SCHOLAR NAME _____

uplifteducation

Rising 8th Grade

2021 Summer Assignment

Math and Science

Rising 8th Grade Summer 2021
Math and Science

Dear Uplift Families:

Through the years many parents have asked what can be done over the summer to maintain skills and develop mathematical and scientific thinking. Uplift has created blended summer math and science assignments to help your scholar retain his/her skills and to provide valuable practice over the summer. You should feel free to discuss the work with your child. Discussions are an important way for scholars to remember and retain concepts. Scholars may enjoy working with peers or parents as they practice. Again, this assignment is simply an opportunity for your scholar to maintain skills.

The assignment and answer keys are uploaded on your scholar's math Schoology course page and can be downloaded and printed at your convenience. Hard copies of the assignments are also available through your scholar's math teacher or in the school office.

A few things to note:

- Our goal is to have scholars experience doing math and science over the summer.
- Teachers hope that everyone attempts the packet.
- Teachers will be collecting packets (complete or incomplete) at the beginning of the 21-22 school year.
- Scholars may get guidance from sibling, parent, etc. If a scholar does not know how to do a certain problem, check the answer and work backwards.
- Feel free to use extra paper if more space is needed to work the problems.

Summer Assignments Overview

Math and Science Packet

The practice in this summer packet addresses the following critical areas scholars learned while in 7th grade:

- Math: Numbers and Operations, Geometry and Measurement; Proportionality
- Science: Organisms and Environments

The packet contains **3 assignments** that engage the scholars in a blend of math and science:

- Part 1: Organization in Plants and Animals
- Part 2: Plant and Animal Cell Organelles
- Part 3: Functions of a Cell

MATHia Online

In addition to the Summer Math/Science Assignments, we also want to provide your scholar with the opportunity to engage in online math skills practice through the use of an online platform called MATHia. Within this program scholars will continue to refine their skills with fraction and decimal operations, ratios and proportions, and geometry concepts. This online program supports scholars to work independently by providing help and hints along the way.

We suggest scholars **engage on the MATHia program about 45 – 60 mins each week during the month of June**. Scholars may access their MATHia accounts through their Uplift Classlink system throughout the month of June. The MATHia system will shut down July 1st to prepare for the 21-22 school year.

STAAR GRADE 7 MATHEMATICS REFERENCE MATERIALS

STAAR® State of Texas Assessments of Academic Readiness

LINEAR EQUATIONS

Slope-intercept form	$y = mx + b$
Constant of proportionality	$k = \frac{y}{x}$

CIRCUMFERENCE

Circle	$C = 2\pi r$	or	$C = \pi d$

AREA

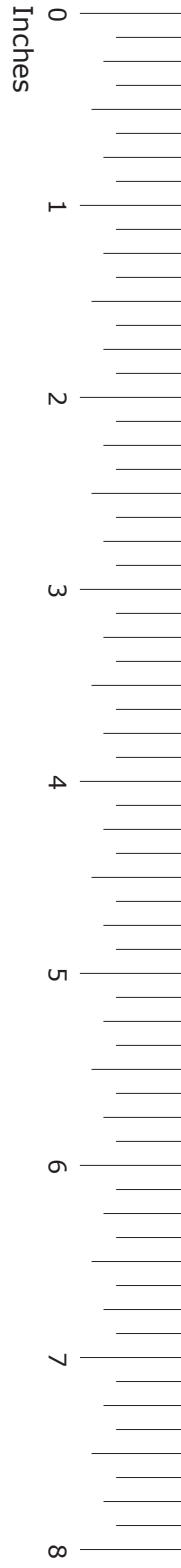
Triangle	$A = \frac{1}{2}bh$
Rectangle or parallelogram	$A = bh$
Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$
Circle	$A = \pi r^2$

VOLUME

Prism	$V = Bh$
Pyramid	$V = \frac{1}{3}Bh$

ADDITIONAL INFORMATION

Pi	$\pi \approx 3.14$	or	$\pi \approx \frac{22}{7}$
Distance			$d = rt$
Simple interest			$I = Prt$
Compound interest			$A = P(1 + r)^t$



