Unit 11 Perimeter and Area

Review Exercise 11

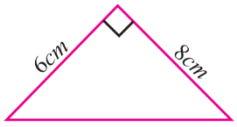
1. Choose the correct option.

(i) Which of the following is unit of area?

(a) m (b) km (c) cm (d) m^2

(ii) The area of triangle is --------.

(a) 12 cm^2 (b) 24 cm^2 (c) 48 cm^2 (d) 96 cm^2



(iii) If the diameter of the circle is 14 *cm*, the perimeter is ----------.

(a) 7π *cm* (b) 14π *cm* (c) 28 *cm* (d) 21 *cm*

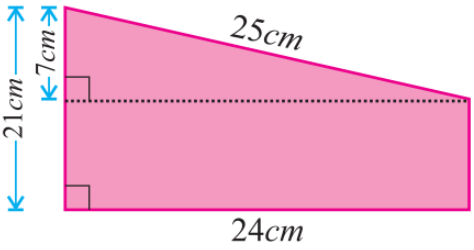
(iv) A quadrant is ---------- of a circle.

(a) 2 times (b) 4 times (c) half (d) quarter

(v) A car covers a distance of 40 km. Its wheel has diameter of 0.4 m. The number of revolutions of the wheel is ----------.

(a) 500 (b) 5000 (c) 50000 (d) 500,000

2. The diagram shows the cross section of a wooden log.
Calculate the area and perimeter of cross section.



Solution: The given cross section has two parts. First one is triangle and the second is rectangle. So, calculate the perimeter and area separately of both figures.

Perimeter of triangle = 7 *cm* + 25 *cm* + 24 *cm*

= 56 *cm*

Area of triangle = $\frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 24\ cm \times 7\ cm$

$= 84\ cm^2$

Now, to calculate perimeter and area of rectangle find its length and width.

Length = 24 *cm* and Width = 21 *cm* – 7 *cm* =14 *cm*. So

Perimeter of rectangle = 2 (Length + Width)

= 2(24 *cm* + 14 *cm*)

= 2 × 38 *cm*

= 76 *cm*

Remember
Perimeter is the sum of all sides of a closed figure.

Area of rectangle = Length × Width

= 24 *cm* × 14 *cm*

= 336 cm^2

Perimeter of wooden log = 21 *cm* + 25 *cm* + 14 *cm* + 24 *cm*

= 84 *cm*

Area of wooden log = Area of triangle + Area of rectangle

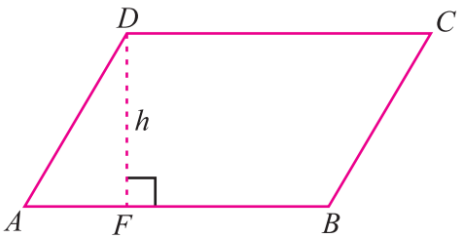
$= 84\ cm^2 + 336\ cm^2$

$= 420\ cm^2$

3. ABCD is a parallelogram with height $h = 12\ cm$ and $m\overline{AB} = 22\ cm$.

(a) Find the area of parallelogram ABCD.

(b) If the area of quadrilateral BCDF is 200 cm^2, find $m\overline{AF}$.



Solution: As we know that

Area of parallelogram = Base × Height

In parallelogram ABCD, base is $m\overline{AB} = 22\ cm$ and height is 12 cm.

(a) Area of parallelogram ABCD = 22 cm × 12 cm

$= 264\ cm^2$

(b) Given that

Area of quadrilateral BCDF = 200 cm^2

Area of parallelogram ABCD = 264 cm^2

It means, Area of the right angled triangle AFD = 264 cm^2 − 200 cm^2

$= 64\ cm^2$

As we know that

Area of triangle $= \frac{1}{2} \times b \times h$

$64\ cm^2 = \frac{1}{2} \times \overline{AF} \times 12\ cm$

Multiplying both sides by 2

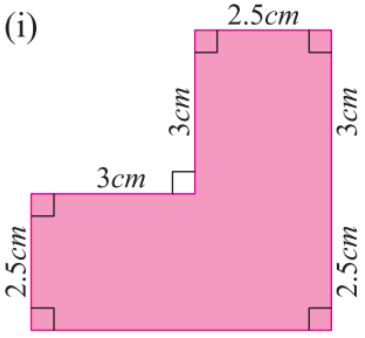
$128\ cm^2 = \overline{AF} \times 12\ cm$

Divide both sides by 12 cm

$10.67\ cm = \overline{AF}$

4. Find area and perimeter of the shaded region. (π = 3.14)

(i)



Solution: To find the perimeter of given shape add the length of all sides

The length of unknown side = 3 cm + 2.5 cm = 5.5 cm

Perimeter of the shaded region = 2.5 cm + 3 cm + 3 cm + 2.5 cm + 3 cm + 2.5 cm + 5.5 cm

$= 22\ cm$

To find the area of shaded region consider two sections and calculate area separately.

