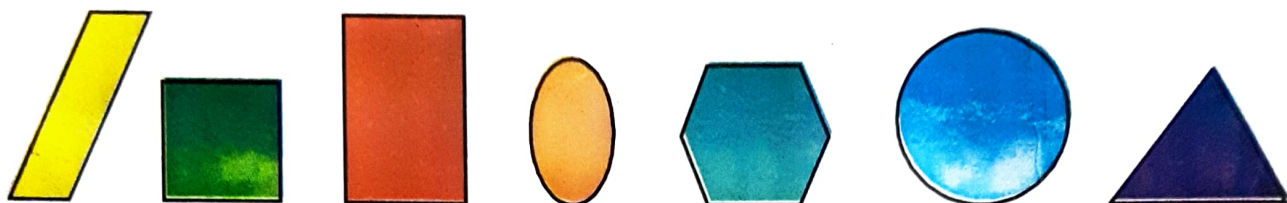


Select rectangle, square and triangle from the following figures-



### Ray

**Teacher**— Seema, where do we get light from during the day time?

**Seema** — From the sun.

**Teacher**— Madhu, how does the sunlight reach us?

**Madhu** — Through the rays of the sun.

**Teacher**— Fareed, the sun rays come from the sun and how far do they go?

**Fareed** — Sir, to a far off distance.

**Teacher**— Fareed, do these sun rays end somewhere?

**Fareed** — No madam, these never end.

**Teacher**— Well done! These never end rather they can go upto infinity.  
Rahul, can we measure the length of the rays.

**Rahul** — No madam.



✿ Teacher should make the students realize the existence of rays with the help of torch.

**Teacher—** Why can't we measure?

**Rahul —** Because the point of origin of the rays is known but the end point is unknown.

**Teacher—** Very good!

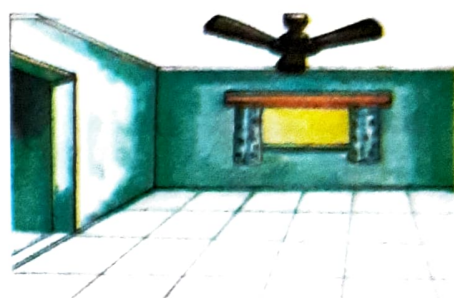
We cannot measure the length of the rays because its point of origin is known but the end point is unknown.

Rays are shown as 

We can write- Ray A B or  $\overrightarrow{AB}$  where A is the origin point of the ray A B.

## Angle

In the pictures, look at the inclination of two hands of the clock, middle part of the open book and the bend between the two walls. In these pictures, corner (angle) like shape is formed.



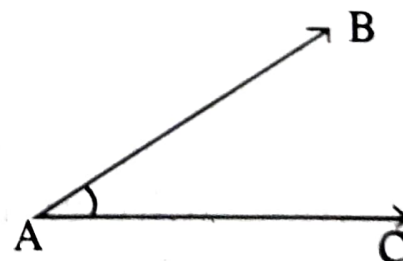
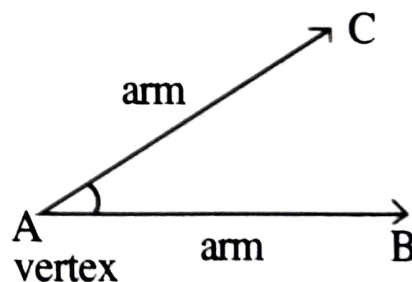
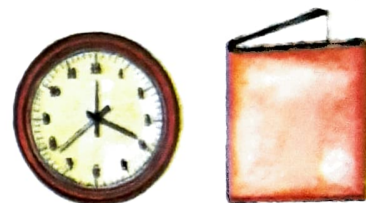
## Let's do-

Mark a point A on a paper and draw two rays AB and AC. A closed corner like figure is formed at the point A. This figure is called an **angle**.

Point A is called the **vertex** of the angle and the rays AB and AC are called the arms of the angle.

The symbol of angle is  $\angle$ .

An angle A is formed at the meeting point of the rays AB and AC. We write this as  $\angle CAB$  or  $\angle BAC$ . The vertex A of an angle is written in the middle.

