

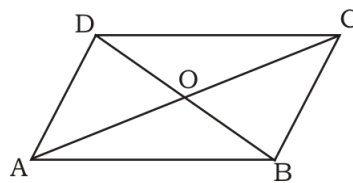
Quadrilateral: 4 sided polygon

Sum of internal angles = 360

Sum of external angles = 360

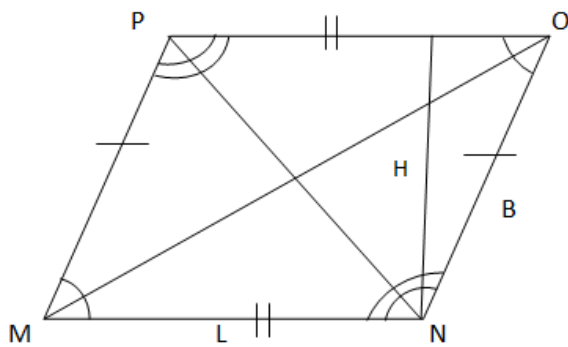
Number of diagonals = 2

Parallelogram: Quadrilateral formed by joining mid points of the sides of any quadrilateral.



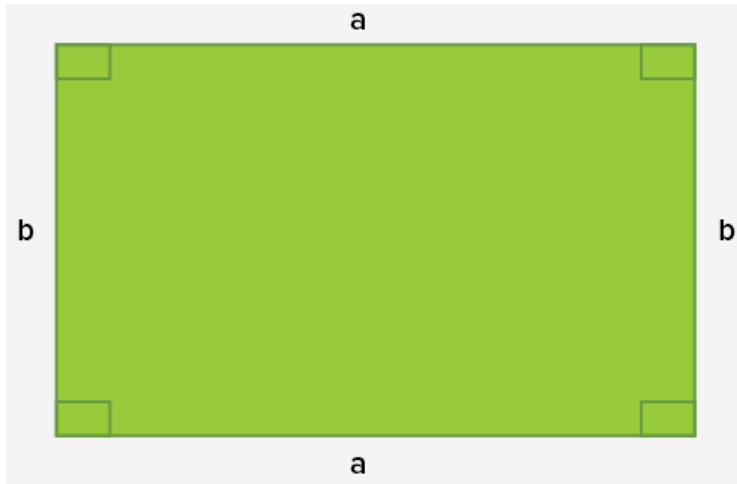
1. Opposite sides are \parallel .
2. Opposite sides are equal.
3. Opposite angles are equal.
4. The diagonals bisect each other i.e.
 $OA=OC$ & $OB=OD$

Area = base \times height
= $ab \sin \theta$, a & b are sides and θ is any angle



Rectangle: Special parallelogram with

1. Equal angles.
2. Equal diagonals.
3. Maximum area.



Area = Base \times Height

$$\text{Diagonal} = \sqrt{a^2 + b^2}$$

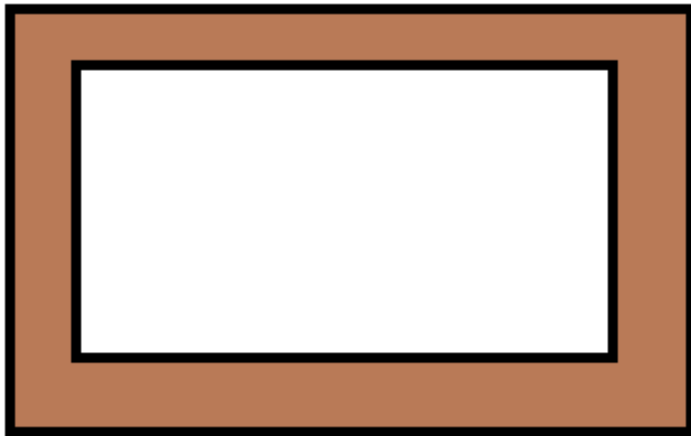
Problem: There is a rectangular garden with dimensions 14m \times 16m. There is a path of width 5m all along outside the garden. Find the area of the path?