Area of section I = Length × Width

= 3 cm × 2.5 cm

= 7.5 cm^2

Area of section II = Length × Width

= 5.5 cm × 2.5 cm

= 13.75 cm^2

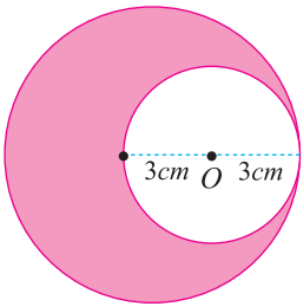
Now to calculate area of whole shaded region add both areas

Area of shaded region = Area of section I + Area of section II

= 7.5 cm^2 + 13.75 cm^2

= 21.25 cm^2

(ii)



Solution: To find the perimeter of given circle. Calculate the circumference of the circle.

Perimeter of big circle = Circumference = $2\pi r$

= 2 (3.14)(6 cm)

= 37.68 cm

Perimeter of small circle = Circumference = $2\pi r$

= 2 (3.14)(3 cm)

= 18.84 cm

Perimeter of shaded region = 37.68 cm +18.84 cm

= 56.52 cm

To find the area of shaded region consider two sections and calculate area separately. Subtract the area of small circle from greater circle.

Area of greater circle = πr^2

= 3.14 × (6 cm)^2

= 3.14 × 36 cm^2

= 113.04 cm^2

Area of smaller circle = πr^2

= 3.14 × (3 cm)^2

= 3.14 × 9 cm^2

= 28.26 cm^2

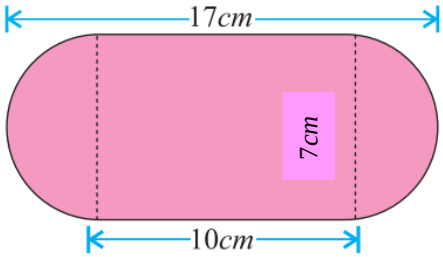
Now to calculate area of whole shaded region add both areas

Area of shaded region = Area of greater circle − Area of smaller circle

= 113.04 cm^2 − 28.26 cm^2

= 84.78 cm^2

(iii)



Solution: To find the perimeter and area of shaded region consider three sections. Here one is rectangle and other two are semi-circles. In case of semi-circle radius will be 3.5 *cm*.

Circumference both of semi-circles = $2 \times \pi r$

$= 2 \times \pi\ (3.5)$

$= 7\pi$

Perimeter of shaded region = $10\ cm + 10\ cm + 7\pi$

$= 20\ cm + 7\pi$

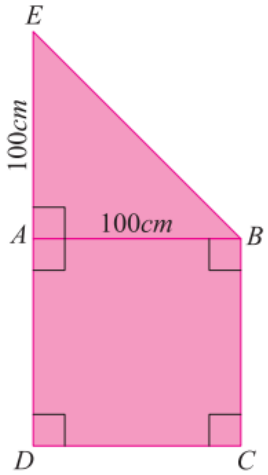
Area of shaded region = Area of rectangle + Area of both semi-circles

$= (\text{Length} \times \text{Width}) + (\pi r^2)$

$= (10\ cm \times 7\ cm) + \pi\ (3.5)^2$

$= 70\ cm^2 + (3.5)^2\ \pi$

5. Find perimeter and area of shaded region. ABCD is a square and ΔABE is a right angled triangle $m\overline{AE} = m\overline{AB} = 100\ cm$ and $m\overline{BE} = 141.4\ cm$.



Solution: To find the perimeter of shaded region add the length of all sides.

In square all sides are equal in length. So

Perimeter of the shaded region = $100\ cm + 100\ cm + 100\ cm + 100\ cm + 141.4\ cm$

$= 541.4\ cm$

To find the area of shaded region consider two sections and calculate area separately.

Area of section I $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 100\ cm \times 100\ cm$

$= 5000\ cm^2$

Area of section II = $(\text{Length of side})^2$

$= (100\ cm)^2$

$= 10000\ cm^2$

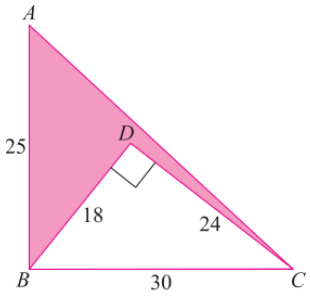
Now to calculate area of whole shaded region add both areas

Area of shaded region = Area of section I + Area of section II

$= 5000\ cm^2 + 10000\ cm^2$

$= 15000\ cm^2$

6. In a triangular garden ABC, $m\overline{BC} = 30\ m$, $m\overline{AB} = 25\ m$, $m\overline{BD} = 18\ m$, $m\overline{CD} = 24\ m$ $m\overline{BC} = 30\ m$. The triangular section BCD is used for growing onion and the rest is used for potatoes.



