Name _____ Date_____

Visualization Chapter 2

Math and Science

Being able to visualize is an important part of learning and discovery in math and science. The formation of mental pictures can help you understand word problems in algebra and arrive at correct solutions to problems, envision 2D and 3D geometric constructions, and imagine what the molecules making up a chemical compound look like.

Some things in math and science may be easier to visualize than others. If we are asked to calculate the volume of a cube, we already know what a cube looks like. Many of us have sketched acute and obtuse angles, and parallel or perpendicular lines. We may have calculated and drawn the intersection of lines and points on graphs. But what about a chemical reaction or something as small as a molecule or a cell? Can you visualize things that you cannot actually see with your eyes? Yes you can, and you may find out, after completing these exercises, that you already visualize more than you think you do when solving problems.

Exercises

For Questions 1 – 4, calculate the answers in your head without using pencil and paper or a calculator.

Question 1

-5 – 7 = _____

How did you get the answer? What did you see? If you have the opportunity, discuss with your classmates how they arrived at their answers.

Question 2

14 x 22 = _____

How did you get the answer? How did you visualize the process of multiplying and adding? Again, if you have the opportunity, discuss with your classmates how they arrived at their answers. Did everyone do it in the same way? Or are there different ways to find the same correct answer? Remember that there is no right or wrong way to visualize math calculations, as long as you can find the correct answer.

Name _____ Date_____

Question 3

What is the volume of a solid block that is 5 inches wide, 10 inches deep, and 7 inches tall?

How did you calculate that? Did you imagine what the block looked like? Did you use your hands to gesture or approximate the actual size of the block? What did your classmates do?

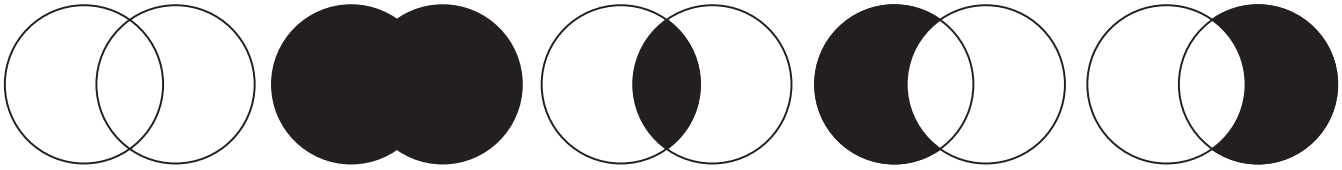
Question 4

Visualizing a solid square cube that is 10 inches in length, width, and height, you can calculate that the volume of the cube would be 1000 in^3. But what would the approximate volume be if you put a hole 4 inches in diameter right through the middle of the block?

Depending on how you rounded your numbers or estimated the value of π, was your answer close to 874? How did you do the calculations? What did you see in your mind as you worked out the problem? What did your classmates do?

Venn Diagram Example

A Venn diagram is often used in math and the sciences to show relationships between sets. Sets can be defined with the Boolean operations of Union, Intersection, and Difference, as shown below.



