Welcome To

Class :7th

Book 1

chapter#13

chapter#14

Chapter#15

Book 2

Chapter#1

Teacher Name:Mrs Zokia

Chapter#13

Area and Perimeter

Of Plane Figures

Discussion Topics

1.conversion of Units

2. Perimeter And Area of Plane Figures

3 .Perimeter And Area of Parallelograms

RELATION BETWEEN VARIOUS UNITS (CONVERSIONS)

Length Units

1 m = 100 cm

1 m = 10 dm

1 cm = 10 mm

1 km = 1000 m

1 hm = 100 m

1 dam = 10 m

1 dm = 10 cm

1 km = 10 hm

Area Units

$1\ m^2 = 100 \times 100\ cm^2 = 10000\ cm^2$

$1\ m^2 = 10 \times 10\ dm^2 = 100\ dm^2$

$1\ cm^2 = 10 \times 10\ mm^2 = 100\ mm^2$

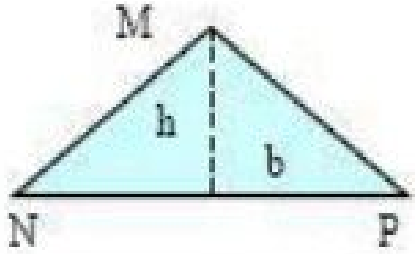
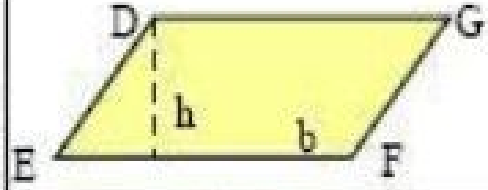
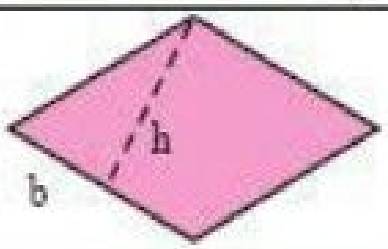
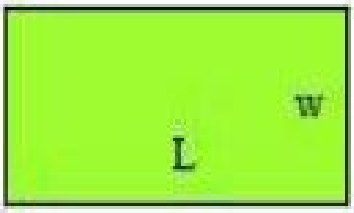
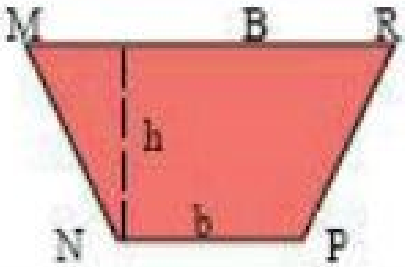
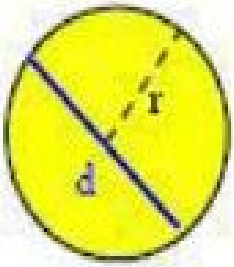
$1\ km^2 = 1000 \times 1000\ m^2 = 100000\ m^2$

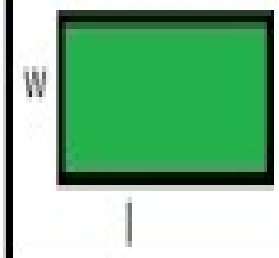
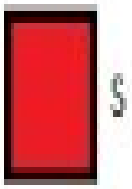
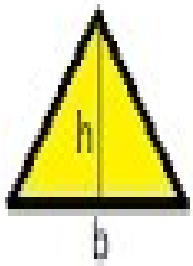
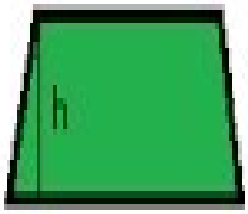
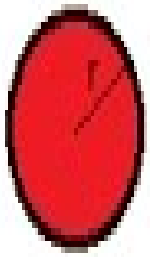
$1\ hm^2 = (100 \times 100)\ m^2 = 10000\ m^2 = 1$ hectare

