

$2x + 8 = 14$ ....

$\frac{x}{7} - 3 = 2$ ....

$10 - x = 7$ ....

The product of a number x and 5 is 35 , find the number x

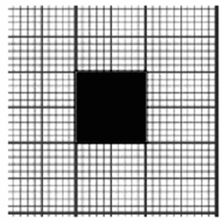
Unit 3

Measurement

Lesson 1 The area and its units

The area of a geometric figure is the number of equal parts forming a region

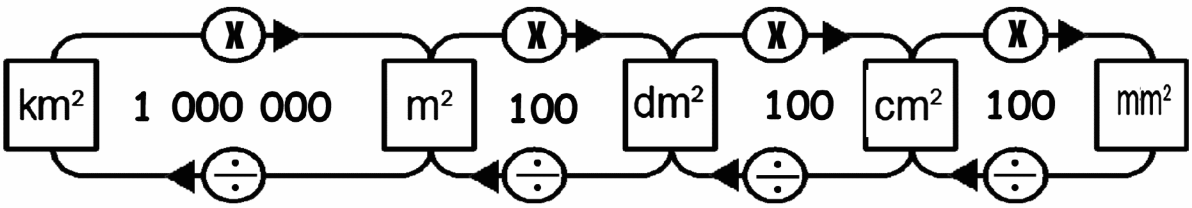
The square centimetre cm^2 is the area of a square of side length **1** cm



The square decimetre = 100 cm^2

The square metre = 100 dm^2 = 10 000 cm^2

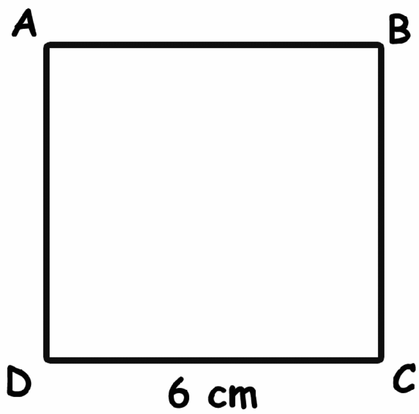
the square kilometre = 1 000 000 m^2



The area of the square

= Side legnth X itself

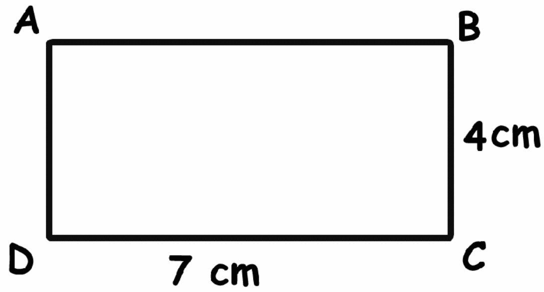
= $6 \times 6 = 36\ cm^2$



The area of the rectangle

= Length X width

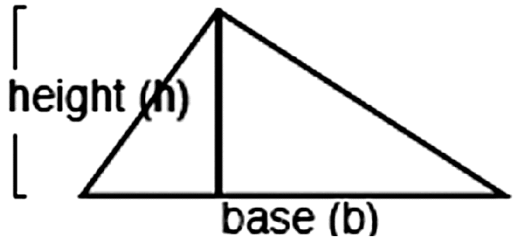
= $7 \times 4 = 28\ cm^2$



Area of a triangle

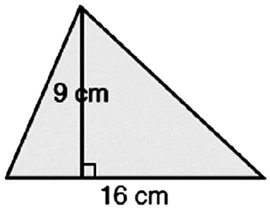
Area of a triangle $= \frac{1}{2} \times \underbrace{\text{base} \times \text{height}}_{}$ (Area of a rectangle)

Formula: $A = \frac{1}{2} \times b \times h$



Find the area of each of the following triangles.

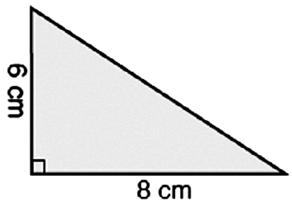
(a)



....

....

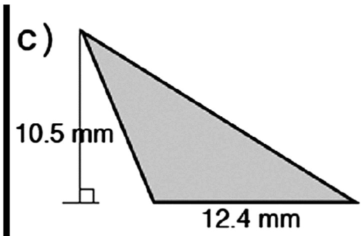
(b)



....

....

c)



....

....

Which is larger in area, a piece of land in the shape of a triangle with base 10 m and height 3 m or a garden in the shape of a square with side length 5 m?

....

....

Calculate the area of an equilateral triangle if its perimeter is 27 cm and, its height is 7.8 cm.

....

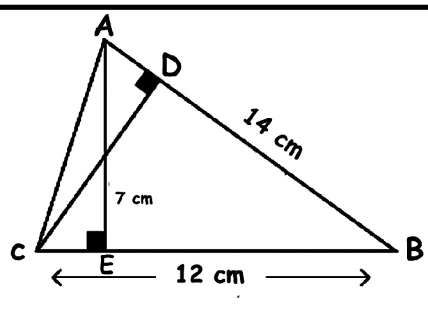
In the opposite figure :

[a] Find The area of the triangle ABC .

[b] Find the length of CD.

....

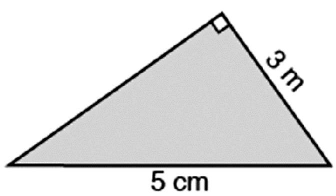
....



Calculate the perimeter of the triangle opposite, if it its area is 6 cm^2.

....

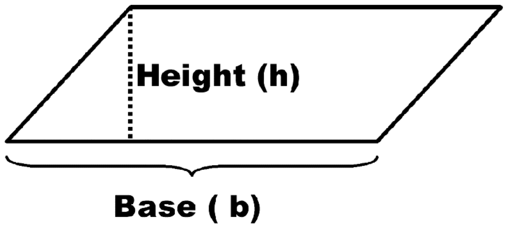
....



