10th Grade Assignment – Week #18

Announcements

- With both of the assignments (which come from the workbook), remember that the "Section A" problems are intended to be somewhat easier, and the "Section B" problems are for those who would like some more challenge. You will need to decide carefully which problems are best for you and for your group to work on.
- There will be no test for this *Mensuration* unit.
- *Algebra Review* starts next week!

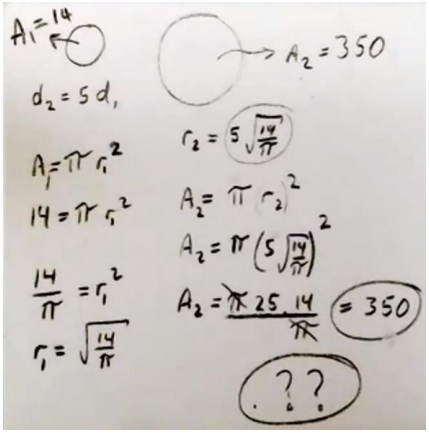
Group Assignment

for Tuesday

- Do this problem first. In the second lecture from week #16, I gave the following problem:

  "Two circles are such that the larger circle has five times the linear dimensions as the smaller circle. Find the area of the larger circle given that the area of the smaller circle is 14." (Note that the linear dimensions refer to the radius, diameter, and circumference of a circle.)

  At the right, there is a (negative image) screenshot of my work on that problem. (Do you remember me doing this?) Then I left you with a question: "How could we do this problem much more easily?" The following problems will help you to answer that question.



  - Do **Problem Set #2:** Problems #4-7.
    (Hint: The answer to the first row of #4 is: $A_1 = 4$; $A_2 = 36$; $S_1 : S_2 = 1:3$; $A_1 : A_2 = 1:9$)
  - Answer this new question: "A (randomly shaped) quadrilateral is put into a photocopier and made 300% as large (which means that its linear dimensions become 3 times as great). If the original quadrilateral had an area of 70 cm^2, what is the area of the enlarged quadrilateral?"
- Choose from the following problems (listed in order of difficulty):
  Problem Set #3: Pr #1d (volume and surface area)
  Problem Set #3: Pr #5
  Problem Set #3: Pr #6a
  Problem Set #2: Pr #9, 10 (a big challenge!)

for Thursday

- Look over **Problem Set #4**, and then decide which problems you want to work on.
  (You will continue working on Problem Set #4 next week.)

Individual Work

- Choose problems to do from the following:
  Problem Set #2: Pr #1, 2, 3;
  Problem Set #3: Pr #1(a-c), 7.
- Work on any of the problems from the above Group Assignment that your group didn't finish.

Problem Set #2

Section A

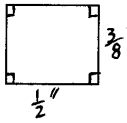
1) a) How many square feet are in a square yard?

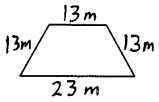
b) How many cubic feet are in a cubic yard?

c) How many square centimeters are in a square meter?

d) How many cubic centimeters are in a cubic meter?

2) Calculate the area.

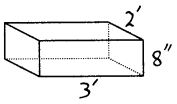
a) 

b) 

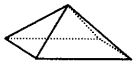
c) 

d) 

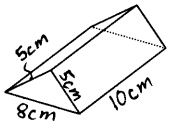
3) Find the volume of each:

a) 

b) A pyramid with a total height of 80 feet, and a square base measuring 120 feet on each side.



c) A cone. 

d) 

e) A sphere that has a diameter of 18cm?

f) 

4) With the below table one square has a length of S_1 and an area of A_1, and a second square has a length of S_2 and an area of A_2. Fill in the table.

S_1	A_1	S_2	A_2	S_1:S_2	A_1:A_2
2		6			
5		15			
2		20			
7		70			
4		6			
2		3			
5		8			

5) What general law does the above table reflect?

6) With the below table one circle has a radius of R_1 and an area of A_1, and a second circle has a radius of R_2 and an area of A_2. Fill in the table.

