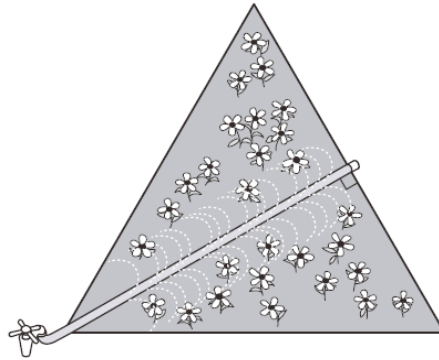


Mr. Schultz has a garden shaped like an equilateral triangle that measures 11 feet on each side. He has placed a watering hose that extends from the faucet located at a vertex to the opposite side, as shown below.



- 1) Define an equilateral triangle.
- 2) Draw a diagram to illustrate this triangular garden and hose, and label the vertices A , B , C and let segment AD represent the hose.
- 3) What is the sum of the measures of all of the interior angles of the triangle?
- 4) What is the measure of each interior angle in the equilateral triangle?
- 5) What is the measure of each of the acute angles adjacent to the hose?
- 6) What geometric terms can be used to define the segment represented by the hose?
- 7) Describe what the hose does to the vertex angle and the opposite base.
- 8) Find the perimeter of the equilateral triangle in feet and in inches.
- 9) Show how to find the length of the hose in feet?
- 10) Find the length of the hose in feet and inches
- 11) Find the height of the equilateral triangle in feet and inches.
- 12) Give an alternate way of finding the length of the hose.
- 13) Find the area of the garden in square inches.
- 14) Express the area of the garden in square feet.
- 15) What is the length of segment \overline{CD} ?
- 16) Show that $\triangle ABD$ is congruent to $\triangle CBD$ using properties of congruent triangles.
- 17) Construct all perpendicular bisectors of $\triangle ABC$. What do you notice?

- 18) Using the point of concurrency, inscribe a circle in the equilateral triangle. What is the term for the center of the circle?
- 19) Using the same center of the triangle, circumscribe the triangle. What is the term for this center?
- 20) In question number 16, what is the total number of triangles formed?
- 21) If Mr. Schultz wants to mulch the garden to a 3-inch depth. How much mulch does he need?
- 22) If a bag contains 324 cubic feet of mulch, and costs \$3.99, how much would he spend to cover the garden?

Richard traveled 270 km in 3 hours. His destination was still 150 km away.

1. What is Richard's average speed for the first 3 hours?
2. How many kilometers will Richard travel for the entire trip?
3. If Richard maintains the same average speed, how many minutes does it take for the entire trip? Convert this time to seconds.
4. Generate a table showing the distance in kilometers traveled by Richard in terms of time in hours.

time (hrs)	distance (km)

5. If one kilometer is approximately 0.62 miles, about how many miles have been traveled throughout the entire trip?
6. If he travels at an average rate of 60 km/h throughout the entire trip, how long will it take him to arrive at his intended destination?
7. If he leaves at 8 a.m. and travels at the speed in #1 for the entire trip, what time will Richard arrive at his destination?
8. If he leaves his house at 10:30 a.m. and travels at an average speed of 110 km/hr while driving, at what time will he get to his destination if he made 3 stops which averaged 30 minutes each?

9. If he decreases his speed by half the average rate in #1, how long will it take him to travel the remaining distance?
10. If he decreases his average speed in #1 by two-thirds, how long will it take him to travel the first 270 km?
11. If he decreases his speed in #1 by 20% for the last 150 km, how much time will he spend on the entire trip?
12. Richard is driving a car that holds 20 gallons of gas and is currently full. If he gets an average of 32 kilometers per gallon, how many times will he fill up his gas tank to reach his destination? If gas costs \$4.38 per gallon, how much money will he spend on gas for the trip?
13. Traffic is bad in the mornings and Richard is trying to decide whether to leave early and fight traffic or leave later and have no traffic. If he leaves at 7:00 a.m. he will travel at an average speed of 60 km/h and if he leaves at 9:00 a.m. he will travel at an average speed of 95 km/h. Compare and contrast these two options.

George saves 15% of his total gross weekly earnings from his 2 part-time jobs. He earns \$6.15 per hour at his first part-time job and \$7.25 at his second part-time job. George works no more than 30 total hours per week.

