

Triangles and Quadrilaterals

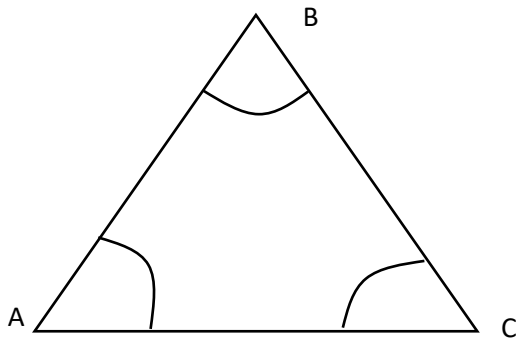
Chapter No 12

By studying this lesson, you will be able to: -

- Obtain the value for the sum of the interior angles of a triangles and a quadrilateral
- Show that the sum of the exterior angles of a triangle and a quadrilateral is 360° .

Triangles

Triangle is a polygon formed with three straight line segments which has three side and three angles called elements of the triangle.



Elements of the triangle ABC

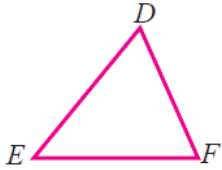
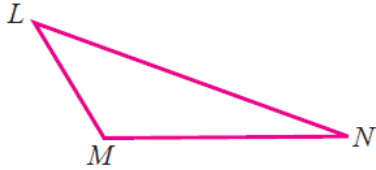
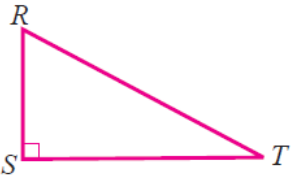
3 Sides : - AB , BC and AC

3 Angles : - ABC, ACB, BAC

Classification of triangles according to the length of the side

Triangle	Figure	Note
Equilateral triangle	A diagram of an equilateral triangle with vertices labeled A, B, and C. Each of the three sides (AB, BC, and AC) has a single tick mark, indicating that all three sides are of equal length.	The lengths of all three sides are equal
Isosceles triangle	A diagram of an isosceles triangle with vertices labeled P, Q, and R. The two sides PQ and PR have double tick marks, indicating that they are of equal length.	The lengths of two sides are equal
Scalene triangle	A diagram of a scalene triangle with vertices labeled X, Y, and Z. There are no tick marks on any of the sides, indicating that all three sides are of unequal length.	All three sides are unequal in length

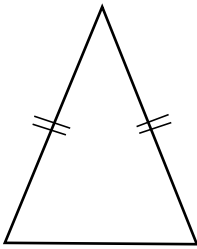
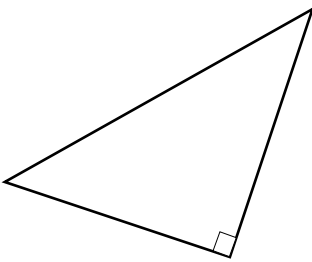
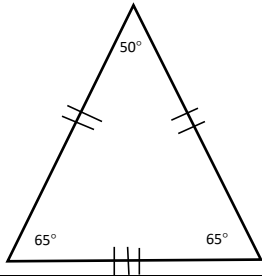
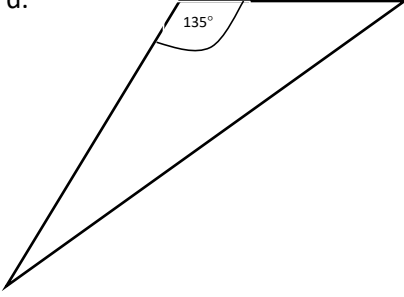
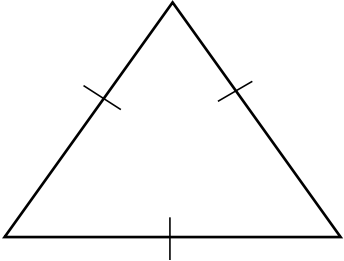
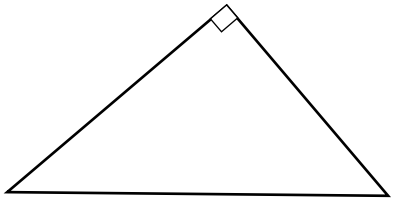
Classification of triangles according to the angle

