

# Angles and Their Measurement

## Ex 13A

Q1

**Answer :**

- 1) Angle formed at the vertex of our elbow with the upper arm and the lower arm as the two rays. This angle will vary as per the position of our arm.
- 2) Angle formed between the two hands of the clock that are hinged at a point.
- 3) Angle formed between the two hands of a windmill. They are also hinged at a point, which is called the vertex of that angle.

Q2

**Answer :**

The vertex is B.

Arms of  $\angle ABC$  are rays  $\overrightarrow{BA}$  and  $\overrightarrow{BC}$ .

Q3

**Answer :**

- (i) Here, three angles are formed. They are  $\angle ABC$ ,  $\angle ACB$  and  $\angle BAC$ .
- (ii) Here, four angles are formed. They are  $\angle ABC$ ,  $\angle BCD$ ,  $\angle CDA$  and  $\angle DAB$ .
- (iii) Here, eight angles are formed. They are  $\angle ABC$ ,  $\angle BCD$ ,  $\angle CDA$ ,  $\angle DAB$ ,  $\angle ABD$ ,  $\angle ADB$ ,  $\angle CDB$ ,  $\angle CBD$ .

Q4

**Answer :**

- (i) Q and S are in the interior of  $\angle AOB$ .
- (ii) P and R are in the exterior of  $\angle AOB$ .
- (iii) A, O, B, N and T lie on the angle  $\angle AOB$ .

Q5

**Answer :**

- (i) False  
Point C is on the angle  $\angle AOC$ .
- (ii) True  
Point C lies in the interior of  $\angle AOD$ .
- (iii) False  
Point D lies in the exterior of  $\angle AOC$ .
- (iv) True  
Point B lies in the exterior of  $\angle AOD$ .
- (v) False  
Point C lies in the interior of  $\angle AOB$ .

Q6

**Answer :**

- (i)  $\angle EPB$
- (ii)  $\angle PQC$
- (iii)  $\angle FQD$

# Angles and Their Measurement

## Ex 13B

Q1

**Answer :**

- (i)  $\angle AOB$  is an obtuse angle since its measure is more than  $90^\circ$ .
- (ii)  $\angle COD$  is a right angle since its measure is  $90^\circ$ .
- (iii)  $\angle FOE$  is a straight angle since its measure is  $180^\circ$ .
- (iv)  $\angle POQ$  is a reflex angle since its measure is more than  $180^\circ$  but less than  $360^\circ$ .
- (v)  $\angle HOG$  is an acute angle since its measure is more than 0 but less than  $90^\circ$ .
- (vi)  $\angle POP$  is a complete angle since its measure is  $360^\circ$ .

Q2

**Answer :**

- (i) Acute angle  
This is because its measure is less than  $90^\circ$  but more than  $0^\circ$ .
- (ii) Obtuse angle  
This is because its measure is more than  $90^\circ$  but less than  $180^\circ$ .
- (iii) Obtuse angle  
This is because its measure is more than  $90^\circ$  but less than  $180^\circ$ .
- (iv) Right angle  
This is because its measure is  $90^\circ$ .
- (v) Reflex angle  
This is because its measure is more than  $180^\circ$  but less than  $360^\circ$ .

(vi) Complete angle

This is because its measure is  $360^\circ$ .

(vii) Obtuse angle

This is because its measure is more than  $90^\circ$  but less than  $180^\circ$ .

(viii) Obtuse angle

This is because its measure is more than  $90^\circ$  but less than  $180^\circ$ .

(ix) Acute angle

This is because its measure is more than  $0^\circ$  but less than  $90^\circ$ .

(x) Acute angle

This is because its measure is more than  $0^\circ$  but less than  $90^\circ$ .

(xi) Zero angle

This is because its measure is zero.

(xii) Acute angle

This is because its measure is more than  $0^\circ$  but less than  $90^\circ$ .

Q3

**Answer :**

(i) One right angle has  $90^\circ$ .

(ii) Two right angles have  $90^\circ + 90^\circ = 180^\circ$ .

(iii) Three right angles have  $90^\circ + 90^\circ + 90^\circ = 270^\circ$ .

(iv) Four right angles have  $90^\circ + 90^\circ + 90^\circ + 90^\circ = 360^\circ$ .

(v)  $\frac{2}{3} \times 90 = 60^\circ$

(vi)  $\left(1 + \frac{1}{2}\right) \text{right angles} = \frac{3}{2} \times 90$   
 $= 135^\circ$

Q4

**Answer :**

(i) At 3 o'clock the angle formed between the hour hand and the minute hand is right angle, i.e.  $90^\circ$ .

(ii) At 6 o'clock the angle formed between the hour hand and the minute hand is a straight angle, i.e.  $180^\circ$ .

(iii) At 12 o'clock the angle formed between the hour hand and the minute hand is a complete angle, i.e.  $0^\circ$ .

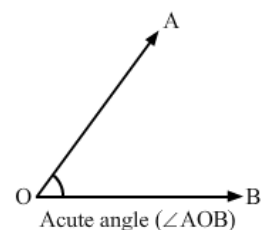
This is because the hour hand and minute hand coincides to each other at 12 o'clock.

(iv) At 9 o'clock the angle formed between the hour hand and the minute hand is a right angle, i.e.  $90^\circ$ .

