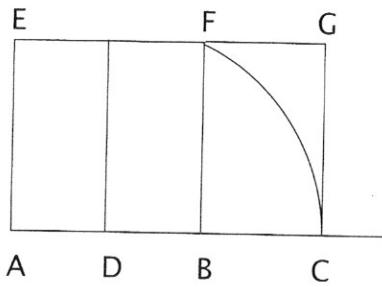


Honors Lesson 10

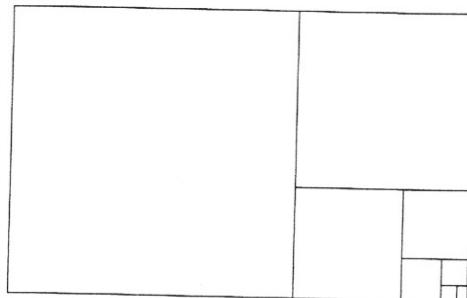
1-4.



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	refreshments	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.

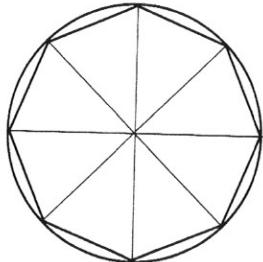
Honors Lesson 12



2. 60°

3. Since the sections are all equal, the center angles are all the same. $360^\circ \div 8 = 45^\circ$

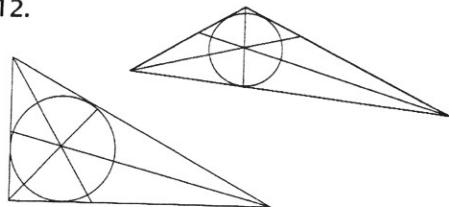
4-8.



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

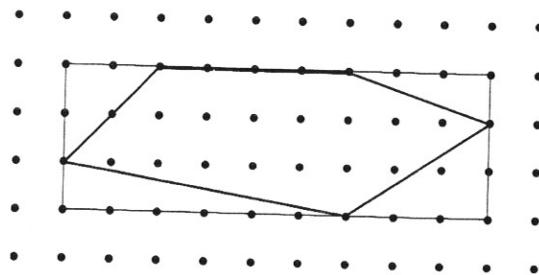
In #1, you learned how to construct an equilateral triangle with each angle equal to 60° . After drawing a circle and one diameter, use the same procedure to construct equilateral triangles inside your circle, using a radius of the circle as your starting point each time. After you have constructed four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

10-12.



Honors Lesson 13

1. See illustration.



2. $3 \times 9 = 27 \text{ units}^2$

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

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

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

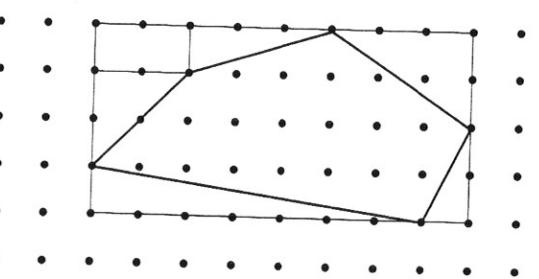
$\frac{1}{2}(3 \times 2) = 3 \text{ units}^2$