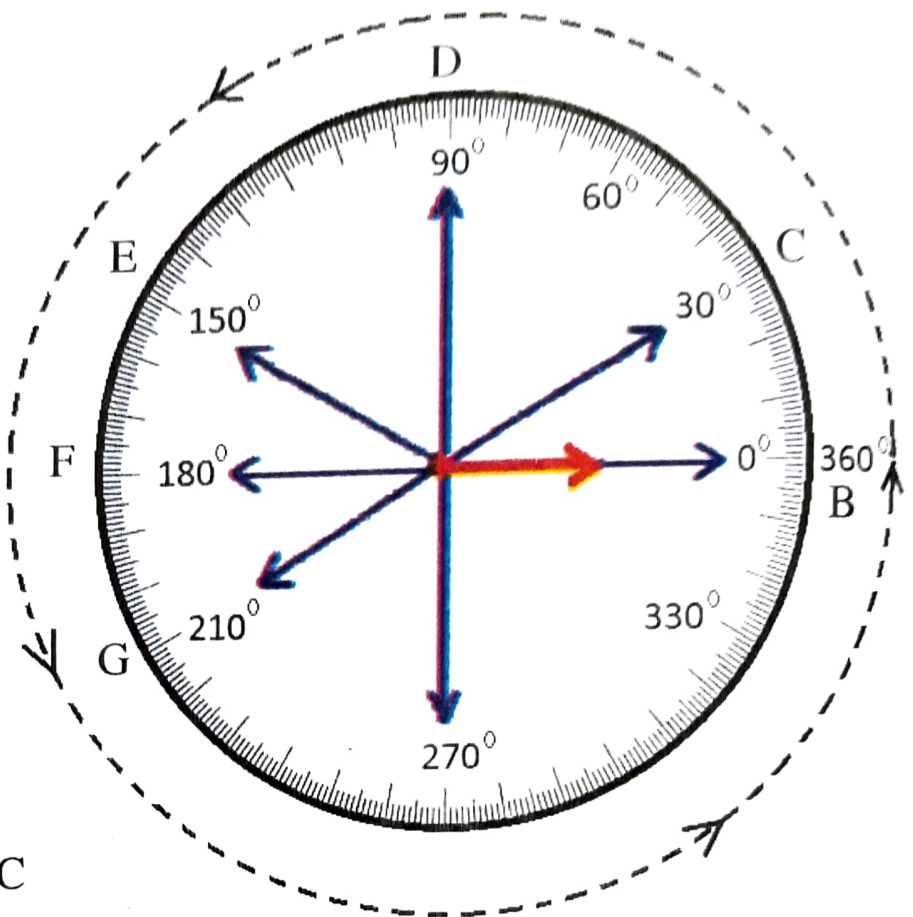


## Measurement of Angle

**The inclination between two rays is called an angle.**



Let us see one such clock which has been divided into 360 small divisions. Each small division of this clock represents 1 degree ( $1^\circ$ ). The centre point of this clock is A. In the initial stage, both the hands of the clock are at point B. In this position, 0 degree angle is formed between the two hands of the clock. Now keeping one hand of the clock at rest, we rotate the other hand. Let us see the different positions of the clock—



At the first step the second hand is brought to the point C

**Now Tell—**

- Angles of what degrees is formed between the two hands ?
- In the same way, measure the angles formed at points D, E, F, G, H and write.
- By rotating the second hand, angle of maximum how many degrees between the two hands can be made?

Angle is measured in degrees.

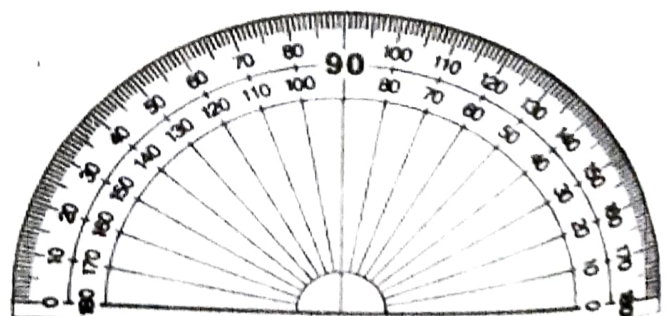
We write it in this way—

$$360 \text{ degrees} = 360^\circ$$

$$90 \text{ degrees} = 90^\circ$$

Protractor is the instrument used to measure an angle.

The shape of a protractor is like a semi circle. This semi circle is divided into 180 equal divisions from right to left as well as from left to right. Each division of it is called a degree. The line segment joining  $0^\circ$  to  $180^\circ$  is called the base. The point exactly in the middle of the base is called the centre point.



