

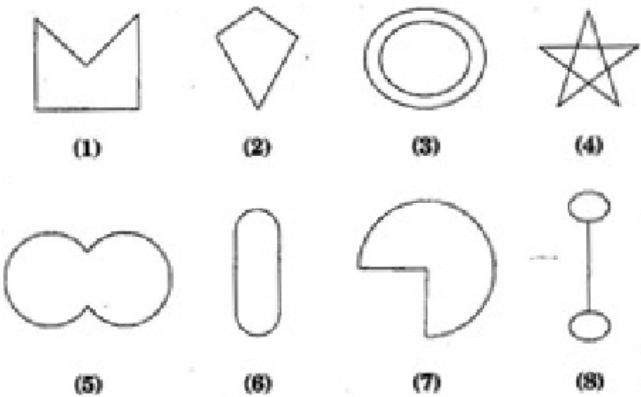
Exercise 3.1 (Revised) - Chapter 3 - Understanding Quadrilaterals - Ncert Solutions class 8 - Maths

Updated On 11-02-2025 By Lithanya

NCERT Solutions for Class 8 Maths Chapter 3 - Understanding Quadrilaterals

Ex 3.1 Question 1.

Given here are some figures:

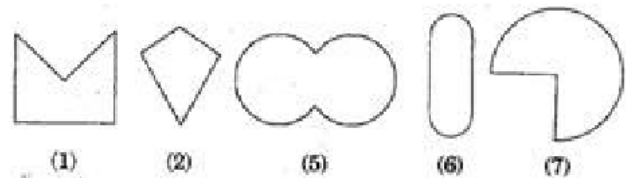


Classify each of them on the basis of the following:

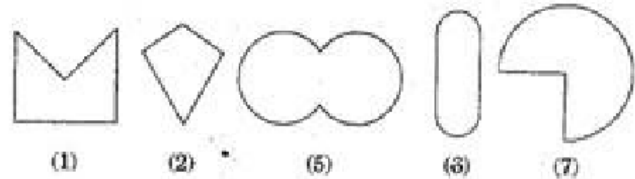
- (a) Simple curve
- (b) Simple closed curve
- (c) Polygon
- (d) Convex polygon
- (e) Concave polygon

Answer.

(a) Simple curve



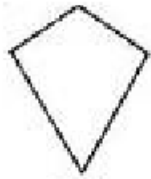
(b) Simple closed curve



(c) Polygons



(1)

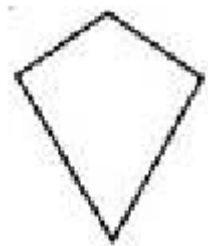


(2)



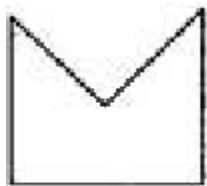
(4)

(d) Convex polygons



(1)

(e) Concave polygon



(1)



(4)

Ex 3.1 Question 2.

What is a regular polygon? State the name of a regular polygon of:

- (a) 3 sides
- (b) 4 sides
- (c) 6 sides

Answer.

A regular polygon: A polygon having all sides of equal length and the interior angles of equal size is known as regular polygon.

(i) 3 sides

Polygon having three sides is called a triangle.

(ii) 4 sides

Polygon having four sides is called a quadrilateral.

(iii) 6 sides

Polygon having six sides is called a hexagon.

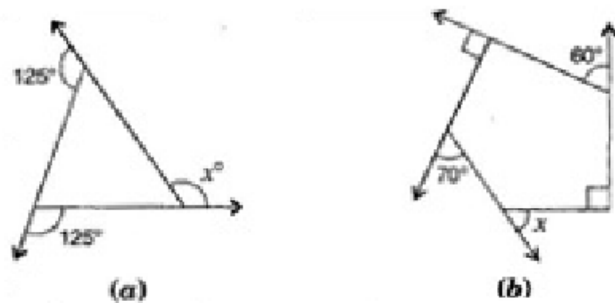
Exercise 3.2 (Revised) - Chapter 3 - Understanding Quadrilaterals - Ncert Solutions class 8 - Maths

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Ex 3.2 Question 1.

