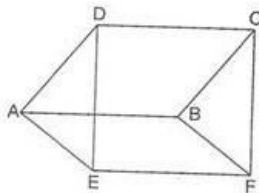


**CBSE Test Paper 04**  
**CH-9 Areas of Parallelograms & Triangles**

1. Two adjacent sides of a parallelogram are 24 cm and 18 cm. If the distance between the longer sides is 12 cm, then the distance between the shorter sides is :
  - a. 16 cm
  - b. 9 cm
  - c. 18 cm
  - d. none of these

2. How many square feet are in a square yard
  - a. 9
  - b. 12
  - c. 6
  - d. 10

3. ABCD and ABFE are parallelograms as shown in the figure. If  $ar(ABCD) = 24 \text{ cm}^2$  and  $ar(ABFE) = 18 \text{ cm}^2$ , then  $ar(EFCD)$  is



- a.  $42 \text{ cm}^2$ .
  - b.  $36 \text{ cm}^2$ .
  - c.  $30 \text{ cm}^2$ .
  - d.  $33 \text{ cm}^2$ .
4. ABCD is a parallelogram. P is any point on CD. If  $ar(\triangle DPA) = 15 \text{ cm}^2$  and  $ar(\triangle APC) = 20 \text{ cm}^2$ , then  $ar(\triangle ABC)$  is
  - a.  $15 \text{ cm}^2$ .
  - b.  $20 \text{ cm}^2$ .
  - c.  $35 \text{ cm}^2$ .
  - d.  $30 \text{ cm}^2$ .
5. Any side of a parallelogram is called
  - a. base
  - b. Altitude

- c. corres. Altitude
- d. area

6. Fill in the blanks:

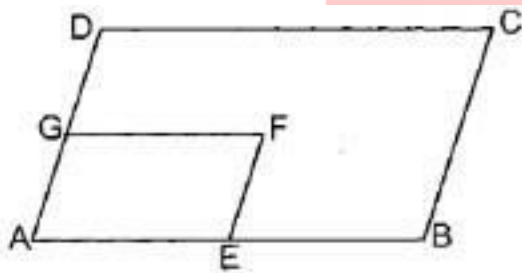
ABCD is a parallelogram. If  $AB = 7.2$  cm and the altitudes corresponding to the sides AB and AD are respectively 10 cm and 8 cm. The value of AD is \_\_\_\_\_.

7. Fill in the blanks:

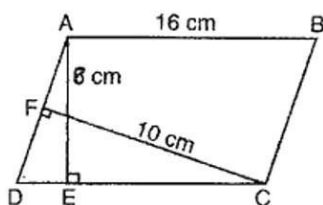
If the area, base and corresponding altitude of a parallelogram are  $x^2$ ,  $x - 3$  and  $x + 4$  respectively, then the value of  $x$  is \_\_\_\_\_.

8. In a parallelogram PQRS,  $PQ = 6$  cm and the corresponding altitude ST is 5 cm. find area of parallelogram.

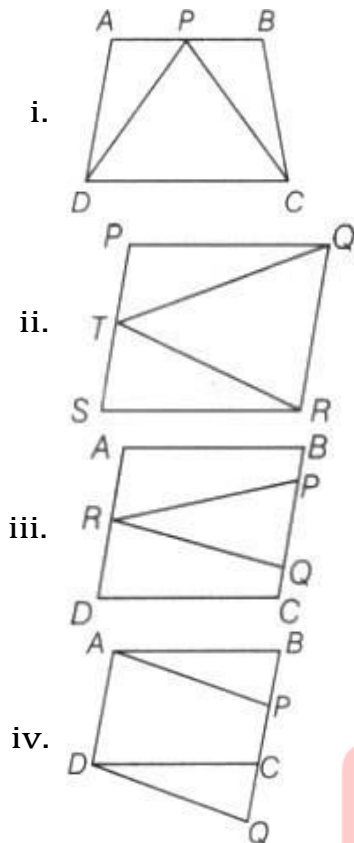
9. In Fig. ABCD and AEFG are two parallelograms. If  $\angle C = 50^\circ$ , determine  $\angle F$ .



