Honors Solutions

Honors Lesson 1

1. Begin by putting x's to show that Tyler and Madison do not like tacos. That leaves Jeff as the one who has tacos as his favorite. Since you know Jeff's favorite, you can also put x's in Jeff's row, under ice cream and steak. We are told that Madison is allergic to anything made with milk, so we can put an x across from her name, under ice cream. Now we can see that Tyler is the only one who can have ice cream as his favorite, leaving Madison with steak.

	ice cream	tacos	steak
Jeff	X	yes	X
Tyler	yes	X	X
Madison	X	X	yes

2. We use similar reasoning for the rest of the problems. Remember that once you have a "yes" in any row or column, the rest of the possibilities in that row and in that column can be eliminated.

	black	brown	blonde
Mike	yes	X	X
Caitlyn	X	X	yes
Lisa	X	yes	X

3.

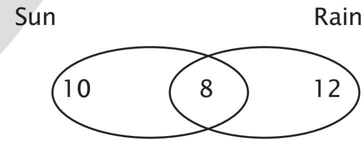
	reading	tennis	cooking	eating
George	X	X	yes	X
Celia	X	yes	X	X
Donna	yes	X	X	X
Adam	X	X	X	yes

4.

	spring	summer	autumn	winter
David	X	X	yes	X
Linda	X	X	X	yes
Shauna	yes	X	X	X
April	X	yes	X	X

Honors Lesson 2

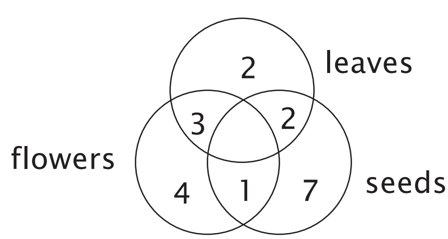
1. $18+20=38$
   $38-30=8$ days had both



   $S\cap R=8$
   $S\cup R=30$
2. 1 (The twisted ring you started with is called a Mobius strip.)
3. 1st time : one long loop is created
   2nd time : two interlocked loops are created
4. $\left[\left(5^2+5\right)\div 6\right]+10=$
   $\left[\left(25+5\right)\div 6\right]+10=$
   $\left(30\div 6\right)+10=$
   $5+10=15$
5. $\left(42\div 7\right)+6-1=$
   $\left(6\right)+6-1=$
   $12-1=11$

Honors Lesson 3

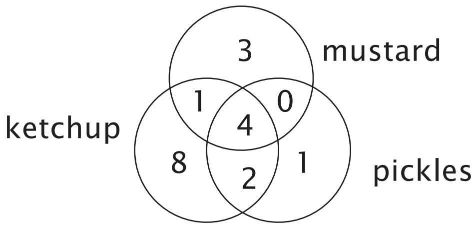
1. 2
2. 4
3. $L\cap F=3$
4. $L\cup F=12$



5. 8
6. 3

7. $K \cup M - P = 12$

8. $K \cap M \cap P = 4$



9. 3x4 = 4 x 3
commutative property
is true for multiplication

10. $9 - 6 \neq 6 - 9$
commutative property
is false for subtraction

11. $(2+1)+5 = 2+(1+5)$
associative property
is true for addition

12. $2 \div 8 \neq 8 \div 2$
commutative property
is false for division

Honors Lesson 4

1. 45º

2. NNW

3. NNE

4. no, he should have corrected 67.5º

5. $5X - 6 = 2X + 18$
$5X - 2X = 18 + 6$
$3X = 24$
$X = 8$

6. $2C + 10 = 43 - C$
$3C = 33$
$C = 11$

7. $(\$1.75 + D) + D = \$3.25$
$2D + \$1.75 = \$3.25$
$2D = \$1.50$
$D = \$.75$
$\$.75 + \$1.75 = \$2.50$
Drink is $.75
Sandwich is $2.50

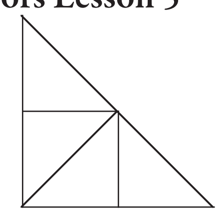
8. let X = number of Isaac's customers
2X = number of Aaron's customers
X+2X = 105
3X = 105
X = 35
2X = 70
Isaac has 35 customers
Aaron has 70 customers

9. $X + 2X = 18$
$3X = 18$
X = 6 feet; 2X = 12 feet

10. $A + (A + 20) = 144$
$2A + 20 = 144$
$2A = 124$
A = 62 apples in one box
62 + 20 = 82 apples in the other box

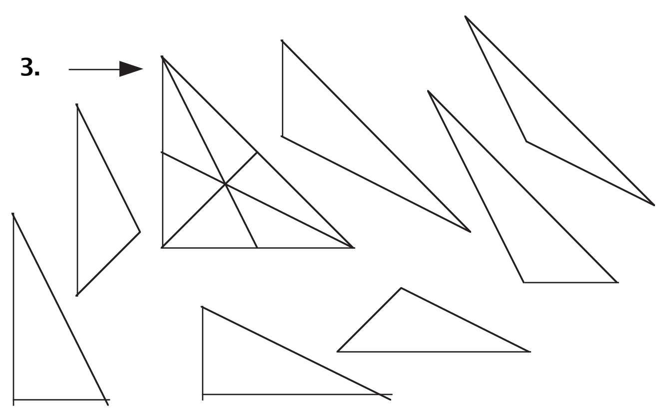
Honors Lesson 5

1.



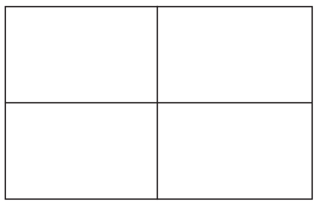
2.
4 small
2 medium
1 large
———
7 total

3.

