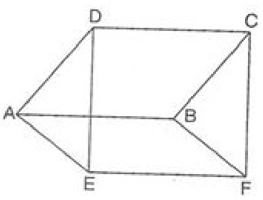
CBSE Test Paper 04

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 $ar\ (ABCD) = 24\ cm^2$ and $ar\ (ABFE) = 18\ cm^2$, then ar (EFCD) is



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

c. corres. Altitude
d. area

6. Fill in the blanks:

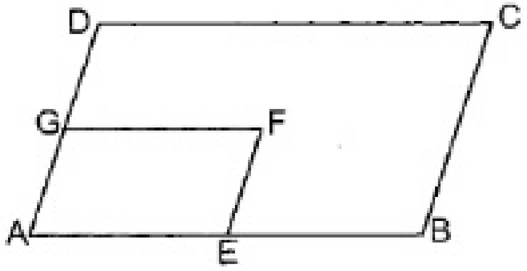
ABCD is a parallelogram. If AB = 7.2 cm and the altitudes corresponding to the sides AB and AD are respectively 10 cm and 8 cm. The value of AD is ________.

7. Fill in the blanks:

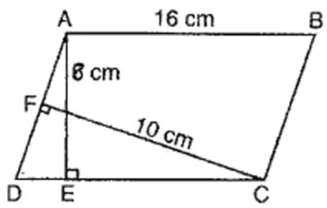
If the area, base and corresponding altitude of a parallelogram are x^2, x - 3 and x + 4 respectively, then the value of x is ________.

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 $\angle C = 50°$, determine $\angle F$.

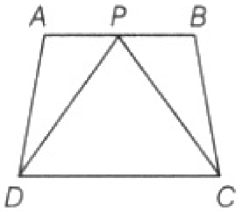


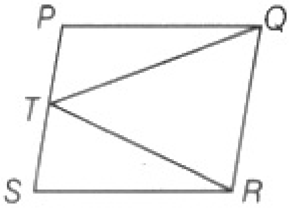
10. In figure, ABCD is a parallelogram. AE $\perp$ DC and CF $\perp$ AD. If AB = 16 cm, AE = 8 cm and CF = 10 cm, find AD.

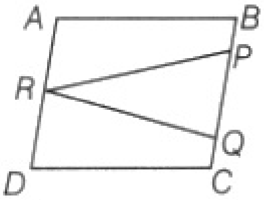


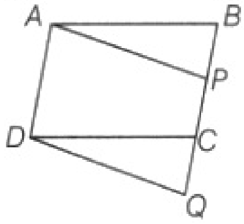
11. P and Q are any two points lying on the sides DC and AD respectively of a parallelogram ABCD. Show that ar($\triangle$APB) = ar($\triangle$BQC)

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.

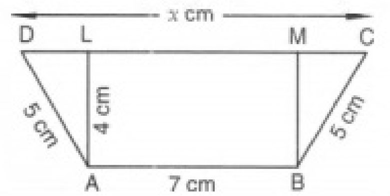
i. 

ii. 

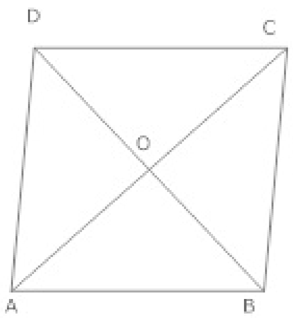
iii. 

iv. 

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 = 2 FC. Prove that AECF is a parallelogram whose area is one-third of the area of parallelogram ABCD.

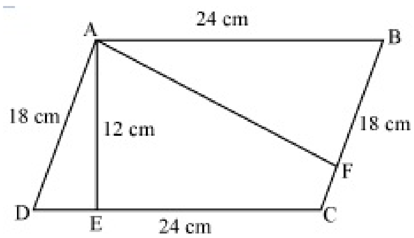
CBSE Test Paper 04

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 = Base $\times$ Corresponding Height = AB $\times$ AE

   = 24 $\times$ 12 = 288 cm^2

   Now, taking BC = 18 cm as base, then

   Area of Parallelogram ABCD = Base $\times$ Corresponding height

   288 = 18 $\times$ AF

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

   AF = 16 cm.

   Therefore the distance between the shorter sides is 16 cm.

2. (a) 9

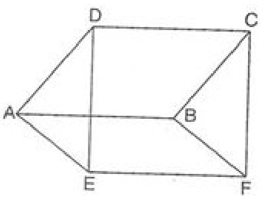
   Explanation:

   There are 9 square feet in 1 square yard.

   1 square yard = 9 square feet

3. (a) $42\,cm^2$.

