Chapter 2
Measurements

Ex 2.1

Question 1.
Fill in the blanks:
(i) The ratio between the circumference and diameter of any circle is _______ .
Answer:
π

(ii) A line segment which joins any two points on a circle is a _______ .
Answer:
Chord

(iii) The longest chord of a circle is _______ .
Answer:
Diameter

(iv) The radius of a circle of diameter 24 cm is _______ .
Answer:
12 cm

(v) A part of circumference of a circle is called as _______ .
Answer:
an arc

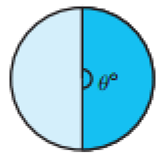
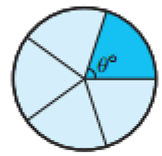
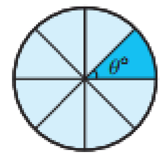
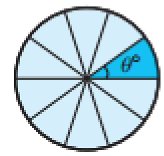
Question 2.
Match the following

(i)	Area of a circle	a.	$\frac{1}{4}\pi r^2$
(ii)	Circumference of a circle	b.	$(\pi + 2)r$
(iii)	Area of the sector of a circle	c.	πr^2
(iv)	Circumference of a semicircle	d.	$2\pi r$
(v)	Area of a quadrant of a circle	e.	$\frac{\theta°}{360°} \times \pi r^2$

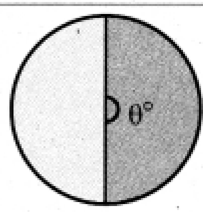
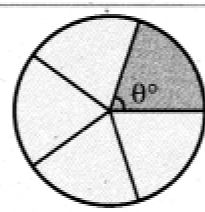
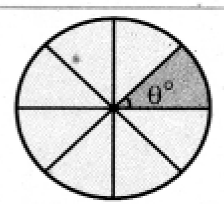
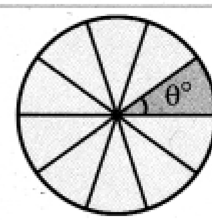
Answer:
(i) – c
(ii) – d

(iii) – e
(iv) – b
(v) – a

Question 3.
Find the central angle of the shaded sectors (each circle is divided into equal sectors).

Sectors				
Central angle of each sector $(\theta°)$				

Answer:

Sector				
Central angle of each sector $(\theta°)$	Number of equal parts $n = 2$ $\theta° = \frac{360°}{n} = \frac{360°}{2}$ $\theta° = 180°$	$n = 5$ $\theta° = \frac{360°}{n}$ $\theta° = \frac{360°}{5}$ $\theta° = 72°$	$n = 8$ $\theta° = \frac{360°}{n}$ $\theta° = \frac{360°}{8}$ $\theta° = 45°$	$n = 10$ $\theta° = \frac{360°}{n}$ $\theta° = \frac{360°}{10}$ $\theta° = 36°$

Question 4.
For the sectors with given measures, find the length of the arc, area and perimeter.
$(\pi = 3.14)$
(i) central angle 45° r = 16 cm
Answer:
(i) central angle 45° r = 16 cm

Length of the arc l = $\frac{\theta°}{360°} \times 2\pi r$ units

l = $\frac{45°}{360°} \times 2 \times 3.14 \times 16$ cm

l = $\frac{1}{8} \times 2 \times 3.14 \times 16$ cm

l = 12.56 cm

Area of the sector = $\frac{\theta°}{360°} \times \pi r^2$ sq. units

A = $\frac{45°}{360°} \times 3.14 \times 16 \times 16$

A = 100.48 cm^2

Perimeter of the sector P = l + 2r units

P = 12.56 + 2(16) cm

p = 44.56 cm

(ii) central angle 120°, d = 12.6 cm

Answer:

∴ r = $\frac{12.6}{2}$ cm

r = 6.3cm

Length of the arc l = $\frac{\theta^\circ}{360^\circ}$ × 2πr units

l = $\frac{120^\circ}{360^\circ}$ × 2 × 3.14 × 63 cm

l = 13.188cm

l = 13.19cm

Area of the sector A = $\frac{\theta^\circ}{360^\circ}$ × πr^2 sq. units

A = $\frac{120^\circ}{360^\circ}$ × 3 14 × 6.3 × 6.3 cm^2

A = 3.14 × 6.3 × 2.1 cm^2

A = 41.54 cm^2

Perimeter of the sector P = l + 2r cm

P = 13.19 + 2(6.3) cm

= 13.19 + 1.2.6 cm

P = 25.79 cm

Question 5.

From the measures given below, find the area of the sectors.