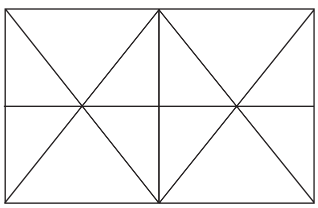


4. 1 started with
2 that are half of first triangle
6 small
<u>7 overlapping</u> (you may need to draw these separately to be able to count each one. See Above.)
16 total

5.

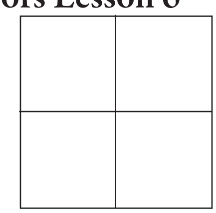


6.

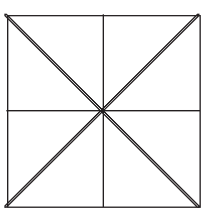


Honors Lesson 6

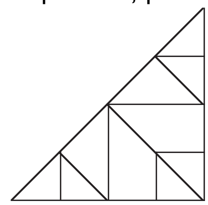
1.



2.



3. triangles, squares, trapezoids, pentagons



4. answers will vary

5. $P = 6X + .5(6)X$
$P = 6X + 3X$
$P = 9X$

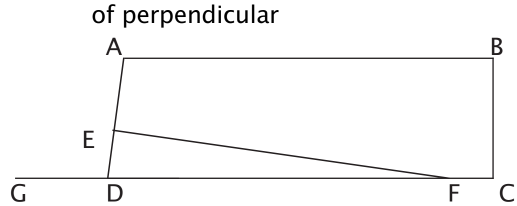
6. $P = 9X$
$P = 9(8)$
$P = \$72$

Honors Lesson 7

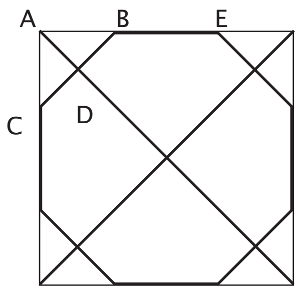
1. Extend all segments
$\overline{AD} \parallel \overline{XY} \parallel \overline{BC}$
$\overline{AB} \parallel \overline{RS} \parallel \overline{DC}$
corresponding angles are congruent

2. Yes; extend $\overline{DF}$ and $\overline{BC}$
these 2 line segements are cut by transversal $\overline{AB}$
corresponding $\angle$'s ADF and ABE are both 90º

3. extend $\overline{DC}$ to include point G
$m\angle A = 100º$
since $\overline{AB}$ and $\overline{DC}$ are parallel, $m\angle GDA$ is 100º.
$m\angle EDF$ is 80º, since it is supplementary to $\angle GDA$.
$m\angle DEF = 90º$ - definition of perpendicular



4. CAB = 90° (given)
BAD = 45°–definition of bisector
ADB = 90° - definition of perpendicular
ABD = 45° - from information given
DBE = 135° - supplementary angles
all other corners work out the same way.



Honors Lesson 8

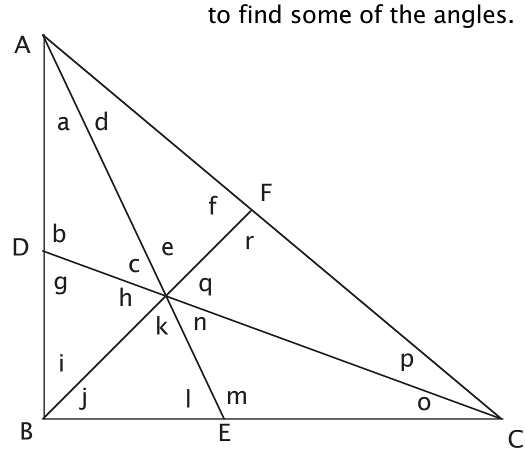
1. Look at the drawing below to see how the angles are labeled for easy reference.
a and d are 25°
definition of bisector

p and o are 20°
definition of bisector

i and j are 45°
definition of bisector

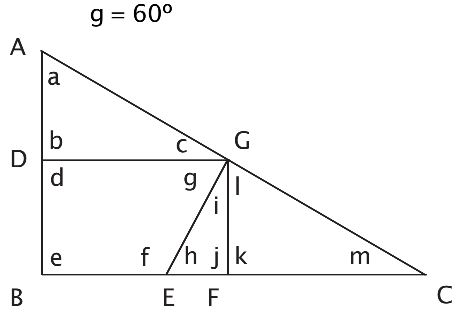
Now look at triangle AEB. Its angles must add up to 180°. We know the measure of a and that of ABC. Add these together, and subtract the result from the total 180° that are in a triangle:
$180-(25+90)=180-115=65°$
$l=65°$

Using similar reasoning, and looking at triangles AEC, BFC, ABF, DBC and ADC, we can find the following:
m = 115°
r = 95° f = 85°
b = 110°. g = 70°
Now we know two angles from each of the smaller triangles. Armed with this knowledge, and the fact that there are 180° in a triangle, we can find the remaining angles:
c = 45° e = 70°
q = 65° n = 45°
k = 70° h = 65°
You can also use what you know about vertical angles and complementary angles to find some of the angles.

