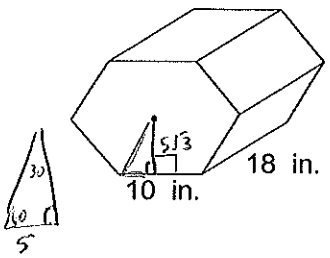
Name ANSWERS Period ____ Date ____

Geometry 22: 11.2 and 11.4 – Practice with Surface Area and Volume of Prisms and Cylinders

For the problems below, find the lateral area, surface area and volume of each. Be sure to **SHOW ALL WORK** including your *B*, *H*, and *P* list! Leave your answers in ~~exact form~~ and remember units.

dec. rounded to hundredth

1. this is a regular hexagonal prism



$a = 5\sqrt{3}$

$p = 60$

Name of figure: hexagonal prism

$B = \frac{1}{2}ap = \frac{1}{2}(5\sqrt{3})(60) = 150\sqrt{3} \approx 259.8$

$H = 18$

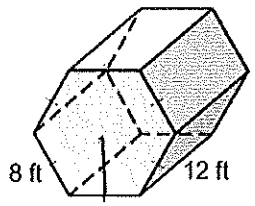
$P = 60$

$LA = 1080\ in^2$ (1080 + 2(150√3))

$SA = 1080 + 300\sqrt{3}\ (\approx 1599.6)\ in^2$

$V = 2700\sqrt{3}\ (\approx 4676.54)\ in^3$ ($V = (150\sqrt{3})(18)$)

2. this is a regular hexagonal prism



$a = 4\sqrt{3}$

$p = 48$

Name of figure: hexagonal prism

$B = \frac{1}{2}ap = \frac{1}{2}(4\sqrt{3})(48) = 96\sqrt{3}\ (\approx 166.28)$

$H = 12$

$P = 48$

$LA = PH = (48)(12)$

$SA = PH + 2B$

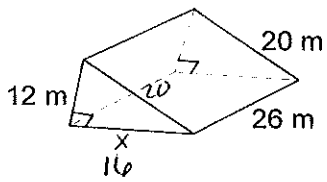
$576 + 2(96\sqrt{3})$

$LA = 576\ ft^2$

$SA = 576 + 192\sqrt{3}\ (\approx 908.55)\ ft^2$

$V = 1152\sqrt{3}\ (\approx 1995.32)\ ft^3$ ($V = (96\sqrt{3})(12)$)

3.



$12^2 + x^2 = 20^2$

$144 + x^2 = 400$

$x^2 = 256$

$x = 16$

$p = 16 + 12 + 20$

Name of figure: triangular prism

$B = \frac{1}{2}bh = \frac{1}{2}(16)(12) = 96$

$H = 26$

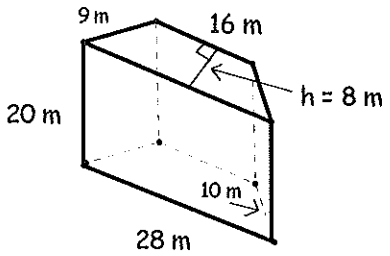
$P = 48$

$LA = 1248\ m^2$ ($PH = (48)(26)$)

$SA = 1440\ m^2$ ($1248 + 2(96)$)

$V = 2496\ m^3$ ($BH = 96(26)$)

4.



Name of figure: trapezoidal prism

$B = 176$

$H = 20$

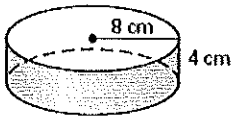
$P = 63$

$LA = 1260\ m^2$

$SA = 1612\ m^2$

$V = 3520\ m^3$

exact

5. 

Name of figure: cylinder

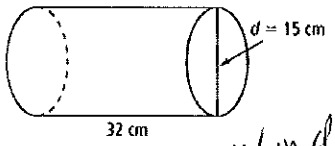
$r = 8$ $C = 16\pi$

$H = 4$ $B = 64\pi$

$LA =$ 64π cm^2 $CH = (16\pi)(4)$

$SA =$ 192π cm^2 $64\pi + 2(64\pi)$

$V =$ 256π cm^3 $V = BH = 64\pi(4)$

6. 

Name of figure: cylinder

$r = 7.5$ $C = 15\pi$

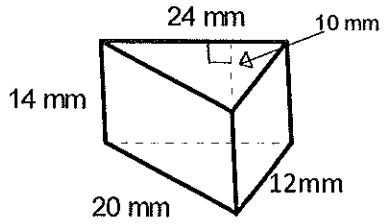
$H = 32$ $B = 56.25\pi$

$LA =$ 480 cm^2 $CH = 15\pi(32)$

$SA =$ 833.43 cm^2 $480 + 2(56.25\pi)$

$V =$ $56.25\pi(32)$ $480 + 353.43$

1800π cm^3 ≈ 5654.87

7. 

Name of figure: triangular prism

$B =$ $\frac{1}{2}bh = \frac{1}{2}(24)(10) = 120$

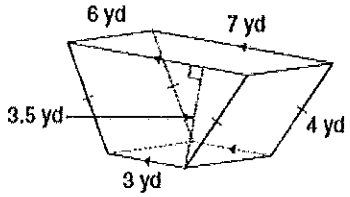
$H =$ 14

$P =$ $24 + 12 + 20 = 56$

$LA =$ $(56)(14) = 784$ mm^2

$SA =$ $784 + 2(120) = 1024$ mm^2

$V =$ $(120)(14) = 1680$ mm^3

8. 