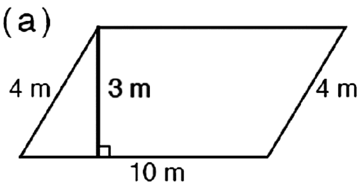
Lesson 2 Area of a parallelogram

Area of a parallelogram = base × height

Formula: A = b × h

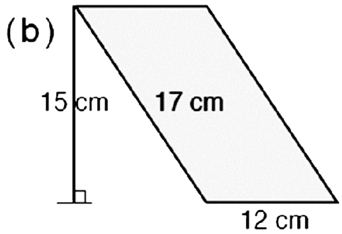


Find the area of each of the following parallelograms.



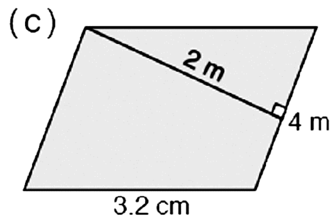
....

....



....

....



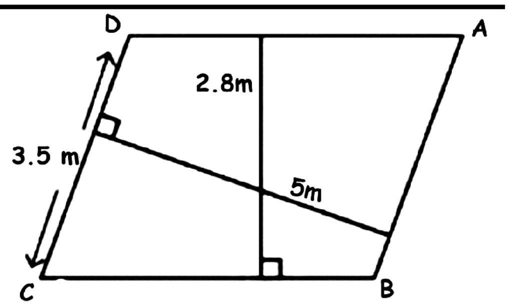
....

....

In the opposite figure find:

[a] The area of the parallelogram ABCD.

[b] The length of BC.

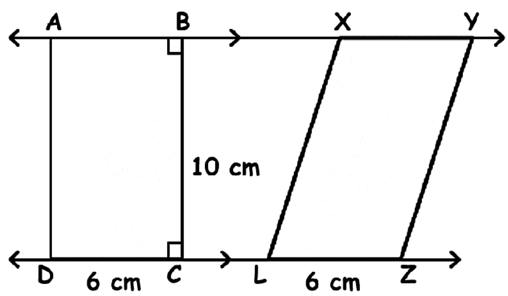


....

....

....

In the opposit figure AY // DZ , ABCD is a rectangle and XYZL is a parallelogram ,Compaire between their areas



....

....

....

....

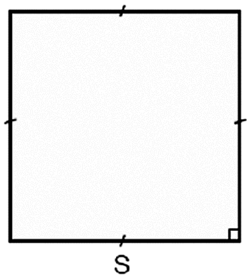
....

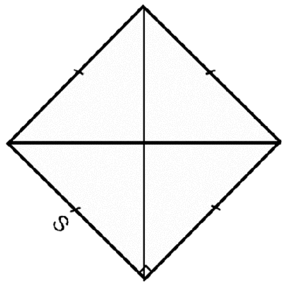
ABCD is a parallelogram of area 375 cm^2, E is a point on $\overline{CD}$ find the area of the triangle AEB.

....

....

Lesson 3 Area of a Square





Area of a square = side length × itself

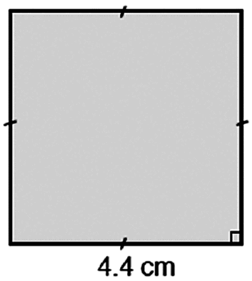
Formula: A = S × S

Area of the square = half the length of its diagonal × itself

Formula: A = $\frac{1}{2}$ d × d

Find the area of each of the following squares.

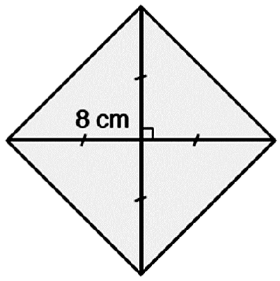
(a)



……………………………………

……………………………………

(b)



……………………………………

……………………………………

The diagonal length of a square is 10 cm long. Find the area of the square. ……………………………………

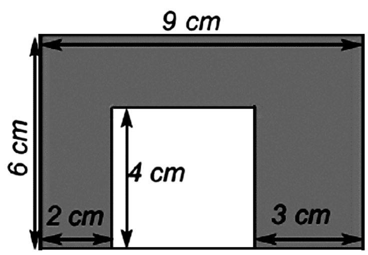
……………………………………

The area of a square is 72 cm^2. Find the length of its diagonal.

……………………………………

……………………………………

The figure opposite is a rectangle whose dimensions are 9 cm and 6 cm. A square of side length 4 cm is cut from it. Calculate: the area of the remaining part

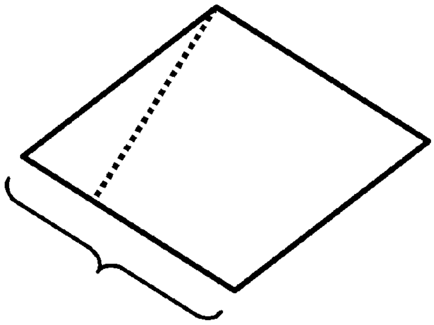


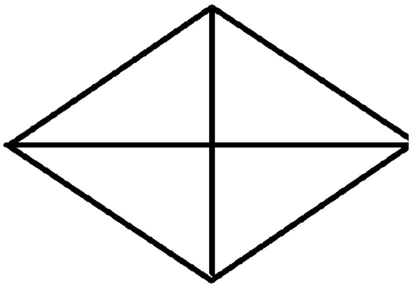
……………………………………

……………………………………

……………………………………

Lesson 4 Area of a rhombus





Area of a rhombus = side length × height

Formula: A = L × h

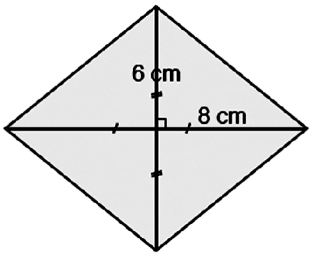
Area of a rhombus

= half the product of its diagonals

Formula: $A = \frac{1}{2} d_1 \times d_2$

Find the area of each of the following rhombuses.

(a)

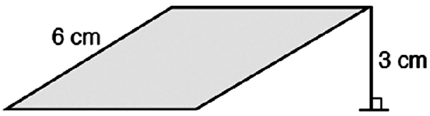


....

....

....