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Area of path = Area of outer rectangle – Area of inner rectangle

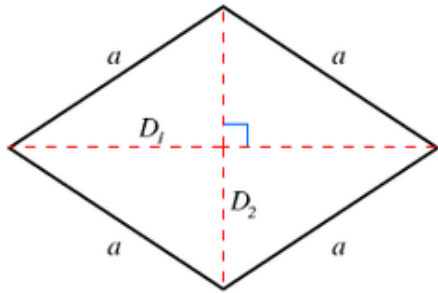
$$= 24 \times 26 - 14 \times 16$$

$$= 400$$



Rhombus: Special parallelogram with

1. Equal sides.
2. Diagonals bisect at 90° .
3. Diagonals are angle bisectors.
4. 4 smaller triangles are congruent.



$$\text{Area} = \frac{1}{2} \times d_1 \times d_2$$

Note: In any quadrilateral if diagonals are perpendicular

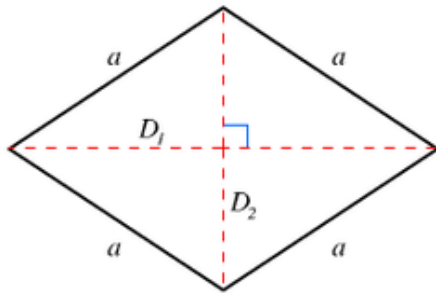
then its area = $\frac{1}{2} \times d_1 \times d_2$

Problem: If diagonals of a Rhombus are 24cm and 32cm then find the perimeter of the Rhombus?

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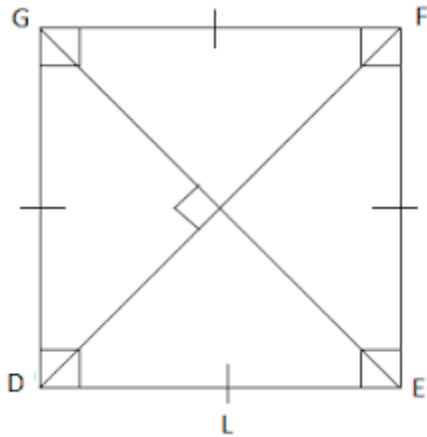
$$\text{Side} = \sqrt{12^2 + 16^2} = 20$$

$$\text{Perimeter} = 4 \times 20 = 80$$



Square: Special Rectangle & Rhombus

1. Equal sides.
2. Diagonals bisect at 90° .
3. Diagonals are angle bisectors.
4. Equal angles.
5. Equal diagonals.



$$\text{Area} = (\text{Side})^2$$

$$\text{Diagonal} = \sqrt{2} \times \text{Side}$$

Problem:

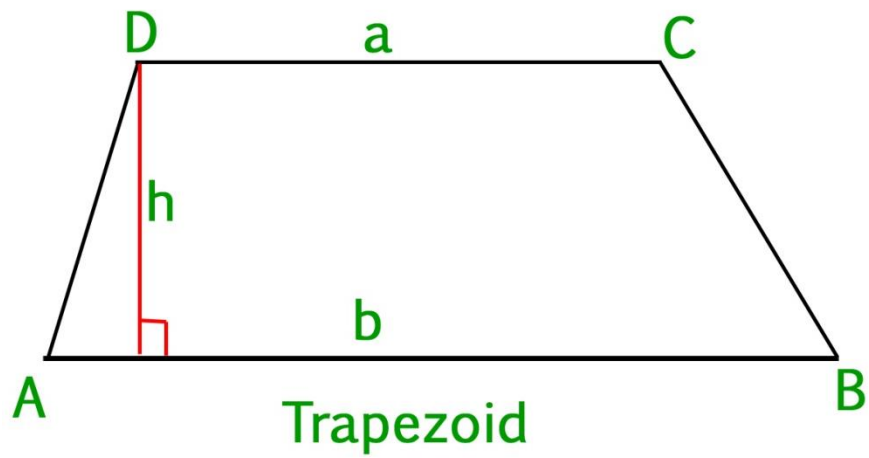
Find the ratio of area of square to rhombus if both are having same sides and one angle of rhombus is 30° .