Use the above information to answer the following questions.

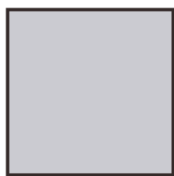
- a. How many part-time jobs does George have?
- b. Rewrite 15% as a decimal.
- c. What is the difference between the hourly rate at George's first job and the hourly rate at his second job?
- d. How much money would George make per week at his first job if he works only 15 hours?
- e. How much money would George make per week at his second job if he only works only 15 hours?
- f. What would George's total gross weekly income be if he works 15 hours at each job?
- g. Using your answer from the previous question, determine how much George's weekly savings would be if he decides to save 15% of his weekly earnings?
- h. If George works twice as many hours on his first job as his second job, how much would he be able to save in a week if he works a total of 18 hours?
- i. How much would George be able to save in one month if he works 15 hours at each job per week (assume 1 month = 4 weeks) and he decides to save 15% of his gross weekly earnings?
- j. Assuming that George will not work at his second job, what is the least number of full weeks that George would have to work at his first job if he wants to save at least \$75? (George will work 30 hours per week and he is still saving 15% of his earnings per week)

George gets a raise at his first job from \$6.15 to \$8.61 per hour. George quits his second job.

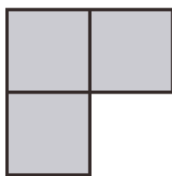
Use the above information to answer the following questions.

- k. What is the percent increase in George's hourly wage at his first job?
- l. George continues saving 15% of his weekly earnings. If he works 30 hours a week, approximately how much money will George save per week?
- m. George wants to buy a lawn mower that costs \$350.00 (tax included). If George saves 15% of his total earnings, what is the least number of hours that he must work in order to save enough money to buy the lawn mower?
- n. Write an equation to represent the situation presented in question m.

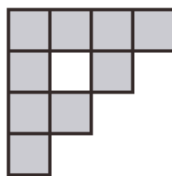
The first 4 stages of a certain fractal are shown below.



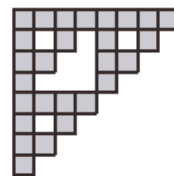
Stage 1



Stage 2



Stage 3



Stage 4

1. If the pattern continues, draw the 5th stage.
2. Explain how you generated Stage 5.
3. Complete the table that represents the five stages in terms of the number of shaded squares.

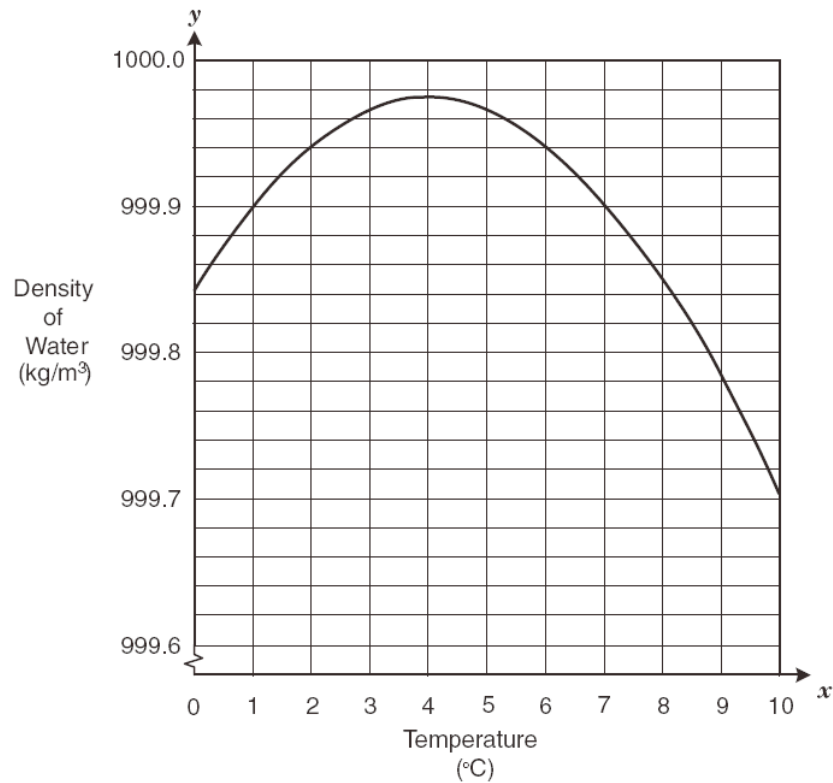
Stage	1	2	3	4	5
Number of Shaded Squares					

