10. Volume of the cylinder:

$V=3.14\ (1)^2(2)$

$V = 6.28\ \text{units}^3$

Volume of the sphere from #9:

$4.19\ \text{units}^3$

$6.28 - 4.19 = 2.09\ \text{units}^3$

Note: You may use the fractional value of π if it seems more convenient.

Honors Lesson 16

1. $(r)\pi r = \pi r^2$
2. $A = LW + LW + LH + LH + WH + WH$
   $= 2LW + 2LH + 2WH$
   $= 2(LW + LH + WH)$
3. $2(S^2 + S^2 + S^2) = 2(3S^2) = 6S^2$
4. $V = 3(11)(3) = 99\ \text{ft}^3$
   $SA = 2(3x11) + 2(3x3) + 2(11x3)$
   $= 2(33) + 2(9) + 2(33)$
   $= 66 + 18 + 66$
   $= 150\ \text{ft}^2$
5. $150\ \text{ft}^2 \div 6$ faces $= 25\ \text{ft}^2$ per face
   $\sqrt{25} = 5$ ft
   The new bin is 5 x 5 x 5.
6. The cube-shaped one holds more.
   $125 - 99 = 26\ \text{ft}^3$ difference.

Honors Lesson 17

1. $V = \pi r^2 h$
   $V = 3.14(2)^2(4)$
   $V = 50.24\ \text{ft}^3$
2. $V = \frac{4}{3}\pi r^3$
   $V = \frac{4}{3}(3.14)(2)^3$
   $V = 33.49\ \text{ft}^3$ (rounded)
3. $V = 3.14(3)^2(6)$
   $V = 169.56\ \text{units}^3$
4. $V = \frac{4}{3}(3.14)(3)^3$
   $V = 113.04\ \text{units}^3$ (rounded)
5. $V = 3.14(1)^2(2)$
   $V = 6.28\ \text{units}^3$
6. $V = \frac{4}{3}(3.14)(1)^3$
   $V = 4.19\ \text{units}^3$ (rounded)
7. $\frac{33.49}{50.24} \approx .67$ $\frac{113.04}{169.56} \approx .67$
   $\frac{4.19}{6.28} \approx .67$
8. $\frac{2}{3}$
9. $A = 2\pi r^2 + 2\pi rh$
   $A = 2(3.14)(3)^2 + 2(3.14)(3)(6)$
   $A = 56.52 + 113.04 = 169.56\ \text{units}^2$
10. $A = 4(3.14)(3)^2$
    $A = 113.04\ \text{units}^2$
11. $\frac{113.04}{169.56} \approx \frac{2}{3}$
12. The surface area and volume of a sphere appear to be $\frac{2}{3}$ of the surface area and volume of a cylinder with the same dimensions. (Archimedes proved that this is the case.)

Honors Lesson 18

1. 4,003 mi
2. 90°; a tangent to a circle is perpendicular to the diameter