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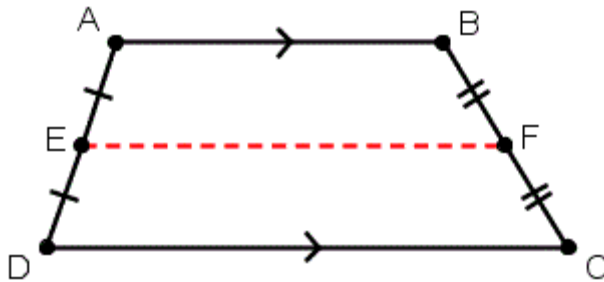
Let a is the side of square as well as rhombus.

$$\frac{\text{Area of square}}{\text{Area of rhombus}} = \frac{a^2}{a^2 \sin 30^\circ} = \frac{1}{\frac{1}{2}} = 2$$

Trapezium(Trapezoid): 2 sides are ||.



$$\text{Area} = \frac{1}{2} \times \text{height} \times \text{sum of } \parallel \text{ sides}$$

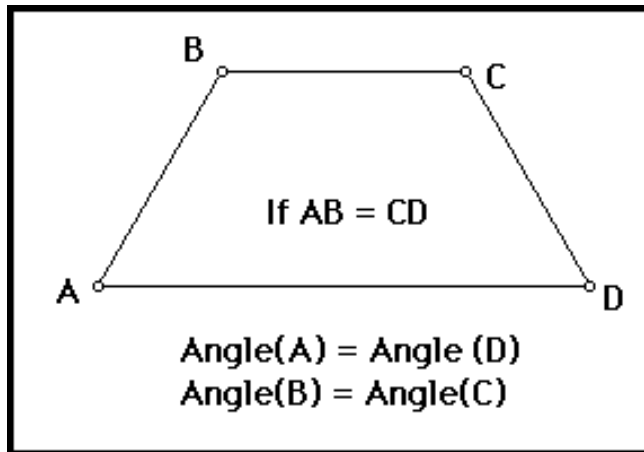


E & F are mid points of AD and BC then

$$EF = \frac{AB+CD}{2}$$

Isosceles Trapezium:

1. Oblique sides (Non-parallel sides) are equal.
2. Diagonals are equal.
3. It is cyclic i.e. sum of opposite angles is 180.



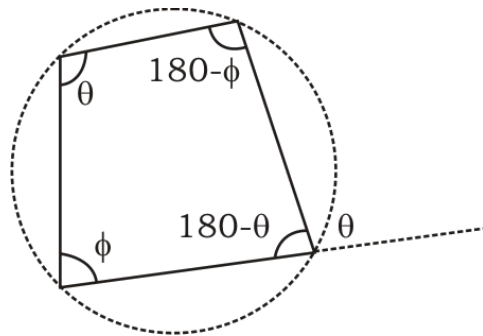
Note: If a trapezium is cyclic then must be an isosceles.

Cyclic quadrilateral:

Sum of opposite angles is 180° .

Or

Quadrilateral inscribed in a circle.



$$\text{Area} = \sqrt{(S-a)(S-b)(S-c)(S-d)}, \text{ S:Semiperimeter}$$

Problem: Find the area of cyclic parallelogram with sides 5cm & 10cm

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$$\text{Area} = 5 \times 10$$

Note: Cyclic parallelogram is a Rectangle.

Solids: Regular & Non-Regular

Regular: Cube, cuboid

Non-Regular: Cone, Pyramid

In Cube/Cuboid

No. of faces = 6

No. of edges = 12

No. of corners/Vertices = 8

For any Solid

Edges + 2 = Faces+ Corners

LSA/CSA: Area without top & bottom.

