

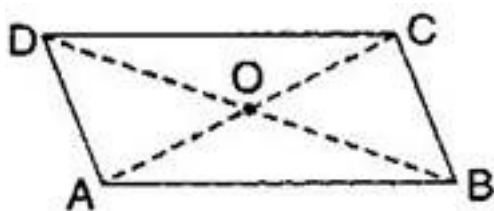
CBSE Class –VIII Mathematics

NCERT Solutions

CHAPTER - 3

Understanding Quadrilaterals (Ex. 3.3)

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



(i) $AD =$ _____

(ii) $\angle DCB =$ _____

(iii) $OC =$ _____

(iv) $m\angle DAB + m\angle CDA =$ _____

Ans. (i) $AD = BC$

[Since opposite sides of a parallelogram are equal]

(ii) $\angle DCB = \angle DAB$

[Since opposite angles of a parallelogram are equal]

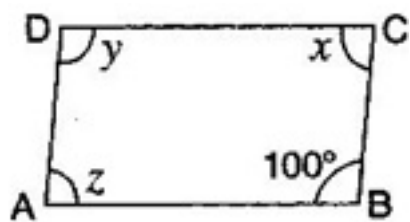
(iii) $OC = OA$

[Since diagonals of a parallelogram bisect each other]

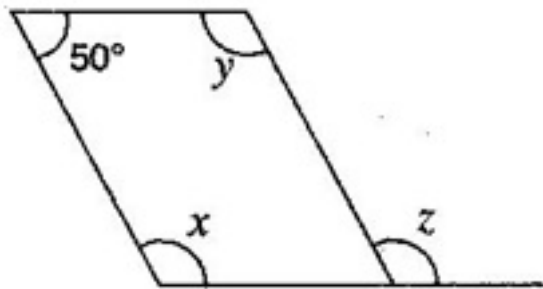
(iv) $m\angle DAB + m\angle CDA = 180^\circ$

[Adjacent angles in a parallelogram are supplementary]

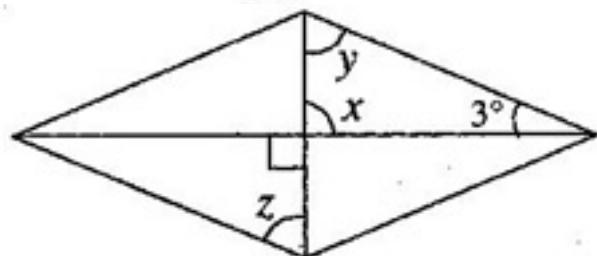
2. Consider the following parallelograms. Find the values of the unknowns x, y, z .



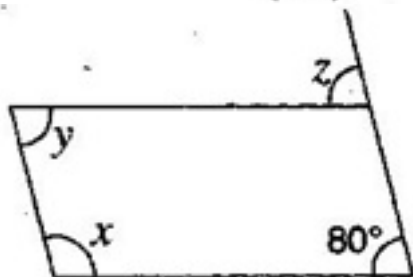
(i)



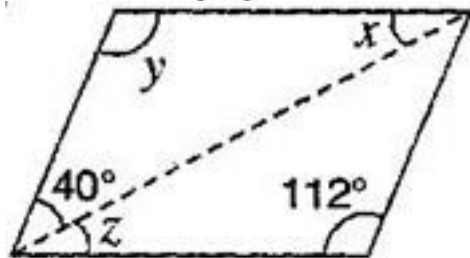
(ii)



(iii)



(iv)

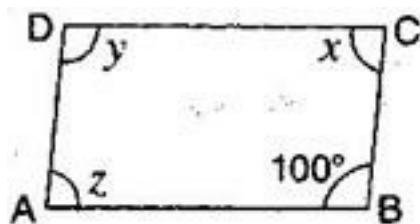


(v)

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

Ans. (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 $z = x = 80^\circ$

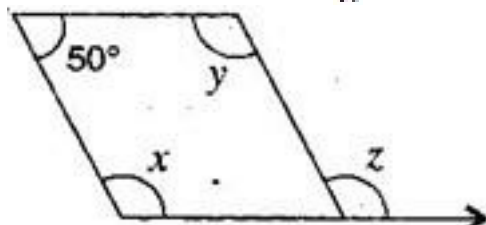
[Since opposite angles of a parallelogram are equal]

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]