(i) Length of the arc = 48 m, r = 10 m

Answer:

Area of the sector A = $\frac{lr}{2}$ sq. units

l = 48m

r = 10m

= $\frac{48 \times 10}{2}$ m^2

= 24 × 10m^2

= 240 m^2

Area of the sector = 240 m^2

(ii) length of the arc = 50 cm, r = 13.5 cm

Answer:

Length of the arc l = 12.5 cm

Radius r = 6 cm

Area of the sector A = $\frac{lr}{2}$ sq. units

A = $\frac{12.5\times6}{2}$

A = 12.5 × 3cm^2

A = 37.5 cm^2

Area of the sector A = 37.5 cm^2

Question 6.

Find the central angle of each of the sectors whose measures are given below. ($\pi = \frac{2}{27}$)

(i) area = 462 cm^2, r = 21 cm

Answer:

area = 462 cm^2, r = 21 cm

Radius of the Sector = 21 cm

Area of the sector = 462 cm^2

$\frac{lr}{2}$ = 462

$\frac{l\times21}{2}$ = 462

l = $\frac{462\times2}{21}$

l = 22 × 2

Length of the arc l = 44 cm

$$\frac{\theta^\circ}{360^\circ} \times 2\pi r = 44 \text{ cm}$$

$$\frac{\theta^\circ}{360^\circ} \times 2 \times \frac{22}{7} \times 21 = 44 \text{ cm}$$

$$\theta^\circ = \frac{44\times360\times7}{2\times22\times21}$$

θ° = 120°

∴ Central angle of the sector = 120°

(ii) length of the arc = 44 m, r = 35 m

Answer:

Radius of the sector = 8.4cm

Area of the sector = 18.48 cm^2

$\frac{lr}{2}$ = 18.48

$\frac{1\times8.4}{2}$ = 18.48

l = $\frac{18.48\times2}{8.4}$

$$\frac{\overset{4.4}{} \overset{9.24}{\cancel{}} \cancel{18.48} \times \cancel{2}}{\cancel{8.4}_{\cancel{4.2}\ \cancel{2.1}\ 1}}$$

Length of the arc l = 4.4 cm

$$\frac{\theta°}{360°} \times 2\pi r = 4.4 \text{ cm}$$

$$\frac{\theta°}{360°} \times 2 \times \frac{22}{7} \times 8.4 = 4.4 \text{ cm}$$

$$\theta° = \frac{4.4 \times 360 \times 7}{2 \times 22 \times 8.4}$$

Hint:

$$\frac{^{1\ \cancel{0.1}\ \cancel{0.2}}\ \cancel{4.4} \times \cancel{360} \times \cancel{7}}{\cancel{2}_1 \times \cancel{22}_1 \times \cancel{8.4}_{\cancel{0.7}\ \cancel{0.1}\ 1}}$$

θ° = 30°

Central angle = 30°

Question 7.

A circle of radius 120 m is divided into 8 equal sectors. Find the length of the arc of each of the sectors.

Answer:

Radius of the circle r = 120 m

Number of equal sectors = 8

∴ Central angle of each sector = $\frac{360°}{n}$

$\theta° = \frac{360°}{8}$

θ° = 45°

Length of the arc l = $\frac{\theta°}{360°} \times 2\pi r$ units

$= \frac{45°}{360°} \times 2\pi \times 120$ m

Length of the arc = 30 × πm

Another method:

$l = \frac{1}{n} \times 2\pi r = \frac{1}{8} \times 2 \times \pi \times 120 = 30\pi$ m

Length of the arc = 30 π m

Question 8.

A circle of radius 70 cm is divided into 5 equal sectors. Find the area of each of the sectors.

Answer:

Radius of the sector r = 70 cm

Number of equal sectors = 5

∴ Central angle of each sector = $\frac{360°}{n}$

θ° = 360°

θ° = 72°

Area of the sector = $\frac{\theta°}{360°}$ × πr^2 sq.units

= $\frac{72°}{360°}$ × π × 70 × 70cm^2

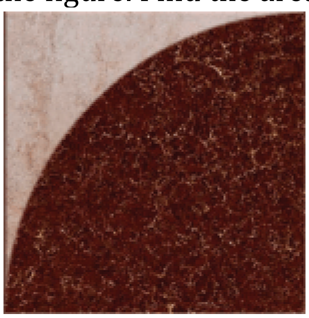
Hint:

= 14 × 70 × πcm^2

= 980 πcm^2

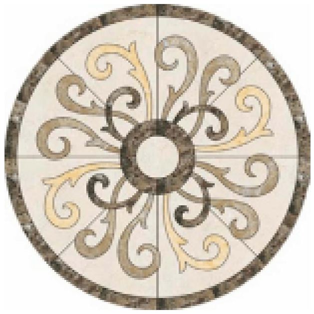
Note: We can solve this problem using A = $\frac{1}{n}$ πr^2 sq. units also.

