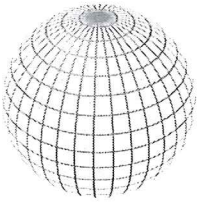
11.7 Surface Area of a Sphere Notes Name KEY

Learning Targets:

1. I can apply the surface area formula of a sphere or a hemisphere to solve problems.

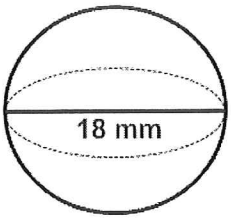


SPHERE: A perfectly round geometrical object in three-dimensional space, where all points are the same distance from the center of the sphere.

SURFACE AREA OF A SPHERE = $4\pi r^2$

Find the surface area of the figure. List your answer in terms of π and then rounded to the nearest tenth.

1.

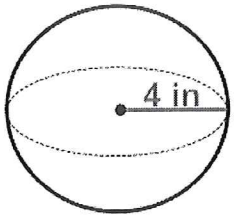


$SA = 4\pi(9)^2 = 324\pi$

SA (exact) = $324\pi mm^2$

SA (rounded) = $1017.9 mm^2$

2.

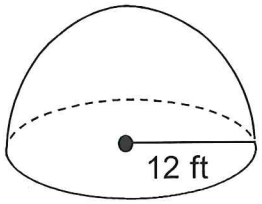


$SA = 4\pi(4)^2 = 64\pi$

SA (exact) = $64\pi in^2$

SA (rounded) = $201.1 in^2$

3. Find the surface area of the hemisphere. List your answer in terms of π and then rounded to the nearest tenth.



$SA = \frac{1}{2}(4\pi(12)^2) + \pi(12)^2$

$= 288\pi + 144\pi = 432\pi$

SA (exact) = $432\pi ft^2$

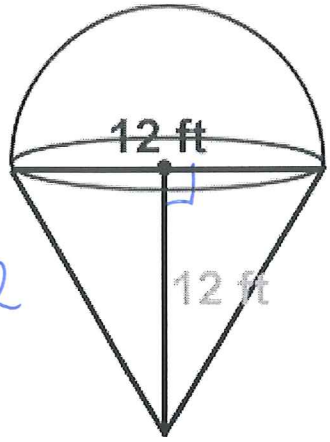
SA (rounded) = $1357.2 ft^2$

11.7 Surface Area of a Sphere Notes Name KEY

Learning Targets:

1. I can apply the surface area formula of a sphere or a hemisphere to solve problems.

4. Find the surface area of the composite figure below. List your answer rounded to the nearest tenth.



$h = 12$

$6^2 + 12^2 = l^2$

$180 = l^2$

$\sqrt{180} = l$

$13.4 = l$

$SA = \frac{1}{2} SA_{sphere} + LA_{cone}$

$SA = \frac{1}{2}(4\pi r^2) + \frac{1}{2} Pl$

$SA = \frac{1}{2}(4\pi(6)^2) + \frac{1}{2}(12\pi)(13.4)$

$SA \approx 478.8 ft^2$

$P = \pi(12)$

$P = 12\pi$

$B = \pi(6)^2 = 36\pi$

SA (rounded) = $478.8 ft^2$

5. A sphere has a surface area of 2304π mm^2. Find the diameter of the sphere.

$SA = 4\pi r^2$

$2304\pi = 4\pi r^2$

$2304 = 4r^2$

$576 = r^2$

$r = 24 mm$

$d = 48 mm$

6. A hemisphere has a surface area of 4500π mm^2. Find the radius of the hemisphere.

$SA = \frac{1}{2}(4\pi(r)^2) + \pi(r)^2$

$4500\pi = 2\pi r^2 + \pi r^2$

$\frac{4500\pi}{\pi} = \frac{3\pi r^2}{\pi}$

$\frac{4500}{3} = \frac{3r^2}{3}$

$1500 = r^2$

$38.7 mm = r$

7. Lobster fishers in Maine often use spherical buoys to mark their lobster traps. Every year the buoys must be repainted. An average buoy has a 12 in. diameter, and an average fisher has about 500 buoys. A quart of marine paint covers 175 ft^2. How many quarts of paint does an average fisher need each year?

Change inches to feet since the paint covers in feet squared.