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

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

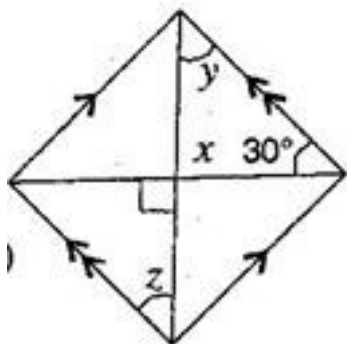
[Corresponding angles]

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

[Since opposite angles of a parallelogram are equal]

(iii) $x = 90^\circ$

[Vertically opposite angles]



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

[Angle sum property of a triangle]

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

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

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

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

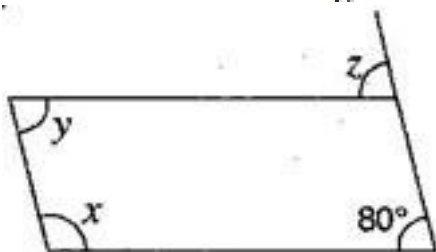
[Alternate angles]

$$(iv) \ z = 80^\circ$$

[Corresponding angles]

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

[Adjacent angles in a \parallel gm are supplementary]



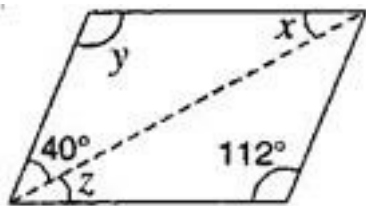
$$\Rightarrow x = 180^\circ - 80^\circ = 100^\circ$$

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

[Opposite angles are equal in a \parallel gm]

(v) $y = 112^\circ$

[Opposite angles are equal in a \parallel 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]

3. Can a quadrilateral ABCD be a parallelogram, if:

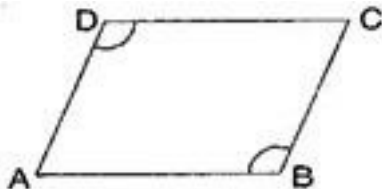
(i) $\angle D + \angle B = 180^\circ$?

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

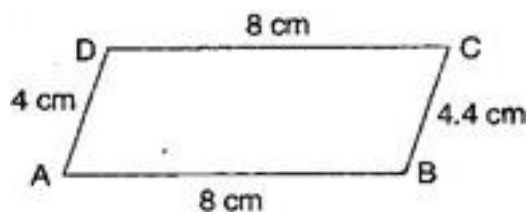
(iii) $\angle A = 70^\circ$ and $\angle C = 65^\circ$?

Ans. (i) $\angle D + \angle B = 180^\circ$

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

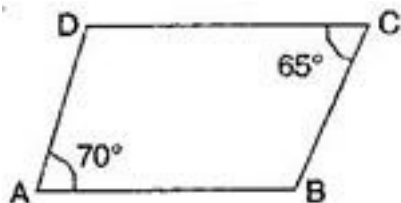


(ii) No, in this case, because one pair of opposite sides are equal and another pair of opposite sides are unequal. So, it is not a parallelogram.



(iii) No. $\angle A \neq \angle C$.

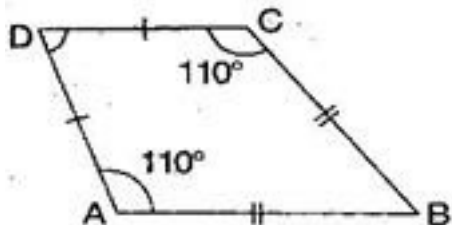
Since opposite angles are equal in parallelogram and here opposite angles are not equal in quadrilateral ABCD. Therefore it is not a parallelogram.



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

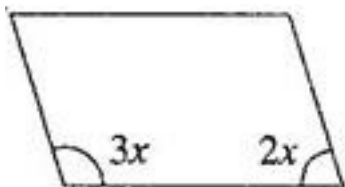
Ans. ABCD is a quadrilateral in which angles $\angle A = \angle C = 110^\circ$.

Therefore, it could be a kite.



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.

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



Since the adjacent angles in a parallelogram are supplementary.

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

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

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

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

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

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

Ans. Let each adjacent angle be x .

Since the adjacent angles in a parallelogram are supplementary.