STAAR GRADE 7 MATHEMATICS REFERENCE MATERIALS

LENGTH

Customary	Metric
1 mile (mi) = 1,760 yards (yd)	1 kilometer (km) = 1,000 meters (m)
1 yard (yd) = 3 feet (ft)	1 meter (m) = 100 centimeters (cm)
1 foot (ft) = 12 inches (in.)	1 centimeter (cm) = 10 millimeters (mm)

VOLUME AND CAPACITY

Customary	Metric
1 gallon (gal) = 4 quarts (qt)	1 liter (L) = 1,000 milliliters (mL)
1 quart (qt) = 2 pints (pt)	
1 pint (pt) = 2 cups (c)	
1 cup (c) = 8 fluid ounces (fl oz)	

WEIGHT AND MASS

Customary	Metric
1 ton (T) = 2,000 pounds (lb)	1 kilogram (kg) = 1,000 grams (g)
1 pound (lb) = 16 ounces (oz)	1 gram (g) = 1,000 milligrams (mg)

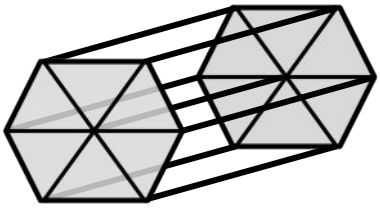
Math Connections

Name: _____ Date: _____

Organs are made up of different types of tissue, which in turn are made up of different types of cells. In this activity you will analyze the different geometric structures cells can assume.

Epithelia tissue lines most digestive tracks in animals. One of the cells found in epithelia tissue, called simple columnar, has elongated hexagonal prism shapes (similar to the shape of a honeycomb). When the cells get crowded, they take the shape of a pyramid.

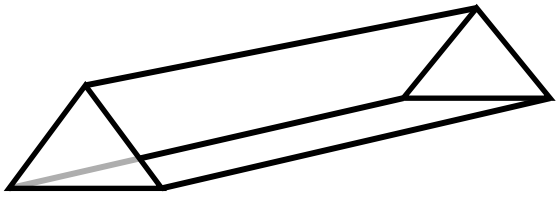
Another type of cell in epithelia tissue, called simple cuboidal cells, is box-like and takes the form of a rectangular prism. When crowded together, simple cuboidal cells also take the shape of a pyramid. You will discover that the difference in volume is between a prism and a pyramid sharing the same base and height.



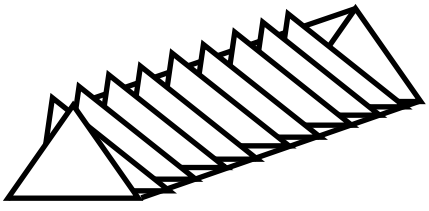
To model the shape, six small equilateral triangle pieces are connected to form the base of a hexagonal prism (model for the simple columnar cell). Two hexagons create the top and bottom bases of the cell. One way to connect the six triangles together is shown below.

Look at only one cross-section piece of the simple columnar cells—a triangular prism-shaped piece. The triangular prism pictured below makes up one out of the six total triangular prisms found in the hexagonal prism cell.

1. Shade in the two congruent, parallel bases in the triangular prism below. Explain why what you shaded forms the bases of the prism.



Imagine stacking your cut-up triangle pieces inside the triangular prism model. Think of the prism as being constructed of many triangle pieces, layered on top of one another (see the drawing below).



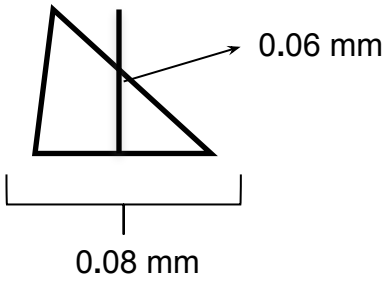
Think about how many triangles would be needed to fill up this prism model. You would need as many triangles as the distance from one base to the other.

2. If the distance from one base to the other is 10 mm long, and each triangle is 0.5 mm thick, how many triangles would it take to fill up the prism?

Answer: _____

Math Connections

3. If you filled the triangular prism completely full, you would then know the volume of the prism. Determine the volume of the prism after considering the dimensions of one of the triangle bases.