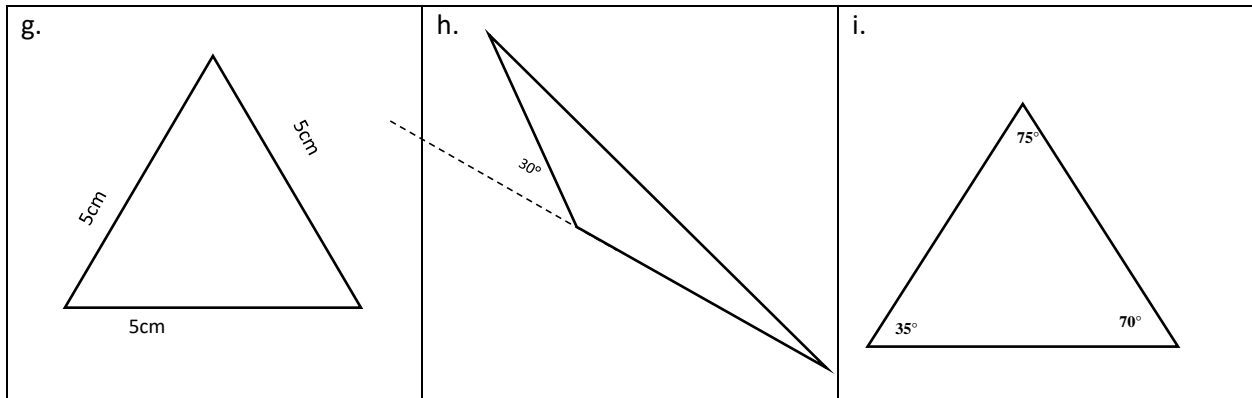
Triangle	Figure	Note
Acute triangle		The magnitude of each angle is less than 90° .
Obtuse triangle		The magnitude of one angle is greater than 90° .
Right triangle		The magnitude of one angle is 90° .

Activity – 01

Complete all the exercises in your exercise book.

Classify the triangles by their sides and angles.

a. 	b. 	c. 
d. 	e. 	f. 



Activity – 02

Complete the review exercise in page 129.

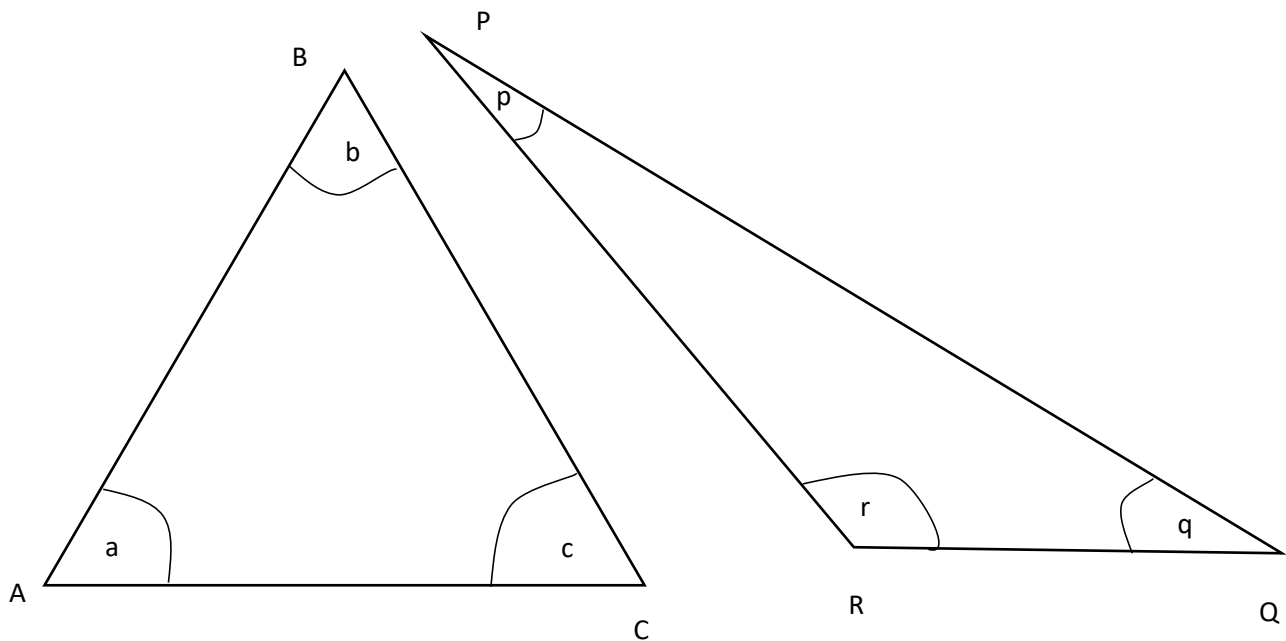
The sum of the interior angles of a triangle

