

Lead Student Lesson Plan

L06: Variables and Formulas

Main Purposes

- Discuss the BYU-Pathway Worldwide devotional
- **Answer questions:** There may be some in the class who are struggling and need some help. Using some time to help them overcome the issues is great. However, spending too much time on questions will take away from the activities that need group participation at the end of the lesson. If questions take too long for the gathering, be sure to remind everyone that tutoring is instantly available at byui.edu/mathhelp, and that they can get a personal tutor to meet with them if they would like.
- **Be aware of extra instruction:** Before this class, the students should be aware of the extra instruction after Exercises 2.2A regarding the combining of like terms and use of the distributive property.

Student Preparation

Students were asked to prepare for gathering by completing specific activities and/or pondering certain questions. Please refer to the gathering instructions in this week's unit or lesson in the course.

Lesson Outline

As the Lead Student this week you will facilitate the Thursday Gathering. The times given for each activity are suggested times. The Gathering should not last more than 60 minutes. Try to make sure that the main purposes of the gathering are met each week.

OPENING	LED BY MISSIONARIES
Announcements, Hymn, and Prayer (5 minutes)	Announcements Opening Hymn: Chosen by missionaries Opening Prayer: By Invitation
CLASS ACTIVITIES	LED BY LEAD STUDENT
BYU-Pathway Worldwide Devotional (8 minutes)	Whole Class Students were asked to watch the BYU-Pathway Worldwide devotional this week at http://byupathway.lds.org/devotionals . They should have done this prior to the gathering. As a class discuss the devotional according to the information provided on the website.

<p>Math Exercise 2.2 Part A</p> <p>(7 minutes)</p>	<p>Whole Class or Small Groups</p> <p>Review this week's Math Exercise 2.2 Part A homework problems. If there are questions about the assignments, work out a few of the most difficult problems together as a whole group or in small groups of 3-4 people.</p> <p>Either A: Ask for a volunteer who understands the difficult problems and can explain how to complete the problem. (It may help to remind people that being able to explain something to someone else is a great way to reinforce one's own learning. Try to include everyone.)</p> <p>Or B: In small groups, work through one or two of each type of problem in the homework, letting each group decide which problems they want to work through together.</p>
<p>Examples</p> <p>(5 minutes)</p>	<p>Whole Class</p> <p>To prepare for working on Math Exercise 2.2 Part B in small groups, review both examples listed below. This will serve as a good review of the extra textbook reading (pg. 73, 74) and the extra video explanation for this week. If students missed that those extras were there, discuss where in the lesson they should have been found. As a reminder, in the US monetary system</p> <p>Penny = \$.01 Nickel = \$.05 Dime = \$.10 Quarter = \$.25</p> <p>Example 1:</p> <p>$p = p$ $d = n - 8$ $V =$</p> <p>Set up an equation using the monetary value of each U.S. coin, just as you have done before.</p> <p>$V = .01(p) + .10(n-8)$ In this example, there aren't any like terms to combine, so the problem is finished.</p> <p>Example 2:</p> <p>$p = w$ $q = w + 4$ $V =$</p> <p>Set up an equation using the monetary value of each U.S. coin, just as you have done before.</p> <p>$V = .01(w) + .25(w+4)$</p>

	<p>Since both terms contain a “w” in this example, first use the distributive property and then combine like terms.</p> $V = .01w + .25w + 1$ $V = .26w + 1$
<p>Math Exercise 2.2 Part B</p> <p>(25 minutes)</p>	<p>Small Groups</p> <p>After working through the examples, break into small groups and work on Exercise 2.2 Part B and rotate the responsibility to explain how to do each problem through the group. If a student doesn’t know how to do a problem when it is their turn, they should explain as much as possible and then the rest of the group should help finish the problem. Then, the student should explain how to solve the problem back to the group.</p> <p>Use calculators to make the computations go faster and to allow students to focus on the principles of substituting numbers in for letters and using formulas</p> <ul style="list-style-type: none"> ▪ #7, 8 will follow the above examples. ▪ #11, 12: Note that the answers can be given without putting π into the calculator as well as the decimal form. Exam two will have the answers to choose from with the π still visible. #19-24 will make use of the textbook material on pg 73, 74 to combine like terms and use the distributive property. ▪ #25: Have fun but don’t take too long on this one. ▪ #26-30 make use of the chart at the bottom of pg 74 to get the right units. Note that starting with Exercise 2.2C, the correct units will be used in the problems regarding shapes.
<p>Variables and Formulas Summary</p> <p>(10 minutes)</p>	<p>Whole Class</p> <ul style="list-style-type: none"> ▪ Review the Variables and Formulas Summary. See document below. ▪ Choose students to write area formulas on the board and to explain them. ▪ Discuss why an area is always represented in square units and why volume is represented in cubic units.
<p>Personal Experience/ Testimony</p>	<p>Lead Student to Class</p> <p>As appropriate, bear your testimony as it pertains to this lesson, this course, or your experiences with the math or personal finance concepts you have learned.</p>
CLOSING	LED BY MISSIONARIES

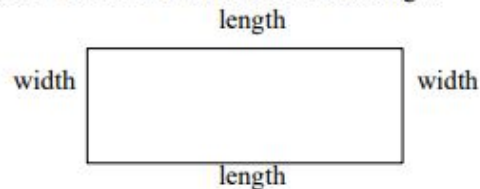
Note

Please download and print a copy of these instructions to use as a reference during Thursday's Pathway Gathering.

