Lines and Angles: Exercise 5.2

Q.1 State the property that is used in each of the following statements?
(i) If a || b, then ∠1 = ∠5.
(ii) If ∠4 = ∠6, then a || b.
(iii) If ∠4 + ∠5 = 180°, then a || b



Sol:

(i) Given: If a || b, then $\angle 1 = \angle 5$. **Property:** pair of corresponding angles property is used.

(ii) Given: If $\angle 4 = \angle 6$, then a || b. **Property:** Pair of alternate angles are equal, then the lines are parallel.

(iii) Given: If $\angle 4 + \angle 5 = 180^\circ$, then a || b **Property:** Sum of interior angles is 180°, then the lines are parallel.

Q.2 In the adjoining figure, identify



(i) The pairs of corresponding angles.

(ii) The pairs of alternate interior angles.

(iii) The pairs of interior angles on the same side of the transversal.

(iv) The vertically opposite angles.

Sol:

(i) The pairs of corresponding angles: $\angle 1$ and $\angle 5$, $\angle 4$ and $\angle 8$, $\angle 2$ and $\angle 6$, $\angle 3$ and $\angle 7$.

(ii) The pairs of alternate interior angles: $\angle 2$ and $\angle 8$, $\angle 3$ and $\angle 5$.

(iii) The pairs of interior angles on the same side of the transversal: $\angle 2$ and $\angle 5$, $\angle 3$ and $\angle 8$.

(iv) The vertically opposite angles: $\angle 1$ and $\angle 3$, $\angle 5$ and $\angle 7$, $\angle 2$ and $\angle 4$, $\angle 6$ and $\angle 8$.

Q.3 In the adjoining figure, *p* || *q*. Find the unknown angles.



Sol: Given: Line *p* || *q*.

From the figure, $\angle d = \angle 125^{\circ}$... (Since, corresponding angles are equal.) Since, Linear pair is the sum of adjacent angles = 180° So, $\angle e + 125^{\circ} = 180^{\circ}$... (Linear pair angles) $\angle e = 180^{\circ} - 125^{\circ}$ $\angle e = 55^{\circ}$ Now, for $\angle f$ $\angle f = \angle e = 55^{\circ}$ (Since, Vertical opposite angles are equal.) $\angle b = \angle d = 125^{\circ}$ (Since, Vertical opposite angles are equal.) $\angle c = \angle f = 55^{\circ}$ (Since, corresponding angles are equal.) $\angle a = \angle e = 55^{\circ}$ (Since, corresponding angles are equal.) Thus, $\angle a = \angle e = \angle f = \angle c = 55^{\circ}$, $\angle b = \angle d = 125^{\circ}$.

Q.4 Find the value of x in each of the following figures if $l \parallel m$.





Sol: (i) In first figure:



From the figure,

 $\angle y = 110^{\circ}$ (Since, corresponding angles are equal.) As we know that, linear pair is the sum of adjacent angles is 180°. So, $\angle x + \angle y = 180^{\circ}$ $\angle x + 110^{\circ} = 180^{\circ}$ $\angle x = 180^{\circ} - 110^{\circ}$ $\angle x = 70^{\circ}$

Thus, required angle $\angle x = 70^{\circ}$.

(ii) In second figure,



From the figure, $x = 100^{\circ}$ (Since, corresponding angles are equal.)

Q.5 In the given figure, the arms of two angles are parallel. If ∠ABC = 70°, then find (i) ∠DGC (ii) ∠DEF



Sol: Given: From the figure, AB || DG and BC || EF (i) Since, AB || DG and BC is the transversal line which intersects them at points B and G. \angle DGC = \angle ABC (Since, corresponding angles) So, \angle DGC = 70°

(ii) Since, BC || EF and DE is the transversal line which intersect them at points G and E. $\angle DEF = \angle DGC$ (Since, corresponding angles) So, $\angle DEF = 70^{\circ}$



980





Since, the sum of interior angles on the same side of transversal is 180° . So, $126^{\circ} + 44^{\circ} = 170^{\circ}$

But here the sum of interior angles on the same side of transversal is not equal to 180° . Therefore, lines *l* and *m* are not parallel to each other.

(ii) Given Figure:



In given figure, let $\angle p$ be the vertically opposite angle of 75°. So, $\angle p = 75^{\circ}$

Since, the sum of interior angles on the same side of transversal is 180°. $\angle p$ + 75° = 75°+75° = 150°

But here the sum of interior angles on the same side of transversal is not equal to 180°.

Therefore, lines *l* and *m* are not parallel to each other.

(iii) Given figure:



In given figure, let q be the vertical angle of 57° .

So, $q = 57^{\circ}$

Since, the sum of interior angles on the same side of transversal is 180°.

 $\angle q + 123^\circ = 57^\circ + 123^\circ = 180^\circ.$

Now, here the sum of interior angles on the same side of transversal is equal to 180° . Therefore, lines *l* and *m* are parallel to each other.

(iv) Given figure:



In given figure, let x be the one of the adjacent angles of a linear pair. Since, linear pair is the sum of adjacent angles is equal to 180° .

 $\angle x + 98^{\circ} = 180^{\circ}$

 $\angle x = 180^{\circ} - 98^{\circ}$

 $\angle x = 82^{\circ}$

Now, $\angle x = 82^{\circ}$ and 720 are the corresponding angles. But corresponding angles should be equal. Therefore, lines *l* and *m* are not parallel to each other.