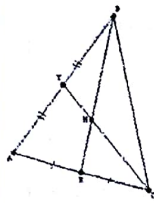


Centers of Triangles

Review

- Centroid: Intersection of Medians
- Orthocenter: Intersection of Altitudes
- Incenter: Intersection of Angle bisectors
- Circumcenter: Intersection of perpendicular bisectors

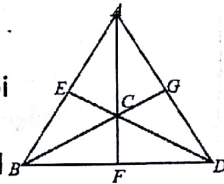
Example



This is the centroid because the segments are medians.

C is the centroid

If $AC = 12$, find BC



AC is twice the length of CF, so $CF = 12/2 = 6$
Therefore, the length of AF is $12 + 6 = 18$.

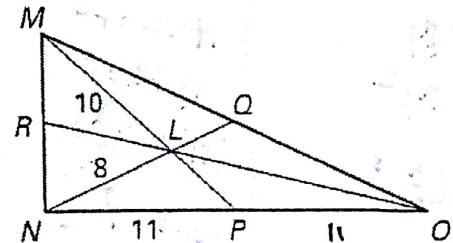
Practice

Identify the segments and the point of concurrency.

1. Segment: Altitudes
Point: orthocenter

2. Segment: angle bisector
Point: incenter

3. L is the centroid of the triangle



Find the lengths:

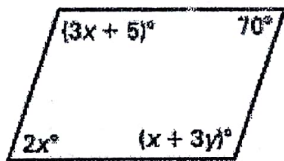
PO = 11 LQ = 4
MP = 15 NQ = 12

Parallelograms

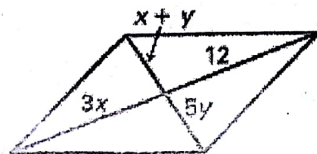
Parallelograms:

- Opposite sides are parallel and congruent.
- Opposite angles are congruent.
- Consecutive angles are supplementary.
- Diagonals bisect each other.

The following shapes are parallelograms. Solve for the variables.

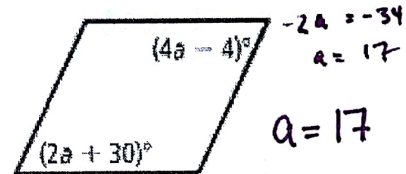


$$\begin{aligned} 2x &= 70 & 3x+5 &= x+3y \\ x &= 35 & 3(35)+5 &= (35)+3y \\ & & 110 &= 35+3y \\ & & 75 &= 3y \\ & & 25 &= y \end{aligned}$$

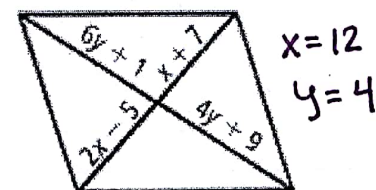


$$\begin{aligned} 3x &= 12 & x+y &= 5y \\ x &= 4 & (4)+y &= 5y \\ & & 4 &= 4y \\ & & 1 &= y \end{aligned}$$

1. The following shapes are parallelograms. Solve for the variables.



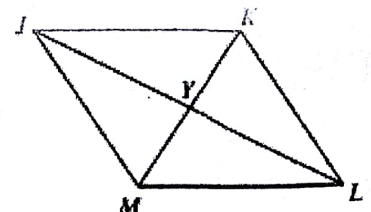
$a = 17$



$x = 12$
 $y = 4$

2. KM = 23.4

Find YM 11.7



Volume

Know your area and volume formulas

- Prism
 $V = Bh$
- Cylinder
 $V = \pi r^2 h$
- Pyramid
 $V = \frac{1}{3} Bh$
- Cone
 $V = \frac{1}{3} \pi r^2 h$
- Sphere
 $V = \frac{4}{3} \pi r^3$

side $(\frac{n}{o})$
Area $(\frac{n}{o})^2$
Volume $(\frac{n}{o})^3$

Class notes

$\frac{250}{750} = \sqrt[3]{\frac{250}{750}}$

Volume of 2 cubes = $2 \cdot 4^3$
 128
 $128 = \frac{4}{3} \pi r^3$
 $3.13 = r$

$317\pi = \frac{1}{3} \pi r^2 \cdot 5$
 $190.2 = r^2$
 $13.79 = r$
 $27.58 = d$

17.5
 $105 + 105$
 42

1. Two spheres M and N have volumes of 250 cubic cm and 750 cubic cm respectively. Find the ratio of their radii.

$\sqrt[3]{\frac{1}{3}} = .69336$

2. Two metal cubes with sides of 4 cm are melted and casted into a spherical ball. Find the radius of sphere so formed.

3.13 cm

3. A cone has a volume of $317\pi \text{ cm}^3$ and a height of 5 cm. Find the diameter of the base.

27.58 cm

4. You have been asked by your school to design a brick planter that will be used by classes to plant flowers. The planter will be built in the shape of a right rectangular prism with no bottom so water and roots can access the ground beneath. The exterior dimensions are to be $12 \text{ ft.} \times 9 \text{ ft.} \times 2\frac{1}{2} \text{ ft.}$ The bricks used to construct the planter are 6 in. long, $3\frac{1}{2} \text{ in.}$ wide, and 2 in. high. What is the volume of the bricks that form the planter?

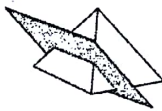
$29.77 \text{ cubic Ft of Brick}$

Roughly 1225 Bricks

Cross sections

Cross sections are the 2 dimension figure formed when cutting a 3 dimensional figure with a plane.

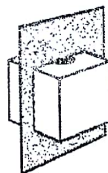
A square pyramid is cut along the shaded plane shown below.



