Unit 1 Lesson 1

Evaluation Blocks and Arithmetic Expressions

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Unit 1 Lesson 2

Strings and Images

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Unit 1 Lesson 3

Contracts, Domain, and Range

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Unit 1 Lesson 4

Writing Contracts

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Defining Variables and Substitution

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Fast Functions

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Composite Functions

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The Design Recipe

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Unit 1 Lesson 9

Solving Word Problems with the Design Recipe

Resources

Introduction

Problems from your textbook will look different from the problems in CSinA but do not be alarmed. As students become experts with the design recipe they will be able to tackle more challenging problems. Many students who have seen algebra before might be strong in the traditional math sequence:
1. Identify Variables
2. Create Function
3. Solve for a given input (or more complicated problems have you solve for given outputs)

The design recipe is a bridge from (a) to (b) because Design Recipe
  I.   Contract and Purpose Statement
  II. Examples
  III. Definition (Creating the Function)

When this tool is offered to students as they are learning how to do simple problems, they are able to access more challenging problems in Algebra 1, CS, and Algebra 2.

Problem Identification Template

Choose word problems from your text that want you to produce:

Linear Function (form slope-intercept form)
- Independent Variable is given or is obvious from the setting.
- Slope is given
- Constant is given or implied.

Linear Function (from table or two points)
- More work on paper is required

Non-Linear (from a table)
- Same structure of conversation but more math content needed.

Note many of your text give word problems with the function already included. Rewrite your text problems taking out the equation but leaving the table or graph to help students focus on the function creation.

Textbook Examples

Textbook Problem 1:

For collecting credit card applications Barry's Daily pay B is related to the number of applications he collects n by the rule B = 20 + 5n. Use this function to complete the table below…

Modified Problem 1 using table:

For collecting credit card applications Barry's Daily pay, Pay, is related to the number of the applications he collects, Applications, by the table below… (the table can be as challenging or as easy as you would like.)

Applications	Pay
5	45
10	70
15	90

Using the Design Recipe can you use the information in the table to create a function?

Textbook Problem 2 (no need to modify):

The Turtle Candy Company sells its signature - chocolate, caramel, pecan turtles- through orders placed online. The company's web page shows the following prices:

Number of Boxes	1	2	3	4	5	10
Prices	20	35	50	65	80	155

Using the Design Recipe can you build a function that best models this situation?

Teacher Created Examples

Example 1:

John works for a supermarket chain and he needs to create a function that will help him compute the new price of products after tax. His manager told him he is to use 6.25% as the tax percentage.

> **Math Skills Covered :**
> - Direct Proportion
> - Combining like terms
> - Factoring out common terms

Example 2:

As a member of the student council, Chris voted for the Dunk-A-Teacher fundraiser. After talking to many companies the council elected to go with Jersey Shore Water Fun Company because they were only going to charge a $500 flat rental fee for the day. Chris is focused on making as much money as possible and needs to make a function to help explain his pricing decisions to the other members of the council. Chris originally thinks charging $0.10 a throw is a fair price. Can you help him make a function to see if $0.10 is a fair price for this event? Keep in mind there are only 1,000 students in this

school and only about 30% of students participate in school wide functions.

Math Skills Covered:
- Linear Functions
- Identifying slope, identifying y-int,
- Sense Making: where is a good price per throw.

Example 3:
Students developing a community garden for a service project need some assistance mapping out costs. At the local garden shop, they could rent the gardening equipment for $40 for 3 hours and $80 for 5 hours. Can you help them develop a function that finds their cost of renting equipment.
Math Skills Covered
Linear Functions
Finding slope from two points
Finding y-intercept when only given points
Sense Making of real-life numbers

Example 3:

Before beginning voice lessons, Wendy already knew how to sing 1 piece, and she expects to learn 2 new pieces during each week of lessons. After 4 weeks of voice lessons, how many pieces will Wendy be able to sing, in total? Define a function and evaluate at 4 weeks to find the answer.

Resources for finding Linear Function problems that you can modify

Simple math problems for middle school students at iXL:
https://www.ixl.com/math/algebra-1/linear-function-word-problems

Complex Problem Solving aligned to Common Core:
http://map.mathshell.org/stds.php?standardid=1480

The Design Recipe

Description:

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Contract and Purpose Statement: **Every contract has three parts...**

_____ : _____ -> _____
    function name   domain   range

PS:_____
                     what does the function do?

Examples: **Write some examples for your function in action... draw circles of evaluation if needed**

Example: _____ (_____) = _____
           function name   input(s)   what the function does with the input(s)

Example: _____ (_____) = _____
           function name   input(s)   what the function does with the input(s)

Definition: **Write the definition, giving variable names to all your input values**

Define: _____ (_____) =
         function name   variables

_____
                 what the function does with those variables

Unit 1 Lesson 10

Rocket Height

Resources