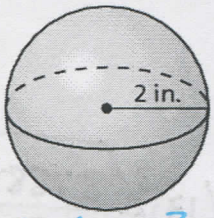
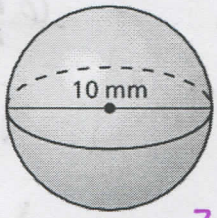
Name Key Date

11.8 Practice WS

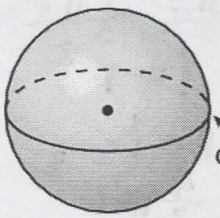
In Exercises 1–3, find the surface area of the sphere. $T = 4\pi r^2$

1. 

$T = 4\pi r^2$
$= 4\pi(2)^2$
$= 16\pi \text{ in}^2$
$\approx 50.265 \text{ in}^2$

2. 

$S = 4\pi r^2$
$= 4\pi(5)^2$
$= 100\pi \text{ mm}^2$
$\approx 314.159 \text{ mm}^2$

3. 

$C = 2\pi r$
$r = 4$

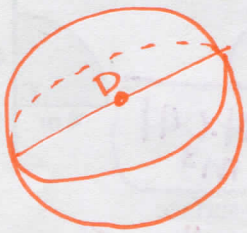
$SA = 4\pi r^2$
$= 4\pi(4)^2$
$= 64\pi \text{ ft}^2$
$\approx 201.062 \text{ ft}^2$

In Exercises 4 and 5, find the indicated measure. Draw and label a figure.

4. the radius of a sphere with a surface area of 36π square meters

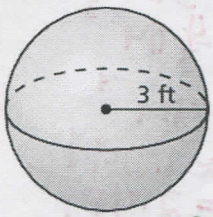
$T = 4\pi r^2$
$\frac{36\pi}{4\pi} = \frac{4\pi(r)^2}{4\pi}$
$9 = r^2$
$r = 3\text{m}$

5. the diameter of a sphere with a surface area of 81π square yards

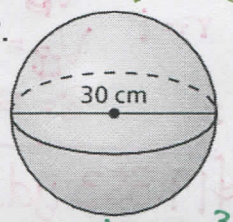


$T = 4\pi r^2$
$\frac{81\pi}{4\pi} = \frac{4\pi r^2}{4\pi}$
$20.25 = r^2$
$r = 4.5$
$d = 2r$
$d = 9 \text{ yds}$

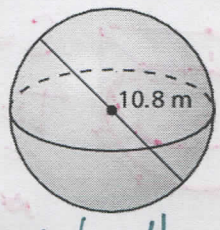
In Exercises 6–8, find the volume of the sphere. $V = \frac{4}{3}\pi r^3$

6. 

$V = \frac{4}{3}\pi r^3$
$= \frac{4}{3}\pi(3)^3$
$= 4\pi(9)$
$= 36\pi \text{ ft}^3$
$\approx 113.097 \text{ ft}^3$

7. 

$V = \frac{4}{3}\pi r^3$
$= \frac{4}{3}\pi(15)^3$
$= 4500\pi \text{ cm}^3$
$\approx 14137.167 \text{ cm}^3$

8. 

$V = \frac{4}{3}\pi r^3$
$= \frac{4}{3}\pi(5.4)^3$
$= \frac{4\pi}{3}(157.464)$
$= 209.952\pi \text{ m}^3$
$\approx 659.584 \text{ m}^3$

In Exercises 9 and 10, find the volume of the sphere with the given surface area.

9. Surface Area $= 4\pi$ in.^{2}

$T = 4\pi r^2$

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

$1 = r^2$

$r = 1$

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

$= \frac{4}{3}\pi(1)^3$

$= \frac{4\pi}{3}$ in^3

≈ 4.189 in^3

10. Surface Area $= 676\pi$ km^2

$T = 4\pi r^2$

$\frac{676\pi}{4\pi} = \frac{4\pi r^2}{4\pi}$

$\sqrt{169} = \sqrt{r^2}$

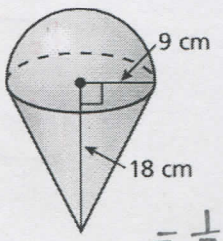
$r = 13$

$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(13)^3 = \frac{8788\pi}{3}$ km^3

≈ 9202.772 km^3

In Exercises 11 and 12, find the volume of the composite solid.

11.



$V = \frac{1}{2}$ ○ + ▽

$= \frac{1}{2}\left(\frac{4}{3}\pi r^3\right) + \frac{1}{3}\pi r^2 h$

$= \frac{1}{2}\left(\frac{4}{3}\pi(9)^3\right) + \frac{1}{3}\pi(9)^2(18)$

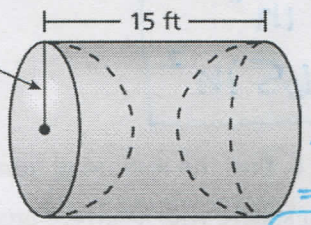
$= \frac{1}{2}(972\pi) + \frac{1}{3}1458\pi$

$= 486\pi + 486\pi$

$= 972\pi$ cm^3

≈ 3053.628 cm^3

12.



$V =$ ▭ − ○

$= \pi r^2 h - \frac{4}{3}\pi r^3$

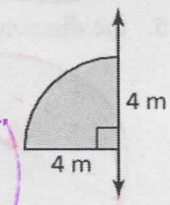
$= \pi(6)^2(15) - \frac{4}{3}\pi(6)^3$

$= 540\pi - 288\pi$

$= 252\pi$ ft^3

≈ 791.681 ft^3

13. Find the surface area and volume of the solid produced by rotating the figure at the right around the given axis.



$S = 4\pi r^2\left(\frac{1}{2}\right)$

$= \frac{4\pi(4)^2}{2}$

$= 32\pi$ m^2

≈ 100.531 m^2

4m

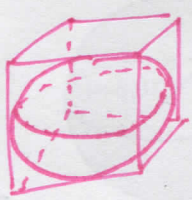
4m

$V = \frac{4}{3}\pi r^3\left(\frac{1}{2}\right)$

$= \frac{4}{3}\pi(4)^3\left(\frac{1}{2}\right)$

$= \frac{128\pi}{3}$ m^3 ≈ 134.041 m^3

14. A sphere is inscribed in a cube with a volume of 8 cubic yards. What is the surface area of the sphere? Explain your reasoning.



$V_{\square} = 8$ yd^3

$V_{\square} = lwh$

$8 = s^3$ $s = 2$

$S = d$ $d = 2$ $r = 1$

$T = 4\pi r^2$

$= 4\pi(1)^2$

$= 4\pi$ yds^2 ≈ 12.566 yds^2

15. In 2000, the International Table Tennis Federation changed the official diameter of a table tennis ball from 38 millimeters to 40 millimeters. Without calculating surface areas and volumes, determine how the surface area and volume of the ball changed. Explain your reasoning. Find the surface areas and volumes to check your answer.

~ figures

SA = squared V = cubed

$SA_{new} = \frac{1600\pi}{1400\pi} = \frac{400}{361}$

$\left(\frac{40}{38}\right)^2 = \left(\frac{20}{19}\right)^2 = \frac{400}{361} \approx 1.11$ 11% increase

$\left(\frac{40}{38}\right)^3 = \frac{8000}{6859} \approx 1.17$ 17% increase

$V_{new} = \frac{\frac{32000\pi}{3}}{\frac{27436\pi}{3}} = \frac{8000}{6859}$