Systematic Review 17D

1. $9\sqrt{6}+23\sqrt{6}=(9+23)\sqrt{6}=32\sqrt{6}$
2. $7\sqrt{2}+8\sqrt{2}=(7+8)\sqrt{2}=15\sqrt{2}$
3. $\sqrt{7}-5\sqrt{7}=1\sqrt{7}-5\sqrt{7}=$
   $(1-5)\sqrt{7}=-4\sqrt{7}$
4. $(3\sqrt{6})(2\sqrt{7})=(3)(2)\sqrt{6}\sqrt{7}=6\sqrt{42}$
5. $(\sqrt{11})(\sqrt{11})=\sqrt{121}=11$
6. $\frac{2\sqrt{30}}{\sqrt{5}}=\frac{2\sqrt{6}}{1}=2\sqrt{6}$
7. $\sqrt{12}=\sqrt{4}\sqrt{3}=2\sqrt{3}$
8. $\sqrt{200}=\sqrt{100}\sqrt{2}=10\sqrt{2}$
9. $2\sqrt{3}\approx 3.46$; $10\sqrt{2}\approx 14.14$
10. $V=Bh=\pi r^2h\approx(3.14)(2^2)(16)$
    $=200.96\text{ cm}^3$
11. $SA=2\pi r^2+2\pi rh\approx$
    $(2)(3.14)(2^2)+(2)(3.14)(16)=$
    $25.12+200.96=226.08\text{ cm}^2$
12. $A=\frac{4+5}{2}(6)=27\text{ units}^2$
13. $A=\pi r^2\approx(3.14)(2.4^2)\approx 18.09\text{ in}^2$
14. arc
15. interior angle $=180°-45°=135°$
16. $540°=(N-2)180°$
    $540°=180N°-360°$
    $900°=180N°$
    $\frac{900°}{180°}=N=5$ sides
17. CFD or BFC or AFD: all are 90°
18. 5 cm
19. ADF: line BD is a transversal cutting lines AD and BC, which are parallel, because they are opposite sides of a rhombus. ∠CBF and ∠ADF are alternate interior angles.
20. 30°; alternate interior angles

Systematic Review 17E

1. $5\sqrt{5}+2\sqrt{2}=5\sqrt{5}+2\sqrt{2}$:
   cannot be simplified
2. $3\sqrt{5}+8\sqrt{5}=(3+8)\sqrt{5}=11\sqrt{5}$
3. $13\sqrt{10}-15\sqrt{10}=$
   $(13-15)\sqrt{10}=-2\sqrt{10}$
4. $(5\sqrt{10})(3\sqrt{13})=(5)(3)\sqrt{10}\sqrt{13}$
   $15\sqrt{130}$
5. $(3\sqrt{8})(2\sqrt{8})=(3)(2)\sqrt{8}\sqrt{8}=$
   $6\sqrt{64}=6(8)=48$
6. $\frac{8\sqrt{12}}{2\sqrt{6}}=\frac{8\sqrt{2}}{2}=\frac{4\sqrt{2}}{1}=4\sqrt{2}$
7. $\sqrt{27}=\sqrt{9}\sqrt{3}=3\sqrt{3}$
8. $\sqrt{20}=\sqrt{4}\sqrt{5}=2\sqrt{5}$
9. $3\sqrt{3}\approx 5.20$; $2\sqrt{5}\approx 4.47$
10. $V=\frac{1}{3}Bh=\frac{1}{3}(21)(21)(13)=$
    $1{,}911\text{ mm}^3$
11. triangles:
    $SA=(4)(\frac{1}{2})(21)(15)=630$
    base:
    $SA=(21)(21)=441$
    total:
    $SA=630+441=1{,}071\text{ mm}^2$
12. $A=bh=(11)(8)=88\text{ units}^2$
13. $C=\pi d\approx(3.14)(6.4)\approx 20.10$ in
14. isosceles
15. interior angle $=180°-72°=108°$
16. $360°\div 72°=5$ sides
17. $X^2+10X+16=(X+8)(X+2)$
18. $X^2+5X+6=(X+2)(X+3)$
19. $X^2+8X+7=(X+7)(X+1)$
20. $X^2+9X+20=(X+5)(X+4)$

Lesson Practice 18A

1. right
2. legs
3. hypotenuse
4. Pythagorean

5. the hypotenuse squared;
If the leg squared plus the leg squared equals the hypotenuse squared, the triangle is a right triangle.