Variables and Formulas Summary

- 1) **Variables:** These symbols, being letters, actually represent numbers, but the numbers can change from time to time, or vary. Thus are they called variables.

Example: Pick general terms for the sides of the rectangle:



Distance around the rectangle = length + width + length + width

Perimeter (around measure):

Perimeter = length + width + length + width, or

$$P = l + w + l + w$$

- 2) **Formula:** These are patterns in the form of equations and variables, often with numbers, which solve for something we want to know, like the perimeter equation before, or like:

Area of a rectangle: $A = B \times H$

Volume of a Sphere: $V = \frac{4}{3}\pi r^3$

Pythagorean Theorem: $a^2 + b^2 = c^2$

Distance, rate: (rate of speed) · (time) = distance
or in other words:

$$rt = d$$

where r is the rate
 t is the time
 d is the distance

Tax Percentage: (interest rate) · (Purchase amount)
or in other words:

$$T = rP$$

Where t is tax
 r is rate of tax
 P is the purchase amount.

Simple Interest: $A = 500(1.09)^3 = \$647.51$

$$A = P(1 + r)^Y$$

where A is the Amount in your account at the end
P is the principal amount (starting amount)
r is the interest rate
Y is the number of years that it is invested.

Temperature Conversion:

$$C = \frac{5}{9}(F - 32)$$

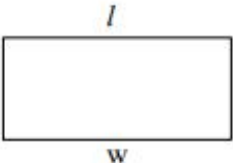
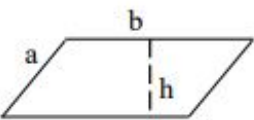
where F is the degrees in Fahrenheit
C is the degree in Celsius

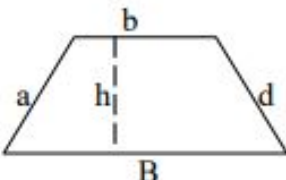
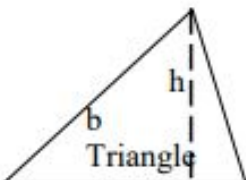
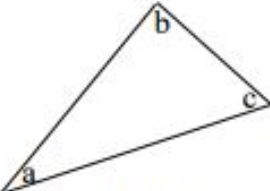
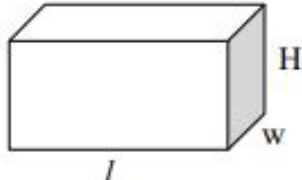
Money US(\$):

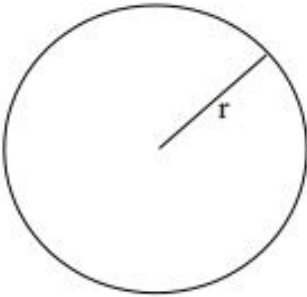
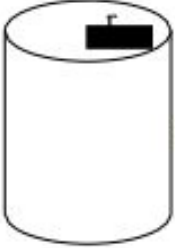
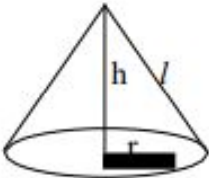
$$V = .25q + .10d$$

where V is the Total Value of money
q is the number of quarters
d is the number of dimes

- 3) **Common Geometric Formulas:** Here are some basic geometric formulas that you need to know for this course:

 <p>Rectangle</p>	$P = 2l + 2w$ $A = lw$	<p>P is the perimeter l is the length w is the width A is the Area</p>
 <p>Parallelogram</p>	$P = 2a + 2b$ $A = bh$	<p>P is the perimeter a is a side length b is the other side length A is the Area</p>

 <p>Trapezoid</p>	$P = b + a + B + d$ $A = \frac{1}{2}h(B + b)$	<p>P is perimeter</p> <p>b is the little base</p> <p>B is the big base</p> <p>a is a leg</p> <p>d is a leg</p> <p>A is the Area</p>
 <p>Triangle</p>	$P = s_1 + s_2 + s_3$ $A = \frac{1}{2}bh$	<p>P is the perimeter</p> <p>A is the Area</p>
 <p>Triangle</p>	$a + b + c = 180^\circ$	<p>a is one angle</p> <p>b is another angle</p> <p>c is another angle</p>
 <p>Rectangular Solid</p>	$SA = 2lw + 2wh + 2lh$ $V = lwh$	<p>l is the length</p> <p>h is the height</p> <p>w is the width</p> <p>SA is the Surface Area</p> <p>V is volume</p>

 <p>Circle</p>	$C = 2\pi r$ $A = \pi r^2$	<p>C is the Circumference or Perimeter</p> <p>π is a number, about 3.14159 . . . it has a button on your calculator</p> <p>r is the radius of the circle</p> <p>A is the area inside the circle.</p>
 <p>Cylinder</p>	$LSA = 2\pi rh$ $SA = 2\pi rh + 2\pi r^2$ $V = \pi r^2 h$	<p>LSA is Lateral Surface Area = Area just on the sides</p> <p>h is the height</p> <p>SA is total surface area</p> <p>π is a number, about 3.14159 . . . it has a button on your calculator</p> <p>r is the radius of the circle</p> <p>V is Volume</p>
 <p>Cone</p>	$LSA = \pi r l$ $SA = \pi r^2 + \pi r l$ $V = \frac{1}{3}\pi r^2 h$	<p>h is the height</p> <p>r is the radius of the circle</p> <p>l is the slant height</p> <p>π is a number, about 3.14159 . . . it has a button on your calculator</p> <p>SA is total surface area</p> <p>LSA is Lateral Surface Area = Area just on the sides</p>