   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

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

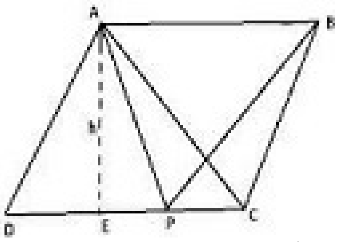
Similarly, $\text{area}(\|gm\text{ABFE}) = \text{area}(\|gm\text{EFGH}) = 18 \text{ cm}^2$

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

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

4. (c) $35\ cm^2$.

   Explanation:

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

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

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

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

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

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

   $\Rightarrow \text{area}(\Delta\text{ABC}) = 35$ 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 ||gm PQRS

   = Base × Altitude

   = 6 × 5 (Square cm)

= 30 square cm

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

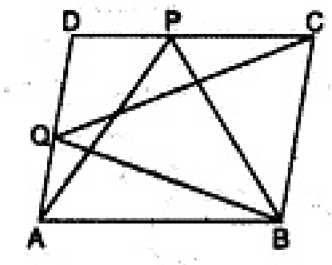
$\therefore \angle A = 50^o$
Similarly, in parallelogram $AEFG$

$\angle A = \angle F$ (opposite angles)

$\therefore \angle F = 50^o$

10. ABCD is a parallelogram.
$\therefore$ DC = AB $\Rightarrow$DC = 16 cm {opposite sides of a parallelogram are equal)
AE $\perp$ DC[Given]
Now Area of parallelogram ABCD = Base $\times$ Corresponding height
$= DC \times AE = 16 \times 8$ = 128 cm^2
Using base AD and height CF, we can find,
Area of parallelogram $= AD \times CF$
$\Rightarrow 128 = AD \times 10$
$\Rightarrow$ AD = $\frac{128}{10}$ = 12.8 cm

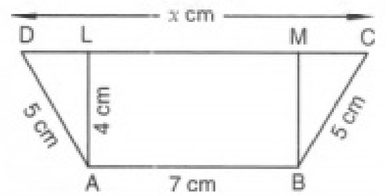
11. Given : P and Q are any two points lying on the sides DC and AD respectively of a parallelogram ABCD.



To prove : ar($\triangle$APB) = ar($\triangle$BQC)
Proof : $\triangle$APB and || gm ABCD are on the same base AB and between the same parallels AB and DC.
ar($\triangle$APB) = $\frac{1}{2}$ ar(|| gm ABCD)
As $\triangle$BQC and || gm ABCD are on the same base BC and between the same parallels BC and AD.
ar($\triangle$BQC) = $\frac{1}{2}$ ar(|| gm ABCD) . . . (2)

ar($\triangle$APB) = ar($\triangle$BQC) . . . [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.

13. 

Draw AL $\perp$ DC, BM $\perp$ DC. Then,
AL = BM = 4 cm and LM = 7 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
Similarly, MC = $\sqrt{BC^2 - BM^2}$ = $\sqrt{25 - 16}$ = 3 cm
$\therefore$ x = CD = CM + ML + LD = (3 + 7 + 3) cm = 13 cm
ar(trap.ABCD) = $\frac{1}{2}$ (AB + CD) $\times$ AL = $\frac{1}{2}$ (7 + 13) $\times$ 4 cm^2 = 40 cm^2

14. Given: A parallelogram ABCD and AC and BC are diagonals
To prove: ar (ABO) = ar (COD) = ar (BCO) = ar (AOD)
Proof: ar (ADB) = ar (ACB)
{two triangle are on same base and between same parallel are equal in area}
$\Rightarrow$ ar(ADB) - ar(ABO) = ar(ACB) - ar(ABO)
$\Rightarrow$ sr(ADO) = ar(BCO) ...(i)
Ar (ADC) = ar (BCD)

$\Rightarrow$ ar(ADC) - ar(CDO) = ar(BCD) - ar(CDO)

$\Rightarrow$ ar(ADO) = ar(AOB) ...(ii)

In triangle ABC, BO is median

$\therefore$ ar(ABO) = ar(BCO) ...(iii)

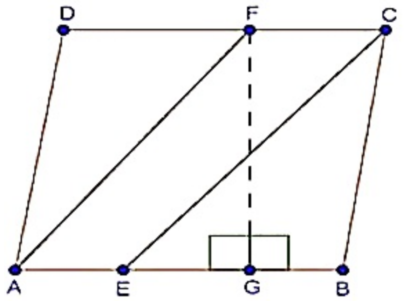
In triangle ADC, OD is median

$\therefore$ ar(ADO) = ar(CDO) ...(iv)

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

Ar(ABO) = ar (CDO) = ar (BCO) = ar (ADO)

Hence proved.

15. 

Construction:- Draw FG $\perp$ AB

Proof:- We have,

BE = 2EA and DF = 2FC

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

$\Rightarrow$ AB = 3EA and DC = 3FC

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

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

then, AE = FC

Thus AE = FC and AE $||$ FC

Then, AECF is a parallelogram

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

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

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