$SA = 4\pi r^2$

$SA = 4\pi(0.5)^2$

$SA = 4\pi(.25)$

$SA \approx 3.14 ft^2$ one buoy

500
x 3.14
1570 ft^2 total area of buoys

$\frac{1570}{175} = 8.97$

The fisher will need 9 qts. of paint

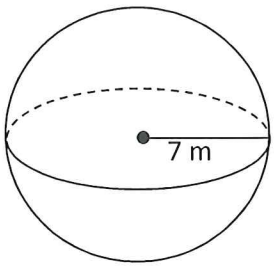
11.7 Surface Area of a Sphere Practice **Name:** KEY

Learning Targets:

1. **I can apply the surface area formula to a sphere or hemisphere to solve problems.**

Find the surface area for each sphere or hemisphere. Keep you answer in terms of π.

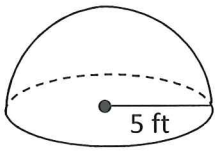
1.



$SA = 4\pi(7)^2$

$= \boxed{196\pi m^2}$

2.

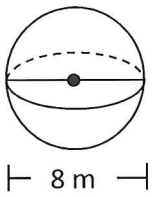


$SA = \frac{1}{2}(4\pi(5)^2 + \pi(5)^2$

$= 50\pi + 25\pi$

$= \boxed{75\pi ft^2}$

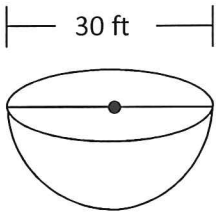
3.



$SA = 4\pi(4)^2$

$= \boxed{64\pi m^2}$

4.



$SA = \frac{1}{2}(4\pi(15)^2) + \pi(15)^2$

$= 450\pi + 225\pi$

$= \boxed{675\pi ft^2}$

5. Calculate the surface area of a sphere with a diameter of 6.2 in.

$SA = 4\pi(3.1)^2$

$SA = 4\pi(9.61)$

$SA = \boxed{38.44\pi in^2}$

$\approx 120.8 in^2$

6. Calculate the surface area of a sphere with a radius of 10 mi.

$SA = 4\pi(10)^2$

$SA = 4\pi 100$

$SA = \boxed{400\pi mi^2}$

$\approx 1256.6 mi^2$

Answer each question

7. What is the radius of a sphere if its surface area is 1200π ft^2?

$SA = 4\pi r^2$

$1200\pi = 4\pi r^2$

$\frac{1200}{4} = \frac{4\pi r^2}{4}$

$300 = r^2$

$17.3 = r$

$r = 17.3$ ft

8. The surface area of a hemisphere is 2250π cm^2. What is the diameter of the hemisphere?

$SA = \frac{1}{2}(4\pi(r)^2) + \pi(r)^2$

$2250\pi = 2\pi r^2 + \pi r^2$

$2250\pi = 3\pi r^2$

$\frac{2250}{3} = \frac{3r^2}{3}$

$750 = r^2$

$27.4\text{ cm} = r$

9. A basketball is a sphere with a diameter of 9 inches. What is the surface area of a basketball?

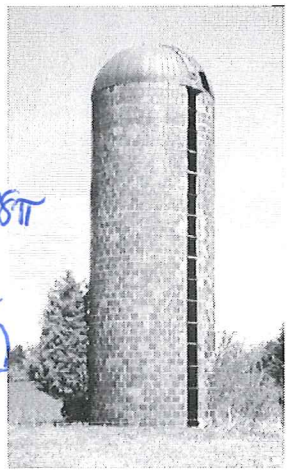
$SA = 4\pi(4.5)^2$

$SA = 4\pi(20.25)$

$SA = 81\pi \text{ in}^2$

The surface area of the basketball is 254.5 in^2

10. A farmer must periodically resurface the interior (wall, floor, and ceiling) of his silo to protect it from the acid created by the compacting of the corn. The height of the silo to the top of the hemispherical dome is 50 ft., and the diameter is 18 ft.



a. What is the approximate surface area that needs to be treated?

approx 3082 ft^2

$r = 18 \div 2 = 9$ ft

$h_{cyl} = 50 - r = 41$ ft

Surface Area Hemisphere:

$SA = \frac{4\pi r^2}{2} = 2\pi(9)^2 = 162\pi$

SA of Floors

$SA_0 = \pi(9)^2 = 81\pi$

SA of walls

$SA = 2\pi rh$

$= 2\pi(9)(41)$

$= 738\pi$

$81\pi + 162\pi + 738\pi$

$= 981\pi$

$= 3081.9 \text{ ft}^2$

$\approx 3082 \text{ ft}^2$

b. If 1 gallon of resurfacing compound covers about 250 ft^2 how many gallons are needed?

13 gal

$\frac{981\pi \text{ ft}^2}{250 \text{ gal/ft}^2} = 3.924\pi = 12.33 \text{ gallons}$

13 gallons are needed to resurface the interior of the silo