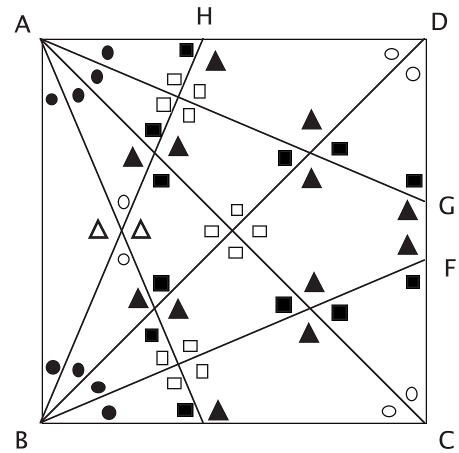


2. b, d, j and k are all 90° definition of perpendicular
$c=180°-(a+b)$ 180° in a triangle
$c=180°-(60+90)=30°$
$l=180°-(K+m)$ 180° in a triangle

$l = 180° - (90 + 30) = 60°$	
$l + i = 90°$	Angle EGC is 90° because of the definition of perpendicular.
$60 + i = 90°$	
$i = 30°$	
$h = 180° - (i + j)$	180° in a triangle
$h = 180° - (30 + 90)$	
$h = 60°$	
$f + h = 180°$	Angle BEC is 180°
$f + 60 = 180°$	
$f = 120°$	
$c + g = 90°$	Angle AGE is 90° because of the definition of perpendicular.
$30 + g = 90°$	
$g = 60°$	



3. Use the same process for this one. Remember that you can also use what you know about vertical angles or complementary and supplementary angles as a shortcut.



● = 22.5°
○ = 45°
■ = 67.5°
□ = 90°
▲ = 112.5°
△ = 135°

Honors Lesson 9

1. large rectangle:
15' 6" = 15.5 ft
15.5 x 13 = 201.5 ft^2
small rectangle:
3 x 5 = 15 ft^2
large trapezoid:
$(9)\left(\frac{10+4}{2}\right) = (9)\left(\frac{14}{2}\right) = (9)(7) = 63 \text{ ft}^2$
small trapezoid:
$(2)\left(\frac{4+8}{2}\right) = (2)\left(\frac{12}{2}\right) = (2)(6) = 12 \text{ ft}^2$
total:
201.5 + 15 + 63 + 12 = 291.5 ft^2

2. It is necessary sometimes to add lines to the drawing to make it clearer. In figure 1a, dotted lines have been added to show how one end of the figure has been broken up. Since we know that the long measurement is 6.40 in and the space between the dotted lined is .80 in, we can see that the heights of the trapezoids add up to 5.60 in. Since we have been told that the top and bottom are the same, each trapezoid must have a height of 2.80 in.

Area of each trapezoid:

$(2.8)\left(\frac{1.27+.80}{2}\right)=(2.8)\left(\frac{2.07}{2}\right)=$

2.898 in^2

Since there are four trapezoids in all, we multiply by 4:

2.898 x 4 = 11.592 in^2

Rectangular center portion:

.80 in x 15 in = 12 in^2

Total:

$12+11.592=23.592\ \text{in}^2$

3. area $=(a)(b)$ or ab (see figure 2)
4. area $=(2a)(2b)$ or 4ab (see figure 3)
5. area $=(na)(nb)$ or n^2ab (see figure 4)
6. area $=n^2ab=(5^2)(4)(5)=(25)(20)=$ 500 ft^2
7. first triangle: $a=\frac{1}{2}xy$

   second triangle: $a=\frac{1}{2}(2x)(2y)=2xy$

   4 times $\frac{1}{2}=2$, so new area is four times as great.
8. first square: $(x)(x)=x^2$

   second square: $(x^2)(x^2)=x^4$

figure 1a

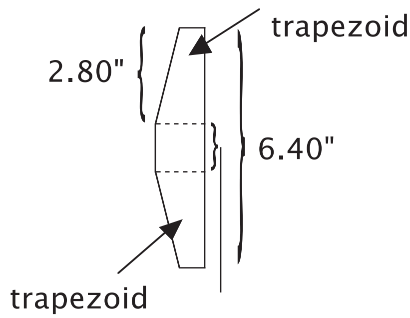
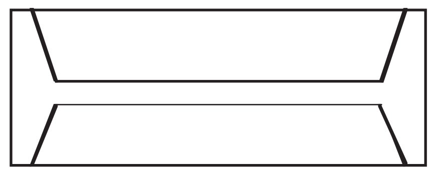


figure 1b (shows a different way of finding the area)



Area of large rectangle $15\times6.4=96\ \text{in}^2$

One trapezoid	long base $15-(2\times.8)=13.4\ \text{in}^2$ short base $15-(2\times1.27)=$ $12.46\ \text{in}^2$ height $(6.4-.8)\div$ $2=2.8\ \text{in}^2$ Area of one trapezoid $=36.204\ \text{in}^2$
Both trapezoids	$2\times36.204=$ $72.408\ \text{in}^2$
Area of figure	$96-72.408=$ $23.592\ \text{in}^2$

figure 2

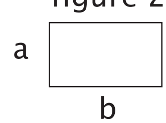


figure 3

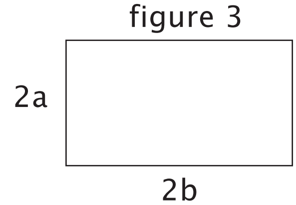


figure 4

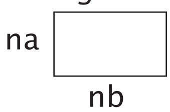


figure 5

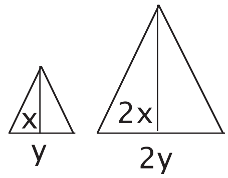
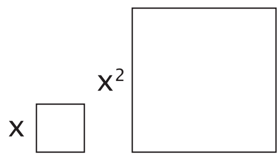
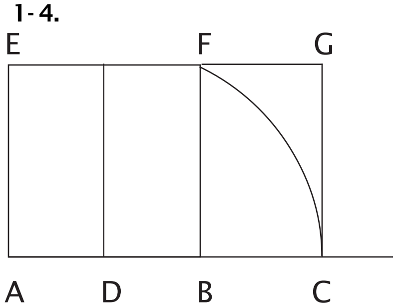


figure 6



Honors Lesson 10

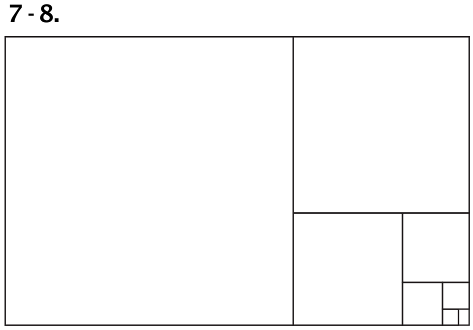
1-4.