Question 9.
Dhamu fixes a square tile of 30cm on the floor. The tile has a sector design on it as shown in the figure. Find the area of the sector. (π = 3.14).



Answer:
Side of the square = 30 cm
∴ Radius of the sector design = 30 cm
Given the design of a circular quadrant.
Area of the quadrant = $\frac{1}{4}$ πr^2 sq.units
= $\frac{1}{4}$ × 3.14 × 30 × 30cm^2
= 3.14 × 15 × 15cm^2
∴ Area of the sector design = 706.5 cm^2 (approximately)

Question 10.
A circle is formed with 8 equal granite stones as shown in the figure each of radius 56 cm and whose central angle is 45°. Find the area of each of the granite stones. (π = $\frac{22}{7}$)



Answer:

Number of equal sectors ‘n’ = 8

Radius of the sector ‘r’ = 56 cm

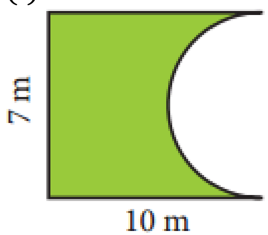
Area of each sector = $\frac{1}{n}$ πr^2 sq. units

= $\frac{1}{8} \times \frac{22}{7} \times 56 \times 56 cm^2$ =1232 cm^2

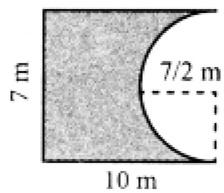
Area of each sector = 1232 cm^2 (approximately)

Ex 2.2

Question 1.
Find the perimeter and area of the figures given below. ($\pi = \frac{22}{7}$)
(i)



Answer:



Length of the arc of the semicircle = $\frac{1}{2} \times 2\pi r$ units

$= \frac{22}{7} \times \frac{7}{2}$ m = 11 m

∴ Perimeter = Sum of all lengths of sides that form the closed boundary

P = 11 + 10 + 7 + 10 m

Perimeter = 38 m

Area = Area of the rectangle – Area of semicircle

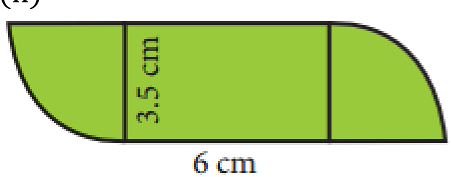
$= (l \times b) - \frac{1}{2}\pi r^2$ sq. units

$$= (10 \times 7) - \frac{1}{2} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}$$

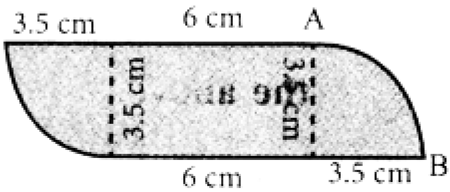
$$= 70 - \frac{11 \times 7}{2 \times 2} = \frac{280 - 77}{4} = \frac{203}{4}$$

$= 50.75\ m^2$ (approx)
Area of the figure $= 50.75\ m^2$ approx.

(ii)



Answer:



Perimeter = sum of outside lengths

Length of the arc of quadrant circle = $\frac{1}{4} \times 2\pi r$ units

= $\frac{1}{2} \times \frac{22}{7} \times 3.5$cm

= 11×0.5 cm = 5.5cm

∴ Length of arc of 2 sectors 2×5.5 cm

= 11 cm

∴ Perimeter P = 11 + 6 + 3.5 + 6 + 35 cm

P = 30 cm

Area Area of 2 quadrant circle + Area of a rectangle.

= $2 \times \frac{1}{4}\pi r^2 + lb$ sq. units

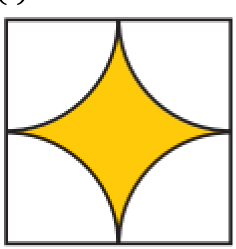
= $(\frac{1}{2} \times \frac{22}{7} \times 3.5 \times 3.5) + (6 \times 3.5)$ cm^2

= $(11 \times 3.5 \times 0.5) + 21$ cm^2

= $(19.25 + 21)$ cm^2 = 40.25 cm^2

∴ Area = 40.25 cm^2 approx

Question 2.
Find the area of the shaded part in the following figures. ($\pi = 3.14$)
(i)



10 cm

Answer:

Area of the shaded part = Area of 4 quadrant circles of radius $\frac{10}{2}$ cm

= $4 \times \frac{1}{4} \times \pi r^2 = 3.14 \times \frac{10}{2} \times \frac{10}{2}$ cm^2

= $\frac{314}{4}$ cm^2 = 78.5 cm^2

Area of the shaded part = 78.5 cm^2

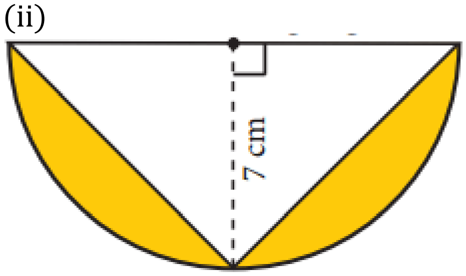
Area of the unshaded part = Area of the square – Area of shaded part

$= a^2 - 78.5\ cm^2 = (10 \times 10) - 78.5\ cm^2$

$= 100 - 78.5cm^2 = 21.5cm^2$

Area of the unshaded part = 21.5 cm^2 (approximately)

(ii)



Answer:
Area of the shaded part = Area of semicircle – Area of the triangle

$$= \left(\frac{1}{2}\pi r^2\right) - \left(\frac{1}{2}bh\right)\ cm^2$$

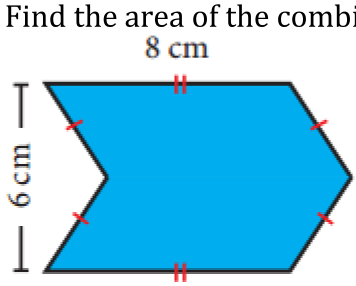
$$= \frac{1}{2} \times 3.14 \times 7 \times 7 - \frac{1}{2} \times 14 \times 7cm^2$$

$$= \frac{153.86}{2} - 49\ cm^2 = 76.93 - 49\ cm^2$$

$$= 27.3\ cm^2$$

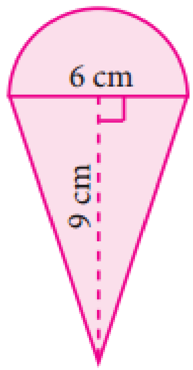
∴ Area of the shaded part = 27.93 cm^2 (approximately)

Question 3.
Find the area of the combined figure given which is got by joining of two parallelograms



Answer:
Area of the figure = Area of 2 parallelograms with base 8 cm and height 3 cm
= 2 × (bh) sq. units
= 2 × 8 × 3cm^2 = 48 cm^2
∴ Area of the given figure = 48 cm^2

Question 4.
Find the area of the combined figure given, formed by joining a semicircle of diameter 6 cm with a triangle of base 6 cm and height 9 cm. (π = 3.14)



Answer:

Area of the figure = Area of the semicircle of radius 3 cm + 2 (Area of triangle with b = 9 cm and h = 3 cm)

= $\left(\frac{1}{2}\pi r^2\right) + \left(2 \times \frac{1}{2}bh\right)$ sq. units

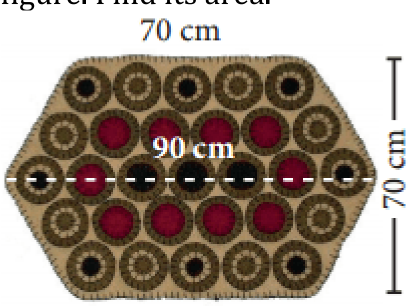
= $\frac{1}{2} \times 3.14 \times 3 \times 3 + (2 \times \frac{1}{2} \times 9 \times 3)cm^2$

= $\frac{28.26}{2} + 27\ cm^2 = 14.13 + 27\ cm^2 = 41.13\ cm^2$

∴ Area of the figure = 41.13 cm^2 (approximately)

Question 5.

The door mat which is in a hexagonal shape has the following measures as given in the figure. Find its area.



Answer:

Area of the doormat = Area of 2 trapezium

Height of the trapezium h $= \frac{70}{2}$ cm: a = 90 cm; b = 70 cm

∴ Area of the trapezium $= \frac{1}{2}$ h (a + b) sq. units

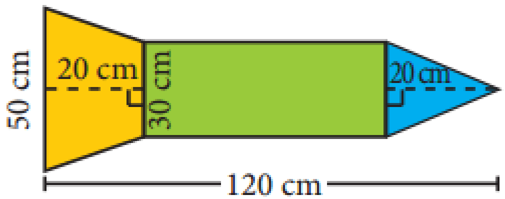
Area of the door mat $= 2 \times \frac{1}{2} \times 35\ (90 + 70)cm^2$