Activity – 03

Follow the guidelines to find the sum of the interior angles of a triangle.

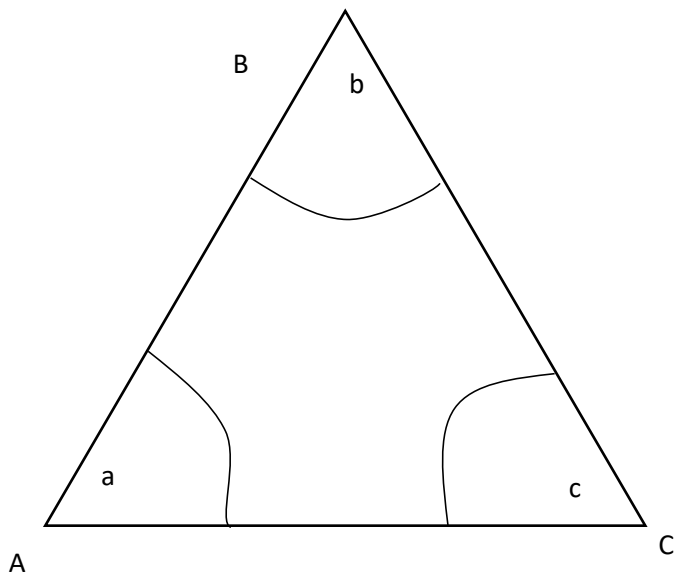
Step 01

Trace the following two types of triangles on a colored A4 sheet and name their vertices and angles as shown below



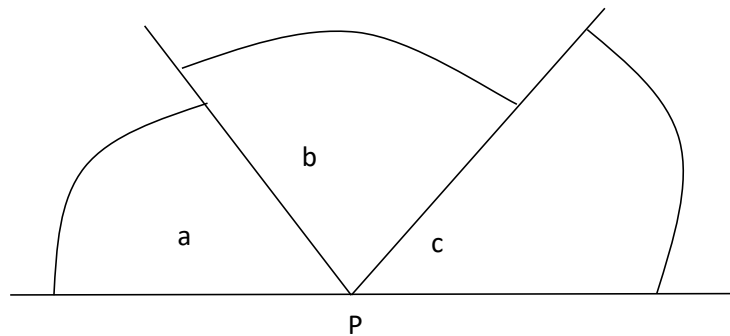
Step 02

Cut the triangle ABC and separate out the three angles a, b, and c as shown in the figure.



Step 03

In your exercise book paste three angles a, b, and c that are cut out as shown in the figure without overlapping them and such that point p on the line is the common vertex.



Step 04

Write down the value of, $a + b + c$, using the angles on a straight line.