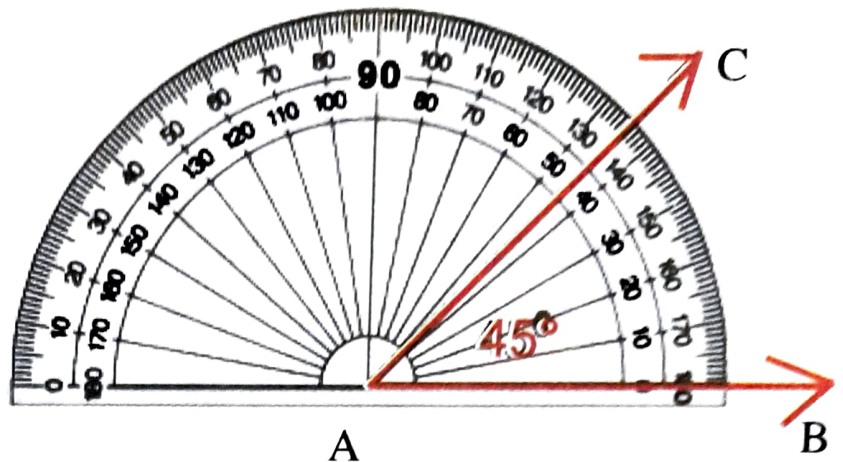
protractor



**Now let's measure the angle –**

In the given picture an angle is formed between the two rays **AB** and **AC**

To measure any angle, first of all, the centre point of the base of a protractor is kept on the vertex **A** of an angle so that the base of the protractor remains on the side **AB**



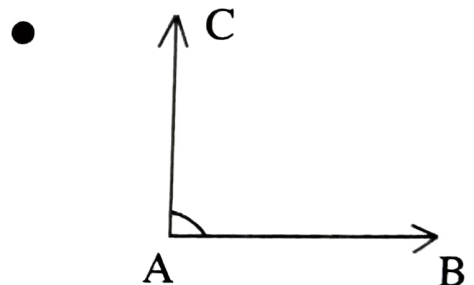
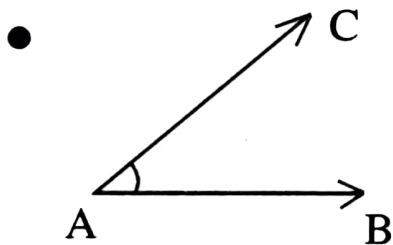
Now we proceed from the point **B** to the point **C** of ray **AC**. We see that the ray **AC** passes through 45 degree of the protractor.

Hence, the angle formed between the two rays is of 45 degrees.



### **Do it yourself-**

Measure the following angles with the help of a protractor –

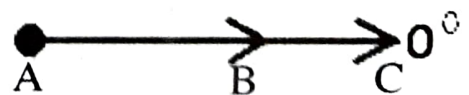


### **Types of angles**

We have seen that the angles are of different measurements. Angle are of different types and names on the basis of their measurements.

**Let's see—**

There are two rays **AB** and **AC** in the given picture. Is there any inclination between these two rays? Both the rays are overlapping each other.



Angle of  $0^\circ$  is formed between these two rays.

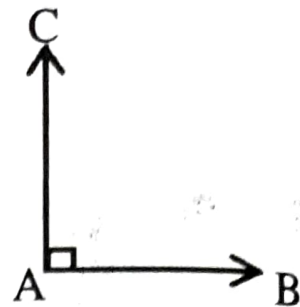


## Right Angle

The angle of 90 degrees between two perpendicular lines is called a **right angle**.

Right angle is represented by  $\angle$ .

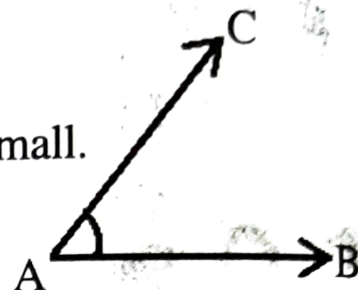
$$1 \text{ Right angle} = 90^\circ$$



## Acute Angle

The angle which is smaller than the right angle is called an **acute angle**. Acute means less or small.