(a) Find the area of the land used for growing potatoes (shaded area)

(b) The cost of growing potatoes is Rs. 80. Find the cost of growing potatoes in the shaded region.

Solution: Given that

$m\overline{BC} = 30\ m,\ m\overline{AB} = 25\ m,\ m\overline{BD} = 18\ m,\ m\overline{CD} = 24\ m, m\overline{BC} = 30\ m$

(a) First all we have to calculate area of both triangles ABC and BDC.

Area of triangle ABC $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 30\ m \times 25\ m$

$= 375\ m^2$

Area of triangle BDC $= \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 18\ m \times 24\ m$

$= 216\ m^2$

The area of the land used for growing potatoes = Area of triangle ABC − Area of triangle BDC

$= 375\ m^2 - 216\ m^2$

$= 159\ m^2$

(b) The cost of growing potatoes is Rs. 80.

The cost of growing potatoes in the shaded region = 159 × 80

= Rs. 12,720

7. Convert the following as directed.

(a) 0.0004 km^2 into m^2

Solution: As we know that 1 km^2 = 1,000,000 m^2

0.0004 km^2 = 0.0004 × 1,000,000 m^2

= 400 m^2

(b) 0.004565 m^2 into cm^2

Solution: As we know that 1 m^2 = 10,000 cm^2

0.004565 m^2 = 0. 004565 × 10,000 cm^2

= 45.65 cm^2

(c) 625,000 m^2 into km^2

Solution: As we know that 1 $m^2 = \frac{1}{1{,}000{,}000}\ km^2$

625,000 $m^2 = 625{,}000 \times \frac{1}{1{,}000{,}000}\ km^2$

= 0.625 km^2

(d) 51350 cm^2 into m^2

Solution: As we know that 1 $cm^2 = \frac{1}{10{,}000}\ m^2$

51350 $cm^2 = 51350 \times \frac{1}{10{,}000}\ m^2$

= 5.135 m^2

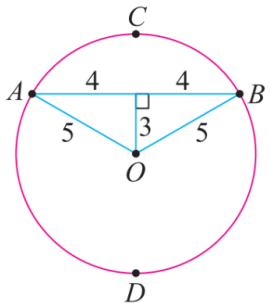
8. The jogging track in a locality is in the form of a circle of radius 200 *m*. ($\pi = 3.14$)
(a) Calculate the distance in *km* covered in one round.
(b) Ahmed wants to run a distance of 4.5 *km* around the circular track. At least how many rounds are required for running the given distance.
(c) If the speed of Ahmed is 3.6 *km/h*, how many minutes he will take to cover a distance of 4.5 *km*.
Solution: Given that the shape of jogging track is circular with radius 200 *m*.

(a) Distance around the track means we have to calculate circumference of the circular path.
As we know that
Circumference of circle = $2\pi r$
$= 2 \times 3.14 \times 200\ m$
$= 1256\ m$
We have to find value *in km*. So,
$1256\ m = 1256\ m \div 1000\ km$
$= 1.256\ km$
Hence, the distance around the given jogging track in kilometres is 1.256 *km*.

(b) The given track is 1.256 km long. So for 4.5 km the number of rounds will be:
4.5 km ÷ 1.256 km = 3.58 or approximately 4 rounds.

(c) Given that
Speed = 3.6 km/h, distance = 4.5 km
We have to find the time taken by Ahmad to cover the distance.
Time = Distance ÷ Speed
= 4.5 km ÷ 3.6 km/h
= 1.25 hours
= 1 hour + 0.25 hour
= 1 hour 15 minutes or 75 minutes
Hence, Ahmad took 75 minutes to cover the required distance at the given speed.

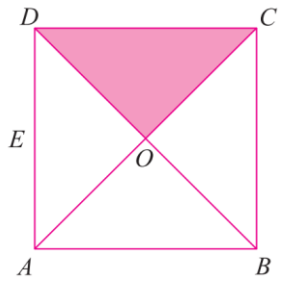
9. The triangle OAB is such that $m\overline{OA} = m\overline{OB} = 5\ cm$ and $\overline{AB} = 8\ cm$. Perpendicular from *O* to *AB* has length 3 *cm*. ($\pi = 3.14$)
(a) Find the area of the ΔOAB.
(b) Which segment of circle has larger area ACB or ADB?
(c) Name a minor and a major arc.



