

Mathematics

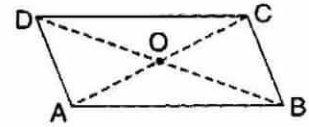
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(Chapter - 3) (Understanding Quadrilaterals)
(Class - VIII)

Exercise 3.2

Question 1:

Given a parallelogram ABCD. Complete each statement along with the definition or property used.

- (i) $AD = \underline{\hspace{2cm}}$ (ii) $\angle DCB = \underline{\hspace{2cm}}$
(iii) $OC = \underline{\hspace{2cm}}$ (iv) $m\angle DAB + m\angle CDA = \underline{\hspace{2cm}}$

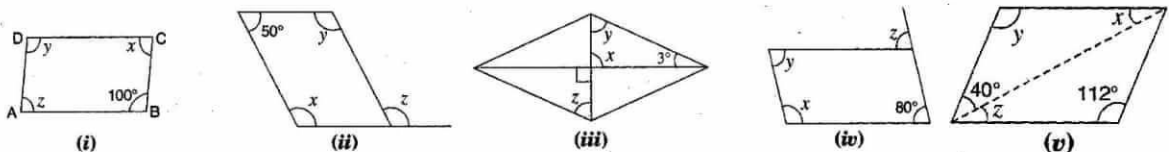


Answer 1:

- (i) $AD = BC$ [Since opposite sides of a parallelogram are equal]
(ii) $\angle DCB = \angle DAB$ [Since opposite angles of a parallelogram are equal]
(iii) $OC = OA$ [Since diagonals of a parallelogram bisect each other]
(iv) $m\angle DAB + m\angle CDA = 180^\circ$
[Adjacent angles in a parallelogram are supplementary]

Question 2:

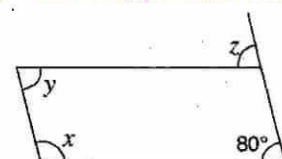
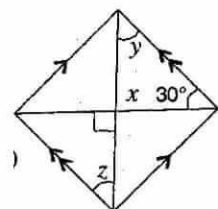
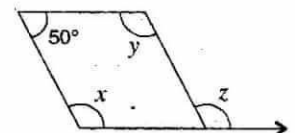
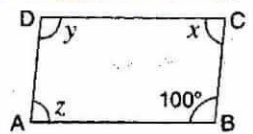
Consider the following parallelograms. Find the values of the unknowns x, y, z .



Note: For getting correct answer, read $3^\circ = 30^\circ$ in figure (iii)

Answer 2:

- (i) $\angle B + \angle C = 180^\circ$ [Adjacent angles in a parallelogram are supplementary]
 $\Rightarrow 100^\circ + x = 180^\circ$
 $\Rightarrow x = 180^\circ - 100^\circ = 80^\circ$
 and $z = x = 80^\circ$
 [Since opposite angles of a parallelogram are equal]
 also $y = 100^\circ$ [Since opposite angles of a parallelogram are equal]
- (ii) $x + 50^\circ = 180^\circ$ [Adjacent angles in a \parallel^{gm} are supplementary]
 $\Rightarrow x = 180^\circ - 50^\circ = 130^\circ$
 $\Rightarrow z = x = 130^\circ$ [Corresponding angles]
- (iii) $x = 90^\circ$ [Vertically opposite angles]
 $\Rightarrow y + x + 30^\circ = 180^\circ$ [Angle sum property of a triangle]
 $\Rightarrow y + 90^\circ + 30^\circ = 180^\circ$
 $\Rightarrow y + 120^\circ = 180^\circ$
 $\Rightarrow y = 180^\circ - 120^\circ = 60^\circ$
 $\Rightarrow z = y = 60^\circ$ [Alternate angles]
- (iv) $z = 80^\circ$ [Corresponding angles]
 $\Rightarrow x + 80^\circ = 180^\circ$ [Adjacent angles in a \parallel^{gm} are supplementary]
 $\Rightarrow x = 180^\circ - 80^\circ = 100^\circ$
 and $y = 80^\circ$
 [Opposite angles are equal in a \parallel^{gm}]



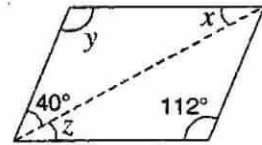
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(Class - VIII)

- (v) $y = 112^\circ$ [Opposite angles are equal in a ||gm]
 $\Rightarrow 40^\circ + y + x = 180^\circ$ [Angle sum property of a triangle]
 $\Rightarrow 40^\circ + 112^\circ + x = 180^\circ$
 $\Rightarrow 152^\circ + x = 180^\circ$
 $\Rightarrow x = 180^\circ - 152^\circ = 28^\circ$
and $z = x = 28^\circ$ [Alternate angles]



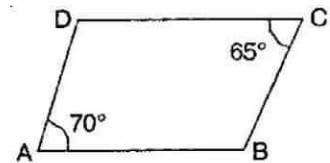
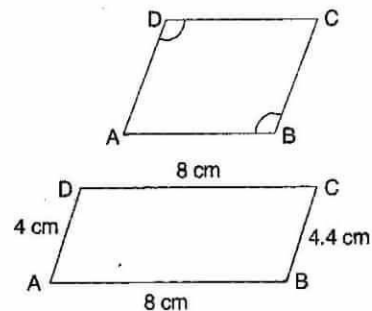
Question 3:

Can a quadrilateral ABCD be a parallelogram, if:

- (i) $\angle D + \angle B = 180^\circ$?
(ii) $AB = DC = 8$ cm, $AD = 4$ cm and $BC = 4.4$ cm?
(iii) $\angle A = 70^\circ$ and $\angle C = 65^\circ$?

