The National
Orthodox School
Shmaisani

Name:
Grade:8(A, B)

Worksheet(4) volume of pyramids and cones

Date :

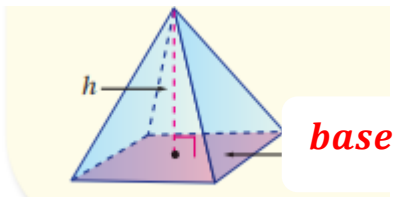**Subject : Math (Unit (7):Mensuration of planes and solids)**

Objective: *Find the volume of pyramids and cones*

$$volume\ of\ the\ pyramid = \frac{1}{3}area\ of\ the\ \textbf{base}\ \times height(h)$$

h

base

$$volume\ of\ the\ cone = \frac{1}{3}area\ of\ the\ base\ \times height(h)$$
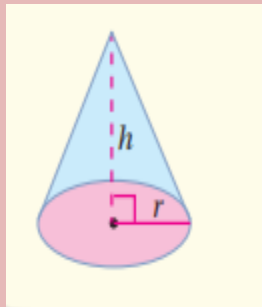
h

r
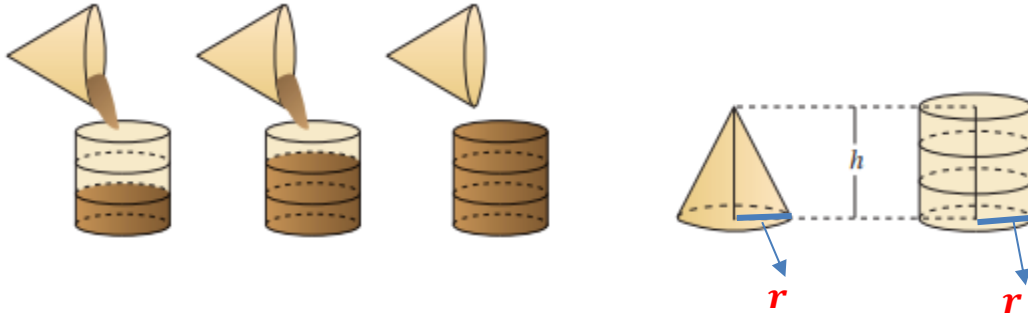
$$V = \frac{1}{3}\pi r^2 h$$

Exercise (1): *Find the volume of the following solids*:

①

12cm
8 cm
5 cm
5 cm
8 cm
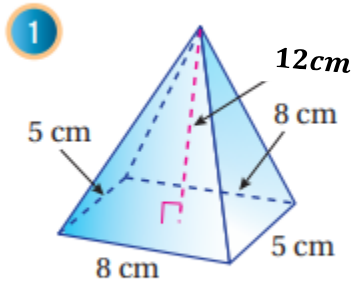
$$\text{Volume Pyramid} = \frac{1}{3} A_{base} * h$$

$$= \frac{1}{3} * (8 * 5) * \overset{4}{\cancel{12}}$$

$$= (160) \, cm^3$$

②

18cm
9cm
14 cm

$$A = \frac{1}{3} * A_{base} * h$$

$$= \frac{1}{3} * (\frac{1}{2} * \overset{3}{\cancel{9}} * \overset{7}{\cancel{14}}) * 18$$

$$= (378) \, cm^3$$

3
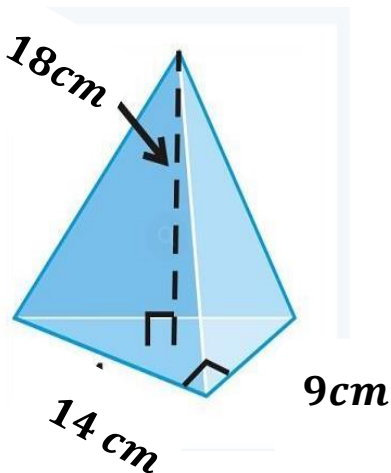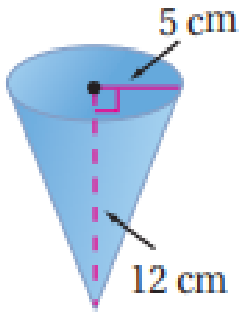
$$A_{cone} = \frac{1}{3} * A_{cone} * h$$