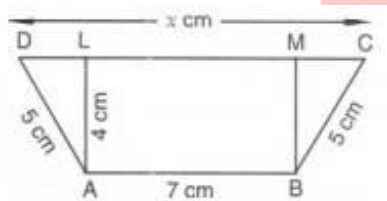
10. In figure, ABCD is a parallelogram.  $AE \perp DC$  and  $CF \perp AD$ . If  $AB = 16$  cm,  $AE = 8$  cm and  $CF = 10$  cm, find AD.



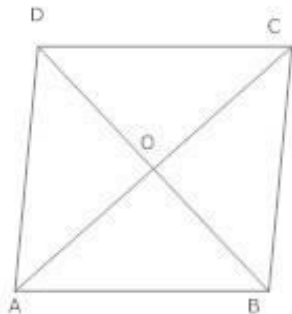
11. P and Q are any two points lying on the sides DC and AD respectively of a parallelogram ABCD. Show that  $\text{ar}(\triangle APB) = \text{ar}(\triangle BQC)$
12. Which of the following figures lie on the same base and between the same parallels? In such a case, write the common base and the two parallels.



13. In the given figure, ABCD is a trapezium in which  $AB = 7$  cm,  $AD = BC = 5$  cm,  $DC = x$  cm, and distance between AB and DC is 4 cm. Find the value of  $x$  and area of trapezium ABCD.



14. Show that diagonals of a parallelogram divide it into four triangles of equal area.



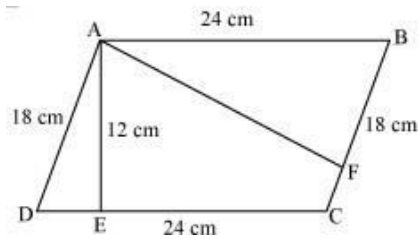
15. ABCD is a parallelogram. E is a point on BA such that  $BE = 2EA$  and F is a point on DC such that  $DF = 2FC$ . Prove that AECF is a parallelogram whose area is one-third of the area of parallelogram ABCD.

**CBSE Test Paper 04**  
**CH-9 Areas of Parallelograms & Triangles**

**Solution**

1. (a) 16 cm

**Explanation:** Let two adjacent sides of a parallelogram be  $AB = 24$  cm and  $AD = 18$  cm and Height  $AE = 12$  cm.



Then Area of parallelogram  $ABCD = \text{Base} \times \text{Corresponding Height} = AB \times AE$

$$= 24 \times 12 = 288 \text{ cm}^2$$

Now, taking  $BC = 18$  cm as base, then

Area of Parallelogram  $ABCD = \text{Base} \times \text{Corresponding height}$

$$288 = 18 \times AF$$

$$AF = \frac{288}{18}$$

$$AF = 16 \text{ cm.}$$

Therefore the distance between the shorter sides is 16 cm.

2. (a) 9

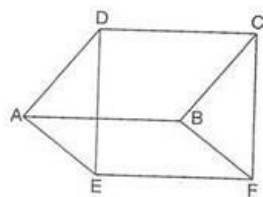
**Explanation:**

There are 9 square feet in 1 square yard.

1 square yard = 9 square feet

3. (a)  $42 \text{ cm}^2$ .

**Explanation:**



Construction: Produced  $AB$  to  $G$ , cuts  $CF$  at  $G$ .

Since parallelogram  $ABCD$  and  $CDHG$  are on the same base  $CD$  and between the same

parallels, then

$$\text{area}(\parallel gm ABCD) = \text{area}(\parallel gm CDHG) = 24 \text{ cm}^2$$

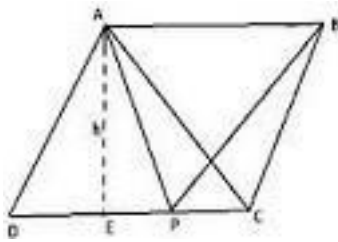
$$\text{Similarly, area}(\parallel gm ABFE) = \text{area}(\parallel gm EFGH) = 18 \text{ cm}^2$$

$$\text{Therefore, area}(EFCD) = \text{area}(EDHG) + \text{area}(EFGH)$$

$$\Rightarrow \text{area}(EFCD) = 24 + 18 = 42 \text{ cm}^2$$

4. (c)  $35 \text{ cm}^2$ .

