Question 1.

Identify all the quadrilaterals that have

(i) four sides of equal length

(ii) four right angles.

Solution:

(i) Any quadrilateral whose four sides are equal in length is a square or rhombus.

(ii) A quadrilateral having four right angles is a square or a rectangle.

Question 2.

Explain how a square is

(i) a quadrilateral

(ii) a parallelogram

(iii) a rhombus

(iv) a rectangle.

Solution:

(i) A square is a quadrilateral which has four sides and four angles whose sum is 360°.

(ii) A square is a parallelogram whose opposite sides are parallel.

(iii) A square is a parallelogram whose sides are equal and so, it is a rhombus.

(iv) A square is a parallelogram whose each angle is 90°.

So, it is a rectangle.

Question 3.

Name the quadrilaterals whose diagonals

(i) bisect each other

(ii) are perpendicular bisectors of each other

(iii) are equal.

Solution:

(i) Rectangle, square, rhombus, parallelogram.

(ii) Square, rhombus.

(iii) Square, rectangle.

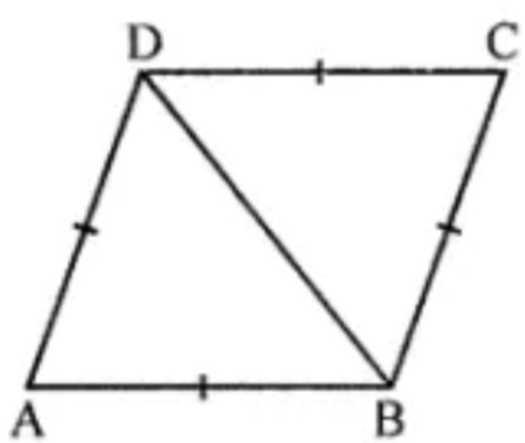
Question 4.

One of the diagonals of a rhombus and its sides are equal. Find the angles of the rhombus.

Solution:

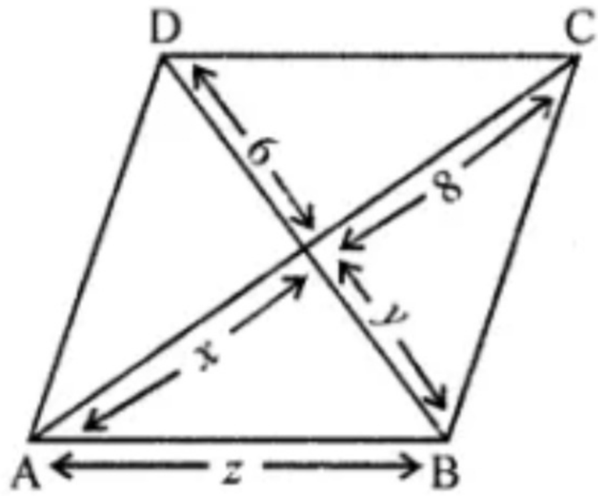
In a rhombus, side and one diagonal are equal.

∴ Angles will be 60° and 120°.



Question 5.

In the given figure, ABCD is a rhombus, find the values of x, y and z.



Solution:

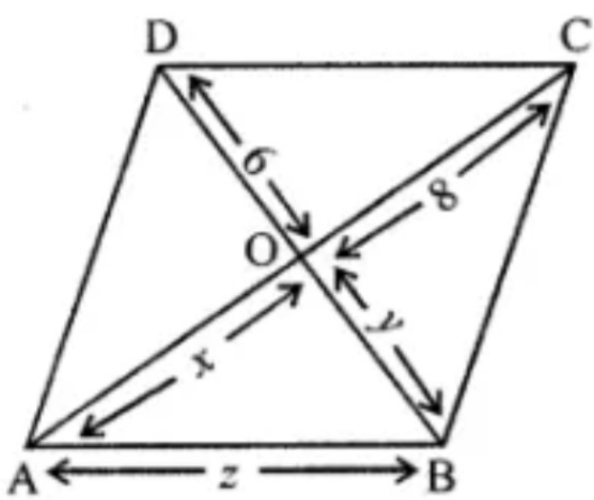
In rhombus ABCD.

∵ The diagonals of rhombus bisect each other at right angles.

∴ AO = OC and BO = OD

AO = x, OC = 8 cm, BO =y and OD = 6 cm

∴ x = 8 cm and y = 6 cm



In ΔAOB,

$AB^2 = AO^2 + BO^2$

$AB^2 = 8^2 + 6^2$

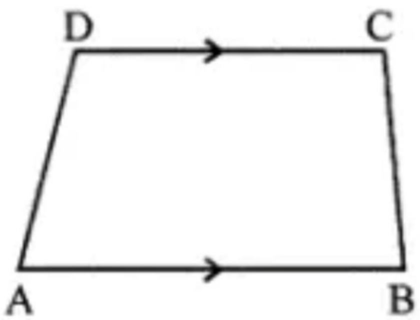
$AB^2 = 64 + 36$

$AB^2 = 100 = (10)^2$

AB = 10 cm

Question 6.