4. Graph the data from the table above.
5. If the pattern continues, how many shaded squares are there in Stage 7? In Stage 20?
6. Identify the type of function.
7. Generate the rule for the n^{th} stage.
8. Justify your reasoning for the general rule.
9. State the rule using function notation $f(x)$.
10. Identify a reasonable domain for this particular fractal function.
11. Identify a reasonable range for this particular fractal function.
12. Assume that the stages in the diagram above are all drawn to the same scale and the area of Stage 1 is 1 square unit. Complete the table that represents the five stages in terms of the shaded area.

Stage	1	2	3	4	5
Area of Shaded Squares	1				

13. What will the area of the shaded squares approach as the stage number becomes infinitely large?

The graph below shows the relationship between temperature and the density of water.



1. At what temperature does the density of water reach its maximum?
2. Describe the domain of the data shown on this graph.
3. Describe the range of the data shown on this graph.
4. Express the y-intercept as an ordered pair. Describe the meaning of the y-intercept.
5. Create a table to represent this graph.
6. What is the change in the density of the water from 6° to 7°C?
7. Between which two integer temperatures is the density increasing at the fastest rate? Justify your reasoning.
8. Between which two integer temperatures is the density decreasing at the slowest rate? Justify your reasoning.
9. Predict a reasonable density at 11°C? Justify your reasoning.
10. What type of function best models the given data (linear, quadratic, exponential, cubic, etc.)? Justify your reasoning.
11. Write an equation to best represent the given data. Explain how to determine the equation.

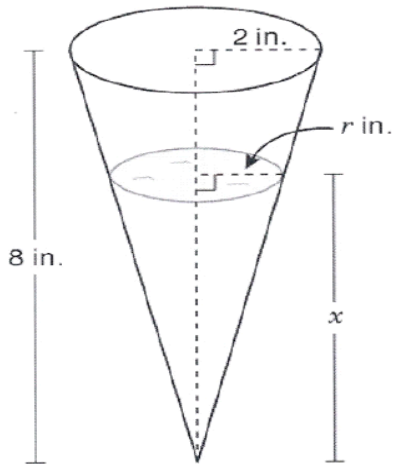
The diagram below shows the top view of a structure built with identical cubes, as well as the number of cubes in each column of the structure.

2	3	4
2	2	
4	2	1

Front

1. How many cubes do you need to build the structure?
2. Draw the front, top and side views of the structure.
3. You build the structure in front of yourself on a table. Owen sits across from you. Draw the front, top and side views that Owen sees.
4. If Leo sits to your left, draw the front, top and side views that Leo sees.
5. Reflect the structure across its left side. Rotate the reflection clockwise through 90° about the center of the middle cube. Draw the front, side and top views.
6. Look only at your three views. Try to build another structure with the same views that is different from the given structure.
7. Is the structure symmetrical? Explain.
8. What is the least number of cubes you would need to add to the structure to make it symmetrical? Explain.
9. Which cubes would you move to make it symmetrical? Explain.

The figure below shows a conical cup containing water. The water depth can be represented by x and the radius of the water surface can be represented by r .



- 1) Find the volume of the conical cup shown in the diagram.
- 2) Derive the formula to find the radius r of water in the conical cup with the given height, x , of water.
- 3) Find the volume of the water in the conical cup when the height of the water, x , is 5 in.
- 4) Find the volume of the water in the conical cup as a function of x , the height of the water in the cup.
- 5) Find the volume of the water in the conical cup when the radius of the surface of the water is 1 in.
- 6) Find the percent of the water contained in the conical cup when the height of the water is 0.5 in.
- 7) If 25% of the conical cup contains water, how many more cubic inches are available to completely fill the conical cup with water?
- 8) Write an expression to represent the area of the water surface in the conical cup in terms of: a) r ; b) x .
- 9) Show how to find the slant height of the conical cup?
- 10) Show how to find the lateral surface area of the conical cup.
- 11) What is the area of the water surface in the conical cup if $x = 4$ in and $r = 1$ in.