Math 9 – Unit 4: Measurement

Name: Mr. Hagen

Lesson 4.3: Cones, Pyramids and Spheres

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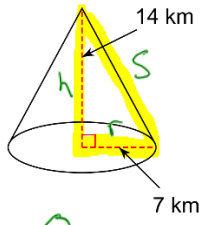
Learning Goal: We are learning to calculate the surface area and volume of cones, square-based pyramids and spheres.

For each figure calculate the surface area and the volume.

1.



$r = 7$
$h = 14$
$s = 15.7$

Net:

slant of cone.

$SA = \pi r^2 + \pi r s$

$SA = (3.14)(7)^2 + (3.14)(7)(15.7)$

$SA = 153.86 + 345.086$

$SA = 498.946\ km^2$

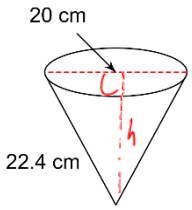
$a^2 + b^2 = c^2$
$r^2 + h^2 = s^2$
$7^2 + 14^2 = s^2$
$49 + 196 = s^2$
$\sqrt{245} = \sqrt{s^2}$
$15.7 = s$

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

$V = \frac{(3.14)(7)^2(14)}{3}$

$V = 718.01\ km^3$

2.



$h = ?$
$r = 10$
$s = 22.4$

$r^2 + h^2 = s^2$
$10^2 + h^2 = 22.4^2$
$100 + h^2 = 501.76$
$-100 \quad -100$
$\sqrt{h^2} = \sqrt{401.76}$
$h = 20\ cm$

$SA = \pi r^2 + \pi r s$

$SA = (3.14)(10)^2 + (3.14)(10)(22.4)$

$SA = 314 + 703.36$

$SA = 1017.36\ cm^2$

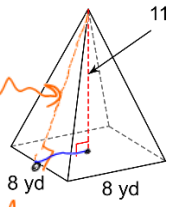
$V = \frac{\pi r^2 h}{3}$

$V = \frac{(3.14)(10)^2(20)}{3}$

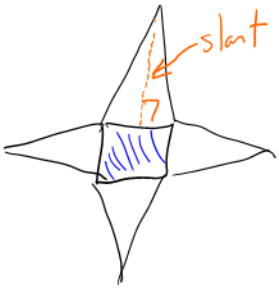
$V = 2093.33\ cm^3$

Square-based pyramids

3.



slant = height of the triangles = h



$a^2 \quad b^2 \quad = c^2$

$\left(\frac{b}{2}\right)^2 + h^2 = s^2$

$\left(\frac{8}{2}\right)^2 + 11^2 = s^2$

$16 + 121 = s^2$

$137 = s^2$

$11.7 = s$

$h = 11$

$s = 11.7$

$b = 8$

$SA = b^2 + 4\left(\frac{bs}{2}\right)$

$SA = b^2 + 2bs$

$SA = 8^2 + 2(8)(11.7)$

$SA = 251.2 yd^2$

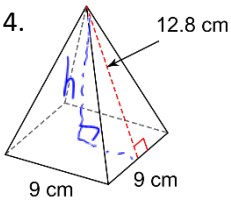
$V = \frac{lwh}{3}$ (box)

$V = \frac{b^2 h}{3}$

$V = \frac{(8)^2(11)}{3}$

$V = 234.67 yd^3$

4.



$h = ?$

$s = 12.8$

$b = 9$

$\left(\frac{b}{2}\right)^2 + h^2 = s^2$

$\left(\frac{9}{2}\right)^2 + h^2 = 12.8^2$

$20.25 + h^2 = 163.84$ -20.25

$h^2 = 143.59$

$h = 11.98$

$h = 12 cm$

$SA = b^2 + 2bs$

$SA = (9)^2 + 2(9)(12.8)$

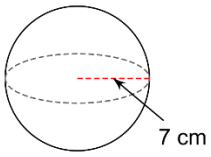
$SA = 311.4 cm^2$

$V = \frac{b^2 h}{3}$

$V = \frac{(9)^2(12)}{3}$

$V = 324 cm^3$

5.



$r = 7$

$SA = 4\pi r^2$

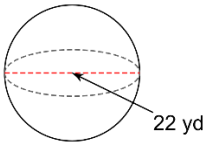
$SA = 4(3.14)(7)^2$

$SA = 615.44 cm^2$

$V = \frac{4\pi r^3}{3}$

$V = \frac{4(3.14)(7)^3}{3} = 1436.03 cm^3$

6.



$r = 11$

$SA = 4\pi r^2$

$SA = 4(3.14)(11)^2$

$SA = 1519.76 yd^2$

$V = \frac{4\pi r^3}{3}$

$V = \frac{4(3.14)(11)^3}{3}$

$V = 5572.45 yd^3$

Use the appropriate formula to solve for the missing measurement.

7. A cone has a volume of 2094.4cm^3 with a radius of 10cm. Determine the length of the slant.

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

$2094.4 = \frac{(3.14)(10)^2 h}{3}$

$2094.4 = 104.67h$

$\frac{2094.4}{104.67} = \frac{104.67h}{104.67}$

$h = 20cm$

$r^2 + h^2 = s^2$

$10^2 + 20^2 = s^2$

$100 + 400 = s^2$

$\sqrt{500} = \sqrt{s^2}$

$22.36cm = s$

8. A sphere has a volume of 904.78in^3. Determine the length of the radius.

$V = \frac{4\pi r^3}{3}$

$3(904.78) = \frac{4(3.14)r^3}{3}$

$2714.34 = 12.56r^3$

$\frac{2714.34}{12.56} = \frac{12.56r^3}{12.56}$

$r = ?$

$\sqrt[3]{216.1098} = \sqrt[3]{r^3}$

$6.0010 = r$

$6in = r$

Success Criteria

- I can use the appropriate formula to find the surface area or volume of a cone, pyramid, or sphere