6. $$\begin{aligned} 8^2+9^2 &= H^2 \\ 64+81 &= H^2 \\ 145 &= H^2 \\ \sqrt{145} &= H \end{aligned}$$

7. $$\begin{aligned} 5^2+5^2 &= H^2 \\ 25+25 &= H^2 \\ 50 &= H^2 \\ \sqrt{50} &= H \\ \sqrt{25}\sqrt{2} &= H \\ 5\sqrt{2} &= H \end{aligned}$$

8. $$\begin{aligned} 7^2+L^2 &= 12^2 \\ 49+L^2 &= 144 \\ L^2 &= \sqrt{95} \end{aligned}$$

9. $$\begin{aligned} 12^2+L^2 &= 13^2 \\ 144+L^2 &= 169 \\ L^2 &= 25 \\ L &= \sqrt{25} \\ L &= 5 \end{aligned}$$

10. $$\begin{aligned} 5^2+6^2 &= 8^2 \\ 25+36 &= 64 \\ 61 &= 64\text{: false} \end{aligned}$$
not a right triangle

11. $$\begin{aligned} 2^2+4^2 &= 6^2 \\ 4+16 &= 36 \\ 20 &= 36\text{: } \textit{false} \end{aligned}$$
not a right triangle

12. $$\begin{aligned} 6^2+8^2 &= 10^2 \\ 36+64 &= 100 \\ 100 &= 100\text{: true} \end{aligned}$$
is a right triangle

Lesson Practice 18B

1. 90°
2. legs
3. hypotenuse
4. Pythagorean theorem
5. the hypotenuse squared, then the triangle is a right triangle. If a triangle is a right triangle, then one leg squared plus the other leg squared equals the hypotenuse squared.

6. $$\begin{aligned} 7^2+10^2 &= H^2 \\ 49+100 &= H^2 \\ 149 &= H^2 \\ \sqrt{149} &= H \end{aligned}$$

7. $$\begin{aligned} 3^2+3^2 &= H^2 \\ 9+9 &= H^2 \\ 18 &= H^2 \\ \sqrt{18} &= H \\ \sqrt{9}\sqrt{2} &= H \\ 3\sqrt{2} &= H \end{aligned}$$

8. $$\begin{aligned} 24^2+L^2 &= 25^2 \\ 576+L^2 &= 625 \\ L^2 &= 49 \\ L &= \sqrt{49} \\ L &= 7 \end{aligned}$$

9. $$\begin{aligned} \left(5\sqrt{2}\right)^2+L^2 &= \left(10\sqrt{3}\right)^2 \\ (5)(5)\sqrt{2}\sqrt{2}+L^2 &= (10)(10)\sqrt{3}\sqrt{3} \\ 25\sqrt{4}+L^2 &= 100\sqrt{9} \\ 25(2)+L^2 &= 100(3) \\ 50+L^2 &= 300 \\ L^2 &= 250 \\ L &= \sqrt{250} \\ L &= \sqrt{25}\sqrt{10} \\ L &= 5\sqrt{10} \end{aligned}$$

10. $4^2+5^2=6^2$
$16+25=36$
$41=36$: false
not a right triangle

11. $10^2+24^2=26^2$
$100+576=676$
$676=676$: true
is a right triangle

12. $12^2+16^2=20^2$
$144+256=400$
$400=400$: true
is a right triangle

Systematic Review18C

1. $7^2+10^2=49+100=149$
$\sqrt{149}$ is between 12 and 13
Any answer that is close
is acceptable.