5. your answer should be close to 0.61803.

6. See illustration above.
The ratio should be close to what you got in #5.

7-8.



Honors Lesson 11

1.

	green, buttons	green, zipper	red, zipper	blue, buttons
Chris	yes	x	x	x
Douglas	x	yes	x	x
Ashley	x	x	x	yes
Naomi	x	x	yes	x

2.

	planning games	refresh – ments	place for party	birthday guest
Sam	x	x	yes	x
Jason	x	x	x	yes
Shane	yes	x	x	x
Troy	x	yes	x	x

3.

	train	boat	airplane	car
Janelle	yes	x	x	x
Walter	x	x	x	yes
Julie	x	yes	x	x
Jared	x	x	yes	x

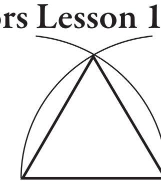
4.

	hot dog	pizza	chicken soup	tossed salad
Molly	yes	x	x	x
Tina	x	x	x	yes
Logan	x	x	yes	x
Sam	x	yes	x	x

5. Answers will vary.

Honors Lesson 12

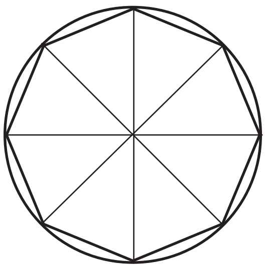
1.



2. 60º

3. Since the sections are all equal, the center angles are all the same. 360º ÷ 8 = 45º

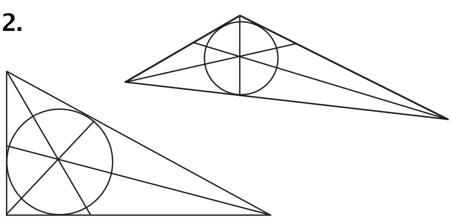
4 - 8.



9. In #3, you divided 360º by 8 to find that each small triangle has a central angle of 45º. Since a hexagon has six sides, you want to construct six triangles inside the circle. 360º ÷ 6 = 60º

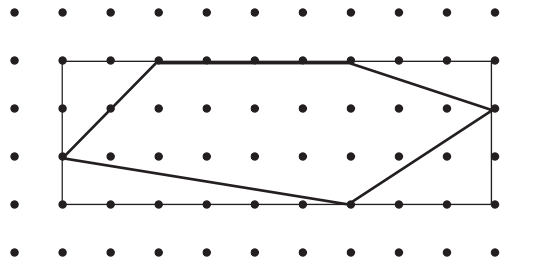
In #1, you learned how to construct an equilateral triangle with each angle equal to 60º. After drawing a circle and one diameter, use the same procedure to construct equilateral triangles inside your circle, using a radius of the circle as your starting point each time. After you have constructed four triangles,connect their points, and you will have an inscribed regular hexagon.

10 - 12.