Step 05

Follow the above steps for triangle PQR in your exercise book

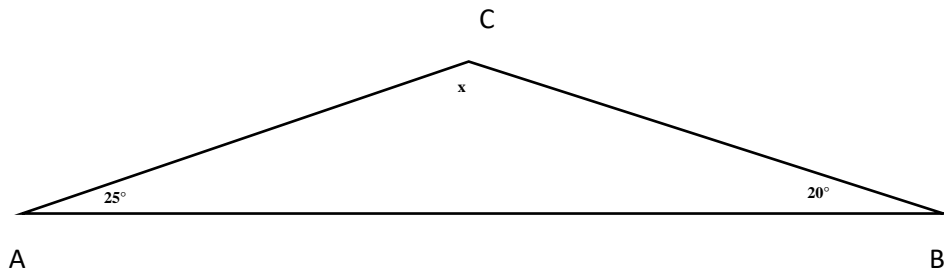
Conclusion

The sum of the interior angles of a triangle is 180° .

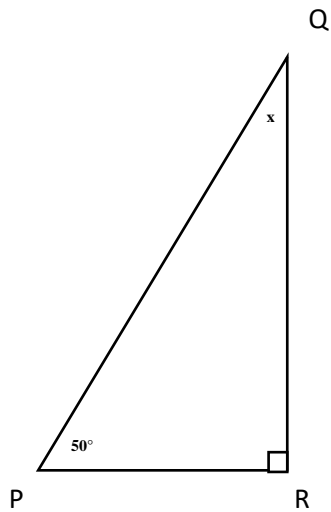
Activity – 04

Find the value of x in each figure given below by reading the examples 1,2, and 3 in the page 131 in the text book.

a)



b)



Activity – 05

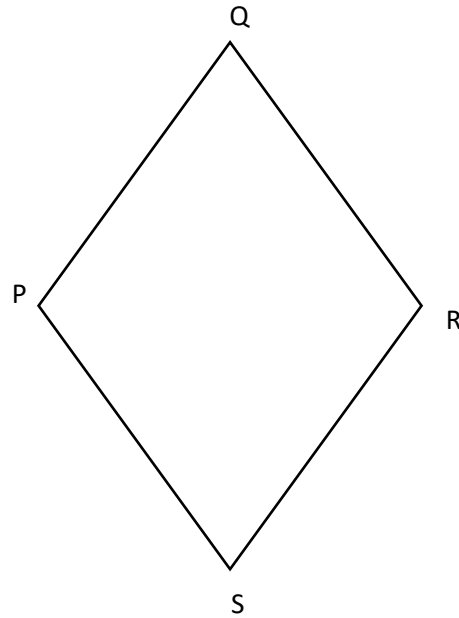
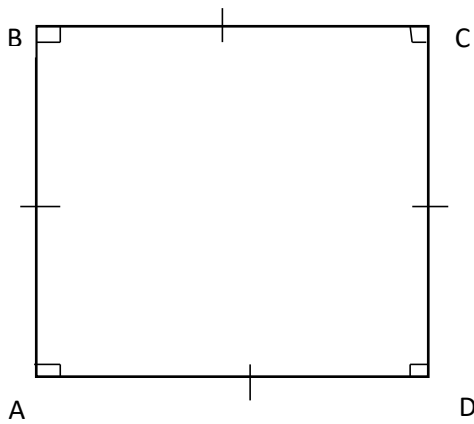
Complete the exercise 12.1 in the page 132.

The sum of the interior angles of a quadrilateral

Activity – 06

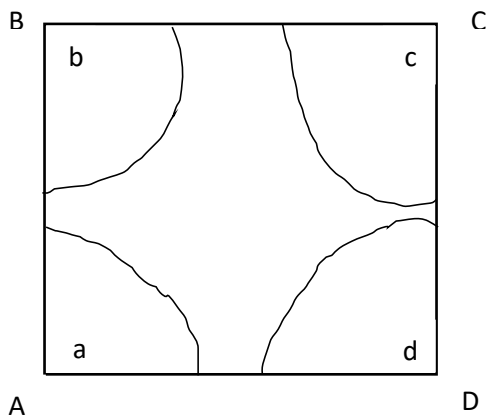
Step 01

Trace the following two quadrilaterals on a colored A4 sheet and name their vertices and interior angles as shown in the figures.