2. $7^2+10^2=H^2$

3. $7^2+10^2=H^2$
$49+100=H^2$
$149=H^2$
$\sqrt{149}=H$

4. $\sqrt{149}=\sqrt{149}$:
cannot be simplified

5. $4^2-3^2=16-9=7$
$\sqrt{7}$ is between 2 and 3

6. $3^2+L^2=4^2$

7. $3^2+L^2=4^2$
$9+L^2=16$
$L^2=7$
$L=\sqrt{7}$

8. $\sqrt{7}\approx 2.65$

9. no

10. $5^2+7^2\neq 9^2$

11. hypotenuse

12. $A=\frac{1}{2}bh=\frac{1}{2}(7)(9)=31.5\text{ in}^2$

13. $A=\pi r^2\approx(3.14)(2^2)=12.56\text{ in}^2$

14. $A=31.5-12.56=18.94\text{ in}^2$

15. $11\sqrt{5}+7\sqrt{5}=(11+7)\sqrt{5}=18\sqrt{5}$

16. $(9\sqrt{2})(5\sqrt{2})=(9)(5)\sqrt{2}\sqrt{2}=$
$45\sqrt{4}=45(2)=90$

17. $\frac{9\sqrt{200}}{12\sqrt{2}}=\frac{3\sqrt{100}}{4}=\frac{3(10)}{4}=$
$\frac{30}{4}=7\frac{1}{2}$ or 7.5

18. $A=\frac{1}{2}bh=\frac{1}{2}(4)(2\sqrt{3})=$
$(2)(2\sqrt{3})=4\sqrt{3}\text{ in}^2$

19. $A=(5)(4\sqrt{3})=20\sqrt{3}\text{ in}^2$

20. $P=(5)(4)=20\text{ in}$

Systematic Review 18D

1. $7^2+7^2=49+49=98$
$\sqrt{98}$ is between 9 and 10

2. $7^2+7^2=B^2$

3. $7^2+7^2=B^2$
$49+49=B^2$
$98=B^2$
$\sqrt{98}=B$

4. $\sqrt{98}=\sqrt{49}\sqrt{2}=7\sqrt{2}$

5. $18^2-(9\sqrt{3})^2=324-81\sqrt{9}=$
$324-81(3)=324-243=81$
$\sqrt{81}=9$

6. $18^2-(9\sqrt{3})^2=M^2$

7. $18^2-(9\sqrt{3})^2=M^2$
$324-81\sqrt{9}=M^2$
$324-81(3)=M^2$
$324-243=M^2$
$81=M^2$
$9=M$

8. $9\sqrt{3}\approx 15.59$

9. yes
10. $24^2+10^2=26^2$
$576+100=676$
$676=676$: true
11. equilateral
12. yes: they are both radii of the circle
13. 50°
14. $m\angle OAB+m\angle OBA+m\angle AOB=180^\circ$
$m\angle OAB+m\angle OBA+50^\circ=180^\circ$
$m\angle OAB+m\angle OBA=130^\circ$
$m\angle OAB=130^\circ\div 2=65^\circ$
15. $\sqrt{3}+\sqrt{3}=2\sqrt{3}$
16. $(\sqrt{6})(-\sqrt{24})=-\sqrt{144}=-12$
17. $\dfrac{2\sqrt{15}}{\sqrt{5}}=\dfrac{2\sqrt{3}}{1}=2\sqrt{3}$
18. $A=\dfrac{1}{2}bh=\dfrac{1}{2}(12)(5\sqrt{6})=30\sqrt{6}\text{ in}^2$
6 triangles
19. $30\sqrt{6}(6)=180\sqrt{6}\text{ in}^2$
20. $P=6(12)=72$ in