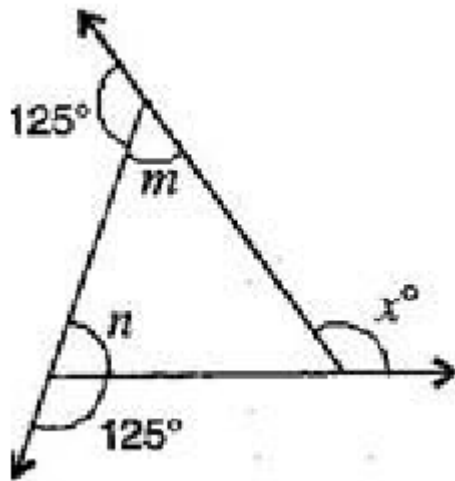
Find x in the following figures:



Answer.

(a) Here, $125^\circ + m = 180^\circ$

[Linear pair]



$$\Rightarrow m = 180^\circ - 125^\circ = 55^\circ$$

And $125^\circ + n = 180^\circ$

[Linear pair]

$$\Rightarrow n = 180^\circ - 125^\circ = 55^\circ$$

$\therefore$ Exterior angle $x^\circ = \text{Sum of opposite interior angles}$

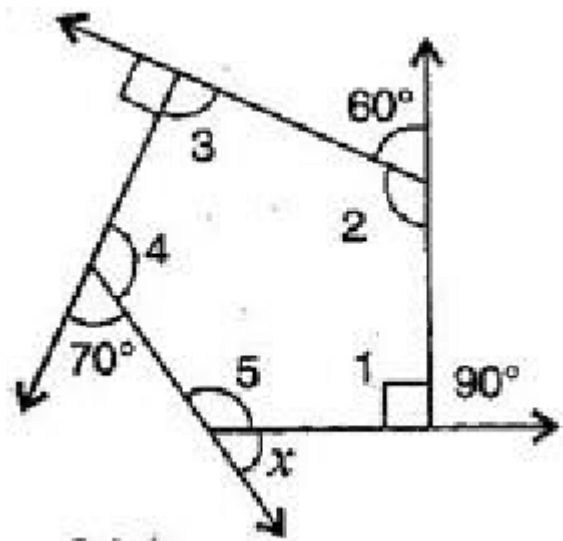
$$\therefore x^\circ = 55^\circ + 55^\circ = 110^\circ$$

(b) Sum of the angles of a pentagon

$$= (n - 2) \times 180^\circ$$

$$= (5 - 2) \times 180^\circ$$

$$= 3 \times 180^\circ = 540^\circ$$



By linear pairs of angles,

$$\angle 1 + 90^\circ = 180^\circ$$

$$\angle 2 + 60^\circ = 180^\circ$$

$$\angle 3 + 90^\circ = 180^\circ$$

$$\angle 4 + 70^\circ = 180^\circ$$

$$\angle 5 + x = 180^\circ$$

Adding eq. (i), (ii), (iii), (iv) and (v),

$$x + (\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5) + 310^\circ = 900^\circ$$

$$\Rightarrow x + 540^\circ + 310^\circ = 900^\circ$$

$$\Rightarrow x + 850^\circ = 900^\circ$$

$$\Rightarrow x = 900^\circ - 850^\circ = 50^\circ$$

Ex 3.2 Question 2.

Find the measure of each exterior angle of a regular polygon of:

- (a) 9 sides
- (b) 15 sides

Answer.

(i) Sum of angles of a regular polygon $= (n - 2) \times 180^\circ$

$$= (9 - 2) \times 180^\circ = 7 \times 180^\circ = 1260^\circ$$

$$\text{Each interior angle} = \frac{\text{Sum of interior angles}}{\text{Number of sides}} = \frac{1260^\circ}{9} = 140^\circ$$

$$\text{Each exterior angle} = 180^\circ - 140^\circ = 40^\circ$$

(ii) Sum of exterior angles of a regular polygon $= 360^\circ$

$$\text{Each exterior angle} = 360/15$$

$$= 24 \text{ degrees}$$

Ex 3.2 Question 3.