$$= \frac{1}{3} * (\pi r^2) * h$$

$$= \frac{1}{3} * (\pi (5)^2) * 12$$

$$= \frac{1}{3} * 25 * \pi * \overset{4}{\cancel{12}}$$

$$= (100\pi) \, cm^3$$

Use $\pi \approx 3.14 \Rightarrow$ Volume $= 3.14 * 100 = (314) \, cm^3$

$$Volume \atop Cone = \frac{1}{3} * A_{base} * h$$

$$= \frac{1}{3} * \pi (2.5)^2 * \overset{4}{\cancel{12}}$$

4

$$= \pi * 6.25 * 4$$

$r = \frac{5}{2} = 2.5 \, m$

$$= 25.00 \pi = \boxed{25\pi \, m^3}$$

5
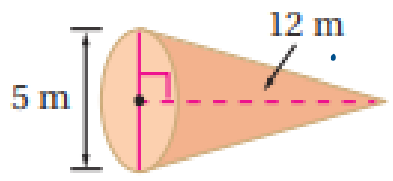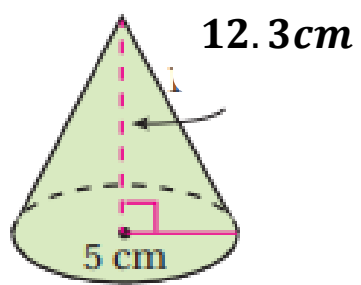
$$A_{cone} = \frac{1}{3} * \pi r^2 * h$$

$$= \frac{1}{3} * \pi (5)^2 * 12.3$$

$$= \frac{1}{3} * \pi * 25 * \overset{4.1}{\cancel{12.3}}$$

$$= \left(102.5\pi\right) cm^3$$

12.3 cm

5 cm

6

Total Volume = Volume$_{\text{cylinder}}$ + Volume$_{\text{cone}}$

1.5 m

3 m

2 m
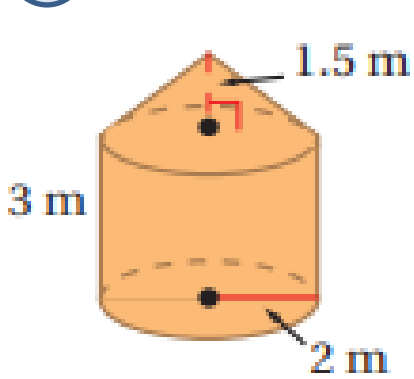
$$\text{Volume}_{\text{cylinder}} = \pi (2)^2 * 3 = \boxed{12\pi} \; m^3$$

$$\text{Volume}_{\text{cone}} = \frac{1}{3} * \pi (2)^2 * 1.5 =$$

$$= \frac{1}{\cancel{3}_1} * \pi * 4 * \cancel{1.5}^{0.5} = \boxed{2\pi} \; m^3$$

Total Volume = $12\pi + 2\pi = \boxed{14\pi} \; m^3$

Use $\pi \approx \frac{22}{7}$. $\Rightarrow$ Total Volume $\approx \cancel{14}^2 * \frac{22}{\cancel{7}} = \boxed{44} \; m^3$

7

Total Volume = Volume$_{\text{Prism}}$ + Volume$_{\text{Pyramid}}$

8-5 =3 m

8 m

5 m

3 m   2.5 m
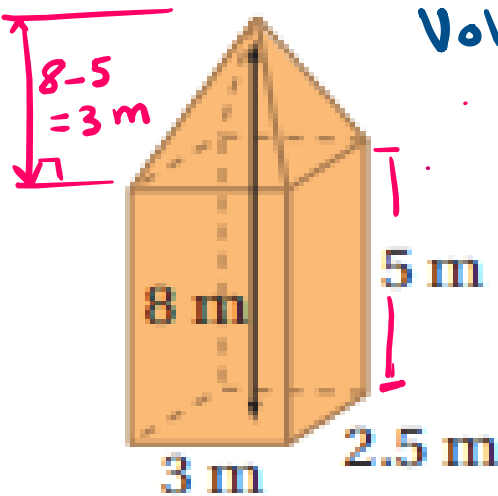
$$\text{Volume}_{\text{Prism}} = A_{\text{base}} * h$$