**Explanation:**



$$\text{area}(\triangle ADC) = \frac{1}{2} \times \text{area}(\parallel gm ABCD)$$

$$\Rightarrow \text{area}(\triangle ADP) + \text{area}(\triangle APC) = \frac{1}{2} \times \text{area}(\parallel gm ABCD)$$

$$\Rightarrow 15 + 20 = \frac{1}{2} \times \text{area}(\parallel gm ABCD)$$

$$\Rightarrow \frac{1}{2} \times \text{area}(\parallel gm ABCD) = 35 \text{ sq. cm} \dots(i)$$

Since triangles APB and parallelogram ABCD are on the same base AB and between the same parallels, then

$$\text{area}(\triangle ABC) = \frac{1}{2} \times \text{area}(\parallel gm ABCD)$$

$$\Rightarrow \text{area}(\triangle ABC) = 35 \text{ sq. cm [From eq.(i)]}$$

5. (a) base

**Explanation:**

Any side of a parallelogram is called its base. No side of the parallelogram can be the height.

6. 9 cm

7. 12

8. Area of  $\parallel gm PQRS$

$$= \text{Base} \times \text{Altitude}$$

$$= 6 \times 5 \text{ (Square cm)}$$

$$= 30 \text{ square cm}$$

9. In parallelogram  $ABCD$ ,  
 $\angle A = \angle C$  (opposite angles)

$$\therefore \angle A = 50^\circ$$

Similarly, in parallelogram  $AEFG$

$$\angle A = \angle F \text{ (opposite angles)}$$

$$\therefore \angle F = 50^\circ$$

10.  $ABCD$  is a parallelogram.

$$\therefore DC = AB \Rightarrow DC = 16 \text{ cm} \text{ \{opposite sides of a parallelogram are equal\}}$$

$$AE \perp DC \text{ [Given]}$$

Now Area of parallelogram  $ABCD = \text{Base} \times \text{Corresponding height}$

$$= DC \times AE = 16 \times 8 = 128 \text{ cm}^2$$

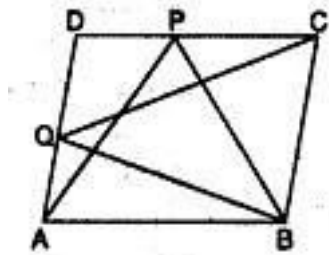
Using base  $AD$  and height  $CF$ , we can find,

$$\text{Area of parallelogram} = AD \times CF$$

$$\Rightarrow 128 = AD \times 10$$

$$\Rightarrow AD = \frac{128}{10} = 12.8 \text{ cm}$$

11. Given :  $P$  and  $Q$  are any two points lying on the sides  $DC$  and  $AD$  respectively of a parallelogram  $ABCD$ .



To prove :  $\text{ar}(\triangle APB) = \text{ar}(\triangle BQC)$

Proof :  $\triangle APB$  and  $\parallel$  gm  $ABCD$  are on the same base  $AB$  and between the same parallels  $AB$  and  $DC$ .

$$\text{ar}(\triangle APB) = \frac{1}{2} \text{ar}(\parallel \text{ gm } ABCD)$$

As  $\triangle BQC$  and  $\parallel$  gm  $ABCD$  are on the same base  $BC$  and between the same parallels  $BC$  and  $AD$ .

$$\text{ar}(\triangle BQC) = \frac{1}{2} \text{ar}(\parallel \text{ gm } ABCD) \dots (2)$$

$$\text{ar}(\triangle APB) = \text{ar}(\triangle BQC) \dots [\text{From (1) and (2)}]$$

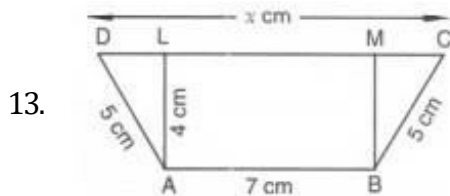
12. In figure (i),  $\triangle PDC$  and trapezium ABCD are lying on the same base DC and between the same parallels AB and DC.

In figure (ii),  $\triangle TRQ$  and parallelogram PQRS are lying on the same base RQ and between the same parallels RQ and SP.

In figure (iii), it can be observed that parallelogram ABCD and  $\triangle PRQ$  are lying between the same parallels AD and BC, but they do not have any common base.

In figure (iv), parallelograms ABCD and APQD are lying on the same base AD and between the same parallel AD and BQ.