How many sides does a regular polygon have, if the measure of an exterior angle is 24° ?

Answer.

Let number of sides be n .

$$\text{Sum of exterior angles of a regular polygon} = 360^\circ$$

$$\text{Number of sides} = \frac{\text{Sum of exterior angles}}{\text{Each interior angle}} = \frac{360^\circ}{24^\circ} = 15$$

Hence, the regular polygon has 15 sides.

Ex 3.2 Question 4.

How many sides does a regular polygon have if each of its interior angles is 165° ?

Answer.

Let number of sides be n .

$$\text{Exterior angle} = 180^\circ - 165^\circ = 15^\circ$$

$$\text{Sum of exterior angles of a regular polygon} = 360^\circ$$

$$\text{Number of sides} = \frac{\text{Sum of exterior angles}}{\text{Each interior angle}} = \frac{360^\circ}{15^\circ} = 24$$

Hence, the regular polygon has 24 sides.

Ex 3.2 Question 5.

- (a) Is it possible to have a regular polygon with of each exterior angle as 22° ?
- (b) Can it be an interior angle of a regular polygon? Why?

Answer.

(a) No. (Since 22 is not a divisor of 360°)

(b) No, (Because each exterior angle is $180^\circ - 22^\circ = 158^\circ$: which is not a divisor of 360°)

Ex 3.2 Question 6.

(a) What is the minimum interior angle possible for a regular polygon? Why?

(b) What is the maximum exterior angle possible for a regular polygon?

Answer.

(a) The equilateral triangle being a regular polygon of 3 sides has the least measure of an interior angle of 60° .

$\therefore$ Sum of all the angles of a triangle

$$= 180^\circ$$

$$\therefore x + x + x = 180^\circ$$

$$\Rightarrow 3x = 180^\circ$$

$$\Rightarrow x = 60^\circ$$

(b) By (a), we can observe that the greatest exterior angle is $180^\circ - 60^\circ$
 $= 120^\circ$.

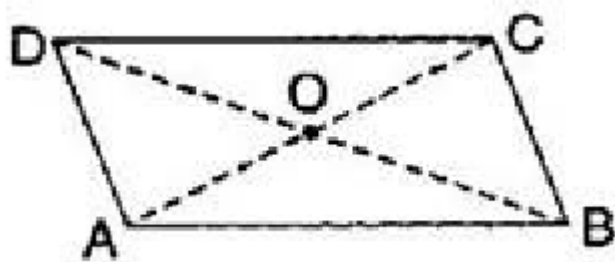
Exercise 3.3 (Revised) - Chapter 3 - Understanding Quadrilaterals - Ncert Solutions class 8 - Maths

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Ex 3.3 Question 1.

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



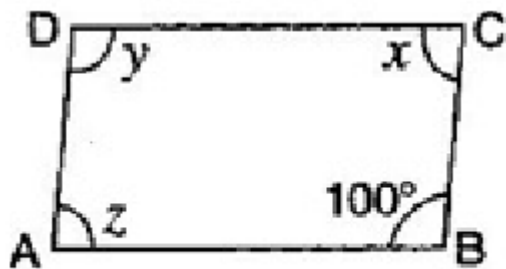
- (i) $AD =$
- (ii) $\angle DCB =$
- (iii) $OC =$
- (iv) $m\angle DAB + m\angle CDA =$

Answer.

- (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]