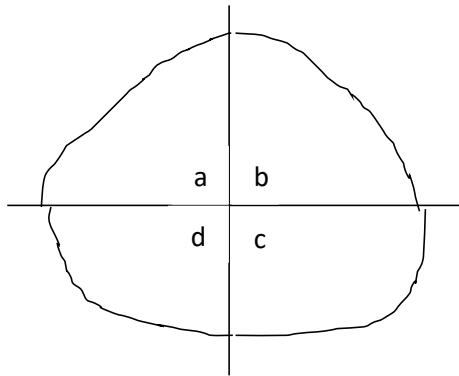
Step 02

Cut and separate out the angles a, b, c, and d of the square ABCD as shown in the figure.



Step 03

In your exercise book, paste the angles that were cut out, around a point without overlapping them, such that the vertices of all the angles coincide



Step 04

Write down a value for $a + b + c + d$ by considering the sum of the angles around a point.

Step 05

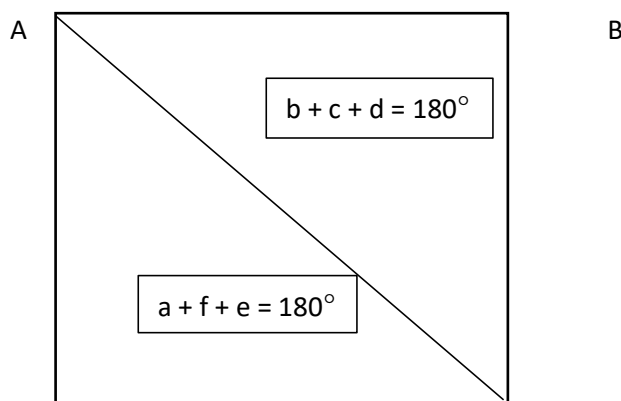
Follow the above steps for quadrilateral PQRS in your exercise book

Conclusion

The sum of the interior angles of a quadrilateral is 360° .

Note: -

Finding the interior angles of a quadrilateral by separating a quadrilateral into triangles and by joining the vertices A and C.

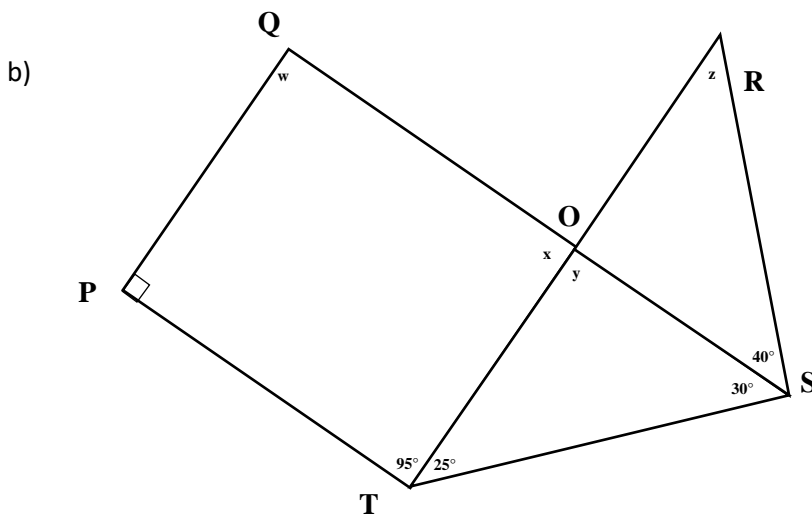
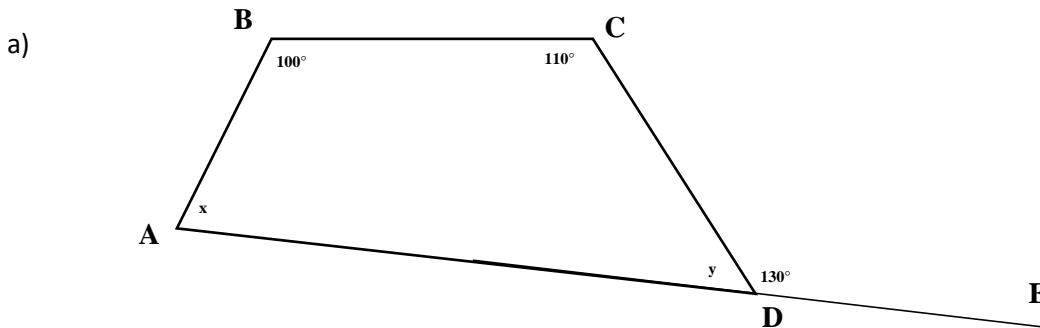