$= 35 \times 160\ cm^2 = 5600\ cm^2$

∴ Area of the door mat = 5600 cm^2

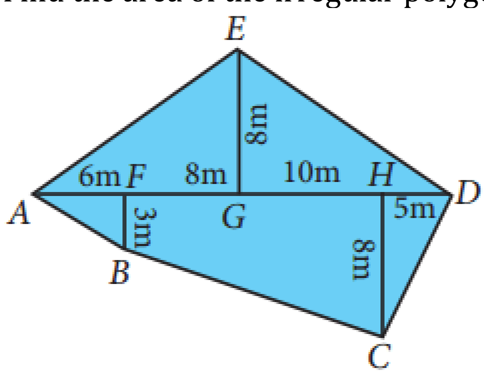
Question 6.

A rocket drawing has the measures as given in the figure. Find its area.



Answer:
Area = Area of a rectangle + Area of a triangle + Area of a trapezium
For rectangle length l = 120 – 20 – 20 cm = 80 cm
Breadth b = 30 cm
For the triangle base = 30 cm
Height = 20 cm
For the trapezium height h = 20 cm
Parallel sided a = 50 cm
b = 30cm
∴ Area of the figure $(l \times b) + (\frac{1}{2} \times \text{base} \times \text{height}) + \frac{1}{2} \times h \times (a + b)$sq. units
$= (80 \times 30) + (\frac{1}{2} \times 30 \times 20) + \frac{1}{2} \times 20 \times (50 + 30)\ cm^2$
$= 2400 + 300 + 800\ cm^2 = 3500\ cm^2$
Area of the figure = $3500\ cm^2$

Question 7.
Find the area of the irregular polygon shaped fields given below.



Answer:

Area of the field = Area of trapezium FBCH + Area of ΔDHC + Area of ΔEGD + Area of ΔEGA + Area of ΔBFA

Area of the triangle = $\frac{1}{2}$ bhsq.units

Area of the trapezium = $\frac{1}{2} \times h \times (a + b)$ sq.units

Area of the trapezium FBCH = $\frac{1}{2} \times (10 + 8) \times (8 + 3) m^2 = 9 \times 11 = 99\ m^2$ ..... (1)

Area of the ΔDHC = $\frac{1}{2} \times 8 \times 5\ m^2 = 20\ m^2$ ..... (2)

Area of ΔEGD = $\frac{1}{2} \times 8 \times 15 m^2 = 60\ m^2$ .... (3)

Area of ΔEGA = $\frac{1}{2} \times 8 \times (8 + 6) m^2 = 4 \times 14\ m^2$

$= 56 m^2$

Area of ΔBFA = $\frac{1}{2} \times 3 \times 6 m^2 = 9\ m^2$

$\therefore$ Area of the field = $99 + 20 + 60 + 56 + 9\ m^2$

$= 244\ m^2$

Area of the field = $244\ m^2$

Ex 2.3

Question 1.
Fill ini the blanks:

(i) The three dimensions of a cuboid are ______ , ______ and ______ .
Answer:
length, breadth, height

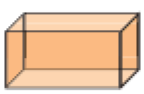
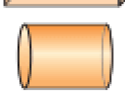
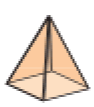
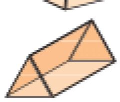
(ii) The meeting point of more than two edges in a polyhedron is called as ______ .
Answer:
Vertex

(iii) A cube has ________ faces.
Answer:
six

(iv) The cross section of a solid cylinder is ______ .
Answer:
circle

(v) If a net of a 3-D shape has six plane squares, then it is called ______ .
Answer:
cube

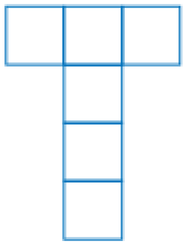
Question 2.
Match the following

(i)		-	(a) Cylinder
(ii)		-	(b) Cuboid
(iii)		-	(c) Triangular Prism
(iv)		-	(d) Square Pyramid

Answer:
(i) – b
(ii) – a
(iii) – d
(iv) – c

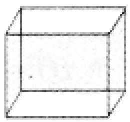
Question 3.
Which 3 – D shapes do the following nets represents? Draw them.

(i)

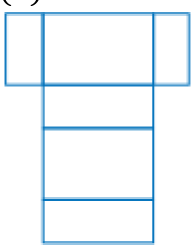


Answer:

The net represents cube, because it has 6 squares.