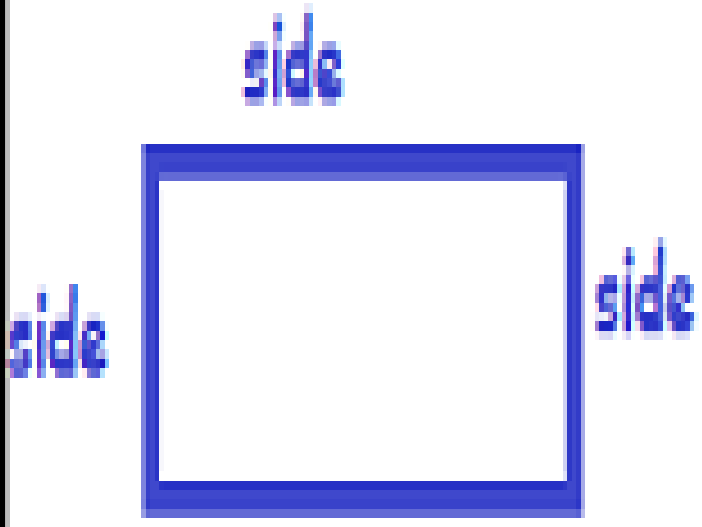
$1\ dam^2 = 10 \times 10\ m^2 = 100\ m^2 = 1$ are

$1\ dm^2 = 10 \times 10\ cm^2 = 100\ cm^2$

$1\ km^2 = 10 \times 10\ hm^2 = 100\ hm^2$

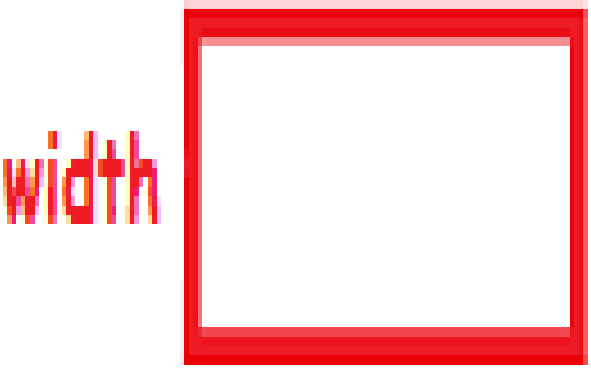
NAME	FIGURE	AREA	PERIMETER CIRCUMFERENCE
TRIANGLE		$A=\frac{b\times h}{2}$	$P=MN+NP+PM$
PARALLELOGRAM		$A=b\times h$	$P=DE+EF+FG+GD$
RHOMBUS		$A=b\times h$	$P=b+b+b+b$ $P=4b$
RECTANGLE		$A=L\times w$	$P=L+w+L+w$ $P=2L+2w$
SQUARE		$A=l^2$	$P=l+l+l+l$ $P=4l$
TRAPEZOID		$A=\frac{(B+b)\times h}{2}$	$P=MN+NP+PR+RM$
CIRCLE		$A=\pi r^2$	$C=2\pi r=\pi d$

Name	Shape	Perimeter P=Perimeter in units	Area A=Area in Square Units	Definition of Variables
Rectangle		$P=2w+2l$	$A=lw$	l=length w=width
Square		$P=4s$	$A=s^2$	s= length of one side
Triangle		$P=s_1+s_2+s_3$	$A=(bh)/2$	h=height b=base
Trapezoid		Not a formula just add up the four sides	$A=\frac{h(l_1+l_2)}{2}$	h=height l=length
Circle		$C=\pi d$	$A=\pi r^2$	r=radius C=circumference