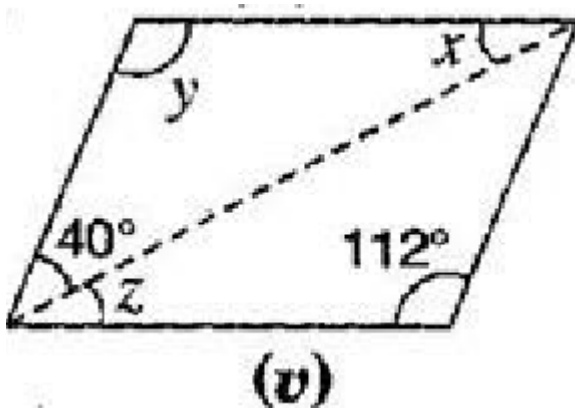
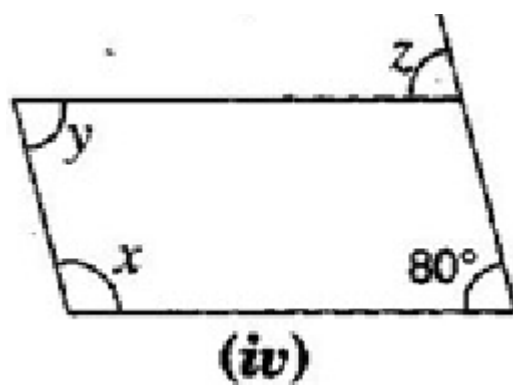
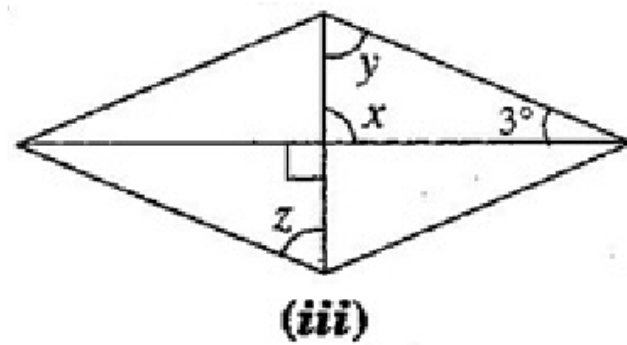
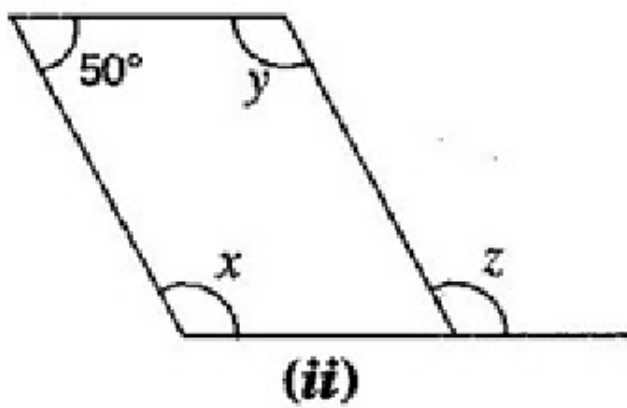
Ex 3.3 Question 2.

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



(i)



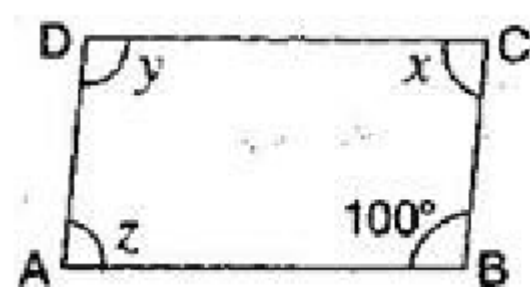


Note: For getting correct answer, read $3^\circ = 30^\circ$ in figure (iii)

Answer.

(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 ||gm are supplementary]



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

$$\Rightarrow z = x = 130^\circ$$

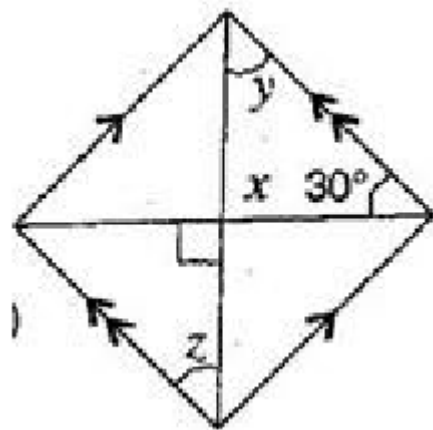
[Corresponding angles]

$$\Rightarrow y = x = 130 \text{ degrees}$$

[Since opposite angles of a parallelogram are equal]

$$\text{(iii) } x = 90^\circ$$

[Vertically opposite angles]



$$\Rightarrow y + x + 30^\circ = 180^\circ$$

[Angle sum property of a triangle]