4. $2 + 1.5 + 3 + 3 = 9.5 \text{ units}^2$

$27 - 9.5 = 17.5 \text{ units}^2$

5. See illustration for 5 & 6.

6. See illustration for 5 & 6.



7. $4 \times 8 = 32 \text{ units}^2$

8. $1 \times 2 = 2 \text{ units}^2$

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

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

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

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

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

9. $2+1.5+3+2+3.5+1 = 13 \text{ units}^2$

$32 - 13 = 19 \text{ units}^2$

10. See illustration.

$10 \times 5 = 50 \text{ units}^2$

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

$1 \times 5 = 5 \text{ units}^2$

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

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

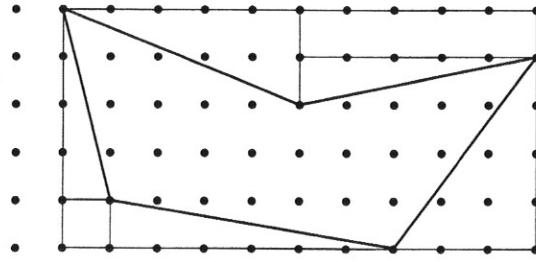
$1 \times 1 = 1 \text{ unit}^2$

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

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

$5 + 5 + 2.5 + 2 + 1 + 3 + 6 = 24.5 \text{ units}^2$

$50 - 24.5 = 25.5 \text{ units}^2$



11. See illustration.

$4 \times 8 = 32 \text{ units}^2$

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

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

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

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

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

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

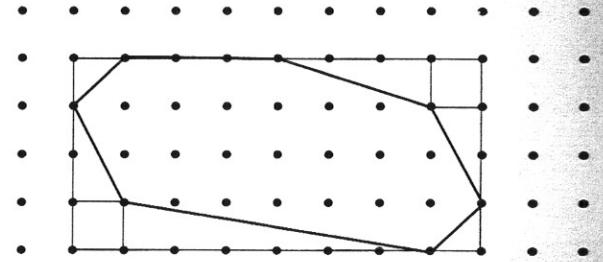
$\frac{1}{2}(5 \times 1) = 2.5 \text{ units}^2$

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

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

$= 9.5 \text{ units}^2$

$32 - 9.5 = 22.5 \text{ units}^2$



Honors Lesson 14

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

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

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

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

$A = \sqrt{36}$

$A = 6 \text{ units}^2$

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. $3 \times 3 \times 3 = 27 \text{ ft}$

2. $12 \times 12 \times 12 = 1,728 \text{ in}^3$

3. $8 \times 4 \times 2 = 64 \text{ in}^3$

$64 \times .3 = 19.2 \text{ lb}$

4. $64 \text{ in}^3 \div 1,728 = .037 \text{ ft}^3$

$.037 \times 1200 = 44.4 \text{ lbs}$

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. $7.065 \times .26 = 1.8369 \text{ lb}$

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

$V = \frac{4}{3} (3.14) (.25)^3$

$V = .07 \text{ in}^3 \text{ (rounded)}$

$.07 \times .3 \approx .02$ pounds for
one bearing

$25 \div .02 = 1,250 \text{ bearings}$

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:

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

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

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

$$1. (r)\pi r = \pi r^2$$

$$2. A = LW + LW + LH + LH + WH + WH \\ = 2LW + 2LH + 2WH \\ = 2(LW + LH + WH)$$

$$3. 2(S^2 + S^2 + S^2) = 2(3S^2) = 6S^2$$

$$4. V = 3(11)(3) = 99 \text{ ft}^3 \\ SA = 2(3 \times 11) + 2(3 \times 3) + 2(11 \times 3) \\ = 2(33) + 2(9) + 2(33) \\ = 66 + 18 + 66 \\ = 150 \text{ ft}^2$$

$$5. 150 \text{ ft}^2 \div 6 \text{ faces} = 25 \text{ ft}^2 \text{ per face} \\ \sqrt{25} = 5 \text{ ft}$$

The new bin is $5 \times 5 \times 5$.

$$6. \text{ The cube-shaped one holds more.} \\ 125 - 99 = 26 \text{ ft}^3 \text{ difference.}$$

Honors Lesson 17

$$1. V = \pi r^2 h$$

$$V = 3.14(2)^2(4)$$

$$V = 50.24 \text{ ft}^3$$

$$2. V = \frac{4}{3}\pi r^3$$

$$V = \frac{4}{3}(3.14)(2)^3$$

$$V = 33.49 \text{ ft}^3 \text{ (rounded)}$$

$$3. V = 3.14(3)^2(6)$$

$$V = 169.56 \text{ units}^3$$

$$4. V = \frac{4}{3}(3.14)(3)^3$$

$$V = 113.04 \text{ units}^3 \text{ (rounded)}$$

$$5. V = 3.14(1)^2(2)$$

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

$$6. V = \frac{4}{3}(3.14)(1)^3$$

$$V = 4.19 \text{ units}^3 \text{ (rounded)}$$

$$7. \frac{33.49}{50.24} \approx .67 \quad \frac{113.04}{169.56} \approx .67 \\ \frac{4.19}{6.28} \approx .67$$

$$8. \frac{2}{3}$$

$$9. A = 2\pi r^2 + 2\pi rh$$

$$A = 2(3.14)(3)^2 + 2(3.14)(3)(6)$$

$$A = 56.52 + 113.04 = 169.56 \text{ units}^2$$

$$10. A = 4(3.14)(3)^2$$

$$A = 113.04 \text{ units}^2$$

$$11. \frac{113.04}{169.56} \approx \frac{2}{3}$$

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

$$1. 4,003 \text{ mi}$$

2. 90° ; a tangent to a circle is perpendicular to the diameter