

♦ Straight angle

An angle of 180° is called a straight angle-as in figure.

$$A$$
 O B

Complete angle

An angle of 360° is called a complete angle as in figure.



Complementary Angles

Two angles are said to be complementary if the sum of their measures is 90° , and each angle is said to be complement of each other.

For example, (45°, 45°), (10°, 80°), (20°, 70°), (30°, 60°).

Note :

- (a) If two angles are complement of each other then each angle is an acute angle, but any two acute angles need not be complementary, for example, 20° and 60° are acute angles but are not complement of each other.
- (b) Two obtuse angles and two right angles cannot be complement of each other.

Supplementary Angles

Two angles are said to be supplementary if sum of their measures is 180° , and each angle is said to be supplement of each other.

For example, $(10^{\circ}, 170^{\circ})$, $(20^{\circ}, 160^{\circ})$, $(30^{\circ}, 150^{\circ})$, $(40^{\circ}, 140^{\circ})$, $(50^{\circ}, 130^{\circ})$ etc. are all pairs of supplementary angles.

Note :

- (a) Two acute angles cannot be supplement of each other.
- (b) Two right angles are always supplementary.
- (c) Two obtuse angles cannot be supplement of each other.

♦ Adjacent Angles

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Two angles are called adjacent angles if

- (i) they have a common vertex (in figure, point P⁴ is common vertex).
- ___(ii) they have a common arm (in figure, PB is⁴ common arm).
- (iii) their other arms lie on the opposite sides of the common arm (in figure, PC and PA)

So, in figure, $\angle APB$ and $\angle BPC$ are adjacent angles.



Note :

- (a) ∠APB and ∠APC are not adjacent angles because their other arms PB and PC are not on the opposite sides of the common arm PA.
- (b) If a ray stands on a line then the sum of the adjacent angles so formed is 180°.

Linear Pair Angles

Two adjacent angles are said to form a linear pair if their non-common arms are two opposite rays.

<u>If In</u> figure, \angle POQ and \angle QOR form a linear pair as their non-common arms OP and OR are two opposite rays i.e., POR is a line.



Note :

(a) Two linear pair angles can also be adjacent angles but it is not necessary

Lines and Angles

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In figure, AB and CD are intersecting lines and O is intersecting point.

For example, letter X made up of line segments contains intersecting lines.

TRANSVERSAL LINE

A line that intersects two or more lines at distinct points is called a transversal line. -

In figure, t is a transversal to lines p and q.



PARALLEL LINES

Two lines l and m are said to be parallel if (i) they lie in the same <u>place plane</u> (ii) they do not intersect when produced indefinitely in either direction and we write $l \parallel m$ (which is read as 'l is parallel to m')

 $l \parallel m$ also implies that $m \parallel l$.

The distance between two parallel lines is same everywhere or if the perpendicular distances between two lines are equal, lines are parallel, other wise not.

For example, the distance between two Railway lines.

Angles formed when a transversal cuts two lines :

Let two lines p and q be cut by a transversal t, then the following angles are formed.



Exterior Angles

Angles which do not contain the segment of the transversal between the two lines are called exterior angles.

Interior Angles

The angles whose arms include the line segment of the transversal between the two lines are called interior angles.

Corresponding Angles

Observe the angles marked in each of the figure.



The angles which

- (i) have different vertices
- (ii) lie on the same side of the transversal and
- (iii) are in corresponding positions (above or below, left or right).-_relative to the two lines are called corresponding angles.

In other words, two angles on the same side of the transversal either above or below the two given lines are called corresponding angles.

Lines and Angles

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Alternate interior angles :

- (i) have different vertices,
- (ii) lie on opposite side of the transversal, and
- (iii) lie between the two lines.
- In other words, A pair of angles in which one arm of each of the angele lies on opposite side of the transversal and other arm of the angle is the segment of the transversal, made by the two line is called a pair of alternate interior angles.

Alternate Exterior Angles



A-_pair of angles in which one arm of both the angles is <u>an -on</u> opposite side of the transversal and whose other arms do not include the segment of the transversal, made by the two lines, and are directed in opposite sides of segment of the transversal is called a pair of alternate exterior angles.



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 $\angle 2$, $\angle 4$, $\angle 5$ and $\angle 6$

 $\angle 1$, $\angle 3$, $\angle 7$ and $\angle 8$

 $\angle 1 \& \angle 5, \angle 2 \& \angle 7,$

 $\angle 3 \& \angle 6, \angle 4 \& \angle 8$

 $\angle 4 \& \angle 5$ and

 $\angle 3 \& \angle 7$ and

 $\angle 4 \& \angle 6$ and

 $\angle 3 \& \angle 8$ and

∠2 & ∠6

Z1 & Z8

∠2 & ∠5

∠1 & ∠7



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No. (i)

(ii)

(iii)

(iv)

(v)

(vi)

(vii)

Interior angelsles

Pairs of corresponding

alternate

alternate

of

of

Pairs of interior angles

on the same side of the

Pairs of exterior angles

on the same side of the

interior angles

exterior angles

transversal

transversal

Exterior angles

angles

Pairs

Pairs

- (i) If two or more parallel lines are cut by a transversal, then each pair of the corresponding angles have equal measure.
- (ii) If two parallel lines are cut by a transversal, the pair of alternate (interior as well as exterior) angles are equal_j.
- (iii) If two parallel lines are cut by a transversal, then each pair of interior angles as well as exterior angles on the same side of the transversal are supplementary.

♦ EXAMPLES **♦**

Ex.7 State the property that is used in each of the following statements:

(i) If a || b, then $\angle 1 = \angle 5$

(ii) If $\angle 4 = \angle 6$, then a $\parallel b$

(iii) If $\angle 4 + \angle 5 = 180^\circ$, then a || b



Lines and Angles

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EXERCISE # 1



S. No	Figures	Naming angles in three ways		Arm s		
(i)		∠AO ₿	∠BOA	4 1	⊖₿	0A
(ii)	$\begin{array}{c} \uparrow X \\ \uparrow X \\ \downarrow X \\ O \end{array} \qquad \begin{array}{c} Y \\ \downarrow Y \end{array}$					

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(iv) 34°(iv) 90°	11 11	cm + 1.9 cm + 2.54 cm + 3.1/ cm + 3.81 cm + 4.44 cm + 5.08 cm +
$- (v) \theta^{\circ} $	11	5.71 cm + 6.35 cm + 6.98 cm + 8.25 cm
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