$$\Rightarrow y + 90^\circ + 30^\circ = 180^\circ$$

$$\Rightarrow y + 120^\circ = 180^\circ$$

$$\Rightarrow y = 180^\circ - 120^\circ = 60^\circ$$

$$\Rightarrow z = y = 60^\circ$$

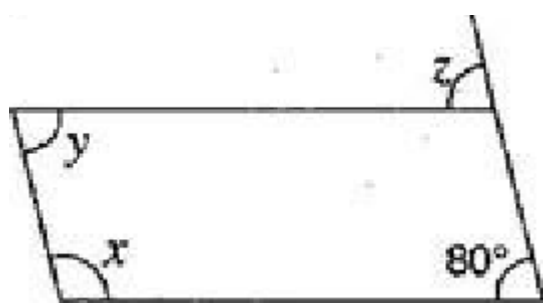
[Alternate angles]

$$\text{(iv) } z = 80^\circ$$

[Corresponding angles]

$$\Rightarrow x + 80^\circ = 180^\circ$$

[Adjacent angles in a || gm are supplementary]



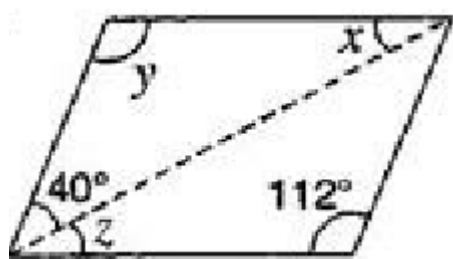
$$\Rightarrow x = 180^\circ - 80^\circ = 100^\circ$$

$$\text{And } y = 80^\circ$$

[Opposite angles are equal in a ||gm]

$$\text{(v) } y = 112^\circ$$

[Opposite angles are equal in a ||gm]



$$\Rightarrow 40^\circ + y + x = 180^\circ$$

[Angle sum property of a triangle]

$$\Rightarrow 40^\circ + 112^\circ + x = 180^\circ \Rightarrow 152^\circ + x = 180^\circ$$

$$\Rightarrow x = 180^\circ - 152^\circ = 28^\circ$$

$$\text{And } z = x = 28^\circ$$

[Alternate angles]

Ex 3.3 Question 3.

Can a quadrilateral ABCD be a parallelogram, if:

$$\text{(i) } \angle D + \angle B = 180^\circ ?$$

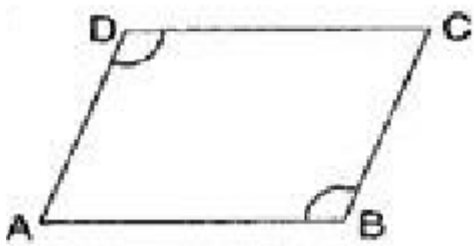
$$\text{(ii) } AB = DC = 8 \text{ cm, } AD = 4 \text{ cm and } BC = 4.4 \text{ cm} ?$$

$$\text{(iii) } \angle A = 70^\circ \text{ and } \angle C = 65^\circ ?$$

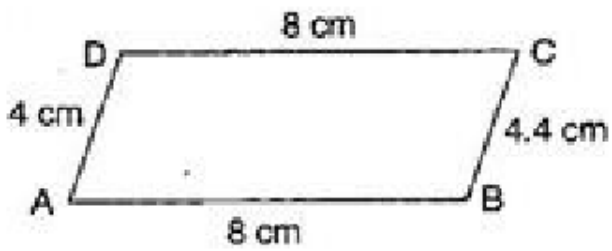
Answer.

$$\text{(i) } \angle D + \angle B = 180^\circ$$

It can be, but here, it needs to be a square or a rectangle.

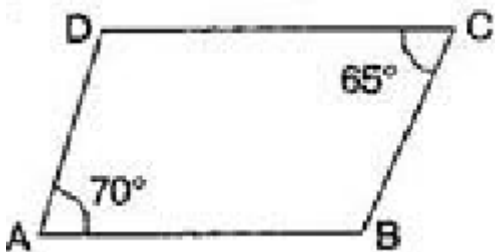


(ii) No, in this case, because one pair of opposite sides are equal and another pair of opposite sides are unequal. So, it is not a parallelogram.