Honors Lesson 13

1. See illustration.



2. 3 x 9 = 27 units^2

3. $\frac{1}{2}(2\text{x}2) = 2$ units^2

$\frac{1}{2}(3\text{x}1) = 1.5$ units^2

$\frac{1}{2}(1\text{x}6) = 3$ units^2

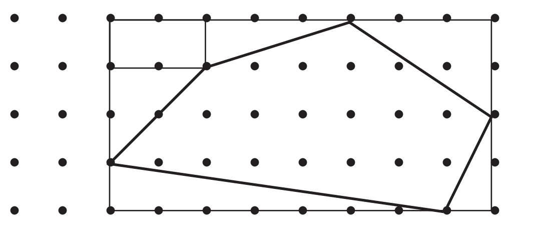
$\frac{1}{2}(3\text{x}2) = 3$ units^2

4. $2 + 1.5 + 3 + 3 = 9.5$ units^2

27 - 9.5 = 17.5 units^2

5. See illustration for 5 & 6.

6. See illustration for 5 & 6.



7. 4x8 = 32 units^2

8. 1x2 = 2 units^2

$\frac{1}{2}(1\text{x}3) = 1.5$ units^2

$\frac{1}{2}(2\text{x}3) = 3$ units^2

$\frac{1}{2}(2\text{x}2) = 2$ units^2

$\frac{1}{2}(1\text{x}7) = 3.5$ units^2

$\frac{1}{2}(1\text{x}2) = 1$ unit^2

9. $2+1.5+3+2+3.5+1=13$ units^2

$32 - 13 = 19$ units^2

10. See illustration.

$10 \times 5 = 50$ units^2

$\frac{1}{2}(5\text{x}2) = 5$ units^2

$1 \times 5 = 5$ units^2

$\frac{1}{2}(1\text{x}5) = 2.5$ units^2

$\frac{1}{2}(4\text{x}1) = 2$ units^2

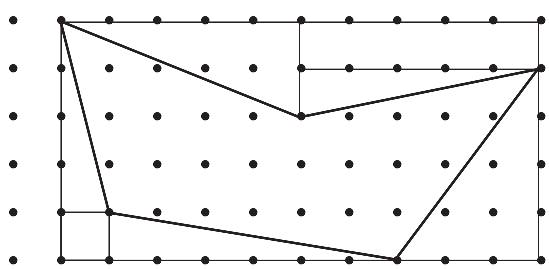
$1 \times 1 = 1$ unit^2

$\frac{1}{2}(6\text{x}1) = 3$ units^2

$\frac{1}{2}(3\text{x}4) = 6$ units^2

$5+5+2.5+2+1+3+6 = 24.5$ units^2

$50 - 24.5 = 25.5$ units^2



11. See illustration.

$4 \times 8 = 32$ units^2

$\frac{1}{2}(1\text{x}1) = .5$ units^2

$\frac{1}{2}(3\text{x}1) = 1.5$ units^2

$1\text{x}1=1$ unit^2

$\frac{1}{2}(1\text{x}2) = 1$ unit^2

$\frac{1}{2}(1\text{x}2) = 1$ unit^2

$1 \times 1 = 1$ unit^2

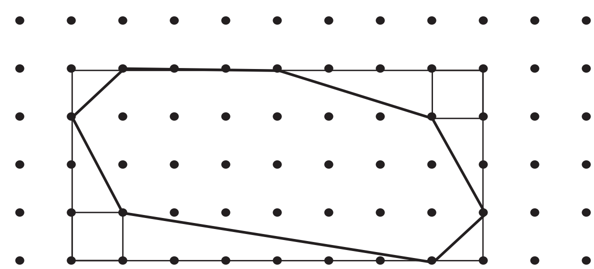
$\frac{1}{2}(5\text{x}1) = 2.5$ units^2

$\frac{1}{2}(2\text{x}1) = 1$ unit^2

$.5 + 1.5 + 1 + 1 + 1 + 1 + 2.5 + 1$

$= 9.5$ units^2

$32 - 9.5 = 22.5$ units^2



Honors Lesson 14

1. $\frac{1}{2}(3\text{x}4) = \frac{1}{2}(12) = 6$ units^2

2. $A = \sqrt{s(s-a)(s-b)(s-c)}$

$A = \sqrt{6(6-3)(6-4)(6-5)}$

$A = \sqrt{6(3)(2)(1)}$

$A = \sqrt{36}$

$A = 6$ units^2

yes

3. $A = \sqrt{16(16-7)(16-10)(16-15)}$
$A = \sqrt{16(9)(6)(1)}$
$A = \sqrt{864}$
$A = 29.39 \text{ units}^2$

4. $A = \sqrt{52(52-36)(52-28)(52-40)}$
$A = \sqrt{52(16)(24)(12)}$
$A = \sqrt{239{,}616}$
$A = 489.51 \text{ units}^2$

5. $V = \pi r^2 h$
$V = 3.14(2)^2(10)$
$V = 3.14(4)(10)$
$V = 125.6 \text{ in}^3$

6. $V = \pi r^2 h$
$V = 3.14(1)^2(10)$
$V = 3.14(1)(10)$
$V = 31.4 \text{ in}^3$
It is $\frac{1}{4}$ the first one

7. $V = \pi r^2 h$
$V = 3.14(2)^2(5)$
$V = 3.14(4)(5)$
$V = 62.8 \text{ in}^3$
It is half the first one.

8. $V = \pi r^2 h$
$V = 3.14(4)^2(10)$
$V = 3.14(16)(10)$
$V = 502.4 \text{ in}^3$
It is four times the first one.

9. $V = \pi r^2 h$
$V = 3.14(2)^2(20)$
$V = 3.14(4)(20)$
$V = 251.2 \text{ cu in}^3$
It is two times the first one

10. When the height is doubled, the volume is doubled. When the height is halved, the volume is halved. When the radius is doubled, the volume increases by a factor of 4. When the radius is halved, the volume decreases by a factor of 4.
The student may use his own words to express this.

11. Answers will vary.

12. Take the formula, and multiply both sides by 2:
$V = \pi r^2 h$
$2V = 2\pi r^2 h$
Now rearrange the factors:
$V = \pi r^2 h$
$2V = \pi r^2 2h$
Take the formula, and multiply both sides by 4:
$V = \pi r^2 h$
$4V = 4\pi r^2 h$
Rewrite the 4 on the right side as 2^2:
$4V = 2^2 \pi r^2 h$
Rearrange the factors:
$4V = \pi 2^2 r^2 h$
$4V = \pi (2r)^2 h$
There is more than one way to set this up. As long as you show the same results as by experimentation, the answer is correct.

Honors Lesson 15

1. $3 \times 3 \times 3 = 27$ ft
2. $12 \times 12 \times 12 = 1{,}728 \text{ in}^3$
3. $8 \times 4 \times 2 = 64 \text{ in}^3$
   $64 \times .3 = 19.2$ lb
4. $64 \text{ in}^3 \div 1{,}728 = .037 \text{ ft}^3$
   $.037 \times 1200 = 44.4$ lbs
   You could probably lift it,
   but it would be much heavier
   than expected.
5. First find what the volume would
   be if it were solid:
   $V = \pi r^2 h$
   $V = 3.14(.5)^2(12)$
   $V = 9.42 \text{ in}^3$
   Now find the volume inside
   the pipe:
   $V = \pi r^2 h$
   $V = 3.14(.25)^2(12)$
   $V = 2.355 \text{ in}^3$
   Then find the difference:
   $9.42 - 2.355 = 7.065 \text{ in}^3$
6. $7.065 \times .26 = 1.8369$ lb
7. $V = \frac{4}{3}\pi r^3$
   $V = \frac{4}{3}(3.14)(.25)^3$
   $V = .07 \text{ in}^3$ (rounded)
   $.07 \times .3 \approx .02$ pounds for
   one bearing
   $25 \div .02 = 1{,}250$ bearings
   Because we rounded some
   numbers, the actual number
   of bearings in the box may be
   slightly different. Keep in mind
   that the starting weight was
   rounded to a whole number.
   Our answer is close enough to
   be helpful in a real life situation,
   where someone wants to know
   approximately how many bearings
   are available without counting.
8. The side view is a trapezoid,
   and the volume of the water
   is the area of the trapezoid
   times the width of the pool:
   $A = \frac{3+10}{2}(40)$
   $A = 6.5(40)$
   $A = 260 \text{ ft}^2$
   $V = 260(20)$
   $V = 5{,}200 \text{ ft}^3$
9. Volume of the sphere:
   $V = \frac{4}{3}(3.14)(1)^3 \text{ units}^3$
   $V = 4.19$
   Volume of the cube:
   $V = 2 \times 2 \times 2 = 8 \text{ units}^3$
   $8 - 4.19 = 3.81 \text{ units}^3$