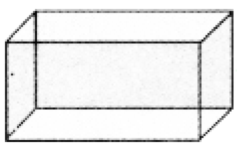


(ii)

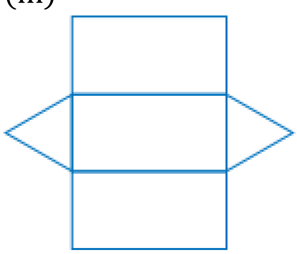


Answer:

The net represents cuboid

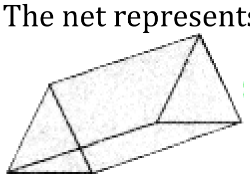


(iii)

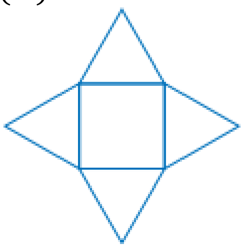


Answer:

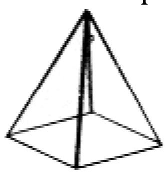
The net represents Triangular prism



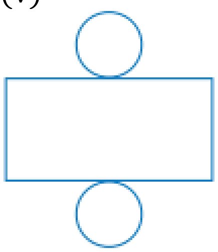
(iv)



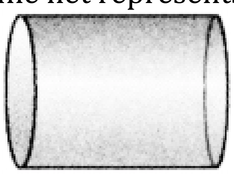
The net represents square pyramid



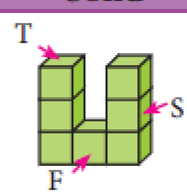
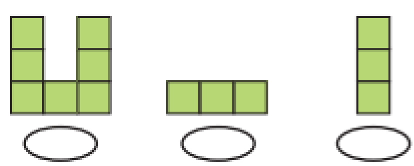
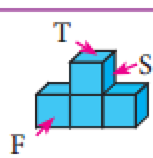
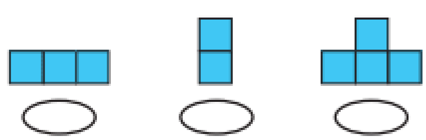
(v)

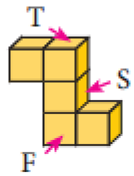
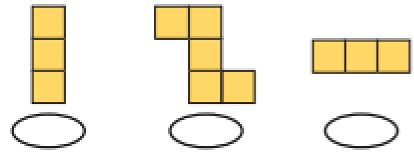


Answer:
Ine net represents cylinder

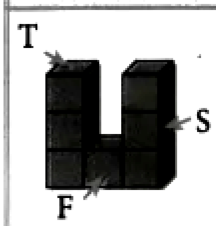
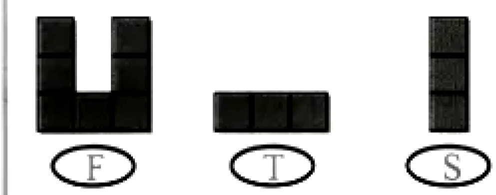
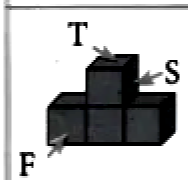
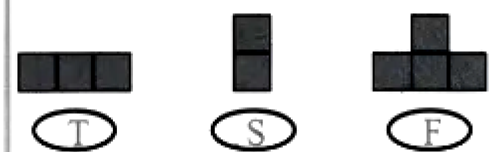
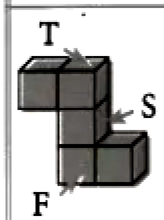
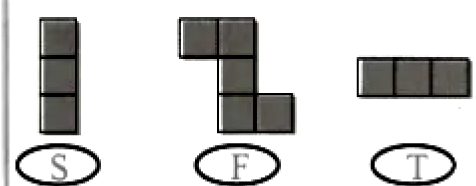


Question 4.
For each solid, three views are given. Identify for each solid, the corresponding Top, Front and Side (T, F and S) views.

Solid	Three views
	
	

Answer:

Solid	Three views
	
	
	

Question 5.
Verify Euler's formula for the table given below.

S.No.	Faces	Vertices	Edges
(i)	4	4	6
(ii)	10	6	12
(iii)	12	20	30
(iv)	20	13	30
(v)	32	60	90

Answer:
Euler's formula is given by $F + V - E = 2$
(i) $F = 4$; $V = 4$; $E = 6$
$F + V - E = 4 + 4 - 6 = 8 - 6$
$F + V - E = 2$
∴ Euler's formula is satisfied.

(ii) $F = 10; V = 6; E = 12$

$F + V - E = 10 + 6 - 12 = 16 - 12 = 4 \neq 2$

∴ Euler’s formula is not satisfied.

(iii) $F = 12; V = 20; E = 30$

$F + V - E = 12 + 20 - 30 = 32 - 30 = 2$

∴Euler’s formula is satisfied.