Which of the following is the cross-section of this solid?

- (A)
- (B)
- (C)
- (D)

A cube with a cylinder cut from its center is cut along the plane shown below.



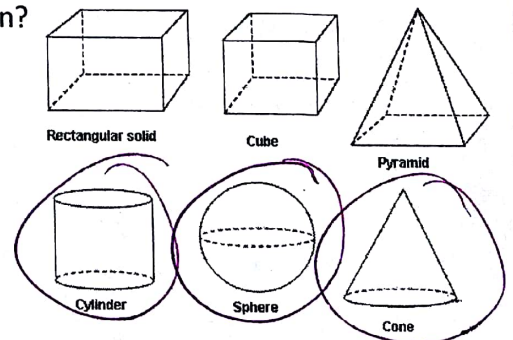
Which of the following is the cross-section of this solid?

- (E)
- (F)
- (G)
- (H)
- (I)
- (J)

1. If a square pyramid was cut parallel to its base, what shape would the cross section be?

Square

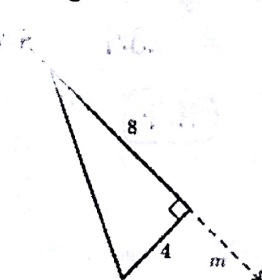
2. Which shape would have a circular cross section?



Rotations

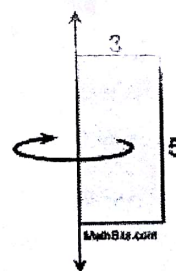
Rotations are the 3 dimensional figure formed when rotating a 2 dimension figure about an axis.

What figure is formed when rotating the triangle about line m ?



Cone with a height of 8 units and radius of 4 units.

What figure is formed when rotating the rectangle about the line as shown?



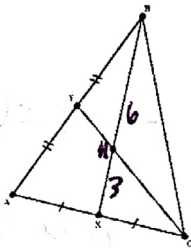
Cylinder
Volume = 45π
 $\pi r^2 h$
 $\pi 3^2 \cdot 5$
 $\pi \cdot 9 \cdot 5$

Two cones are similar. Their heights have a ratio of 4:3. What is the ratio of their volumes?

$$\frac{64}{27}$$

The volume of the right circular cylinder is 100π cubic inches. If its height is 5 in., what is its radius in inches?

$$\sqrt{20} \text{ or } 4.47 \text{ in}$$



If the length of BH is 6 units, what is the length of BX?

9 units

A sphere is inside a cube with dimensions 6 in. by 6 in. by 6 in. What is the difference in the two volumes? Round to nearest tenth

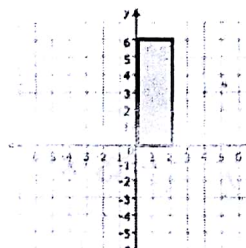
$$\frac{4}{3}\pi(3)^3$$

$$113.0973355$$

$$6^3 = 216$$

$$- 113.0973355$$

$$102.9 \text{ in}^3$$



Use the figure to answer the question. If the yellow rectangle is rotated about the y axis, what 3 dimensional figure would be formed?

Cylinder

What are the radius and height?

$$r=2 \quad h=6$$

$$\pi \cdot 2^2 \cdot 6$$

$$V = 24\pi$$

A dairy farmer stores milk in a stainless steel cylindrical tank. The tank is 8.3 feet tall and has a radius of 4.5 feet. The density of 2% milk is about 29.17 kg/m³. What is the approximate weight of the milk in the tank?

$$D = \rho m/V$$

$$29.17 = \pi r^2 \cdot h \cdot m$$

$$29.17 = \frac{m}{\pi(4.5)^2 \cdot 8.3}$$

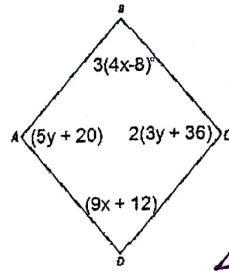
$$15,402.44 = m$$

kg

If the radius of a sphere is cut in half, how will the volume of the original sphere and the new sphere compare?

$\frac{1}{8}$ the volume for new

Find the values of x and y if quadrilateral ABCD is a parallelogram.



$$4x + 8 = 3x + 4$$

$$x = 12$$

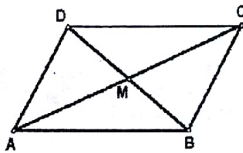
$$y = -52$$

$$5y + 20 = 6y + 72$$

$$-y = 52$$

$$y = -52$$

$\overline{AM} = 2x - 28$ and $\overline{CM} = 3(x + 7)$. What is the length of \overline{AM} ?



$$2x - 28 = 3x + 21$$

$$-49 = x$$

$$-98 - 28$$

$$-126$$

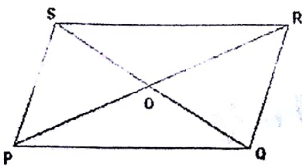
What is the volume of a cone that has a circumference of 70 feet and a height of 7 feet?

$$\frac{70}{2\pi} = r$$

$$\frac{1}{3} \pi \left(\frac{70}{2\pi}\right)^2 \cdot 7$$

$$909.836 \text{ ft}^3$$

$\overline{SO} = 5x - 10$ and $\overline{SQ} = 12x - 32$, find x .



$$SO = \frac{1}{2} SQ$$

$$6x - 16 = 5x - 10$$

$$x = 6$$

A square pyramid has a base with equal lengths of 5 meters. The volume of the pyramid is approximately 59.2 m³. What is the height of the pyramid to the nearest meter?

$$59.2 = \frac{1}{3} \cdot 25 \cdot x$$

$$x = 7.104$$

$$7 \text{ meters}$$