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
   $SA = 2(3\text{x}11) + 2(3\text{x}3) + 2(11\text{x}3)$
   $= 2(33) + 2(9) + 2(33)$
   $= 66 + 18 + 66$
   $= 150$ ft^2
5. 150 ft^2 ÷ 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. $\frac{33.49}{50.24} \approx .67$ $\frac{113.04}{169.56} \approx .67$
   $\frac{4.19}{6.28} \approx .67$
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. $555 \div 5{,}280 \approx .1$
$L^2 + 4{,}000^2 = 4{,}000.1^2$
$L^2 + 16{,}000{,}000 = 16{,}000{,}800.01$
$L^2 = 16{,}000{,}800.01 - 16{,}000{,}000$
$L^2 = 800.01$
$L = \sqrt{800.01} \approx 28.3$ 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

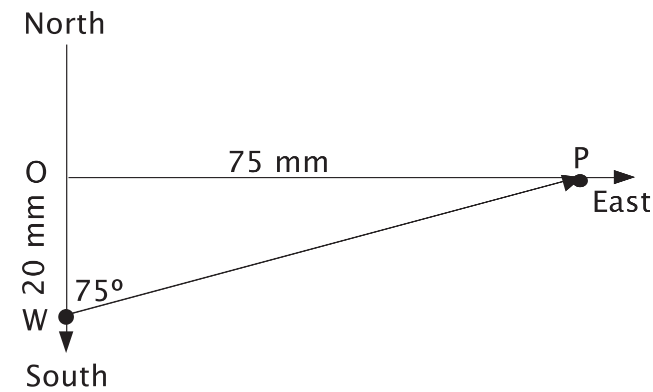
Honors Lesson 19

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
$V = \frac{1}{2}(3 \times 4) \times 10$
$Y = 60 \text{ ft}^3$
4. $SA = (2)\left(\frac{1}{2}(3 \times 4)\right) + (3x10) +$
$(4 \times 10) + (5 \times 10)$
$SA = 12 + 30 + 40 + 50$
$SA = 132 \text{ ft}^2$
5. Think of the wire as a long, skinny cylinder.
$1 \text{ ft}^3 = 12 \times 12 \times 12 = 1{,}728 \text{ in}^3$
Volume of wire = area of base x length
$1{,}728 = (3.14 \times .1^2) \times L$
$1{,}728 = .0314L$
$55{,}031.8 \text{ in} \approx L$
$55{,}031.8 \div 12 \approx 4{,}586$ 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 × height
$V = 3.14(9 \div 2)^2 \times 22.12$
$V = 3.14(4.5)^2 \times 22.12$
$V \approx 1{,}406.5 \text{ in}^3$

7. Cylinder will be 4 inches high and 4 inches in diameter. Area of one circular end $= 3.14(2)^2 = 12.56 \text{ in}^2$
area of side $= 3.14(4) \times 4 = 50.24 \text{ in}^2$
$50.24 + 12.56 + 12.56 = 75.36 \text{ in}^2$
You also could have used what you learned in lesson 17 to find the surface area of the cylinder. First find the surface area of the sphere, and then multiply by $\frac{3}{2}$.
(See below for an alternative solution.)
7. alternative solution
SA of sphere $= 4(3.14)(2)^2 =$
50.24 in^2
$\frac{3}{2}$ or $1.5(50.24) = 75.36 \text{ in}^2$
8. $A = 2(4 \times 4) + 2(4 \times 4) + 2(4 \times 4)$
$A = 32 + 32 + 32 = 96 \text{ in}^2$
The cylinder uses less cardboard.
(However, there will be odd-shaped, possibly unuseable pieces left over.)

Honors Lesson 20

1. $300 \div 150 = 2$ hours
2. answers may vary
The wind blew him off course.
3. $30 \div 2 = 15$ mm
4. $150 \div 2 = 75$ mm
5. $\angle OWP = 80°$
6. $\angle OWP = 75°$
$90° - 75° = 15°$
See drawing.
Your answers to #5 and #6 may vary slightly depending how carefully you drew and measured.