In the given figure, ABCD is a trapezium. If ∠A : ∠D = 5 : 7, ∠B = (3x + 11)° and ZC = (5x – 31)°, then find all the angles of the trapezium.



Solution:

In the given figure,

ABCD is a trapezium in which DC || AB

∠A : ∠D = 5 : 7

∠B = (3x + 11)° and

∠C = (5x – 31)°

∵ ABCD is a trapezium

∴ ∠B + ∠C = 180° (Cointerior angle)

3x + 11° + 5x – 31° = 180°

8x – 20° = 180° ⇒ 8x = 180° + 20° = 200°

⇒ x = $x = \frac{200°}{8} = 25°$

2x = 180°– 118°

2x = 62° ⇒ x = 31°

∴ ∠ABO = 31°

(ii) Also, ∠AOB + ∠AOD = 180° (Linear pair)

∴ ∠AOD = 180°– 118° = 62°

Now, In ΔAOD, AO = DO = y°

∴ 62 + 2y= 180°

2y = 180° – 62°

2y = 180°– 62°

2y = 118° ⇒ y = 59°

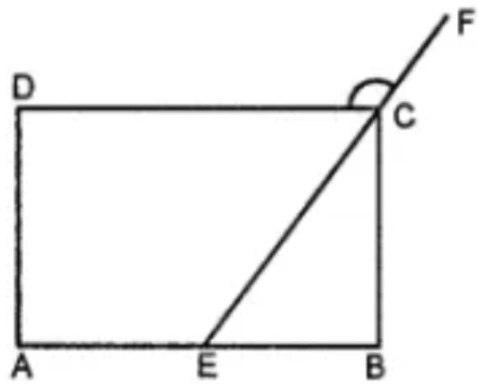
(iii) $\angle OCB = \angle OAD = 59°$ (Alternate angles)

Question 7.

In the given figure, ABCD is a rectangle. If $\angle CEB$: $\angle ECB = 3 : 2$ find

(i) $\angle CEB$,

(ii) $\angle DCF$



Solution:

In Δ BCE, $\angle B = 90°$ ($\because$ ABCD is a rectangle)

$\therefore \angle CEB + \angle ECB = 90°$

$3x + 2x = 90°$

$\Rightarrow x = 18°$

$\therefore \angle CEB = 3x = 3 \times 18° = 54°$

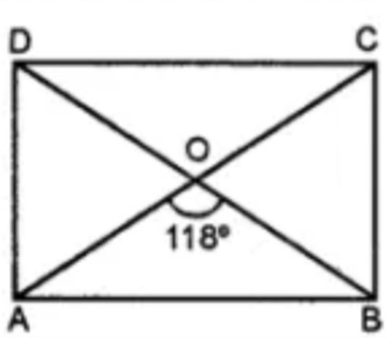
Now, $\angle CEB = \angle ECD = 54°$ (Alternate angles)

Also $\angle ECD + \angle DCF = 180°$ (Linear pair)

$\Rightarrow \angle DCF = 180 - 54 = 126°$

Question 8.

In the given figure, ABCD is a rectangle and diagonals intersect at O. If $\angle AOB = 118°$, find



(i) ∠ABO

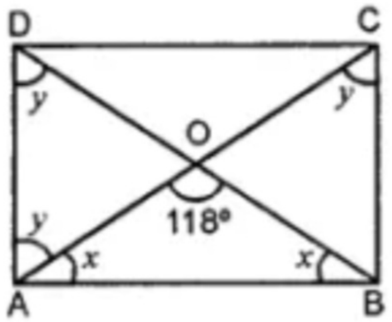
(ii) ∠ADO

(iii) ∠OCB

Solution:

In Δ ABO, OA = OB

(∵ diagonals of a rectangle bisect each other)



∴ ∠OAB = ∠OBA = x °

⇒ 118° + x + x = 180°

2x= 180°– 118°

2x = 62° ⇒ x = 31°

∴ ∠ABO = 31°

(ii) Also, ∠AOB + ∠AOD = 180° (Linear pair)

∴ ∠AOD = 180° – 118° = 62°

Now, In Δ AOD, AO = DO = y°

∴ 62 + 2y = 180°

2y = 180°– 62°

2y = 118° ⇒ y = 59°

(iii) ∠OCB = ∠OAD = 59° (Alternate angles)

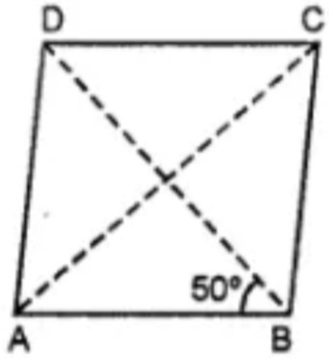
Question 9.