Answer 3:

- (i) $\angle D + \angle B = 180^\circ$
It can be, but here, it needs not to be.
- (ii) No, in this case because one pair of opposite sides are equal and another pair of opposite sides are unequal. So, it is not a parallelogram.
- (iii) No. $\angle A \neq \angle C$.
Since opposite angles are equal in parallelogram and here opposite angles are not equal in quadrilateral ABCD. Therefore it is not a parallelogram.

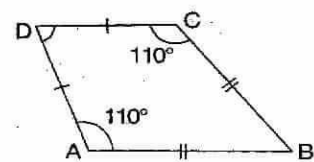


Question 4:

Draw a rough figure of a quadrilateral that is not a parallelogram but has exactly two opposite angles of equal measures.

Answer 4:

ABCD is a quadrilateral in which angles $\angle A = \angle C = 110^\circ$.
Therefore, it could be a kite.



Question 5:

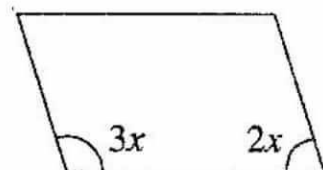
The measure of two adjacent angles of a parallelogram are in the ratio 3:2. Find the measure of each of the angles of the parallelogram.

Answer 5:

Let two adjacent angles be $3x$ and $2x$.

Since the adjacent angles in a parallelogram are supplementary.

$$\begin{aligned}\therefore 3x + 2x &= 180^\circ \\ \Rightarrow 5x &= 180^\circ \\ \Rightarrow x &= \frac{180^\circ}{5} = 36^\circ \\ \therefore \text{One angle} &= 3x = 3 \times 36^\circ = 108^\circ \\ \text{and another angle} &= 2x = 2 \times 36^\circ = 72^\circ\end{aligned}$$



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(Class - VIII)

Question 6:

Two adjacent angles of a parallelogram have equal measure. Find the measure of the angles of the parallelogram.

Answer 6:

Let each adjacent angle be x .

Since the adjacent angles in a parallelogram are supplementary.

$$\therefore x + x = 180^\circ \quad \Rightarrow 2x = 180^\circ \quad \Rightarrow x = \frac{180^\circ}{2} = 90^\circ$$

Hence, each adjacent angle is 90° .

$$\therefore x + x + x = 180^\circ \quad \Rightarrow 3x = 180^\circ \quad \Rightarrow x = 60^\circ$$

Question 7:

The adjacent figure HOPW is a parallelogram. Find the angle measures x , y and z . State the properties you use to find them.

Answer 7:

Here $\angle HOP + 70^\circ = 180^\circ$ [Angles of linear pair]

$$\angle HOP = 180^\circ - 70^\circ = 110^\circ$$

and $\angle E = \angle HOP$ [Opposite angles of a \parallel^{gm} are equal]

$$\Rightarrow x = 110^\circ$$

$\angle PHE = \angle HPO$ [Alternate angles]

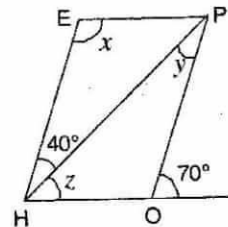
$$\therefore y = 40^\circ$$

Now $\angle EHO = \angle O = 70^\circ$ [Corresponding angles]

$$\Rightarrow 40^\circ + z = 70^\circ$$

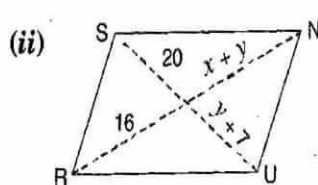
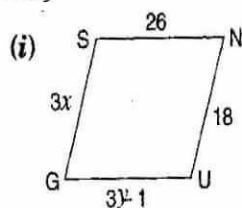
$$\Rightarrow z = 70^\circ - 40^\circ = 30^\circ$$

Hence, $x = 110^\circ$, $y = 40^\circ$ and $z = 30^\circ$



Question 8:

The following figures GUNS and RUNS are parallelograms. Find x and y . (Lengths are in cm)



Answer 8:

(i) In parallelogram GUNS,

$GS = UN$ [Opposite sides of parallelogram are equal]

$$\Rightarrow 3x = 18 \quad \Rightarrow x = \frac{18}{3} = 6 \text{ cm}$$

Also $GU = SN$ [Opposite sides of parallelogram are equal]

$$\Rightarrow 3y - 1 = 26$$

$$\Rightarrow 3y = 26 + 1 \quad \Rightarrow 3y = 27 \quad \Rightarrow y = \frac{27}{3} = 9 \text{ cm}$$

Hence, $x = 6 \text{ cm}$ and $y = 9 \text{ cm}$.