Honors Lesson 21

1. πy^2
2. $A = \pi x^2 - \pi y^2$
3. $y^2 + z^2 = x^2$
$z^2 = x^2 - y^2$
4. $A = \pi(x^2 - y^2)$
5. $A = \pi(z^2)$
6. $A = \pi(z^2)$
$A = \pi\left(\frac{10}{2}\right)^2$
$A = \pi(5)^2$
$A = 3.14 \times 25$
$A = 78.5 \text{ in}^2$
7. $A = 3.14(4)^2$
$A = 3.14 \times 16 = 50.24 \text{ in}^2$
8. $A = L \times W$
$50.24 = L \times .007$
$50.24 \div .007 \approx 7{,}177$ in
9. $7{,}177 \div 2 \approx 3{,}589$ tickets
(rounded to the nearest whole number)

Honors Lesson 22

1. This bird is red.
2. ∠A is congruent to ∠B.
3. I get 100% on my math test.
4. This triangle has two congruent sides.

Honors Lesson 23

1. If I get burned, I touched the hot stove. Not necessarily true.
2. If two line segments are congruent, they have equal length.
   True.
3. If a bird is red, it is a cardinal.
   Not necessarily true.
4. If the leg squared plus the leg squared equals the hypotenuse squared, the triangle is a right triangle.
   True.
5. If my plants wilt, I stop watering them.
   Not true if I am sensible!

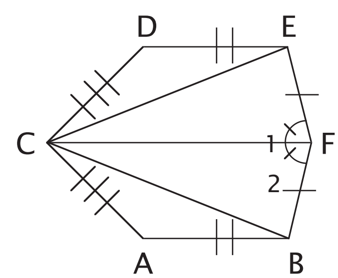
Honors Lesson 24

1. $50°$; the measure of an inscribed angle is half the measure of the intercepted arc.
2. $130°$; $180°-50°$
3. $50°$; same reason as #1
4. $80°$; $180°-(50°+50°)$
5. $160°$; $360°-(100°+100°)$
6. $80°$; vertical angles
7. $85°$; $180°-95°$
8. $15°$; $180-(80°+85°)$
   checking results with remote interior angles: $80°+15°=95°$
9. $80°$; angle 1 and the $70°$ angle next to it put together form an angle that is the alternate interior angle to the $150°$ angle at the top left.
   $150°-70°=80°$
10. $70°$; alternate interior angles
11. $30°$; $180°-(70°+80°)$
12. $30°$; alternate interior angles

Honors Lesson 25

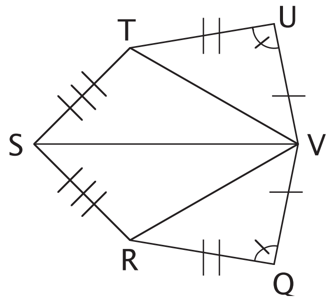
1.

Statements	Reasons
$\overline{AF} \cong \overline{EF}$	Given
$\angle 1 \cong \angle 2$	Given
$\overline{CF} \cong \overline{CF}$	Reflexive
$\triangle CEF \cong \triangle CAF$	SAS
$\overline{CE} \cong \overline{CA}$	Corresponding parts of congruent triangles
$\triangle CDE \cong \triangle CBA$	SSS
$\angle CDE \cong \angle CBA$	Corresponding parts of congruent triangles



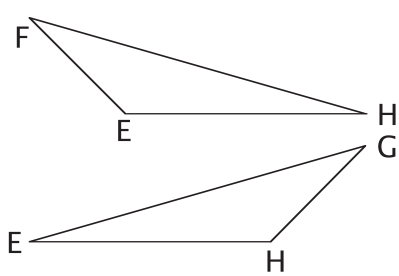
2.

Statements	Reasons
$\overline{TU} \cong \overline{RQ}$	Given
$\angle TUV \cong \angle RQV$	Given
$\overline{UV} \cong \overline{QV}$	Given
$\triangle TUV \cong \triangle RQV$	SAS
$\overline{TV} \cong \overline{RV}$	CPCTRC
$\overline{ST} \cong \overline{SR}$	Given
$\overline{SV} \cong \overline{SV}$	Reflexive
$\triangle TSV \cong \triangle RSV$	SSS
$\angle TSV \cong \angle RSV$	CPCTRC



3.

Statements	Reasons
$\overline{FE} \cong \overline{GH}$	Given
$\overline{FH} \cong \overline{GE}$	Given
$\overline{EH} \cong \overline{EH}$	Reflexive
$\triangle FEH \cong \triangle GHE$	SSS



Honors Lesson 26

1.

Statements	Reasons
$\overline{AB} \cong \overline{AC}$	Given
$\angle ARB \cong \angle AQC$	Perpendicular
$\angle BAR \cong \angle CAQ$	Reflexive
$\triangle BAR \cong \triangle CAQ$	AAS or HA
$\overline{CQ} \cong \overline{BR}$	CPCTRC

2.

Statements	Reasons
$\overline{XB} \cong \overline{YB}$	Definition of bisector
$\angle XBA \cong \angle YBA$	Definiton of Perpendicular
$\overline{BA} \cong \overline{BA}$	Reflexive
$\triangle XBA \cong \triangle YBA$	SAS or LL
$\overline{XA} \cong \overline{YA}$	CPCTRC

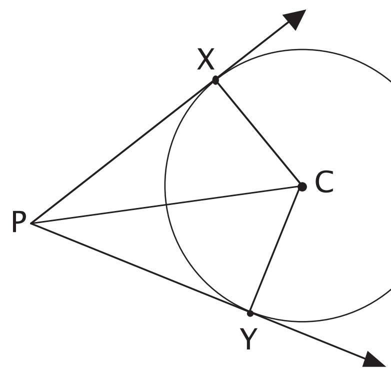
3.