In the given figure, ABCD is a rhombus and ∠ABD = 50°. Find :

(i) ∠CAB

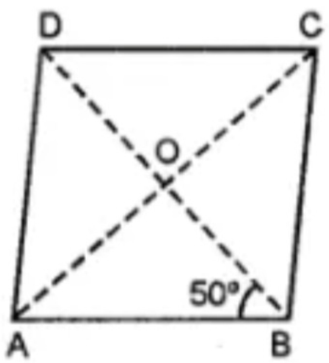
(ii) ∠BCD

(iii) ∠ADC



Solution:

(i) We know that diagonals of a rhombus are ⊥ to each other.



∴ ∠BOA = 90°

In Δ AOB,

∠OAB + ∠BOA + ∠ABO = 180°

∠OAB + 90° + 50° = 180°

∠OAB = 180 − 140 = 40°

∴ ∠CAB = ∠OAB = 40°

(ii) ∠BCD = 2 ∠ACD = 2 × 40° = 80°

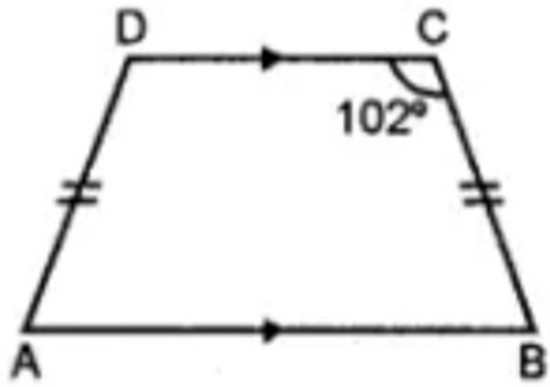
(∵ ∠CAB = ∠ACD alternate angles)

(iii) ∠ADC = 2 ∠BDC = 2 × 50° = 100°

(∵ ∠ABD = ∠BDC alternate angles)

Question 10.

In the given isosceles trapezium ABCD, ∠C = 102°. Find all the remaining angles of the trapezium.



Solution:

AB || CD

$\angle B + \angle C = 180°$

($\because$ adjacent angles on the same side of transversal are supplementary)

$\Rightarrow \angle B + 102° = 180°$

$\angle B = 180° - 102° = 78°$

As AD = BC (Given)

$\therefore \angle A = \angle B = 78°$

$\angle A + \angle B + \angle C + \angle D = 360°$

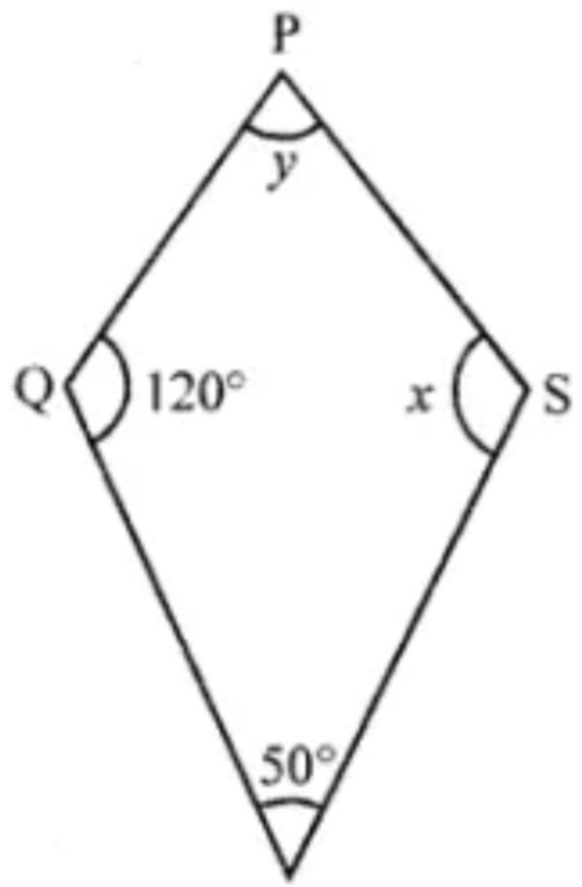
$78° + 78° + 102° + \angle D = 360°$

$\angle D + 258° = 360°$

$\angle D = 102°$

Question 11.

In the given figure, PQRS is a kite. Find the values of x and y.



Solution:

In the figure, PQRS is a kite

$\angle Q = 120°$ and $\angle R = 50°$

$\therefore \angle Q = \angle S$

$\therefore x = 120°$

$\angle P + \angle R = 360° - (120° + 120°)$

$\angle P + \angle R = 360° - 240° = 120°$

But $\angle R = 50°$

$\therefore \angle P = y = 120° - 50° = 70°$

Hence, $x = 120°, y = 70°$