(b)

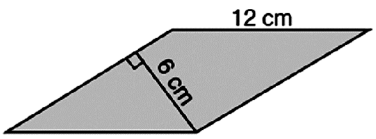


....

....

....

(c)

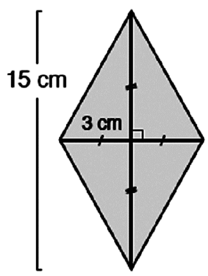


....

....

....

(d)



....

....

....

The lengths of the diagonals of a rhombus are 24 cm and 10 cm. Calculate its area.

....

....

The lengths of the diagonals of a rhombus are 12 cm and 16 cm and its height is 9.6 cm. Find its side length.

....

....

....

....

The side length of a rhombus is 5 cm, its height is 4.8 cm and the length of one of its diagonal is 6 cm. Calculate the length of the other diagonal.

....

....

....

....

In the figure opposite, area of the rectangle ABCD equals 144 cm^2 IF AB = 8 cm, Calculate the area of the rhombus AFDE.

....

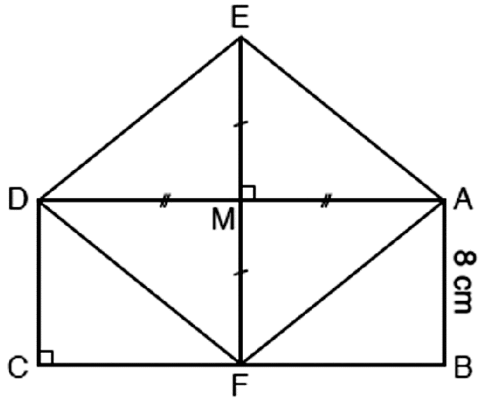
....

....

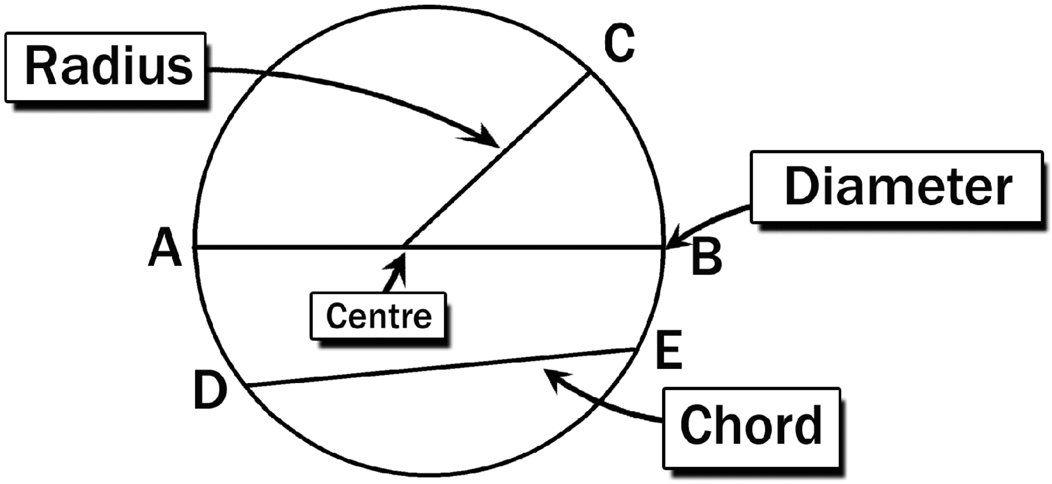
....

....

....



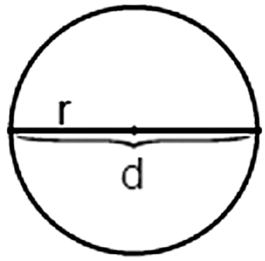
Lesson 5 Investigating circumference



Circumference = $\pi \times$ diameter

Formula : $C = \pi \times d = \pi \times 2r$

Where $\pi = 3.14$ (to the nearest hundredth).



π is the ratio between the circumference of the circle and the length of its diameter
It is named by the greek letter π pronounced "pie"

Find each circumference to the nearest whole number. "$\pi = 3.14$"

(a) d = 5 cm

....

....

(b) r = 25 mm

....

....

Find each circumference to the nearest whole number. "$\pi = \frac{22}{7}$"

(a) d = 7 cm

....

....

(b) r = 14 m

....

....

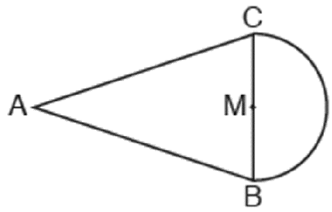
The radius of the tyre of Hazem's bicycle is 38 cm. Find the distance covered when the tyre of the bicycle makes 8 complete rotations. "$\pi = 3.14$"

....

....

....

Calculate the perimeter of the figure opposite, if AB = AC = 6 cm and the radius of the circle M equals 3.5 cm. "$\pi = \frac{22}{7}$"



....

....

....

A circle of circumference 66cm. Find the length of its diameter ($\pi = \frac{22}{7}$).

....

....

....

If half the circumference of a circle equals 314 cm, find its diameter in metres ($\pi \simeq 3.14$).

....

....

....

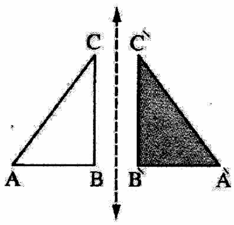
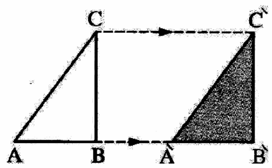
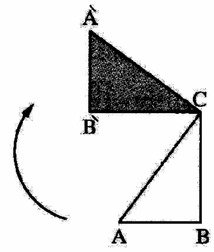
Unit 4

Geometric Transforations

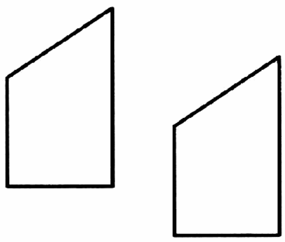
Lesson 1 Geometric transformations - Symmetrical figures and axis of Symmetry

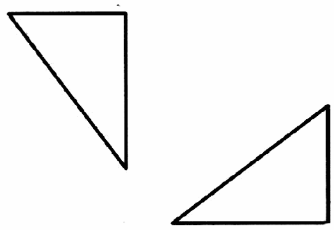
Geometric transformations

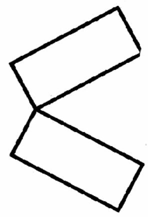
A geometric transformation transforms every point A in the plane to another point À in the plane itself.