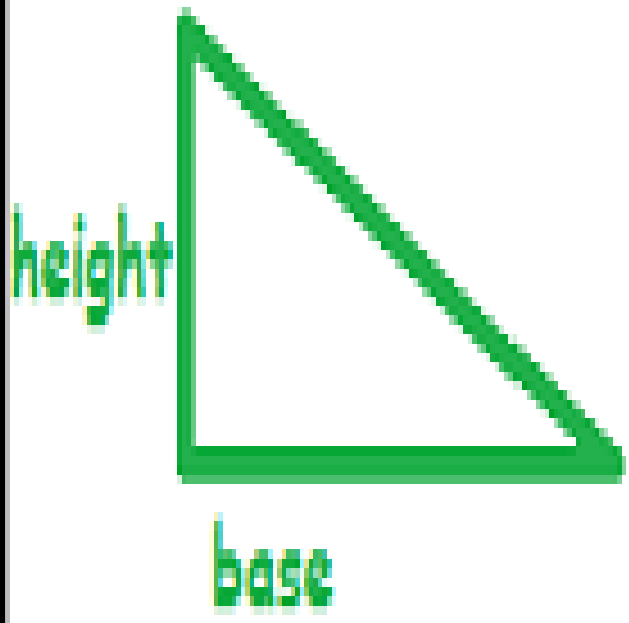
Perimeter=

side + side + side + side

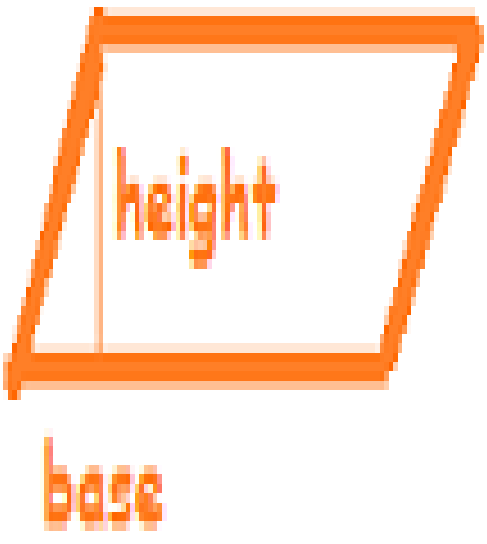


Area =

length x width



$$\text{Area} = \frac{\text{base} \times \text{height}}{2}$$



Area = base x height

AREA & PERIMETER

rectangle

$A = l \times w$

$P = 2 \times (l + w)$

square

$A = s^2$

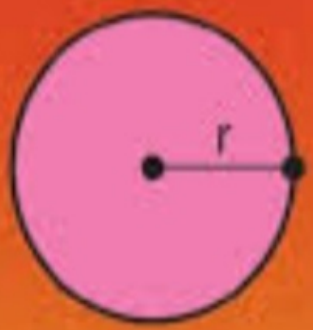
$P = 4 \times s$

triangle

$A = \frac{1}{2} b \times h$

$P = s_1 + s_2 + s_3$

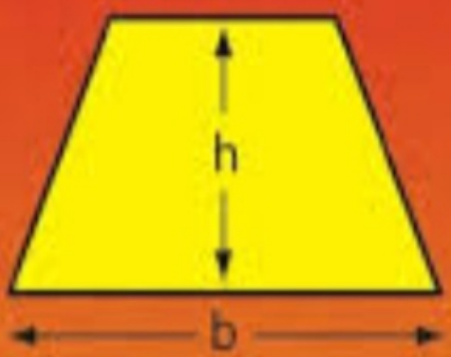
circle



$A = \pi \times r^2$

$C = 2\pi \times r$

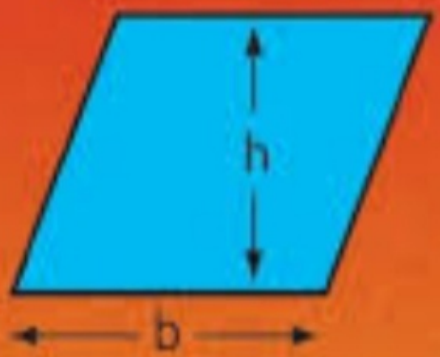
trapezoid



$A = \frac{1}{2} h \times (b_1 + b_2)$

$P = s_1 + s_2 + s_3 + s_4$

parallelogram



$A = b \times h$

$P = 2 \times (l + w)$

Basic Terms

A = **area** The measure of the inside of a closed figure, expressed in square units (8 sq. in. or 8 $in.^2$).

P = **perimeter** The measure of the distance around the outside of a closed figure.

C = **circumference** The perimeter of a circle.