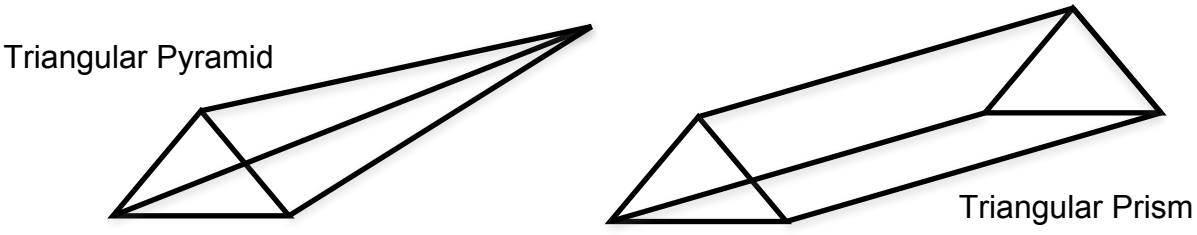


Knowing that the distance from base to base is 10 mm, calculate the volume of the triangular prism.

Answer: _____

4. To find the volume of the triangular prism cross-section of the cell, use the formula Volume = area of the base x height of the prism or V = Bh. Explain how this formula connects to the model from questions 2 and 3.

When the simple columnar cells get crowded, they take on a pyramidal shape. Keeping the dimensions constant with the triangular prism, an example of the pyramidal is shown below.



Imagine filling up the triangular pyramid full of liquid (or materials commonly found in a cell, such as the nucleus, cell-membrane, mitochondrion, etc.). Imagine taking that filled triangular pyramid and dumping the contents into the triangular prism (pictured above, on the right).

How many times do you think it would take Ms. Simon to fill up the triangular pyramid and transfer its liquid into the triangular prism until the prism would be completely filled?

Your guess: _____

If you guessed “three times,” you are correct. Explain in your own words how you came to this conclusion?

_____

_____

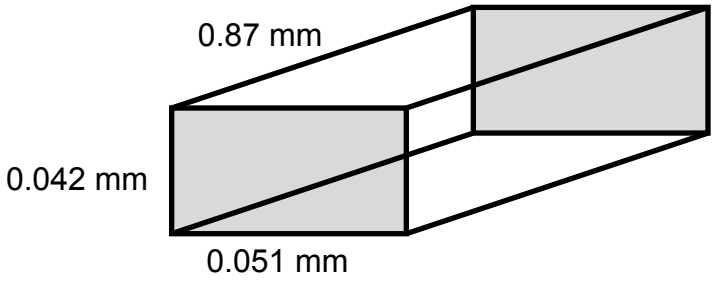
5. Using the formula for the volume of a triangular prism, what is the formula for the volume of a triangular pyramid? (Use symbols: V for volume, B for area of the base, and h for height of the pyramid).

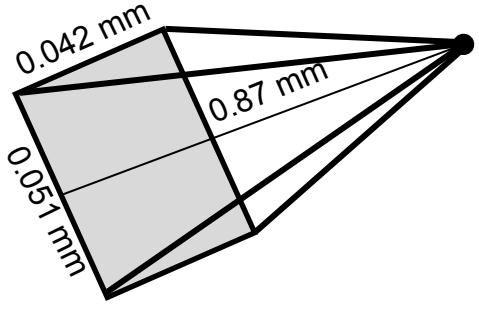
Math Connections

6. What is the volume of the triangular pyramid pictured on page 1? The height of the triangle is 0.06 mm, and the base of the triangle is 0.08 mm. The pyramid's height—the distance from the top vertex to the bottom base, forming a right angle with the base—is also 10 mm.

Answer: _____

Now, let's investigate the volume of simple cuboidal cells. Help the students investigate volume differences between a rectangular prism and a rectangular pyramid which share a congruent base and height.





7. For the shapes above, the base of the rectangular prism is the same as the base of the rectangular pyramid. What is the area of the base for both the prism and pyramid?

Answer: _____

8. The formula for the volume of a rectangular prism is the area of the base multiplied by the height of the prism, or V = Bh, where B represents the area of the base. Calculate the volume of the rectangular prism.

Answer: _____

To demonstrate the relationship between the volumes of a rectangular pyramid and a rectangular prism that have congruent bases and equal heights, imagine filling the rectangular pyramid up with sand and then dumping the sand from the pyramid into the rectangular prism. How many times do you think it will take to fill the rectangular prism with sand?