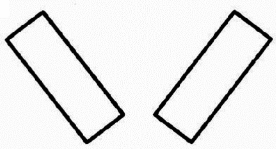
Geometric transformations	Reflection (flip) : Reflection is a over a line.	Translation (slide) : Translation is moving in a certain direction along a line.	Rotation (turn) : Rotation is turning the figure around a point with a certain angle.
For example			

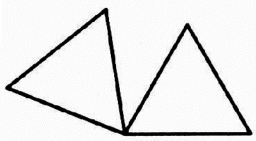
Describe the type of transformation in each of the following figures (reflection , translation or rotation) :

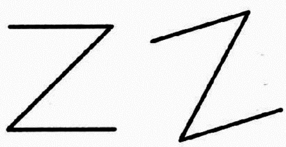

....

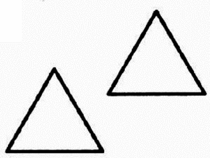

....

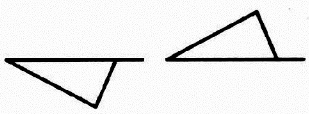

....

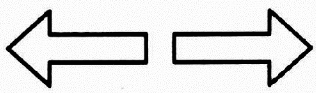

....


....


....


....


....

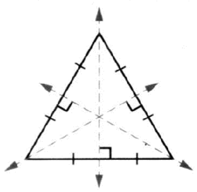
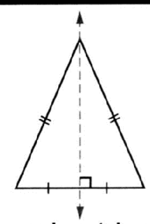
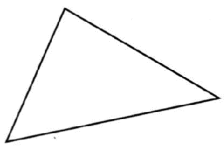
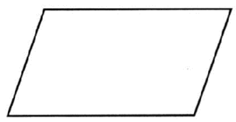
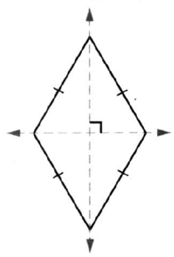
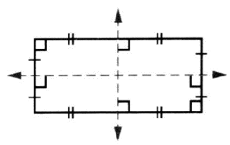
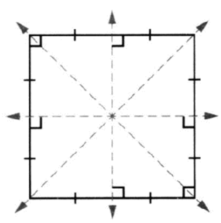
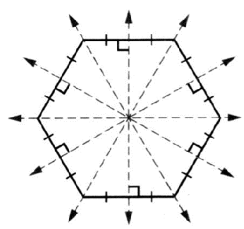
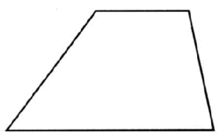
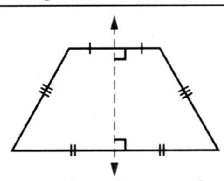

....

Symmetrical figures and axis of Symmetry

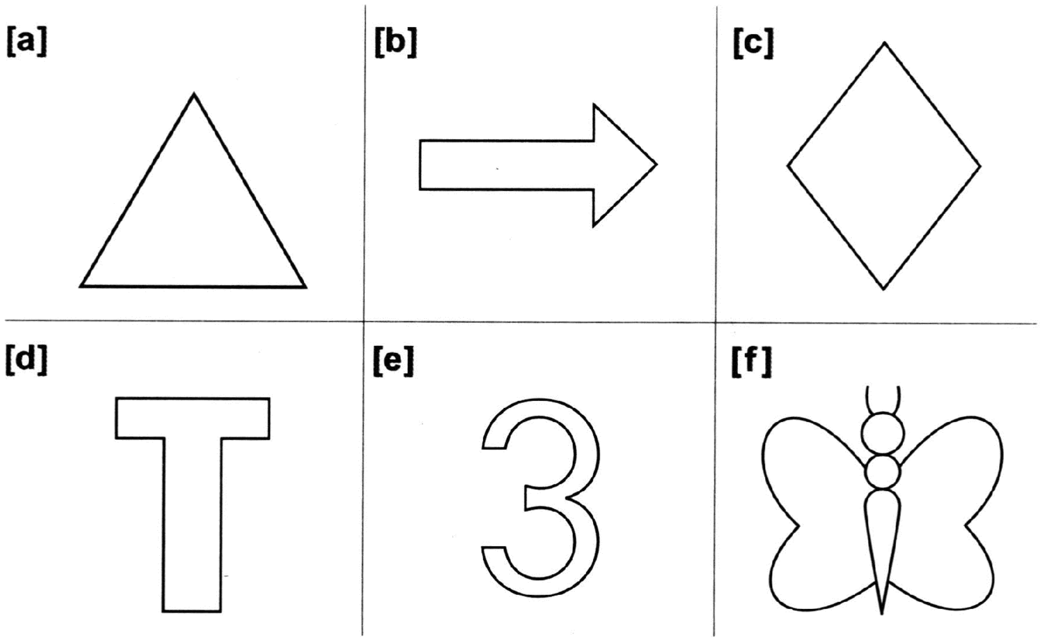
Axis of Symmetry

- Axis of symmetry is a straight line dividing the figure into two identical parts.
- The straight line L is considered to be an axis of symmetry for a figure, if every point on that figure has an identical point on the same figure, with respect to the line L.