Statements	Reasons
$\overline{EF} \cong \overline{GF}$	From proof above
$\overline{EX} \cong \overline{GX}$	Definition of Bisector
$\overline{FX} \cong \overline{FX}$	Reflexive
$\triangle EFX \cong \triangle GFX$	SSS or HL
$\angle EXH \cong \angle GXH$	Definition of Perpendicular
$\overline{HX} \cong \overline{HX}$	Reflexive
$\triangle EHX \cong \triangle GHX$	SAS or LL
$\overline{EH} \cong \overline{GH}$	CPCTRC

Honors Lesson 27

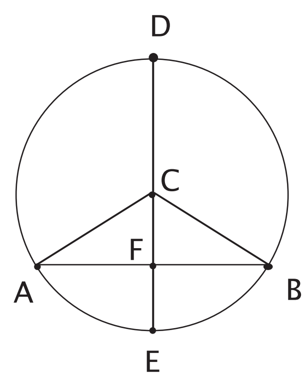
1.

Statements	Reasons
$\overline{XC} \cong \overline{YC}$	Radius of a circle
$\angle PYC \cong \angle PXC$	A tangent of a circle is perpendicular to the radius at that point.
$\overline{PC} \cong \overline{PC}$	Reflexive
$\triangle PYC \cong \triangle PXC$	HL
$\overline{PX} \cong \overline{PY}$	CPCTRC



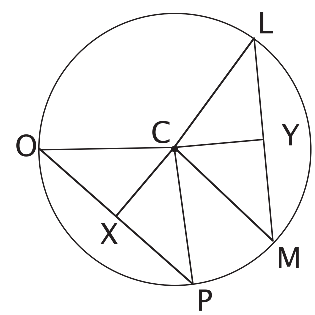
2.

Statements	Reasons
$\overline{DE} \perp \overline{AB}$	Given
$\overline{AC} \cong \overline{BC}$	Radius of a circle
$\overline{FC} \cong \overline{FC}$	Reflexive
$\triangle FCA \cong \triangle FCB$	HL
$\angle ACE \cong \angle BCE$	CPCTRC
$\overset{\frown}{AE} \cong \overset{\frown}{BE}$	Property of central angle



3.

Statements	Reasons
$\overline{OP} \cong \overline{LM}$	Given
$\overline{OC} \cong \overline{LC}$	Radius of a circle
$\overline{PC} \cong \overline{MC}$	Radius of a circle
$\triangle CPO \cong \triangle CML$	SSS
$\overline{OX} \cong \overline{LY}$	Definition of Bisector
$\triangle OCX \cong \triangle LCY$	HL
$\overline{XC} \cong \overline{YC}$	CPCTRC



Honors Lesson 28

1. $67 = \left(\frac{1}{2}\right)X$

$134^\circ = X$

$50\left(\frac{1}{2}\right) = Y$

$100^\circ = Y$

$180 - (50 + 67) = \left(\frac{1}{2}\right)Z$

$63 = \left(\frac{1}{2}\right)Z$

$126^\circ = Z$

2. $B = 180 - 77 = 103^\circ$

$A = 180 - 84 = 96^\circ$

$C = 2x77 = 154^\circ$

3. $m\overset{\frown}{QR} = 2(63^\circ) = 126^\circ$

$m\angle QCR = m\overset{\frown}{QR} = 126^\circ$

4. $m\angle AEC = \frac{40^\circ + 30^\circ}{2} = \frac{70^\circ}{2} = 35^\circ$

$m\angle BED = 35^\circ$

5. $m\angle KPL = \frac{116^\circ - 36^\circ}{2} = \frac{80^\circ}{2} = 40^\circ$

Honors Lesson 29

1.

angle	tan
10º	.18
15º	.268
30º	.58
45º	1
60º	1.73

2. $\tan 10° = \frac{a}{20}$

$.18 = \frac{a}{20}$

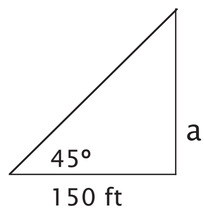
$a = .18(20)$

$a = 3.6$ mi or 19,008 ft

3. $\tan 45° = \frac{a}{150}$

$1 = \frac{a}{150}$

$150 \text{ ft} = a$

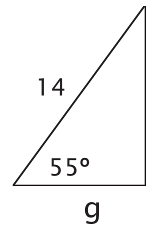


4. $\cos 55° = \frac{g}{14}$

$.5736 = \frac{g}{14}$

$(14).5736 = g$

$g = 8.0304$ ft

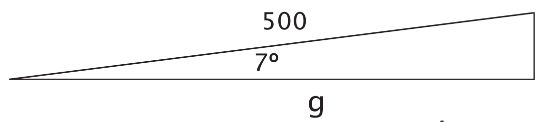


5. $\cos 7° = \frac{g}{500}$

$.9925 = \frac{g}{500}$

$(500).9925 = g$

$g = 496.25$ ft

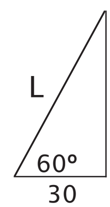


6. $\cos 60° = \frac{30}{L}$

$.5 = \frac{30}{L}$

$.5L = 30$

$L = 60$ ft



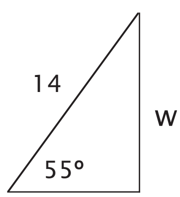
Honors Lesson 30

1. $\sin 55° = \frac{w}{14}$

$.8192 = \frac{w}{14}$

$(14).8192 = w$

$w = 11.4688$ ft



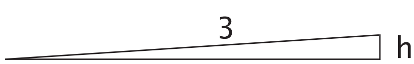
2. $\sin 4° = \frac{h}{3}$

$.0698 = \frac{h}{3}$

$(3).0698 = h$

$h = .2094$ mi

$.2094(5{,}280) = 1{,}105.632$ ft



3. $\sin 34° = \frac{p}{4.5}$

$.5592 = \frac{p}{4.5}$

$(4.5).5592 = p$

$p = 2.5164$ mi or 13,286.592 ft