Hence, figures (i), (ii) and (iv) lie on the same base and between the same parallels.



Draw  $AL \perp DC$ ,  $BM \perp DC$ . Then,

$$AL = BM = 4 \text{ cm and } LM = 7 \text{ cm}$$

In  $\triangle ADL$ , we have

$$AD^2 = AL^2 + DL^2$$

$$\Rightarrow 25 = 16 + DL^2$$

$$\Rightarrow DL^2 = 25 - 16 = 9$$

$$\Rightarrow DL = 3$$

$$\text{Similarly, } MC = \sqrt{BC^2 - BM^2} = \sqrt{25 - 16} = 3 \text{ cm}$$

$$\therefore x = CD = CM + ML + LD = (3 + 7 + 3) \text{ cm} = 13 \text{ cm}$$

$$\text{ar}(\text{trap. ABCD}) = \frac{1}{2} (AB + CD) \times AL = \frac{1}{2} (7 + 13) \times 4 \text{ cm}^2 = 40 \text{ cm}^2$$

14. Given: A parallelogram ABCD and AC and BC are diagonals

To prove:  $\text{ar}(\triangle ABO) = \text{ar}(\triangle COD) = \text{ar}(\triangle BCO) = \text{ar}(\triangle AOD)$

Proof:  $\text{ar}(\triangle ADB) = \text{ar}(\triangle ACB)$

{two triangle are on same base and between same parallel are equal in area}

$$\Rightarrow \text{ar}(\triangle ADB) - \text{ar}(\triangle ABO) = \text{ar}(\triangle ACB) - \text{ar}(\triangle ABO)$$

$$\Rightarrow \text{ar}(\triangle ADO) = \text{ar}(\triangle BCO) \dots (i)$$

$$\text{Ar}(\triangle ADC) = \text{ar}(\triangle BCD)$$

$$\Rightarrow \text{ar}(\text{ADC}) - \text{ar}(\text{CDO}) = \text{ar}(\text{BCD}) - \text{ar}(\text{CDO})$$

$$\Rightarrow \text{ar}(\text{ADO}) = \text{ar}(\text{AOB}) \dots(\text{ii})$$

In triangle ABC, BO is median

$$\therefore \text{ar}(\text{ABO}) = \text{ar}(\text{BCO}) \dots(\text{iii})$$

In triangle ADC, OD is median

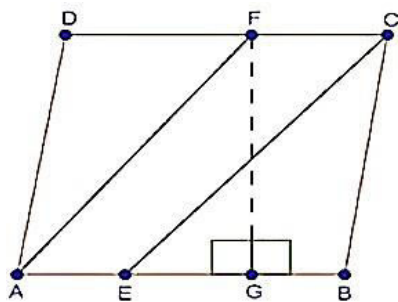
$$\therefore \text{ar}(\text{ADO}) = \text{ar}(\text{CDO}) \dots(\text{iv})$$

From (i), (ii), (iii) and (iv)

$$\text{Ar}(\text{ABO}) = \text{ar}(\text{CDO}) = \text{ar}(\text{BCO}) = \text{ar}(\text{ADO})$$

Hence proved.

15.



Construction:- Draw  $FG \perp AB$

Proof:- We have,

$$BE = 2EA \text{ and } DF = 2FC$$

$$\Rightarrow AB - AE = 2EA \text{ and } DC - FC = 2FC$$

$$\Rightarrow AB = 3EA \text{ and } DC = 3FC$$

$$\Rightarrow AE = \frac{1}{3} AB \text{ and } FC = \frac{1}{3} DC \dots (\text{i})$$

But  $AB = DC$  [opposite side of  $\parallel^{gm}$ ]

then,  $AE = FC$

Thus  $AE = FC$  and  $AE \parallel FC$

Then, AECF is a parallelogram

$$\text{Now, ar}(\parallel^{gm} \text{ AECF}) = AE \times FG$$

$$\Rightarrow \text{ar}(\parallel^{gm} \text{ AECF}) = \frac{1}{3} AB \times FG \text{ [From (i)]}$$

$$\Rightarrow \text{ar}(\parallel^{gm} \text{ AECF}) = \frac{1}{3} \text{ar}(\parallel^{gm} \text{ ABCD})$$