Your guess: _____

9. If you guessed "three times," you are correct. The volume of a rectangular pyramid is ⅓ of the volume of a rectangular prism. Using the formula for the volume of a rectangular prism, what is the formula for the volume of a rectangular pyramid? (Use symbols V for volume, B for area of the base, and h for height of the pyramid). Use your formula to calculate the volume of the rectangular pyramid pictured above.

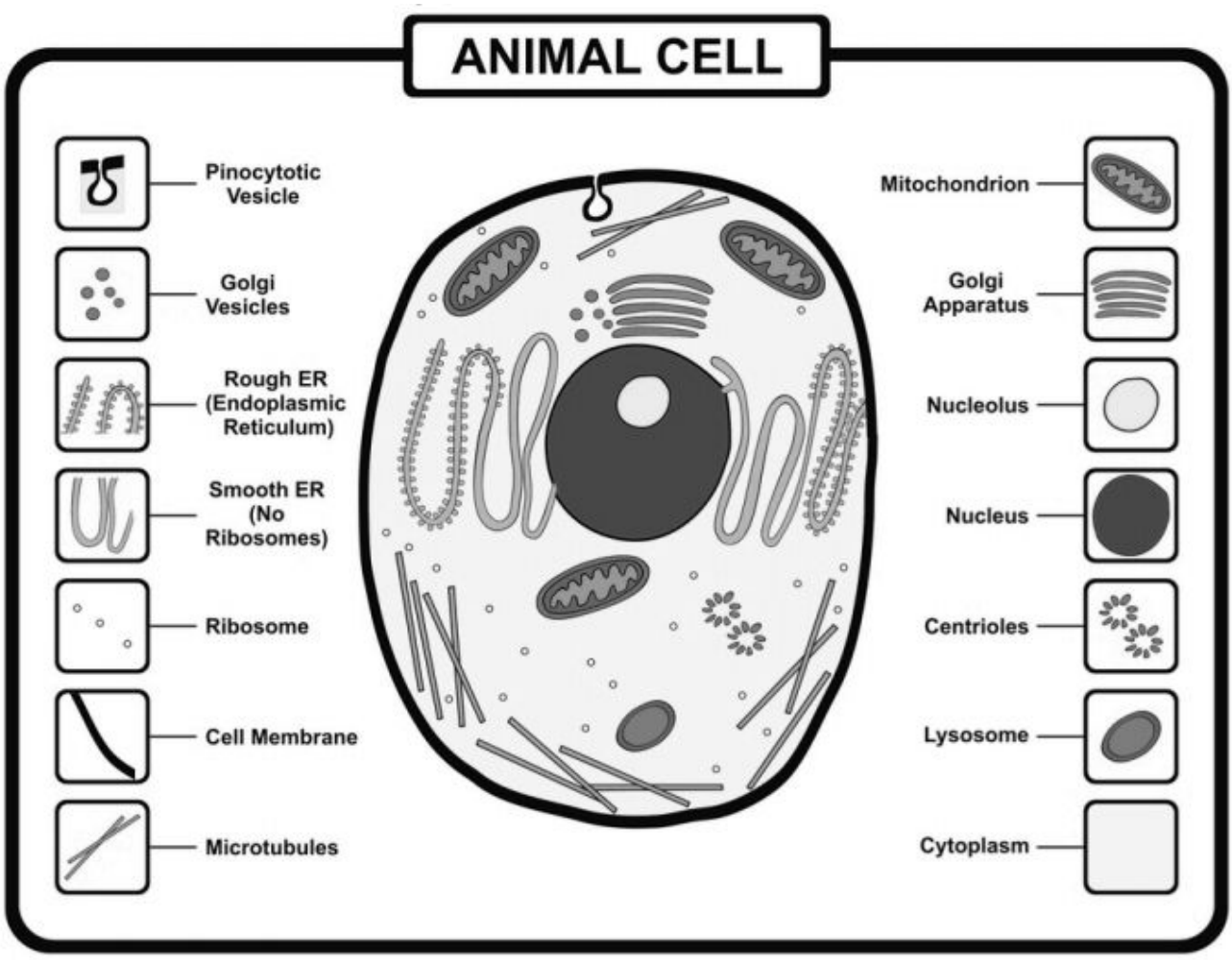
Answer: _____

Math Connections

Name: _____ Date: _____

All eukaryotic cells contain organelles, which are any of a number of organized or specialized structures within a living cell. The unique structures and chemical compositions of individual organelles in plant and animal cells allow those organelles to perform distinct functions within the cell. Some organelles, like the nucleus, are found in both plant and animal cells; other organelles are used to distinguish between plant and animal cells.