π = **pi (3.14)** The ratio of a circle's circumference to its diameter.

b = base
h = height
l = length
w = width
r = radius
s = side

Exercise 13A

1. (a) $40\ m^2 = 40 \times 10\,000\ cm^2$

$= 400\,000\ cm^2$

(b) $16\ cm^2 = 16 \times 0.0001\ m^2$

$= 0.0016\ m^2$

(c) $0.03\ m^2 = 0.03 \times 10\,000\ cm^2$

$= 300\ cm^2$

(d) $28\,000\ cm^2 = 28\,000 \times 0.0001\ m^2$

$= 2.8\ m^2$

2. (i) Breadth of rectangle $= \frac{259}{18.5}$

$= 14\ cm$

(ii) Perimeter of rectangle $= 2(18.5 + 14)$

$= 2(32.5)$

$= 65\ cm$

3. Area of figure = area of square – area of triangle

$$= 9^2 - \frac{1}{2} \times 3 \times 2.5$$
$$= 81 - 3.75$$
$$= 77.25 \text{ m}^2$$

4. **(a)** Diameter of circle $= 2 \times 10$
$= 20$ cm

Circumference of circle $= 2\pi(10)$
$= 20\pi$
$= 62.8$ cm (to 3 s.f.)

Area of circle $= \pi(10)^2$
$= 100\pi$
$= 314 \text{ cm}^2$ (to 3 s.f.)

(b) Radius of circle $= \frac{3.6}{2}$
$= 1.8$ m

Circumference of circle $= 2\pi(1.8)$
$= 3.6\pi$
$= 11.3$ m (to 3 s.f.)

Area of circle $= \pi(1.8)^2$
$= 3.24\pi$
$= 10.2 \text{ m}^2$ (to 3 s.f.)

(c) Radius of circle $= \frac{176}{2\pi}$
$= \frac{88}{\pi}$
$= 28.0$ mm (to 3 s.f.)

Diameter of circe $= 2 \times \frac{88}{\pi}$
$= \frac{176}{\pi}$
$= 56.0$ mm (to 3 s.f.)

Area of circle $= \pi\left(\frac{88}{\pi}\right)^2$
$= \pi\left(\frac{7744}{\pi^2}\right)$
$= \frac{7744}{\pi}$
$= 2460 \text{ mm}^2$ (to 3 s.f.)

(d) Radius of circle $= \sqrt{\frac{616}{\pi}}$
$= 14.0$ cm (to 3 s.f.)

Diameter of circle $= 2 \times \sqrt{\frac{616}{\pi}}$
$= 28.0$ cm (to 3 s.f.)

Circumference of circle $= 2\pi\left(\sqrt{\frac{616}{\pi}}\right)$
$= 88.0$ cm (to 3 s.f.)

5. Let the diameter of the semicircle be x cm.

$$\frac{1}{2} \times \pi \times x + x = 144$$
$$\frac{1}{2} \times \frac{22}{7} \times x + x = 144$$
$$\frac{11}{7}x + x = 144$$
$$\frac{18}{7}x = 144$$
$$x = 56$$

$\therefore$ Diameter of semicircle $= 56$ cm
$= 0.56$ m

6. **(a)** **(i)** Perimeter of figure $= 2\pi\left(\frac{21}{2}\right) + 2(36 - 21)$
$= 2\pi(10.5) + 2(15)$
$= 21\pi + 30$
$= 96.0$ cm (to 3 s.f.)

(ii) Area of figure = area of two semicircles + area of rectangle
$= \pi(10.5)^2 + 15 \times 21$
$= 110.25\pi + 315$
$= 661 \text{ cm}^2$ (to 3 s.f.)

(b) **(i)** Perimeter of figure $= \frac{1}{2} \times 2\pi(5) + 2(5) + \sqrt{200}$
$= 5\pi + 10 + \sqrt{200}$
$= 39.9$ cm (to 3 s.f.)

(ii) Area of figure = area of semicircle + area of triangle
$= \frac{1}{2} \times \pi(5)^2 + \frac{1}{2} \times 10 \times 10$
$= \frac{25}{2}\pi + 50$
$= 89.3 \text{ cm}^2$ (to 3 s.f.)