(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.



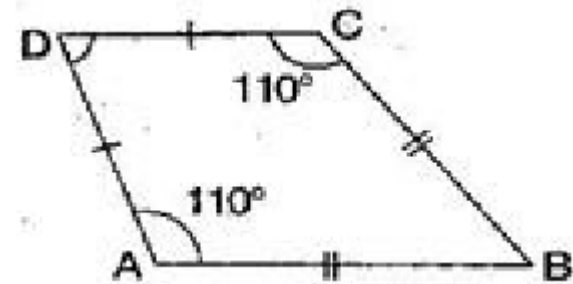
Ex 3.3 Question 4.

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

Answer.

$ABCD$ is a quadrilateral in which angles $\angle A = \angle C = 110^\circ$.

Therefore, it could be a kite.

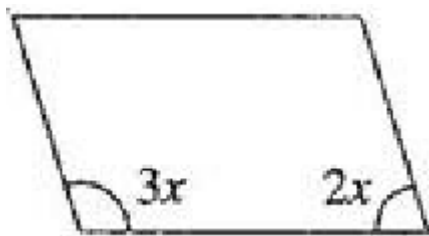


Ex 3.3 Question 5.

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.

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



Since the adjacent angles in a parallelogram are supplementary.

$$\therefore 3x + 2x = 180^\circ$$

$$\Rightarrow 5x = 180^\circ$$

$$\Rightarrow x = \frac{180^\circ}{5} = 36^\circ$$

$$\therefore \text{One angle} = 3x = 3 \times 36^\circ = 108^\circ$$

$$\text{And Another angle} = 2x = 2 \times 36^\circ = 72^\circ$$

Ex 3.3 Question 6.

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

Answer.

Let each adjacent angle be x .

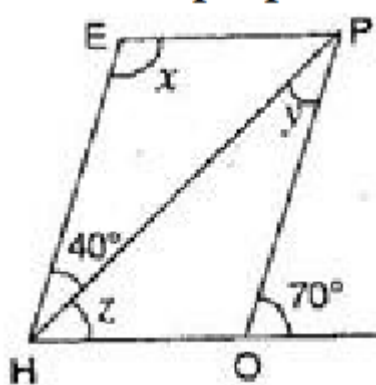
Since the adjacent angles in a parallelogram are supplementary.

$$\begin{aligned}\therefore x + x &= 180^\circ \\ \Rightarrow 2x &= 180^\circ \\ \Rightarrow x &= \frac{180^\circ}{2} = 90^\circ\end{aligned}$$

Hence, each adjacent angle is 90° .

Ex 3.3 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.



$$\angle HOP + 70^\circ = 180^\circ$$

Answer.

$$\text{Here } \angle HOP = 180^\circ - 70^\circ = 110^\circ$$

[Angles of linear pair]

$$\text{And } \angle E = \angle HOP$$

[Opposite angles of a ||gm are equal]

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

$$\angle PHE = \angle HPO$$

[Alternate angles]

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

$$\text{Now } \angle EHO = \angle O = 70^\circ$$

[Corresponding angles]

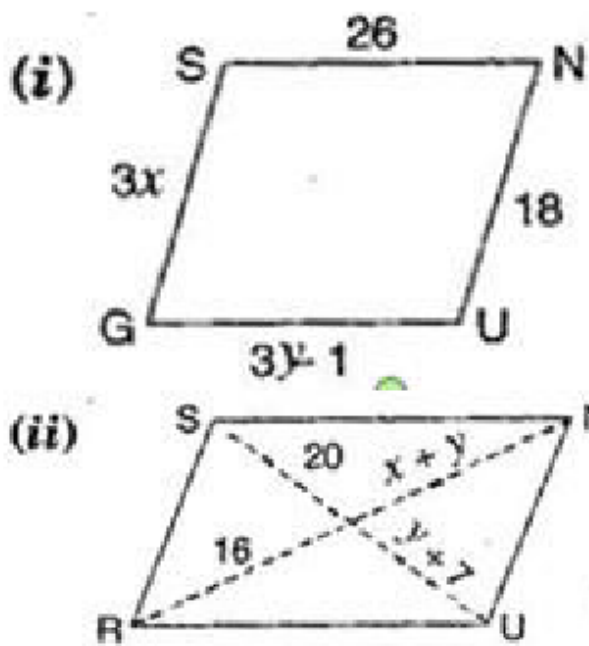
$$\Rightarrow 40^\circ + z = 70^\circ$$

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

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

Ex 3.3 Question 8.