Solution: Given that triangle OAB is such that $m\overline{OA} = m\overline{OB} = 5\ cm$ and $\overline{AB} = 8\ cm$. Perpendicular from *O* to *AB* has length 3 *cm*.
(a) Area of triangle OAB = $\frac{1}{2} \times b \times h$
$= \frac{1}{2} \times 8\ cm \times 3\ cm$
$= 12\ cm^2$

(b) It's obvious. The segment ADB of the given circle has larger area.
(c) In the given circle, ACB is minor arc and ADB is major arc.

10. ABCD is a square and *O* is the mid-point of diagonals, given that $m\overline{AC} = 12\ cm, m\overline{DC} = \sqrt{72}\ cm$. Find shaded area.

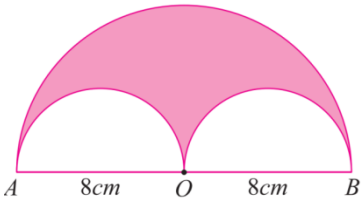


Solution: Given that *O* is the mid-point of diagonals of the square ABCD. The length of one side of the given square is $\sqrt{72}\ cm$.
If we consider the right angled triangle DCB then its area will be:

Area of triangle DCB $= \frac{1}{2} \times b \times h$
$= \frac{1}{2} \times \sqrt{72}\ cm \times \sqrt{72}\ cm$
$= 36\ cm^2$

As the diagonal AC divide the triangle DCB into two halves. So
To find the area of shaded region $= 36\ cm^2 \div 2$
$= 18\ cm^2$

11. Find area and perimeter of the shaded region. ($\pi = 3.14$)



Solution: Given that O is the centre of circle and radius is 8 *cm*.
To find the perimeter of shaded region calculate the circumference of big semi-circle.
Circumference of big semi-circle $= \pi r$
$= 3.14 \times 8\ cm$
$= 25.12\ cm$
Circumference of both small semi-circles $= 2 \times \pi r$
$= 2 \times 3.14 \times 4\ cm$
$= 25.12\ cm$
Perimeter of shaded region $= 25.12\ cm + 25.12\ cm$
$= 50.24\ cm$

To find the area of shaded region consider two sections (big semi-circle and small semi-circles) and calculate area separately.

Area of section I = Area of big semi-circle $= \frac{\pi r^2}{2}$
$= \frac{3.14 \times (8\ cm)^2}{2}$
$= \frac{3.14 \times 64\ cm^2}{2}$
$= 100.48\ cm^2$

In small semi-circles radius will be 4 *cm*.

Area of section II = Area of both semi-circles $= 2 \times \frac{\pi r^2}{2}$
$= 2 \times \frac{3.14 \times (4\ cm)^2}{2}$
$= 3.14 \times 16\ cm^2$
$= 50.24\ cm^2$

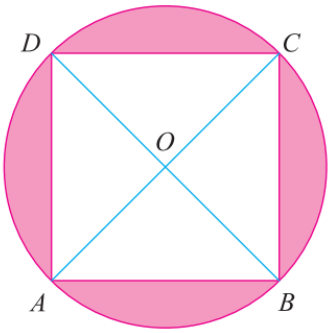
Now, to calculate the area of shaded region, subtract the area of small semi-circles from area of big semi-circle.

Area of shaded region = Area of section I − Area of section II

$= 100.48\ cm^2 - 50.24\ cm^2$

$= 50.24\ cm^2$

12. O is the centre of circle of radius 15 *cm*. ABCD is a square of side length $\sqrt{450}$ *cm*. Find area and perimeter of the shaded region. ($\pi = 3.14$)



Solution: Given that O is the centre of circle and radius is 15 *cm*. Where ABCD is a square of side length $\sqrt{450}$ *cm*.

To find the perimeter of shaded region calculate the circumference of circle and add the length of all sides of the square.

Circumference of circle = $2\pi r$

$= 2 \times 3.14 \times 15$ cm

$= 94.2\ cm$

In square all sides are equal in length. So

Perimeter of the square = 4 × Length of side

$= 4 \times \sqrt{450}\ cm$

$= 84.85\ cm$

Perimeter of shaded region = $94.2\ cm + 84.85\ cm$

$= 179.05\ cm$

To find the area of shaded region consider two sections and calculate area separately.

Area of section I = Area of circle = πr^2

$= 3.14 \times (15\ cm)^2$

$= 3.14 \times 225\ cm^2$

$= 706.5\ cm^2$

Area of section II = Area of square = $(\text{Length of side})^2$

$= (\sqrt{450}\ cm)^2$

$= 450\ cm^2$

Now, to calculate the area of shaded region, subtract the area of square from area of circle.

Area of shaded region = Area of section I − Area of section II

$= 706.5\ cm^2 - 450\ cm^2$

$= 256.5\ cm^2$