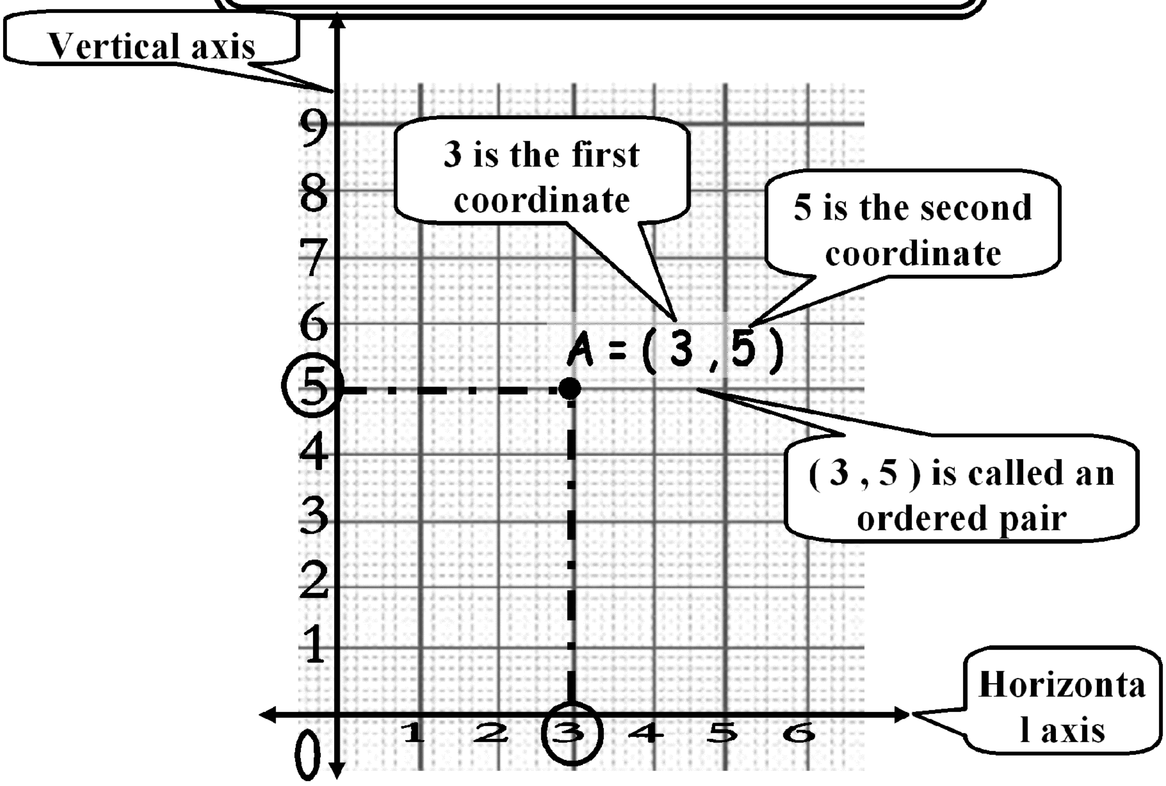
Axes of symmetry for some geometrical figures

The figure	Number of axes of symmetry	The figure	Number of axes of symmetry
 Equilateral triangle	3	 Isosceles triangle	1
 Scalene triangle	0	 Parallelogram	0
 Rhombus	2	 Rectangle	2
 Square	4	 Regular hexagon	6
 Trapezium	0	 Isosceles trapezium	1

In each of the following, draw all the axes of symmetry :



Two dimensions coordinate Plane and some geometric figures



Every point in the two dimensional coordinal corresponds an ordered pair , and every ordered pair corresponds a point

On the 2-dimensional Coordinate plane . Find the coordinate of each of the points :

A (...... , ...)

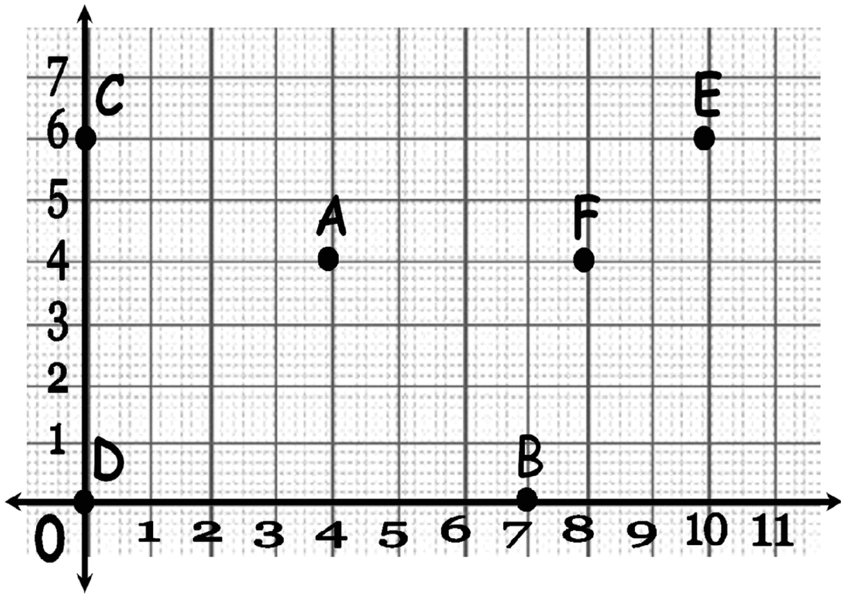
B (...... , ...)

C ....

D ....

E ....

F ....



Put each ordered pair on the 2-dimensional coordinate plane :

A (5 , 6)

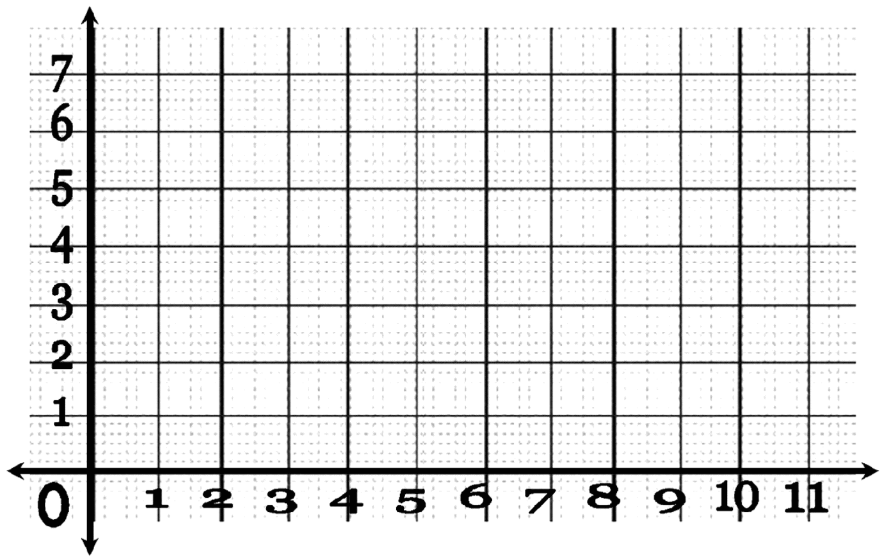
B (3 , 3)

C (0 , 0)

D (1 , 7)

E (0 , 6)

F (6 , 0)



Graph the points A (1 , 6) , B (2 , 2) , C (8 , 2) and D (7 , 6) , then connect them in order.