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



Answer.

(i) In parallelogram GUNS,

$$GS = UN$$

[Opposite sides of parallelogram are equal]

$$\Rightarrow 3x = 18$$

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

Also $GU = SN$

[Opposite sides of parallelogram are equal]

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

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

$$\Rightarrow 3y = 27$$

$$\Rightarrow y = \frac{27}{3} = 9 \text{ cm}$$

Hence, $X = 6$ cm and $X = 9$ cm.

(ii) In parallelogram RUNS,

$$y + 7 = 20$$

[Diagonals of ||gm bisect each other]

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

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

$$\Rightarrow x + 13 = 16$$

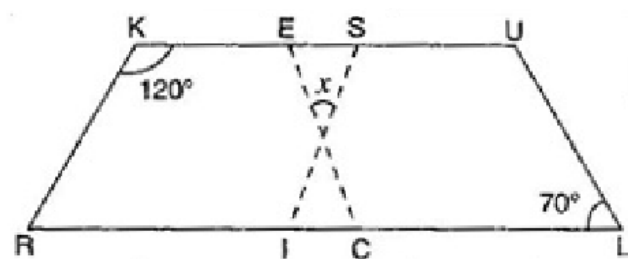
$$\Rightarrow x = 16 - 13$$

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

Hence, $x = 3$ cm and $y = 13$ cm.

Ex 3.3 Question 9.

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



Answer.

In parallelogram RISK,

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

[Opposite angles of a ||gm are equal]

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

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

And $\angle ECI = \angle L = 70^\circ$

[Corresponding angles]

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

[Angle sum property of a triangle]

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

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

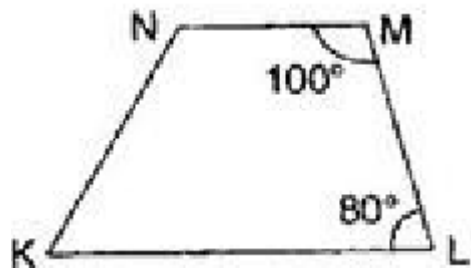
$$\Rightarrow n = 180^\circ - 130^\circ = 50^\circ$$

Also $x = n = 50^\circ$

[Vertically opposite angles]

Ex 3.3 Question 10.

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



Answer.

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

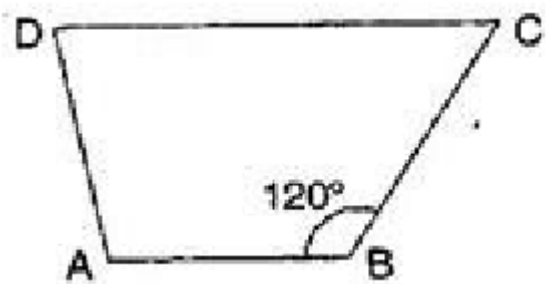
[Sum of interior opposite angles is 180°]

$\therefore$ NM and KL are parallel.

Hence, KLMN is a trapezium.

Ex 3.3 Question 11.

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



Answer.

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

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

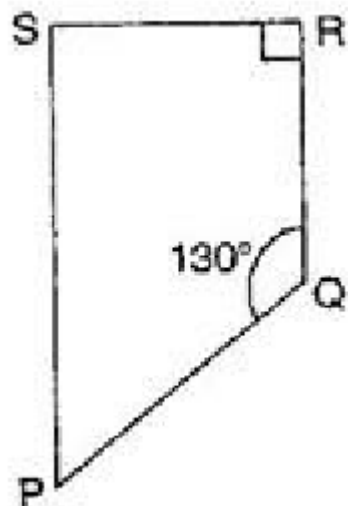
$\therefore 120^\circ + m\angle C = 180^\circ$

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

Ex 3.3 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.