Therefore, the sum of the interior angles of the quadrilateral ABCD	=	the sum of the interior angles of the triangle ADC	+	the sum of the interior angles of the triangle ABC
	=	$(a + f + e)$	+	$(b + c + d)$
	=	180°	+	180°
	=	360°		

Accordingly, the sum of the interior angles of a quadrilateral is 360°

Activity – 07

Read the examples in the page 134 and find the value of the angles denoted by English letters in each figure



Activity – 08

Complete the exercise 12.2 in the page 135 in your exercise book.

Sets

Chapter 19

By studying this lesson, you will be able to,

- identify the symbols used to denote whether an object is an element of a set or not,
- identify the null set and the symbol used to denote the null set, and
- identify the standard notation used to denote the number of elements in a set.

❖ **Set is a collection of identifiable object.**

❖ **Elements of a Set are the objects belonging to a Set**

Eg: - Let A be the Set of prime numbers between 0 and 10.

This can be expressed as

$$A = \{ 2, 3, 5, 7 \}$$

In the above example 2, 3, 5 and 7 are elements and write each elements once within the curly brackets.

Activity – 09

Do the review exercise in your exercise book to recall what you have learnt earlier.

Set Notation

Eg : - 01. Let C be the set of even numbers between 2 and 20.

$$C = \{\text{even numbers between 2 and 20}\}$$

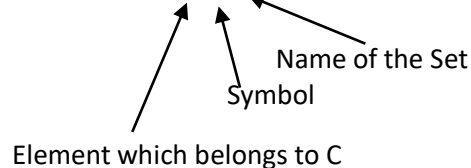
$$C = \{4, 6, 8, 10, 12, 14, 16, 18\}$$

4 is an element of the Set C

How to write the above sentence by using the symbol “ \in ”

“ \in ” – this means “is an element of”

4 is an element of the Set C is written as, $4 \in C$



Eg: 02. 16 is an element of the Set C is written as, $16 \in C$

How to write 3 is not an element of the Set C using the symbol “ \notin ”

\notin - this means “is not an element”

3 is not an element of the Set C is written as,

$$3 \notin C$$

Activity – 10

Let $A = \{\text{multiples of 5 between 0 and 50}\}$, check whether following statements are **true** or **false**

Eg. $5 \in A$	True
a) $6 \notin A$
b) $10 \notin A$
c) $55 \notin A$
d) $50 \in A$
e) $7 \in A$

Activity – 11

Complete the exercise 19.1 in the page 43 (Text Book – Part II)

Number of elements in a Set

Eg 1: - Let $P = \{\text{multiples of 3 between 0 to 10}\}$

$$P = \{3, 6, 9\}$$

P has 3 elements. Those are 3, 6 and 9.

How to write that the Set P has 3 elements using the notation $n(P)$.

$n(P)$ – this means number of elements of P (inside the brackets write the name of the Set)

$$n(P) = 3$$

Eg 2: - $A = \{5, 10, 15, 20\}$

$$n(A) = 4$$

Activity – 12

Complete the exercise 19.2 (page 45) in your exercise book.

NULL Set

A Set which has no elements, is called the null Set.

We denote the null Set by $\{\}$ or \emptyset

Eg: - $A = \{\text{even numbers between 2 and 4}\}$

The Set A doesn't have any elements.

Therefore, A is a null Set.

$A = \emptyset$ OR $A = \{\}$

The number of elements in the null set is zero. That is,

$$n(\emptyset) = 0$$

Activity – 13

Complete the activity 19.3 (page 46)