Name of figure: trapezoidal prism

$B =$ $\frac{1}{2}h(b_1 + b_2) = \frac{1}{2}(3.5)(3+7) = 17.5$

$H =$ 6

$P =$ $7 + 4 + 3 + 4 = 18$

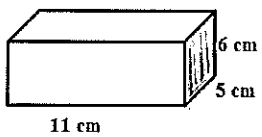
$LA =$ $(18)(6) = 108$ yd^2

$SA =$ $108 + 2(17.5) = 143$ yd^2

$V =$ $(17.5)(6) = 105$ yd^3

9. In a rectangular prism, any one of the faces can be considered a BASE. Therefore, in the problems below, first identify (shade) which face in each that you want to use as your 'base' and stay consistent with it when calculating the surface areas and volumes. (don't forget to fill in 'the list')

$B =$ $(5)(6) = 30$



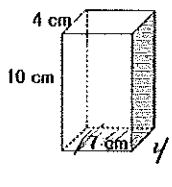
$H =$ 11

$P =$ 22

$SA =$ $(22)(11) + 2(30)$ $242 + 60$ 302 cm^2

$V =$ $(30)(11)$ 330 cm^3

$B =$ $(7)(4) = 28$



$H =$ 10

$P =$ 22

$SA =$ $(22)(10) + 2(28)$ $220 + 56$ 276 cm^2

$V =$ $(28)(10) = 280$ cm^3

10. A rectangular prism has dimensions 6" x 8" x 12". Find total surface area and volume.

$B = (6)(8) = 48$

$H = 12$

$P = 28$

$P = 6+8+6+8$

$SA = (28)(12) + 2(48)$

$336 + 96$

$432\ in^2$

$V = (48)(12)$

$576\ in^3$

11. The surface area of a trapezoidal prism is 366 square units. The area of the base is 53 square units and the perimeter of the base is 26 units. What is the height of the prism?

$SA = PH + 2B$

$366 = 26H + 2(53)$

$366 = 26H + 106$

$-106 \quad -106$

$260 = 26H$

$H = 10$ units

12. The volume of a cylinder is 960 π cubic inches. The height of the cylinder is 15 inches. Find the radius **and** area of the base.

$V = BH$

$\frac{960\pi}{15} = \frac{B(15)}{15}$

$64\pi\ in^2 = B$

$r = 8$ in

13. If a cylinder has surface area of 144π sq in, and the height of the cylinder is 21 in, find the radius and the volume.

1.72
2.36
3.

$SA = CH + 2B$

$144\pi = C(21) + 2B$

$144\pi = 2\pi r(21) + 2\pi r^2$

$\frac{144\pi = 42\pi r + 2\pi r^2}{\pi}$

$\frac{144 = 42r + 2r^2}{2}$

$72 = 21r + r^2$

$0 = r^2 + 21r - 72$

$(r+24)(r-3) = 0$

$r = -24$ or 3

$r = 3$ in

$B = 9\pi$

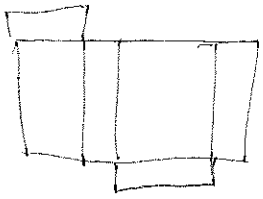
$H = 21$

$V = BH$

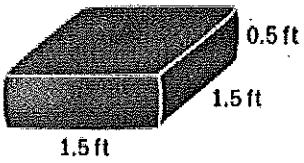
$(9\pi)(21)$

$189\pi\ in^3$

14. Draw a net of a rectangular prism.



15. You are making the stadium cushion shown. The foam for the cushion costs $1.60 per cubic foot, and the fabric costs $.50 per square foot. How much does it cost to make the cushion?



$B = (1.5)(1.5) = 2.25$

$H = .5$

$P = 6$

foam $V = BH$

$(2.25)(.5)$

$V = 1.125\ ft^3$

$\times \$1.60$

$\$1.80$

fabric $SA = PH + 2B$

$(6)(.5) + 2(2.25)$

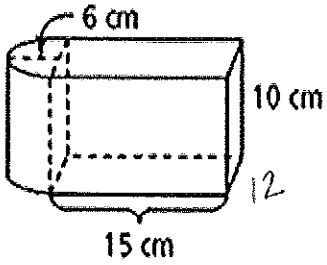
$3 + 4.5$

$7.5\ ft^2$ $\$3.75$

$\times .5$

$+$ $\$5.55$

16. Judging by appearances, what is the surface area of the solid shown at the right? What is the volume? Round your answers to the nearest whole number.



rect. prism

$B = (15)(12) = 180$

$H = 10$

$P = 54$

half cylinder $r = 6$

$B = \frac{36\pi}{2} = 18\pi$

$H = 10$

$C = \frac{12\pi}{2} = 6\pi$

$V = BH = (180)(10) = 1800$

$V = BH$

$(18\pi)(10)$

$180\pi \approx 565.49$

$V \approx 2365\ cm^3$

$SA = PH + 2B - (12)(10)$ ← not a surface

$(54)(10) + 2(180) - 120$

$540 + 360 - 120$

$780\ cm$

$SA = CH + 2B$

$(6\pi)(10) + 2(18\pi)$

$60\pi + 36\pi$

$96\pi\ cm^2$

$1081.59\ cm^2$