(iv) $F = 20; V = 13; E = 30$

$F + V - E = 20 + 13 - 30 = 33 - 30 = 3 \neq 2$

∴Euler’s formula is not satisfied.

(v) $F = 32; V = 60; E = 90$

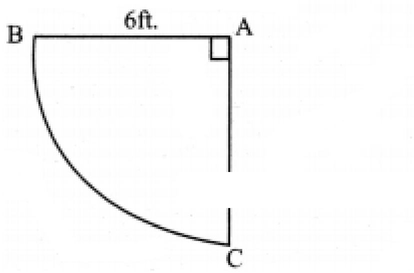
$F + V - E = 32 + 60 - 90 = 92 - 90 = 2$

∴ Euler’s formula is satisfied.

Ex 2.4

Question 1.
Two gates are fitted at the entrance of a library. To open the gates easily, a wheel is fixed at 6 feet distance from the wall to which the gate is fixed. If one of the gates is opened to 90°, find the distance moved by the wheel (π = 3.14).

Amswer:
Let A be the position of the wall AC be the gate in initial position and AB be position when it is moved 90°.
Now the arc length BC gives the distance moved by the wheel.



Length of the arc $= \frac{\theta}{360^\circ} \times 2\pi r$ units

$= \frac{90^\circ}{360^\circ} \times 2 \times 3.14 \times 6$ feets

$= 3.14 \times 3$ feets

$= 9.42$ feets

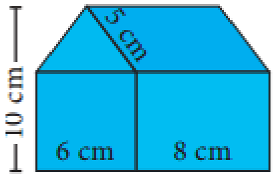
∴ Distance moved by the wheel = 9.42 feets.

Question 2.
With his usual speed, if a person covers a circular track of radius 150 m in 9 minutes, find the distance that he covers in 3 minutes (π = 3.14).
Answer:
Radius of the circular track = 150m
Distance covers in 9 minutes = Perimeter of the circle = 2 × π × r units
Distance covered in 9 min = 2 × 3.14 × 150m
Distance covered in 1 min $= \frac{2 \times 3.14 \times 150}{9}$m

$$\text{Distance covered in 3 min} = \frac{2 \times 3.14 \times \cancel{150}^{50} \times \cancel{3}}{\cancel{9}_{\cancel{3}_1}} = 314 \text{ m}$$

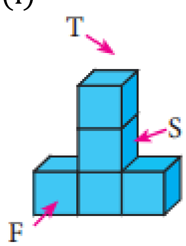
Distance he covers in 3min = 314m

Question 3.
Find the area of the house drawing given in the figure.

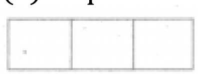


Answer:
Area of the house = Area of a square of side 6 cm + Area of a rectangle with l = 8cm, b = 6 cm + Area of a Δ with b = 6 cm and h = 4 cm + Area of a parallelogram with b = 8 cm, h = 4 cm
$= (\text{side} \times \text{side}) + (l \times b) + (\frac{1}{2} \times b \times h) + bh \text{ cm}^2$
$= (6 \times 6) + (8 \times 6) + (\frac{1}{2} \times 6 \times 4) + (8 \times 4) \text{ cm}^2$
$= 36 + 48 + 12 + 32 \text{ cm}^2$
$= 128 \text{ cm}^2$
Required Area = 128 cm^2

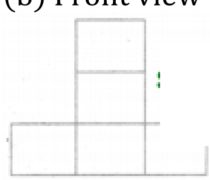
Question 4.
Draw the top, front and side view of the following solid shapes
(i)



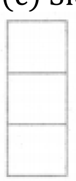
Answer:
(a) Top view



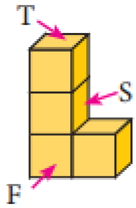
(b) Front view



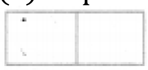
(c) Side view



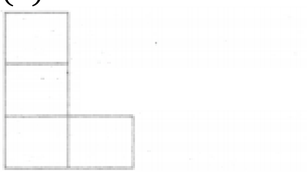
(ii)



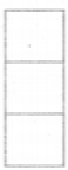
Answer:
(a) Top view



(b) Front view

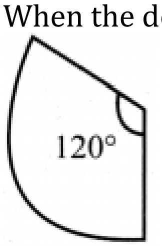


(c) Side view



Challenging Problems

Question 5.
Guna has fixed a single door of width 3 feet in his room where as Nathan has fixed a double door, each of width $1\frac{1}{2}$ feet in his room. From the closed position, if each of the single and double doors can open up to 120°, whose door takes a minimum area?
Answer:
Width of the door that Guna fixed = 3 feet.
When the door is open the radius of the sector = 3 feet



Angle covered = 120°
∴ Area required to open the door

$$= \frac{120^\circ}{360^\circ} \times \pi r^2 = \frac{120^\circ}{360^\circ} \times \pi \times 3 \times 3$$

= 3π $feet^2$

(b) Width of the double doors that Nathan fixed = $1\frac{1}{2}$ feet.