A → B → C → D → A

[a] What is the name of the figure ABCD ?

....

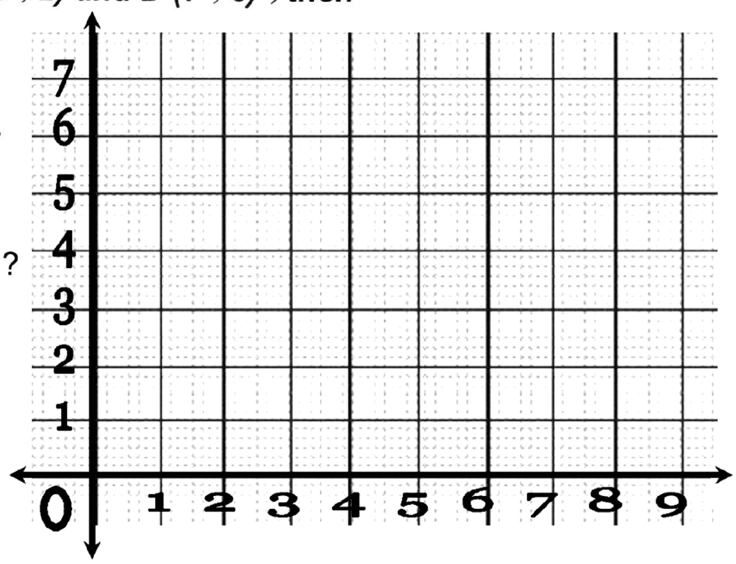
[b] What is the distance between A and D ?

....

[c] What is the length of $\overline{BC}$?

....

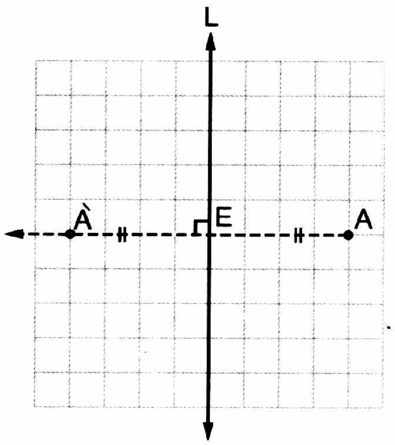
[d] What is the coordinates of the midpoint of $\overline{AD}$?..



Lesson 2 Reflection

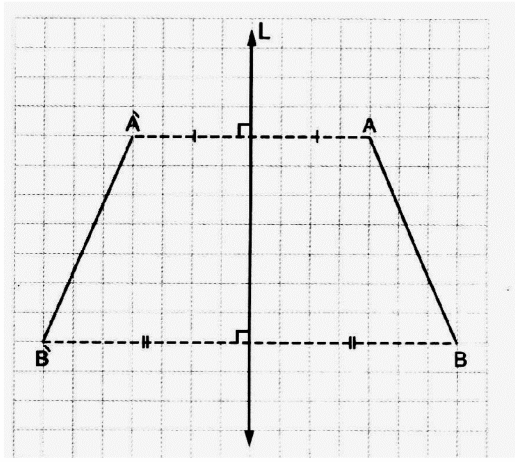
Reflection across a line

1 the image of a point by reflection across a line



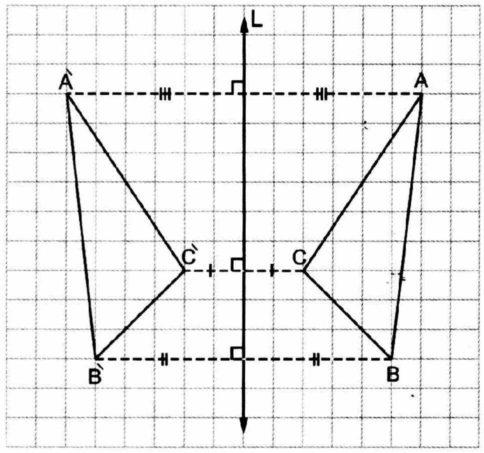
The line L is called the axis of reflection.

2 the image of a line segment by reflection across a line



AB = ÀB̀

3 the image of a geometric figure by reflection across a line

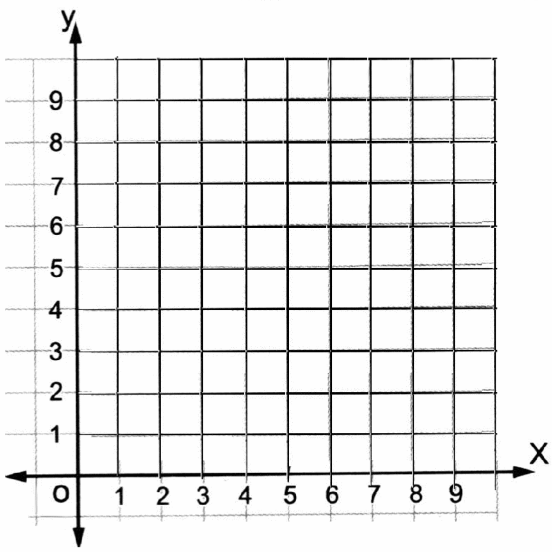


- ÀB̀ = AB , B̀C̀ = BC , C̀À = CA ,
- m (∠ À) = m (∠ A) , m (∠ B̀) = m (∠ B)

  , m (∠ C̀) = m (∠ C).