$$= (2.5 * 3) * 5$$

$$= 7.5 * 5 = \boxed{37.5} \; m^3$$

$$\text{Volume}_{\text{Pyramid}} = \frac{1}{3} A_{\text{base}} * h$$

$$= \frac{1}{\cancel{3}_1} * (3 * 2.5) * 3 = \boxed{7.5} \; m^3$$

$\Rightarrow$ Total Volume = $37.5 + 7.5$

$$= \boxed{45} \; m^3$$

4

1

$V = 200 \text{ cm}^3$
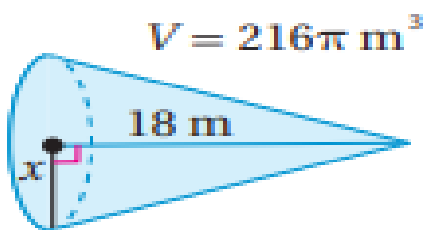
x

10 cm

10 cm

$$\text{Volume}_{\text{Pyramid}} = \frac{1}{3} * A_{\text{base}} * h$$

$$200 = \frac{1}{3} * \frac{10}{1} * \frac{10}{1} * x$$

$$\frac{3}{100} * \boxed{200 = \frac{100}{3} x} * \frac{3}{100}$$

$$\boxed{x = 6 \text{ cm}}$$

2

$V = 216\pi \text{ m}^3$

18 m

x

$$\text{Volume}_{\text{Cone}} = \frac{1}{3} * A_{\text{base}} * h$$

$$216 \cancel{\pi} = \frac{1}{\cancel{3}} * \cancel{\pi} * x^2 * \cancel{18}^{6}$$

$$\frac{216}{6} = \frac{6x^2}{6}$$

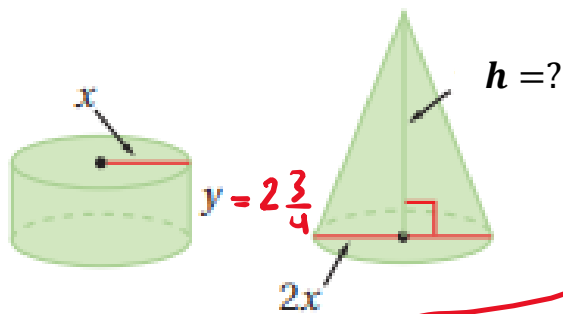$$\sqrt{x^2} = \overset{+}{\underset{-}{\sqrt{}}} \sqrt{36}$$

$$x = +6, \cancel{-6}$$

$$\boxed{x = 6 \text{ m}}$$

Exercise (3): *The cone and the cylinder shown below have the same volume, find **the height of the cone(h)** if the height of the cylinder(y) = $2\frac{3}{4}$ cm ?*

$$\text{Volume} = \text{Volume}$$
$$\text{cylinder} \qquad \text{cone}$$

$h =?$

x

$y = 2\frac{3}{4}$

$2x$

$$\implies r = \frac{2x}{2} = x$$

$$\pi x^2 * 2\frac{3}{4} = \frac{1}{3} * \pi * x^2 * h$$
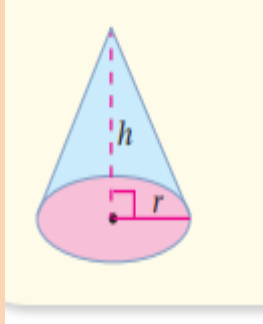
$$\boxed{\frac{11}{4} = \frac{h}{3}}$$

$$3 * \frac{11}{4} = \frac{h}{3} * 3$$

$$h = \frac{33}{4} = \boxed{8\frac{1}{4}} \text{ cm}$$

$$= \boxed{8.25} \text{ cm}$$

Exercise (4): *The area of the base of the cone shown below is (314)cm^2 and a height (9cm), find : a)its volume. b)its radius.*

$$\text{Volume}_{\text{cone}} = \frac{1}{3} * A_{\text{base}} * h$$

$$= \frac{1}{3} * \frac{314}{1} * \frac{9}{1}$$

$$= \boxed{942} \ cm^3$$

$$A_{\text{base}} = \pi r^2 \qquad \text{Use } \pi = 3.14$$

$$\frac{314}{3.14} = \frac{3.14 * r^2}{3.14} \rightarrow r^2 = \frac{314 * 100}{3.14 * 100} = \frac{31400}{314}$$

$$r^2 = 100 \rightarrow \boxed{r = 10} \ cm$$

Exercise(5): *Find the height of a pyramid of volume 20m^3 and base area 12m^2?*

$$\text{Volume} = \frac{1}{3} * A_{\text{base}} * h$$

$$20 = \frac{1}{3} * \frac{12}{1} * h \rightarrow \frac{20}{4} = \frac{4 * h}{4}$$

$$\boxed{h = 5m}$$

Teacher: Wisam Al-mashni

7