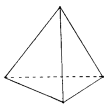
R_1	A_1	R_2	A_2	R_1:R_2	A_1:A_2
2		6			
5		15			
2		20			
7		70			
4		6			
2		3			
5		8			

7) What general law does the above table reflect?

(Problem Set #2) Section B

8) A rectangular painting, with a length twice its width, is mounted in a frame that has a 10 cm wide strip going around the painting. This strip has a total area of 3100 cm^2. Find the dimensions of the painting (without the strip).

9) What is the volume of a tetrahedron with 6cm long edges?



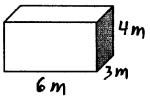
10) What is the formula for the volume of a tetrahedron given only the length of an edge (E)?

Problem Set #3

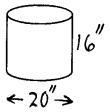
Section A

1) Calculate the volume and surface area.

a)

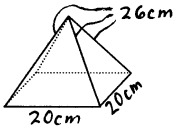


b)



c) A ball that has a 14-inch diameter.

d)



2) What is the ratio of the volumes of two cubes if the ratio of their edges is…
   a) 2:1?
   b) 3:1?
   c) 5:3?

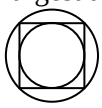
3) What is the ratio of the volumes of two spheres if the ratio of their radii is…
   a) 2:1?
   b) 3:1?
   c) 5:3?

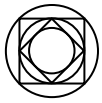
4) What general law do the previous two problems reflect?

5) Find the diameter of a circle that has an area of 50 ft^2.

Section B

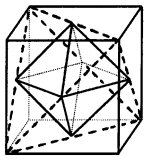
6) In the below drawings we have circles, squares and equilateral triangles. For each case, find the ratio of the radii of the largest and smallest circles.

a)  b) 

c)  d) 

7) A circular garden is surrounded by a two-foot wide concrete path, which has an area of 176 ft^2. Find the diameter of the garden.

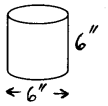
8) *Nested Cube, Tetrahedron, and Octahedron.* If you have a cube with a tetrahedron and a octahedron inside it, then what is the ratio of their volumes?

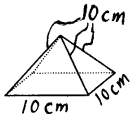


Problem Set #4

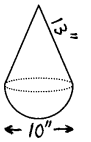
Section A

1) Find the volume and surface area.

a) 

b) 

2) Find the volume.



3) Find the volume of an octahedron with 3cm edges.

4) Find the diameter of a sphere with a volume of 30 ft^3.

5) Find the diameter of a sphere with a surface area of 30 ft^2.

6) If the ratio of the radii of two circles is a:b, then what is the ratio of their areas?

7) Fill in the blanks.
   a) If the scale factor of two similar figures (e.g., two circles, or two rectangles) is a:b, then find the ratio of their areas.
   b) If the scale factor of two similar solids (e.g., two cylinders, or two prisms) is a:b, then find the ratio of their volumes.

8) If one log is 60% longer and 60% thicker than another log, how much does the bigger one weigh if the smaller one weighs 10 pounds?

9) A rectangle has an area of 15 and a perimeter of 17.
   a) Find the dimensions of the rectangle.
   b) Find the perimeter of a square with the same area.
   c) Find the circumference of a circle with the same area.

10) If the base of a cone has an area of $20m^2$, what is the area of the section parallel to base that is halfway up the cone?

Section B

11) Derive a formula for the area of an equilateral triangle given B as its base.

12) Find the surface area of a cone (disregarding its base) that has a base radius of 8m and an edge length of 10m.

13) Derive a formula that calculates the surface area of a cone (disregarding the circular base) given k as the length along the edge, and r as the radius of the base.

14) *The Conical Drinking Glass.* How much water is in a conical drinking glass that is filled half-way to the top, if its maximum capacity is 12 fl. oz.?

15) *Leonardo da Vinci's Lunes.* What is the combined area of the two lunes (L & M) in terms of a, b, and c?