A seventh-grade science class spent the past week discussing animal and plant cells. The students discussed the function and structure of the various organelles present in both types of cells. Today the students will analyze the geometry found in the structure of animal cells. Use the materials supplied by your teacher and the picture below to answer the questions that follow.



The teacher explained that the nucleus and nucleolus of an animal cell are nearly perfect circles.

1. Use the string and centimeter ruler provided by your teacher to measure the circumference of the nucleus in the magnified picture above. (Round your answer to the nearest tenth.)

Math Connections

Refer to the picture of the animal cell on page 1 to answer the following questions. (Round your answers to the nearest tenth.)

2. What is the measure of the diameter of the nucleus? Write a math sentence to show how you would solve for diameter.

3. What is the circumference of the nucleolus? Write a math sentence to show how you would solve for circumference.

4. What is the measure of the diameter of the nucleolus?

5. Use the information from the previous four questions to complete the table below. For the last column, use a calculator to divide the circumference by the diameter.

Cell structure	Circumference	Diameter	Circumference / diameter
Nucleus			
Nucleolus			

Compare your results to those of your classmates. What do you notice about the quotient?

6. For any circle, the ratio between the diameter and circumference is known by the Greek letter π (pi), which is close to the value 3.14. Measure and cut off a piece of string equal to the diameter of the nucleus. Approximately how many of the diameter-sized pieces of string do you need to measure all the way around the circular nucleus? Try it out, explain the results of your experiment, and define what π means to you.

Math Connections

Name: _____ Date: _____

Functions of a Cell

The cell theory states that all living organisms are composed of cells. Cells are the basic unit of structure and function in living things, and all cells arise from preexisting cells. This theory holds true for all living things, unicellular or multicellular.

Cellular respiration is one of the key ways a cell gains useful energy to fuel cellular processes by producing adenosine triphosphate (ATP). It occurs in both prokaryotic and eukaryotic cells and has three main stages.

Stage 1: Glycolysis

One molecule of glucose is split into two molecules of ATP, two molecules of pyruvic acid (3-carbon sugar), and two high-energy, electron-carrying molecules of NADH.

Products of Glycolysis

	Pyruvic acid	ATP	NADH	H_2O
Number of molecules	2	2	2	2

Stage 2: The Krebs Cycle

The two molecules of pyruvic acid are converted to acetyl CoA in the mitochondria. The chart below shows the products of the Krebs cycle for every one molecule of acetyl CoA that enters.

Products of the Krebs cycle

	CO_2	CoA	ATP	$NADH^+$	$FADH_2^+$
Number of molecules	2	1	1	3	1

Stage 3: Electron Transport Chain

The electrons produced from the Krebs cycle are passed to oxygen. This process forms ATP. It happens in the mitochondria of eukaryotic cells and in the cell membrane of prokaryotic cells.

Products of Electron Transport Chain in Prokaryotic Cells

	H_2O	ATP	NAD
Number of molecules	2	38	2

Products of Electron Transport Chain in Eukaryotic Cells

	H_2O	ATP	NAD
Number of molecules	2	36	2

Math Connections

Use the tables and information from page one to help you answer the questions below. Set up a proportion for each question to show how you solved the problem.

1. In a eukaryotic cell, how many ATP molecules will result from the cellular respiration of 30 glucose molecules?

2. In the Krebs Cycle, 25 molecules of acetyl CoA enter in the same cycle. How many molecules of ATP are produced? How many molecules of CO_2 are produced?

3. In glycolysis, if 24 molecules of pyruvic acid are produced, how many molecules of glucose are there?

4. Use the chart below to show the products of the Krebs Cycle for 24 molecules of acetyl CoA that enter the cycle.

	CO_2	CoA	ATP	$NADH^+$	$FADH_2^+$
Number of molecules					

5. In a prokaryotic cell, what are the products of five glucose molecules from the process of cellular respiration?

	H_2O	ATP	NAD
Number of molecules			