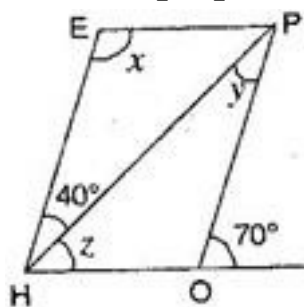
$$\therefore x + x = 180^\circ$$

$$\Rightarrow 2x = 180^\circ$$

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

Hence, each adjacent angle is 90° .

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



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

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

[Angles of linear pair]

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

[Opposite angles of a \parallel gm are equal]

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

$$\angle PHE = \angle HPO$$

[Alternate angles]

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

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

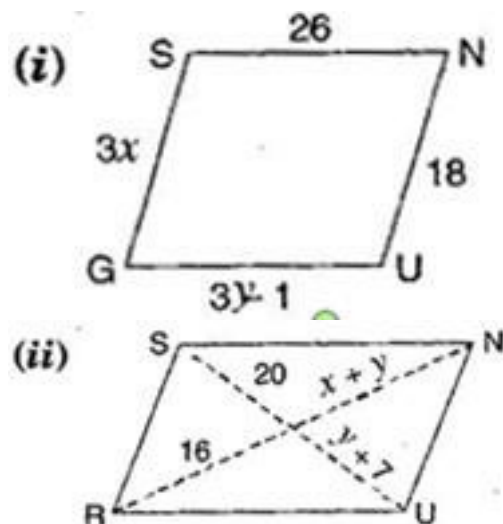
[Corresponding angles]

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

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

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

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



Ans. (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 $y = 9$ cm.

(ii) In parallelogram RUNS,

$$y + 7 = 20$$

[Diagonals of \square bisect each other]

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

And $x + y = 16$

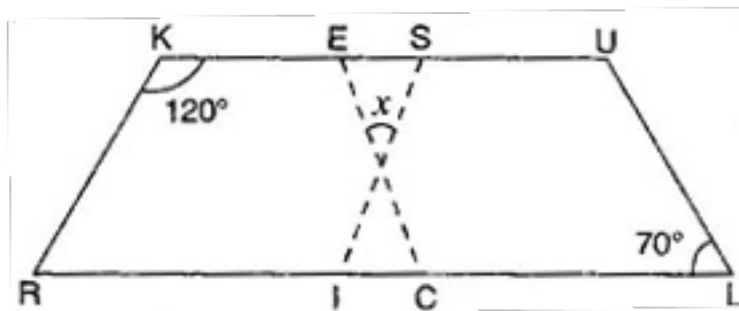
$$\Rightarrow x + 13 = 16$$

$$\Rightarrow x = 16 - 13$$

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

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

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



Ans. In parallelogram RISK,

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

[Opposite angles of a \parallel 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]

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

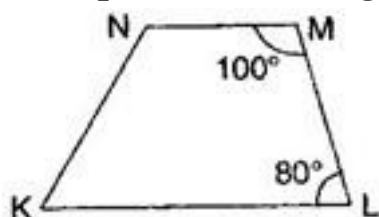
$$\Rightarrow 130^\circ + n = 180^\circ$$

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

Also $x = n = 50^\circ$

[Vertically opposite angles]

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



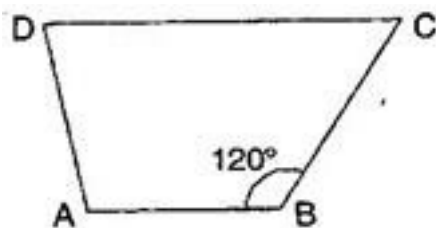
Ans. Here, $\angle M + \angle L = 100^\circ + 80^\circ = 180^\circ$

[Sum of interior opposite angles is 180°]

\therefore NM and KL are parallel.

Hence, KLMN is a trapezium.

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



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

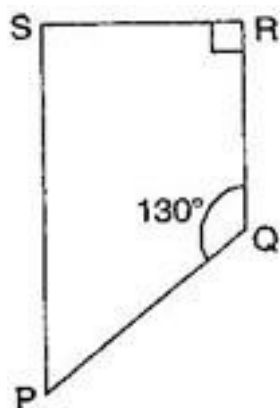
[$\because \overline{AB} \parallel \overline{DC}$]

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

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

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 $m\angle P$)



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

[Sum of co-interior angles is 180°]

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

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

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

$$\because \angle R = 90^\circ [\text{Given}]$$

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

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

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

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]

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

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

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

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