A B

$A \cup B$
A union B

$A \cap B$
A intersect B

A – B
A minus B

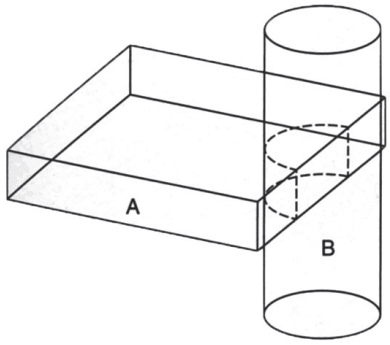
B – A
B minus A

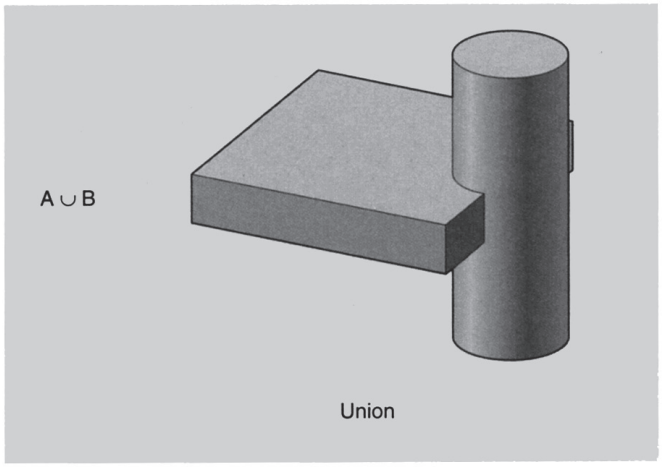
Name _____ Date_____

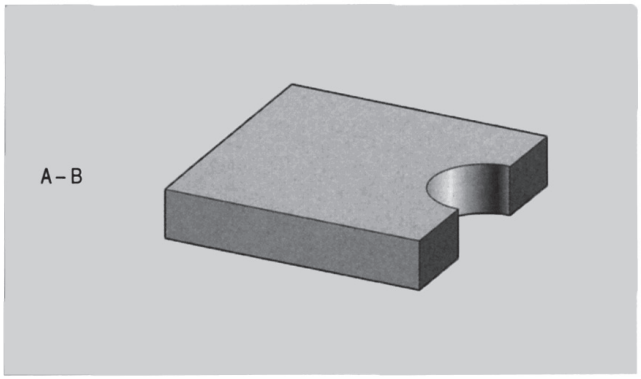
Visualization Chapter 2

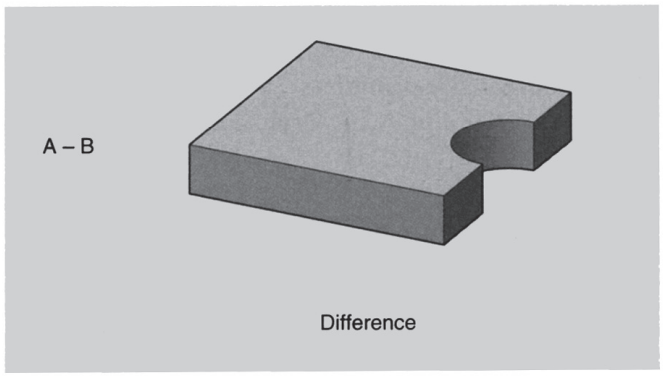
Math and Science

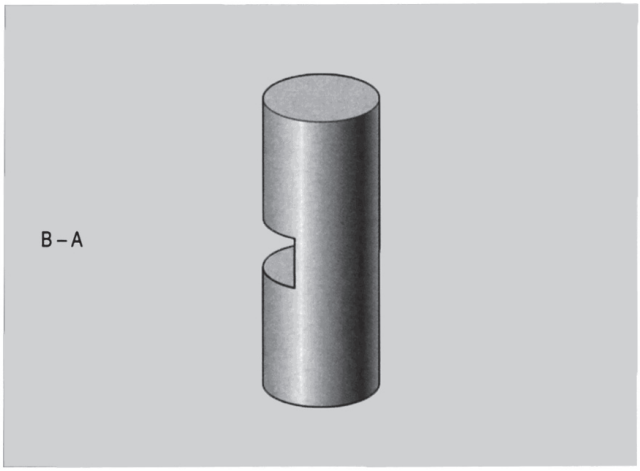
The same Boolean operations used in the Venn diagram can be used in 3D modeling to make secondary shapes, from basic primitive shapes such as cylinders and cubes. Following are some examples of the effect of Boolean operations on primitive geometric shapes that have some overlapping volume. Later in this program you will do some visualization exercises with geometric shapes and Boolean operations.

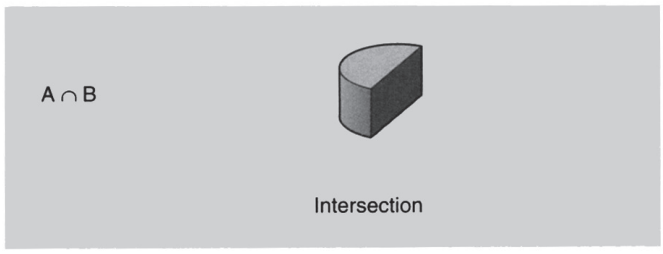












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