TSA/SA: Sum of area of the all the visible surfaces

Or

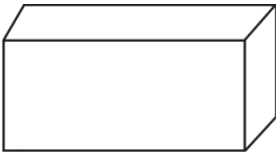
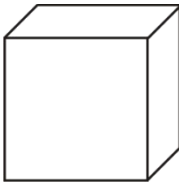
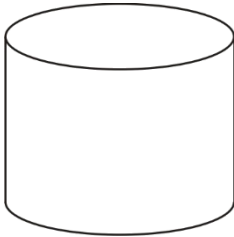
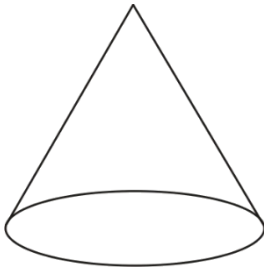
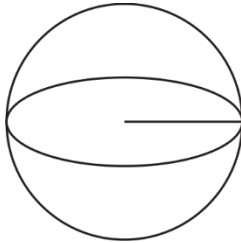
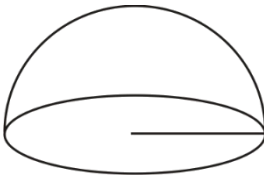
LSA + Area of top & bottom.

Volume: Capacity

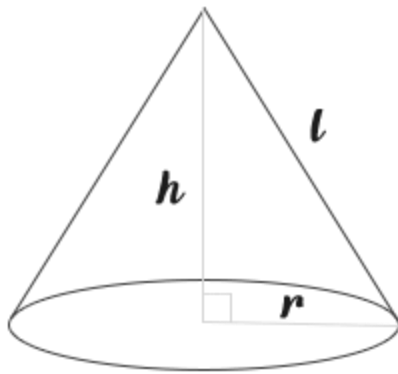
Diagonal:

Cube = $\sqrt{3} a$

Cuboid = $\sqrt{l^2 + b^2 + h^2}$

S. No	Name	Figure	Lateral/Curved Surface Area	Total Surface Area	Volume
1.	Cuboid		$2 \times h \times (l \times b)$ h – height l – length b – breadth	$2(lb + bh + lh)$	$l \times b \times h$
2.	Cube		$4a^2$ a – edge	$6a^2$	a^3
3.	Right Circular Cylinder		$2 \pi r h$ r – radius h – height	$2 \pi r (r + h)$	$\pi r^2 h$
4.	Right Circular Cone		$\pi r l$ h – height r – radius l – slant height $l^2 = r^2 + h^2$	$\pi r (r + l)$	$\frac{1}{3} \times \pi r^2 h$
5.	Sphere		$4 \pi r^2$ r – radius	$4 \pi r^2$ r – radius	$\frac{4}{3} \times \pi r^3$
6.	Hemi-sphere		$2 \pi r^2$	$3 \pi r^2$	$\frac{2}{3} \times \pi r^3$

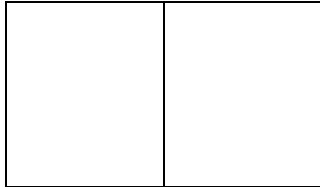
Volume of any Pyramid = $\frac{1}{3} \times \text{Base area} \times \text{height}$



Problem: 2 cubes each of side 5 cm are joined together to form a cuboid. Find its surface area?

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Each cube is having 6 faces and therefore, total 12 faces out of which only 10 are visible.

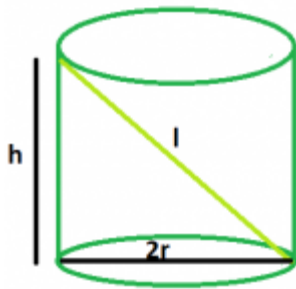


Therefore

$$SA = 10 \times \text{Area of each face} = 10 \times 25$$

Problem: Find the length of the longest rod that can be kept inside the cylinder formed by folding a square with sides $10\pi\text{cm}$?