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

[Sum of co-interior angles is 180°]

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

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

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

$\because \angle R = 90^\circ$ [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 $\angle P$.

$\angle S + \angle R + \angle Q + \angle P = 360^\circ$

[Angle sum property of quadrilateral]

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

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

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

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

Exercise 3.4 (Revised) - Chapter 3 - Understanding Quadrilaterals - Ncert Solutions class 8 - Maths

NCERT Solutions for Class 8 Maths Chapter 3 - Understanding Quadrilaterals

Ex 3.4 Question 1.

State whether true or false:

- (a) All rectangles are squares.
- (b) All rhombuses are parallelograms.
- (c) All squares are rhombuses and also rectangles.
- (d) All squares are not parallelograms.
- (e) All kites are rhombuses.
- (f) All rhombuses are kites.
- (g) All parallelograms are trapeziums.
- (h) All squares are trapeziums.

Answer.

- (a) False. Since, squares have all sides are equal.
- (b) True. Since, in rhombus, opposite angles are equal and diagonals intersect at mid-point.
- (c) True. Since, squares have the same property of rhombus but not a rectangle.
- (d) False. Since, all squares have the same property of parallelogram.
- (e) False. Since, all kites do not have equal sides.
- (f) True. Since, all rhombuses have equal sides and diagonals bisect each other.
- (g) True. Since, trapezium has only two parallel sides.
- (h) True. Since, all squares have also two parallel lines.

Ex 3.4 Question 2.

Identify all the quadrilaterals that have:

- (a) four sides of equal lengths.
- (b) four right angles.

Answer.

- (a) Rhombus and square have sides of equal length.
- (b) Square and rectangle have four right angles.

Ex 3.4 Question 3.

Explain how a square is:

- (a) a quadrilateral
- (b) a parallelogram
- (c) a rhombus
- (d) a rectangle

Answer.



- (i) A square is a quadrilateral, since it has four equal lengths of sides.
- (ii) A square is a parallelogram, since it contains both pairs of opposite sides equal.
- (iii) A square is already a rhombus. Since, it has four equal sides and diagonals bisect at 90° to each other.
- (iv) A square is a parallelogram, since having each adjacent angle a right angle and opposite sides are equal.

Ex 3.4 Question 4.

Name the quadrilateral whose diagonals:

- (i) bisect each other.
- (ii) are perpendicular bisectors of each other.
- (iii) are equal.

Answer.

- (i) If diagonals of a quadrilateral bisect each other then it is a rhombus, parallelogram,

rectangle or square.

- (ii) If diagonals of a quadrilateral are perpendicular bisector of each other, then it is a rhombus or square.

- (iii) If diagonals are equal, then it is a square or rectangle.

Ex 3.4 Question 5.

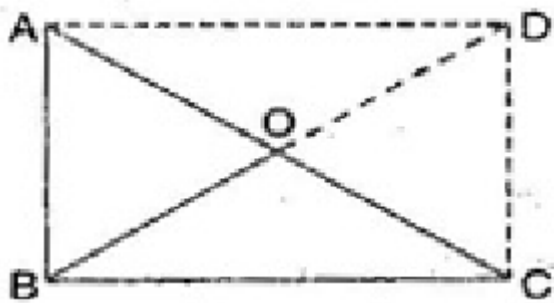
Explain why a rectangle is a convex quadrilateral.

Answer.

A rectangle is a convex quadrilateral since its vertex are raised and both of its diagonals lie in its interior.

Ex 3.4 Question 6.

ABC is a right-angled triangle and O is the mid-point of the side opposite to the right angle. Explain why O is equidistant from A, B and C. (The dotted lines are drawn additionally to help you.)



Answer.

Since, two right triangles make a rectangle where O is equidistant point from A, B, C and D because O is the mid-point of the two diagonals of a rectangle.

Since AC and BD are equal diagonals and intersect at mid-point.

So, O is the equidistant from A, B, C and D.