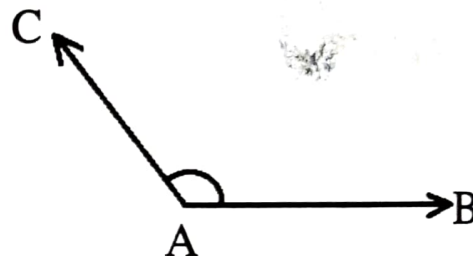
$$\text{Acute angle} < 90^\circ$$



## Obtuse Angle

The angle which is greater than the right angle ( $90^\circ$ ) but less than two right angles ( $180^\circ$ ) is called an **obtuse angle**.

$$90^\circ < \text{obtuse angle} < 180^\circ$$



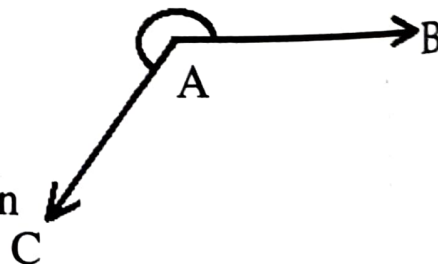
## Straight Angle

The angle of  $180^\circ$  is called a **straight angle**.



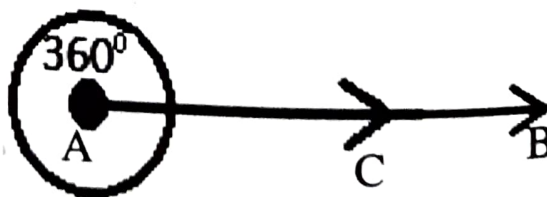
## Reflex Angle

The angle which is greater than  $180^\circ$  and less than  $360^\circ$  is called a **reflex angle**.



## Complete Angle

The angle of  $360^\circ$  is called a **complete angle**.



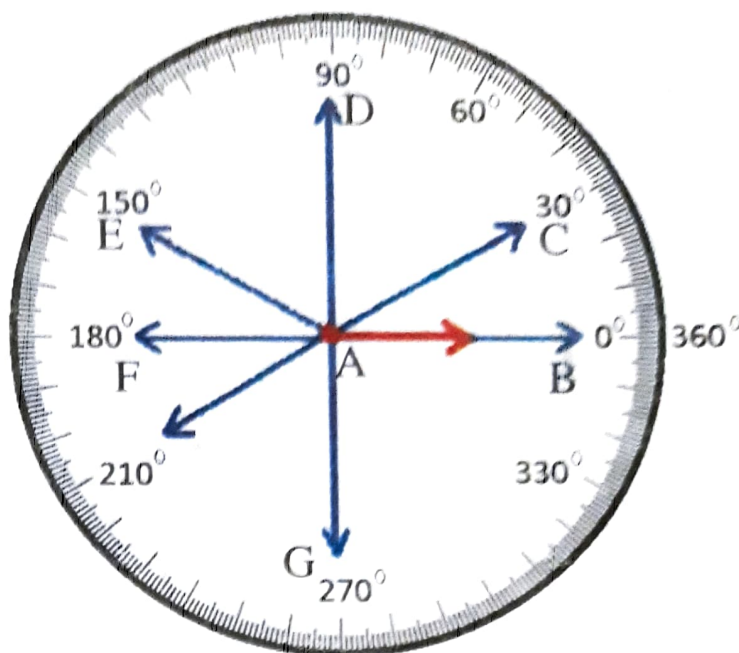


## Do it Yourself-

Fill in the blanks on the basis

of the angles shown in the picture –

- $\angle B A C = \dots\dots\dots$
- $\angle \dots\dots\dots = \text{right angle}$
- $\angle \dots\dots\dots = \text{straight angle}$
- $\angle B A E = \dots\dots\dots$
- $\angle B A G = \dots\dots\dots$
- $\angle \dots\dots\dots = \text{complete angle}$