(c) **(i)** Perimeter of figure $= \frac{1}{2} \times 2\pi\left(\frac{18}{2}\right) + 2\pi\left(\frac{18}{4}\right)$
$= \frac{1}{2} \times 2\pi(9) + 2\pi(4.5)$
$= 9\pi + 9\pi$
$= 18\pi$
$= 56.5$ cm (to 3 s.f.)

(ii) Area of figure
= area of big semicircle + area of two small semicircles
$= \frac{1}{2} \times \pi(9)^2 + \pi(4.5)^2$
$= \frac{81}{2}\pi + 20.25\pi$
$= 60.75\pi$
$= 191 \text{ cm}^2$ (to 3 s.f.)

7. **(i)** Perimeter of figure $= 2\pi(2) + 2(9 - 2 \times 2) + 2(3)$
$= 4\pi + 2(5) + 6$
$= 4\pi + 10 + 6$
$= 4\pi + 16$
$= 28.6$ m (to 3 s.f.)

Q#7

(a) Area of figure = area of rectangle − area of four quadrants

$= 9 \times [(2)(2) + 3] - \pi(2)^2$

$= 9 \times 7 - 4\pi$

$= 63 - 4\pi$

$= 50.4\ m^2$ (to 3 s.f.)

13B

1. (a) Area of parallelogram $= 12 \times 7$
$= 84 \text{ cm}^2$

(b) Base of parallelogram $= \dfrac{42}{6}$
$= 7 \text{ m}$

(c) Height of parallelogram $= \dfrac{42.9}{7.8}$
$= 5.5 \text{ mm}$

2. (a) Area of trapezium $= \dfrac{1}{2} \times (7 + 11) \times 6$
$= \dfrac{1}{2} \times 18 \times 6$
$= 54 \text{ cm}^2$

(b) Height of trapezium $= \dfrac{126}{\frac{1}{2} \times (8 + 10)}$
$= \dfrac{126}{\frac{1}{2} \times 18}$
$= \dfrac{126}{9}$
$= 14 \text{ m}$

(c) Length of parallel side 2 of trapezium $= \dfrac{72}{\frac{1}{2} \times 8} - 5$
$= \dfrac{72}{4} - 5$
$= 18 - 5$
$= 13 \text{ mm}$

3. (i) Area of parallelogram $= 6 \times 9$
$= 54 \text{ cm}^2$

(ii) Perimeter of parallelogram $= 2(10 + 6)$
$= 2(16)$
$= 32 \text{ cm}$

4. Area of parallelogram $= PQ \times ST = QR \times SU$
$PQ \times 8 = 10 \times 11.2$
$PQ \times 8 = 112$
$PQ = 14$

Length of $PQ = 14 \text{ m}$

5. (i) Area of trapezium $= \dfrac{1}{2} \times (35.5 + 20) \times 15$
$= \dfrac{1}{2} \times 55.5 \times 15$
$= 416.25 \text{ cm}^2$

(ii) Perimeter of trapezium $= 35.5 + 18 + 20 + 16$
$= 89.5 \text{ cm}$

6. (i) Area of trapezium $= \dfrac{1}{2} \times (PQ + RS) \times PT = 150 \text{ m}^2$
$\dfrac{1}{2} \times (12 + RS) \times 10 = 150$
$5 \times (12 + RS) = 150$
$12 + RS = 30$
$RS = 18$

Length of $RS = 18 \text{ m}$

(ii) Perimeter of trapezium $= PQ + QR + RS + PS = 54.7 \text{ m}$
$12 + QR + 18 + 13 = 54.7$
$43 + QR = 54.7$
$QR = 11.7$

Length of $QR = 11.7 \text{ m}$

7. Area of shaded regions = area of trapezium $ABCD$ – area of $\triangle BCE$
$= \dfrac{1}{2} \times (10 + 14) \times 12 - \dfrac{1}{2} \times 14 \times 12$
$= \dfrac{1}{2} \times 24 \times 12 - 84$
$= 144 - 84$
$= 60 \text{ cm}^2$