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(Class - VIII)

(ii) In parallelogram RUNS,

$$y + 7 = 20$$

[Diagonals of ||^{gm} bisects each other]

$$\Rightarrow y = 20 - 7 = 13 \text{ cm}$$

$$\text{and } x + y = 16$$

$$\Rightarrow x + 13 = 16$$

$$\Rightarrow x = 16 - 13$$

$$\Rightarrow x = 3 \text{ cm}$$

Hence, $x = 3 \text{ cm}$ and $y = 13 \text{ cm}$.

Question 9:

In the figure, both RISK and CLUE are parallelograms. Find the value of x .

Answer 9:

In parallelogram RISK,

$$\angle RIS = \angle K = 120^\circ$$

[Opposite angles of a ||^{gm} are equal]

$$\angle m + 120^\circ = 180^\circ \quad [\text{Linear pair}]$$

$$\Rightarrow \angle m = 180^\circ - 120^\circ = 60^\circ$$

$$\text{and } \angle ECI = \angle L = 70^\circ$$

[Corresponding angles]

$$\Rightarrow m + n + \angle ECI = 180^\circ$$

[Angle sum property of a triangle]

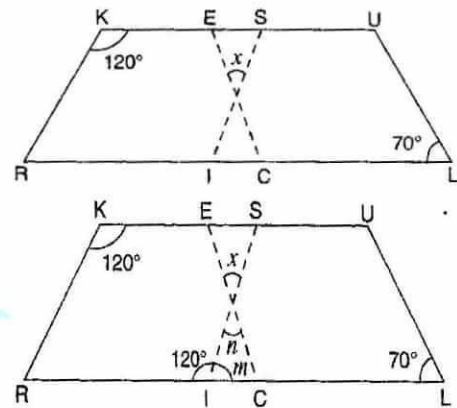
$$\Rightarrow 60^\circ + n + 70^\circ = 180^\circ$$

$$\Rightarrow 130^\circ + n = 180^\circ$$

$$\Rightarrow n = 180^\circ - 130^\circ = 50^\circ$$

$$\text{also } x = n = 50^\circ$$

[Vertically opposite angles]



Question 10:

Explain how this figure is a trapezium. Which is its two sides are parallel?

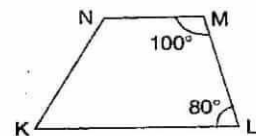
Answer 10:

$$\text{Here, } \angle M + \angle L = 100^\circ + 80^\circ = 180^\circ$$

[Sum of interior opposite angles is 180°]

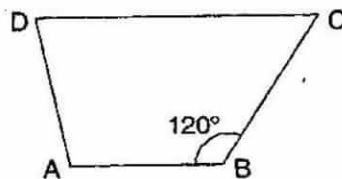
\therefore NM and KL are parallel.

Hence, KLMN is a trapezium.



Question 11:

Find $m\angle C$ in figure, if $\overline{AB} \parallel \overline{DC}$,



Answer 11:

$$\text{Here, } \angle B + \angle C = 180^\circ$$

[$\because \overline{AB} \parallel \overline{DC}$]

$$\therefore 120^\circ + m\angle C = 180^\circ$$

$$\Rightarrow m\angle C = 180^\circ - 120^\circ = 60^\circ$$

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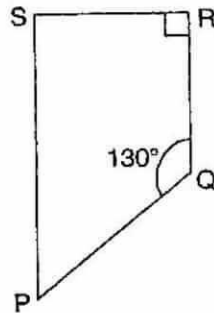
(Chapter - 3) (Understanding Quadrilaterals)

(Class - VIII)

Question 12:

Find the measure of $\angle P$ and $\angle S$ if $\overline{SP} \parallel \overline{RQ}$ in given figure.

(If you find $m\angle R$ is there more than one method to find $m\angle P$)



Answer 12:

Here, $\angle P + \angle Q = 180^\circ$

[Sum of co-interior angles is 180°]

$$\Rightarrow \angle P + 130^\circ = 180^\circ$$

$$\Rightarrow \angle P = 180^\circ - 130^\circ$$

$$\Rightarrow \angle P = 50^\circ$$

$$\therefore \angle R = 90^\circ$$

[Given]

$$\therefore \angle S + 90^\circ = 180^\circ$$

$$\Rightarrow \angle S = 180^\circ - 90^\circ$$

$$\Rightarrow \angle S = 90^\circ$$

Yes, one more method is there to find $\angle P$.

$$\angle S + \angle R + \angle Q + \angle P = 360^\circ \quad [\text{Angle sum property of quadrilateral}]$$

$$\Rightarrow 90^\circ + 90^\circ + 130^\circ + \angle P = 360^\circ$$

$$\Rightarrow 310^\circ + \angle P = 360^\circ$$

$$\Rightarrow \angle P = 360^\circ - 310^\circ$$

$$\Rightarrow \angle P = 50^\circ$$