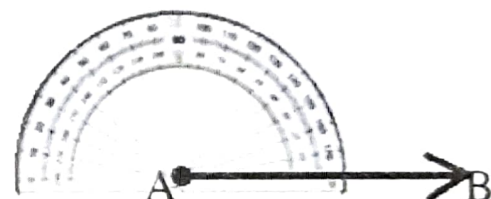


## Construction of an angle with the help of a protractor

**Let's do and learn—** Construct an angle of  $60^\circ$  with the help of a protractor.

**Step-1** Draw a ray  $AB$  –  $A \longrightarrow B$

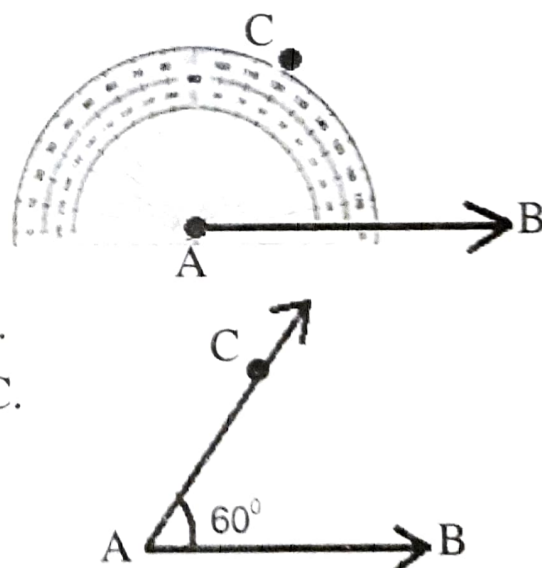
**Step-2** Place the protractor in such a way that the centre point of the base is on the point  $A$  and the line representing  $0^\circ$  of the protractor remains on the line segment  $AB$ .



**Step-3** Now through the measuring scale on the circumference of the protractor, observe from  $0^\circ$  upto  $60^\circ$ .

**Step-4** On the measurement of  $60^\circ$ , mark point  $C$ .

**Step-5** Remove the protractor and draw a ray  $AC$ .



Angle  $BAC$  is of  $60^\circ$

## Do it yourself-



- Construct the following angles with the help of a protractor -

(a)  $45^\circ$

(b)  $165^\circ$

(c)  $90^\circ$

(d)  $105^\circ$

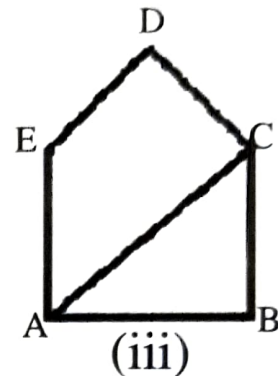
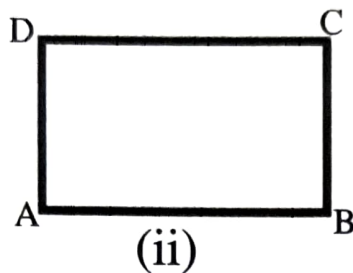
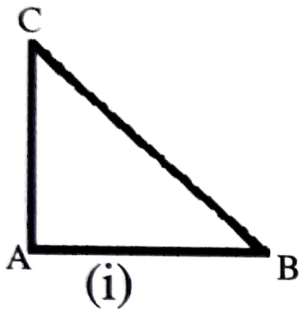


## We have learnt

- To identify the angles and sides in different shapes.
- To identify the various shapes on the basis of the angles and sides.

## Exercise

1. How many angles are there in the given figures? Write the names of the angles—

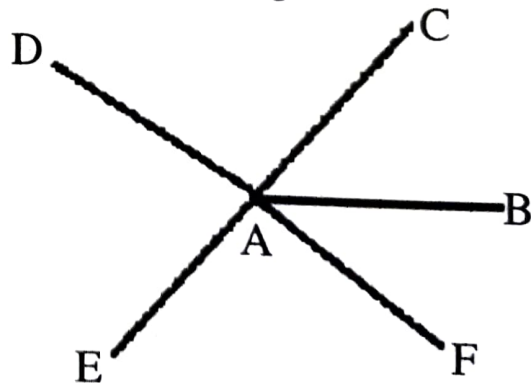


2. Look at the following angles and tell its type —

- |                 |                 |                 |                 |                 |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| (a) $120^\circ$ | (b) $48^\circ$  | (c) $90^\circ$  | (d) $0^\circ$   | (e) $280^\circ$ |
| (f) $360^\circ$ | (g) $140^\circ$ | (h) $180^\circ$ | (i) $220^\circ$ | (j) $270^\circ$ |

3. Look at the following figures and tell the types of angles —

- (a)  $\angle BAC$
- (b)  $\angle BAD$
- (c)  $\angle BAE$
- (d)  $\angle BAF$



4. Draw the following angles with the help of a protractor —

- |                 |                 |                 |                 |
|-----------------|-----------------|-----------------|-----------------|
| (a) $30^\circ$  | (b) $360^\circ$ | (c) $90^\circ$  | (d) $140^\circ$ |
| (e) $170^\circ$ | (f) $180^\circ$ | (g) $200^\circ$ | (h) $270^\circ$ |