- △ ÀB̀C̀ is congruent to △ ABC.

On the coordinate plane , draw the triangle ABC where A (2 , 1) , B (5 , 3) , and C (5 , 8) , then draw the image of it by reflection across $\overleftrightarrow{BC}$.

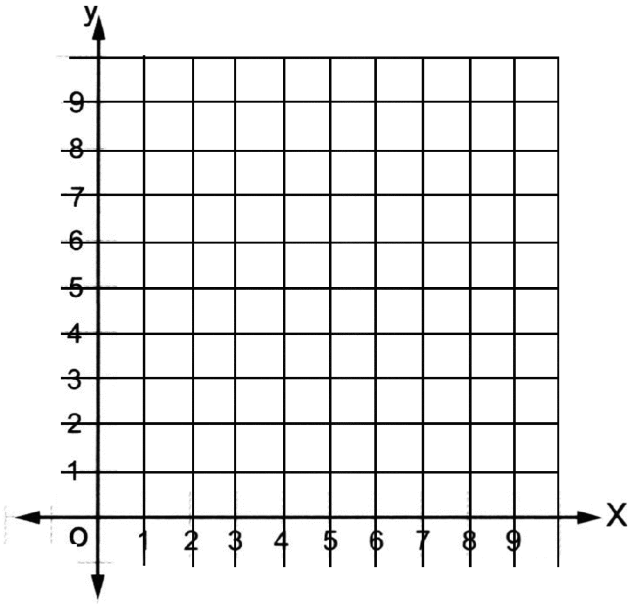


On the coordinate plane , draw the square ABCD where A (4 , 3) , B (7 , 3) , C (7 , 6) and D (4 , 6) , then draw its image $\grave{A}\grave{B}\grave{C}\grave{D}$ by reflection across $\overleftrightarrow{AD}$.

Complete :

$\grave{A}$ (..... , ...) , $\grave{B}$ (..... , ...)

$\grave{C}$ (..... , ...) , $\grave{D}$ (..... , ...)

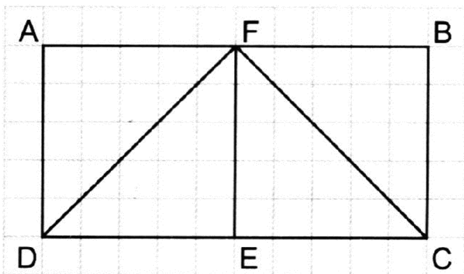


In the opposite figure , complete :

[a] The image of Δ CBF by reflection across $\overleftrightarrow{EF}$ is ....

[b] The image of Δ CBF by reflection across $\overleftrightarrow{CF}$ is ....

[c] Δ CEF is the image of Δ DEF by reflection across ....

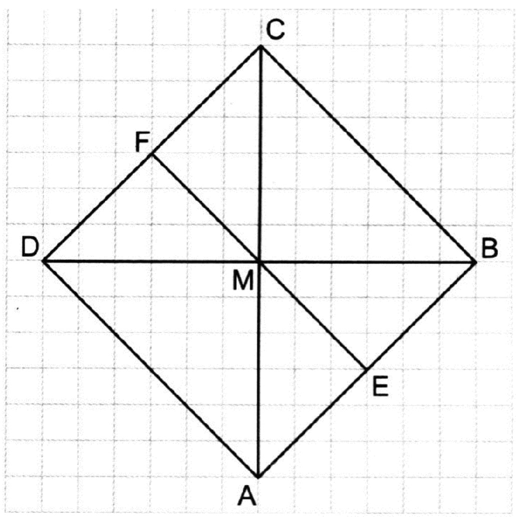


In the opposite figure , complete :

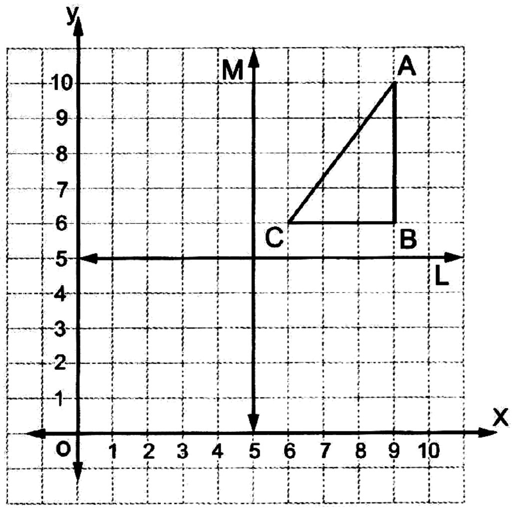
[a] The image of Δ BMC by reflection across $\overleftrightarrow{EF}$ is ....

[b] The image of Δ DMF by reflection across $\overleftrightarrow{EF}$ is ....

[c] Δ ADM is the image of Δ ABM by reflection across ....



The opposite figure represents a coordinate plane :



(a) Write the coordinates of points A , B and C.

A ....

B ....

C. ....

(b) Draw Δ À B̀ C̀ the image of Δ ABC by reflection across (L) and determine the coordinates of the vertices À , B̀ and C̀.

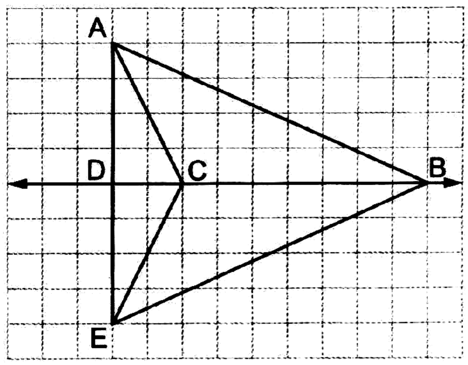
À .... , B̀ .... and C̀. ....

(c) Draw Δ A̎ B̎ C̎ the image of Δ ABC by reflection across (M) and determine the coordinates of its vertices A̎ , B̎ and C̎.

A̎ .... , B̎ .... and C̎. ....

In the opposite figure , $\overleftrightarrow{BD}$ is the axis of reflection.

Complete :



(a) The image of Δ ABC by reflection across $\overleftrightarrow{BD}$ is .... , then

AB = ... and AC = ...