Find the length of the longest rod that can be kept inside the cylinder formed by folding a square with side $10\pi\text{cm}$?



Height of cylinder = 10π

Circumference of base = $2\pi R = 10\pi$

$R = 5\text{cm}$

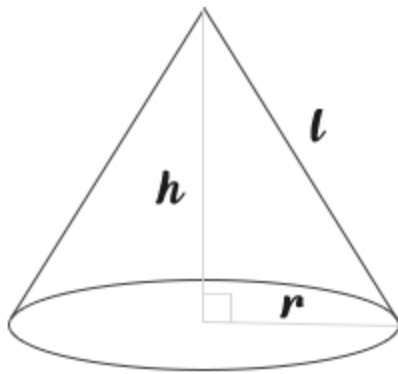
Longest rod = $\sqrt{(2R)^2 + h^2}$

$$\sqrt{10^2 + (10\pi)^2} = \sqrt{100 + 100\pi}$$

Problem:

Find the volume of the right circular cone with slant height 10cm and diameter 16cm.

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$$R = 8, l = 10$$

As we know, $h^2 + r^2 = l^2$

Triplet is (6,8,10)

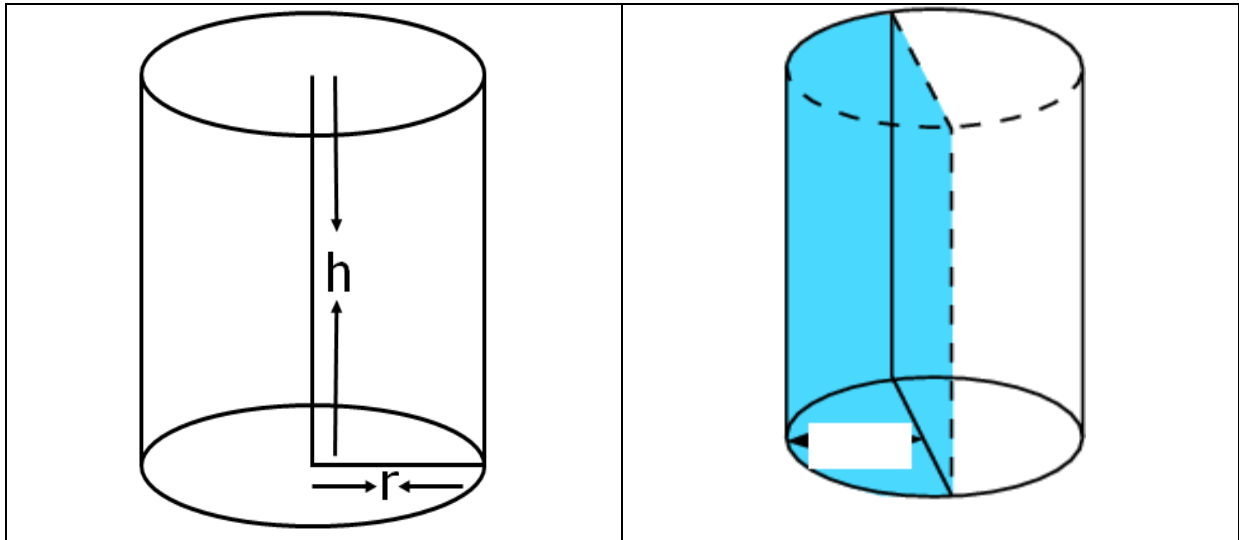
Therefore, $h = 6$

$$V = \frac{1}{3} \times 8 \times 8 \times 6\pi = 128\pi$$

Problem:

A right circular cylinder with radius 6cm and height 14 cm is cut into 2 equal parts by cut perpendicular to its base then find the increase in the surface area?

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Increase in SA = Area of 2 rectangles

$$= 2 (2r \times h)$$

$$= 2 \times 2 \times 6 \times 14 = 336$$