Angle described to open = 120°

Area required to open = 2 × Area of the sector

$$= 2 \times \frac{120^\circ}{360^\circ} \times \pi \times \frac{3}{2} \times \frac{3}{2} \text{ feets}^2 = \frac{3\pi}{2} \text{ feet}^2$$

z

= $\frac{1}{2}$ (3π) $feet^2$

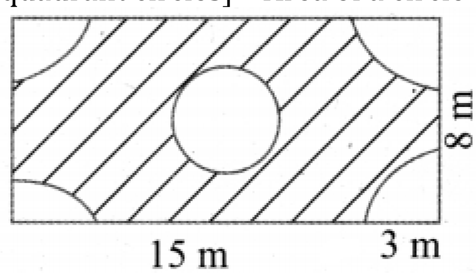
∴ The double door requires the minimum area.

Question 6.

In a rectangular field which measures 15 m x 8m, cows are tied with a rope of length 3m at four corners of the field and also at the centre. Find the area of the field where none of the cow can graze. (π = 3.14).

Answer:

Area of the field where none of the cow can graze = Area of the rectangle – [Area of 4 quadrant circles] – Area of a circle



Area of the rectangle = l × b $units^2$

= 15 × $8m^2$ = $120m^2$

Area of 4 quadrant circles = 4 × $\frac{1}{4}$ πr^2 units

Radius ofthe circle = 3m

Area of 4 quadrant circles = 4 × $\frac{1}{4}$ × 3.14 × 3 × 3 = 28.26 m^2

Area of the circle at the middle = πr^2 units

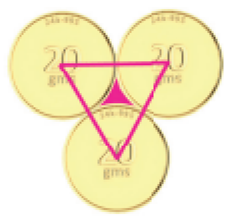
= 3.14 × 3 × $3m^2$ = $28.26m^2$

∴ Area where none of the cows can graze

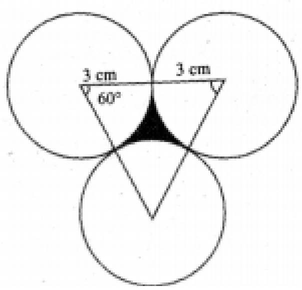
= [120 – 28.26 – 28.26]m^2 = 120 – 56.52 m^2 = 63.48 m^2

Question 7.

Three identical coins, each of diameter 6 cm are placed as shown. Find the area of the shaded region between the coins. (π = 3.14) (√3 = 1.732)



Answer:
Given diameter of the coins = 6 cm
∴ Radius of the coins = $\frac{6}{2}$ = 3 cm
Area of the shaded region = Area of equilateral triangle – Area of 3 sectors of angle 60°



Area of the equilateral triangle = $\frac{\sqrt{3}}{4}$ a^2 units^2 = $\frac{\sqrt{3}}{4}$ × 6 × 6 cm^2
= $\frac{1.732}{4}$ × 6 × 6 cm^2 = 15.588 cm^2
Area of 3 sectors = 3 × $\frac{\theta}{360°}$ × πr^2 sq.units
= 3 × $\frac{60°}{360°}$ × 3.14 × 3 × 3 cm^2 = 1.458 cm^2
∴ Area of the shaded region = 15.588 – 14.13 cm^2 = 1.458 cm^2
Required area = 1.458 cm^2 (approximately)

Question 8.
Using Euler's formula, find the unknowns.

S.No.	Faces	Vertices	Edges
(i)	?	6	14
(ii)	8	?	10
(iii)	20	10	?

Answer:
Euler's formula is given by F + V – E = 2
(i) V = 6, E = 14
By Euler's formula = F + 6 – 14 = 2
F = 2 + 14 – 6
F = 10

(ii) F = 8,E = 10
By Euler's formula = 8 + V – 10 = 2

$V = 2 - 8 + 10$
$V = 4$

(iii) $F = 20, V = 10$
By Euler's formula $= 20 + 10 — E = 2$
$30 - E = 2$
$E = 30 - 2.$
$E = 28$
Tabulating the required unknowns

S. No	Faces	Vertices	Edges
(i)	10	6	14
(ii)	8	4	10
(iii)	20	10	28