(b) The image of Δ ACD by reflection across $\overleftrightarrow{BD}$ is .... , then

AD = ... and $\overline{CD}$ = ...

coincides on ....

(c) Δ ABC is congruent to Δ ....

and Δ ECD is congruent to Δ ....

Unit 5

Statistics

Lesson 3 Representing data by pie charts

The table shows how Laila spent her money on a holiday.

(a) Represent these data by a pie chart.

Accommodation	Food	Air-plane	Shopping
LE 1080	LE 540	LE 1080	LE 1620

(b) What did she spend most of her money on? ......

....

....

....

....

....

....

....

Ahmed had LE 900, He divided the sum of money among his mother and 3 sisters. The following table shows the amount of money each of them received.

(a) Complete the table.

(b) Represent these data by a pie chart.

Mother	Nancy	Mai	Sara
$\frac{1}{2}$	$\frac{1}{6}$		$\frac{1}{4}$

(c) How much money did Mai receive?

(d) How much money did Ahmed's mother receive?

....

....

....

....

....

....

....

....

Lesson 1 Collecting and organizing data

Using the following word:

abgedhawasshottlcalamonshaafass

(a) Complete the frequency table at the right using the name of the word.

Letter	Tally	Frequency
a	𝍸 |||	8
e	.....	.....
i	.....	.....
o	.....	.....
u	.....	.....

---

the number of letters in each of the first twenty - five words of a story are shown opposite. Make a frequency table.

6	3	4	2	3	5	3	7	3	4
3	3	4	3	3	3	6	6	3	5
3	2	3	7	5					

number	Tally	Frequency
total		

The ages of 50 pupils are given opposite, present this information in a frequency table and a line graph.

15	12	12	13	14	13	12	14	14	13
12	15	16	14	14	13	14	12	12	13
14	13	13	13	12	14	15	14	15	13
14	14	13	14	12	13	14	15	14	13
12	16	14	13	13	12	14	12	14	15

Age	Tally	Frequency
	Total	

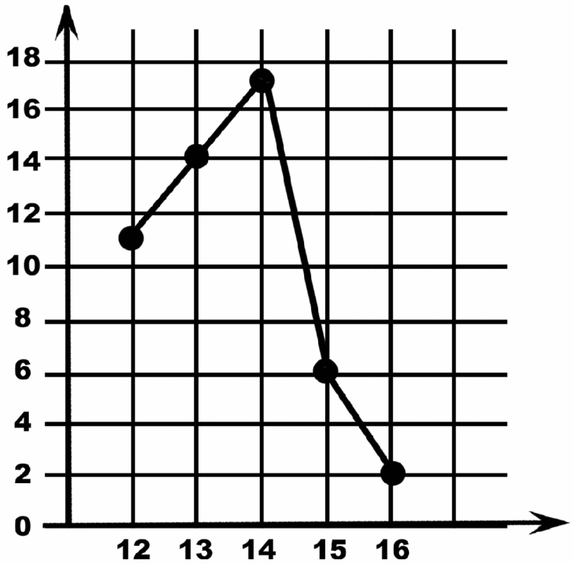
Lesson 2 Displaying data

Example

The ages of 50 pupils are given opposite, present this information in a frequency table and a line graph.

15	12	12	13	14	13	12	14	14	13
12	15	16	14	14	13	14	12	12	13
14	13	13	13	12	14	15	14	15	13
14	14	13	14	12	13	14	15	14	13
12	16	14	13	13	12	14	12	14	15

Age	Tally	Frequency
12	𝍸 𝍸 |	11
13	𝍸 𝍸 ||||	14
14	𝍸 𝍸 𝍸 ||	17
15	𝍸 |	6
16	||	2
	Total	50



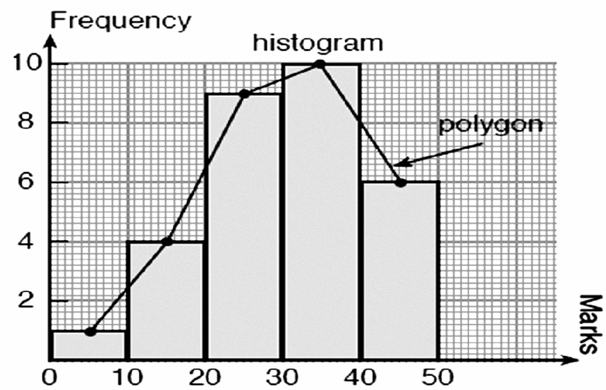
Thirty students in Mathematics task obtained the following marks out of a maximum of 50 marks.

38	39	29	14	46	17
48	45	19	43	49	12
43	39	22	21	37	36
22	21	30	31	35	37
23	22	27	33	9	22

Present this information in a frequency table and as a histogram and frequency polygon.

Using a class interval of 10:

Class	Class Centre	Frequency
- 10	5	1
- 20	15	4
- 30	25	9
- 40	35	10
- 50	45	6



A new car dealer asked forty of his customers how many years they kept their cars before selling them. The answers were:

8	1	3	5	4	4	4	6
5	6	4	4	3	5	3	5
4	4	5	2	6	5	3	4
2	8	4	4	5	6	4	7
4	7	5	8	3	3	5	2

(a) Complete the frequency table.

(b) Draw a line graph.

Age of car in years	Tally	Frequency
8	|||	3
7		
6	||||	
5	~~||||~~ ||	8
4		
3		
2	|||	3
1		
	Total	40

A class of 30 pupils had a 10 question task. The results were:

6	7	6	5.5	7	5	7	10	8	6
8	7	6.5	10	6	7	9	10	8	8.5
8	9.5	9	7	7.5	7.5	9	5	9	8

(a) Arrange these scores in a frequency table using the sets:

5 -, 6 - , ... , 10 -.

(b) Draw a histogram and a frequency polygon.

	Tally	Frequency

A survey team asked 100 persons chosen at random how many hours a week they watched TV.

Number of hours	0 -	5 -	10 -	15 -	20 -
Persons	6	24	54	12	4

Show this data by:

(a) a histogram

(b) a frequency polygon