Systematic Review 18E

1. $6^2+(2\sqrt{3})^2=36+4(\sqrt{9})=$
$36+4(3)=36+12=48$
$\sqrt{48}$ is between 6 and 7
2. $R^2=6^2+(2\sqrt{3})^2$
3. $R^2=6^2+(2\sqrt{3})^2$
$R^2=36+4(\sqrt{9})$
$R^2=36+4(3)$
$R^2=36+12$
$R^2=48$
$R=\sqrt{48}$
4. $\sqrt{48}=\sqrt{16}\sqrt{3}=4\sqrt{3}$
5. $11^2+11^2=121+121=242$
$\sqrt{242}$ is between 15 and 16
6. $T^2=11^2+11^2$
7. $T^2=11^2+11^2$
$T^2=121+121$
$T^2=242$
$T=\sqrt{242}=\sqrt{121}\sqrt{2}=11\sqrt{2}$
8. $11\sqrt{2}\approx 15.56$
9. yes $(2\sqrt{7})^2+(2\sqrt{3})^2=(2\sqrt{10})^2$
$4\sqrt{49}+4\sqrt{9}=4\sqrt{100}$
$4(7)+4(3)=4(10)$
$28+12=40$
$40=40$: true
10. The sum of the legs squared equals the hypotenuse squared.
11. yes: It would be a right triangle with equal legs. $(45^\circ-45^\circ-90^\circ)$
12. $V=Bh=\pi r^2h\approx(3.14)(2+3)^2(12)$
$=942\text{ m}^3$
13. $V=Bh=\pi r^2h\approx(3.14)(2^2)(12)$
$=150.72\text{ m}^3$
14. $V=942-150.72=791.28\text{ m}^3$
15. $5\sqrt{2}-4\sqrt{3}=5\sqrt{2}-4\sqrt{3}$:
cannot be simplified
16. $(5\sqrt{6})(2\sqrt{10})=$
$(5)(2)\sqrt{6}\sqrt{10}=10\sqrt{60}=$
$10\sqrt{4}\sqrt{15}=10(2)(\sqrt{15})=20\sqrt{15}$
17. $\dfrac{\sqrt{100}}{\sqrt{25}}=\dfrac{\sqrt{4}}{1}=\dfrac{2}{1}=2$ or:
$\dfrac{\sqrt{100}}{\sqrt{25}}=\dfrac{10}{5}=2$
18. $X^2+3X-10=(X+5)(X-2)$
19. $X^2-2X-3=(X-3)(X+1)$
20. $X^2+X-6=(X+3)(X-2)$

Lesson Practice 19A

1. $\dfrac{9}{\sqrt{2}}=\dfrac{9\sqrt{2}}{\sqrt{2}\sqrt{2}}=\dfrac{9\sqrt{2}}{\sqrt{4}}=\dfrac{9\sqrt{2}}{2}$

10. Volume of the cylinder:
$V=3.14\ (1)^2(2)$
$V = 6.28$ units^3
Volume of the sphere from #9:
4.19 units^3
$6.28 - 4.19 = 2.09$ 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. $V = 3(11)(3) = 99$ ft^3
$SA = 2(3x11) + 2(3x3) + 2(11x3)$
$= 2(33) + 2(9) + 2(33)$
$= 66 + 18 + 66$
$= 150$ ft^2
5. 150 ft$^2 \div 6$ faces $= 25$ ft^2 per face
$\sqrt{25} = 5$ ft
The new bin is 5 x 5 x 5.
6. The cube-shaped one holds more.
$125 - 99 = 26$ ft^3 difference.