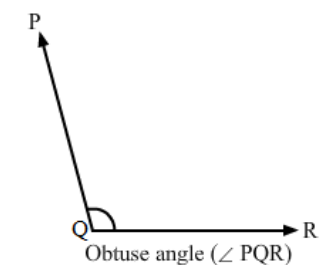
Q5

**Answer :**

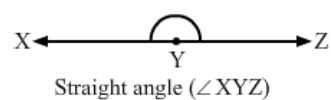
(i) Acute angle



(ii) Obtuse angle



(iii) Straight angle



# Angles and Their Measurement

## Ex 13C

Q1

**Answer :**

- (i)  $\angle AOB = 45^\circ$
- (ii)  $\angle PQR = 75^\circ$
- (iii)  $\angle DEF = 135^\circ$
- (iv)  $\angle LMN = 55^\circ$
- (v)  $\angle TSR = 135^\circ$
- (vi)  $\angle GHI = 75^\circ$

We have measured all the above angles by placing the protractor on one of the arms of the angle and measuring the angle through the other arm that coincides with the angle on the protractor.

Q2

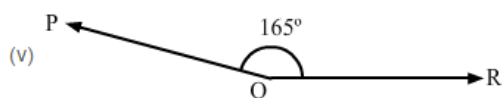
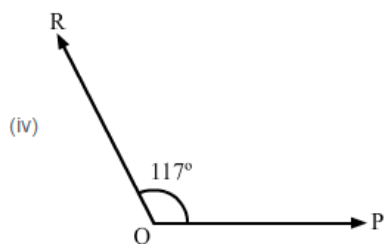
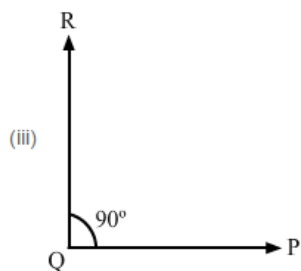
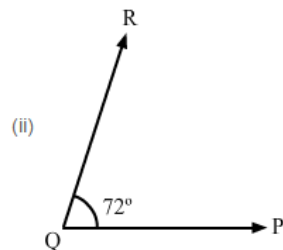
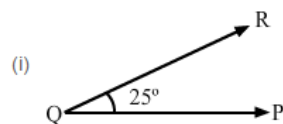
**Answer :**

Steps to follow:

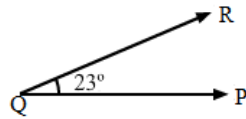
Draw a ray QP with Q as the initial point.

Place the protractor on QP. With its centre on Q, mark a point R against the given angle mark of the protractor.

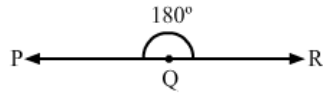
Join RQ. Now, PQR is the required angle.



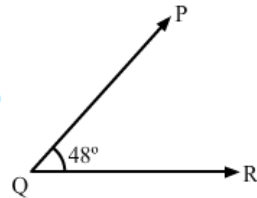
(vi)



(vii)



(viii)



Q3

**Answer :**

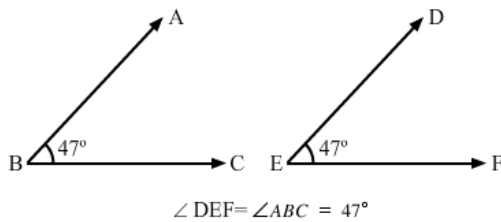
We can see that  $\angle ABC = 47^\circ$ .

Steps to follow to construct angle  $\angle DEF$  equal to  $\angle ABC$ :

Draw a ray EF with E as the initial point.

Place the protractor on EF. With its centre at E, mark a point D against the angle  $47^\circ$  of the protractor.

Join DE.  $\angle DEF = 47^\circ = \angle ABC$  is the required angle.



Q4

**Answer :**

Draw a line segment AB of length 6 cm.

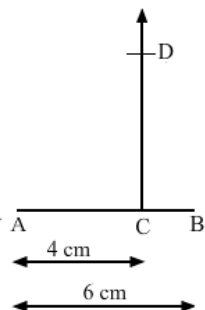
Mark point C on AB such that AC is equal to 4 cm.

Place the protractor on AB such that the centre of the protractor is on C and its base lies along AB.

Holding the protractor, mark a point D on the paper against the  $90^\circ$  mark of the protractor.

Remove the protractor and draw a ray CD with C as the initial point.

Now,  $CD \perp AB$



# Angles and Their Measurement

## Ex 13D

Q1

**Answer :**

(c) On the angle

Vertex is the initial point of two rays between which the angle is formed. Therefore, it lies on the angle.

Q2

**Answer :**

(c) an angle

The initial point is called the vertex.

Q3

**Answer :**

(c) straight angle

Q4

**Answer :**

(b) right angle

Q5

**Answer :**

(b) an obtuse angle

This is because it is more than  $90^\circ$  but less than  $180^\circ$ .

Q6

**Answer :**

(d) a reflex angle

This is because it is more than  $180^\circ$  but less than  $360^\circ$ .

Q7

**Answer :**

(c)  $180^\circ$

Q8

**Answer :**

(c) a reflex angle

This is because it is more than  $180^\circ$  but less than  $360^\circ$ .

Q9

**Answer :**

(d) a complete angle

This is because it completes the rotation of  $360^\circ$ .

Q10

**Answer :**

(b) more than  $180^\circ$  but less than  $360^\circ$

Q11

**Answer :**

(b)

2 right angles =  $2 \times 90^\circ = 180^\circ$  (straight angle)

Q12

**Answer :**

(b)  $135^\circ$

$$\begin{aligned}\frac{3}{2} \text{ right angle} &= \frac{3}{2} \times 90^\circ \\ &= 135^\circ\end{aligned}$$

Q13

**Answer :**

(c)  $10^\circ$

Number of spokes = 36

Measure of the angle of the wheel = Complete angle =  $360^\circ$

Angle between a pair of adjacent spokes =  $\frac{\text{Measure of angle}}{\text{Number of spokes}} = \frac{360^\circ}{36} = 10^\circ$