Honors Lesson 17

1. $V = \pi r^2 h$
$V = 3.14(2)^2(4)$
$V = 50.24$ ft^3
2. $V = \frac{4}{3}\pi r^3$
$V = \frac{4}{3}(3.14)(2)^3$
$V = 33.49$ ft^3 (rounded)
3. $V = 3.14(3)^2(6)$
$V = 169.56$ units^3
4. $V = \frac{4}{3}(3.14)(3)^3$
$V = 113.04$ units^3 (rounded)
5. $V = 3.14(1)^2(2)$
$V = 6.28$ units^3
6. $V = \frac{4}{3}(3.14)(1)^3$
$V = 4.19$ units^3 (rounded)
7. $\frac{33.49}{50.24} \approx .67 \quad \frac{113.04}{169.56} \approx .67$
$\frac{4.19}{6.28} \approx .67$
8. $\frac{2}{3}$
9. $A = 2\pi r^2 + 2\pi rh$
$A = 2(3.14)(3)^2 + 2(3.14)(3)(6)$
$A = 56.52 + 113.04 = 169.56$ units^2
10. $A = 4(3.14)(3)^2$
$A = 113.04$ 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

3. $L^2 + 4{,}000^2 = 4{,}003^2$
$L^2 = 4{,}003^2 - 4{,}000^2$
$L^2 = 16{,}024{,}009 - 16{,}000{,}000$
$L^2 = 24{,}009$
$L = \sqrt{24{,}009} \approx 155$ mi
4. $29{,}035 \div 5{,}280 \approx 5$ mi
5. $L^2 + 4{,}000^2 = 4{,}005^2$
$L^2 + 16{,}000{,}000 = 16{,}040{,}025$
$L^2 = 16{,}040{,}025 - 16{,}000{,}000$
$L^2 = 40{,}025$
$L = \sqrt{40{,}025} \approx 200$ mi
6. $555 \div 5{,}280 \approx .1$
$L^2 + 4{,}000^2 = 4{,}000.1^2$
$L^2 + 16{,}000{,}000 = 16{,}000{,}800.00$
$L^2 = 16{,}000{,}801.01 - 16{,}000{,}000$
$L^2 = 800.01$
$L = \sqrt{800.01} \approx 28.3$ mi
7. $150^2 + 4{,}000^2 = (X + 4{,}000)^2$
8. $X^2 + 8{,}000X + 16{,}000{,}000$
9. $22{,}500 + 16{,}000{,}000 = X^2$
$+8{,}000X + 16{,}000{,}000$
$22{,}500 = X^2 + 8{,}000X$
$0 = X^2 + 8{,}000X - 22{,}500$
or $X^2 + 8{,}000X - 22{,}500 = 0$
10. $8{,}000X = 22{,}500$
$X = 22{,}500 \div 8{,}000$
$X \approx 2.8$ mi

Honors Lesson 19

1. V = area of base x altitude
$V = (4 \cdot 4)(8)$
$V = 128 \text{ in}^3$
2. $SA = 2(4x4) + 2(4x8) + 2(4x8)$
$SA = 2(16) + 2(32) + 2(32)$
$SA = 32 + 64 + 64$
$SA = 160 \text{ in}^2$
3. V = area of base x altitude
$V = \frac{1}{2}(3x4)x10$
$Y = 60 \text{ ft}^3$
4. $SA = (2)\ \frac{1}{2}(3x4)\ + (3x10) +$
$(4x10) + (5x10)$
$SA = 12 + 30 + 40 + 50$
$SA = 132 \text{ ft}^2$
5. Think of the wire as a long, skinny cylinder.
$1 \text{ ft}^3 = 12x12x12 = 1{,}728 \text{ in}^3$
Volume of wire = area of base x length
$1{,}728 = (3.14x1^2)x\ L$
$1{,}728 = .0314L$
$5{,}5031.8 \text{ in} \approx L$
$5{,}5031.8 \div 12 \approx 4{,}586$ ft
6. $A = LW$ Let L = the circumference and W = the height of the cylinder.
Diameter = 9, so $L = 3.14(9)$
$28.26 \text{ in} \approx L$ This is one dimension of the rectangle and the circumference of the cylinder.
$625 = 28.26W$
$22.12 \text{ in} = W$ This is the other dimension of the rectangle and the height of the cylinder.
V = area of base x height
$V = 3.14(9 \div 2)^2 x\ 22.12$
$V = 3.14(4.5)^2 x\ 22.12$
$V \approx 1{,}406.5 \text{ in}^3$