

Curriculum topics:

- Algebraic Linear Equations
- Mixture Word Problems
- Problem Solving Strategies
- Reason Abstractly and Quantitatively

Subject: Math

Grade range: 6 – 9

Who we are:

Resource Area for Teaching (RAFT) helps educators transform the learning experience through affordable “hands-on” activities that engage students and inspire the joy and discovery of learning.

For more ideas and to see RAFT Locations


www.raft.net/visit-raft-location

HAPPY TRAILS MIX


A Mixed Bag of Math and Trail Mix!







Mix a healthy amount of different ingredients into a bag of trail mix that sells for a set price!




Happy Trails Mix Recording Sheet



Bead Color	Amount per Pound	Cost per Pound	Cost per Bead
Brown 	50		
Red 	200		
Yellow 	150		
Black 	70		

Equation Formula to make a mixture with a net cost of \$2.00 a bag:

Markup of 50 %
 Retail price = net cost + markup = \$ _____



Materials required

For each team of 2 to 4 students:

- Happy Trails Mix Recording Sheet, 1 (page 5)
- Pony beads, 20 each of the following colors: brown, red, yellow, and black
- Six-sided die with numbers 1 – 6
- Six-sided die with numbers 7 – 12

To do and notice

NOTE: The following colored beads represent different types of healthy ingredients:

Brown = almonds

Yellow = dried pineapple chunks

Red = dried cranberries

Black = raisins

1 Observe the amount of each ingredient per pound on the “Amount per Pound” column of the Happy Trails Mix Recording Sheet:

Almonds → 50

Cranberries → 200

Dried Pineapple → 150

Raisins → 70

2 For each ingredient in the “Amount per Pound” column, divide that number by ten, then take that respective number of beads out of the bag and set them aside.

3 Roll the 1 – 6 die to obtain the cost per pound for the raisins. Record in the appropriate column on the Happy Trails Mix Recording Sheet. Repeat to find the cost per pound for cranberries.

4 Roll the 7 – 12 die to obtain the cost per pound for the dried pineapple chunks. Repeat to find the cost per pound for almonds. Record costs.

5 Write an equation for the cost of each individual ingredient rounded to the nearest cent (e.g., if one pound of almonds is \$8, and there are 50 almonds per pound, then the cost per almond, a , could be written as $\rightarrow a = 8.00 \div 50 = \$ 0.16$

6 Once the individual costs for all ingredients are found, choose at least two of each type of bead to create a mixture with a net cost of \$2.00 a bag.

7 After creating a mixture, write this as an equation and explain findings.

For Example:

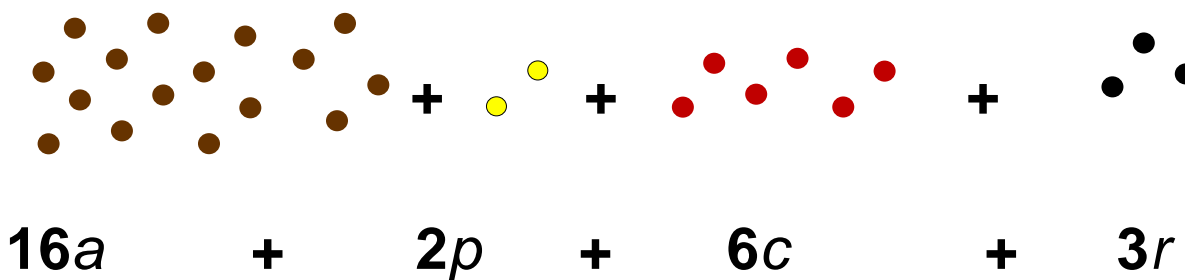
Almonds (a) are \$8 per pound and there are 50 almonds in a pound; ($a = 8.00 \div 50 = \$ 0.16$)

Cranberries (c) are \$4 per pound and there are 200 in a pound; ($c = 4.00 \div 200 = \$ 0.02$)

Dried pineapple chunks (p) are \$9 per pound and there are 150 in a pound; ($p = 9.00 \div 150 = \$ 0.06$)

Raisins (r) are \$2 per pound and there are 70 raisins in a pound; ($r = 2.00 \div 70 = \$ 0.03$)

Does the following equation work? $16a + 2p + 6c + 3r = \$2.00$. If not, try another combination of ingredients by substituting in different amounts for each ingredient..... there will be more than one answer!



8 Calculate the markup using a markup rate of 50%.

9 Calculate the retail price per bag by adding the markup to the net cost of the ingredients.

The math behind the activity

This activity incorporates Algebraic reasoning with trial and error to help students find a workable mixture of ingredients to be sold at a certain price per bag. Some of the trail mix ingredients cost more than others, so combining them with less expensive ingredients takes into account financial trade-offs; the decision of what to put into a bag includes a process of compromises and balances to make the final result appealing, tasty, and economical.

The Happy Trails Mix activity also reinforces what good problem solvers do according to the eight National Common Core math practices: (1) make sense of problems and be persistent in solving them; (2) reason abstractly and quantitatively; (3) create viable arguments and critique the reasoning of others; (4) model with mathematics; (5) use appropriate tools strategically; (6) attend to precision; (7) look for and make use of structure; and (8) look for and express regularity in repeated reasoning.



Curriculum Standards:

Equations and Variables
(Common Core Math Standards: Expressions and Equations, Grade 6, 2, 5, 6, 7, & 9; Grade 7, 4)

Solving linear equations in one variable
(Common Core Math Standards: Grade 8, Equations and Expressions, 7)

Creating equations, interpreting solutions
(Common Core Math Standards: High School, Algebra – Creating Equations, 1, 2, & 3)

Solving equations,
(Common Core Math Standards: High School, Algebra – Reasoning with Equations & Inequalities, 1 & 3)

Problem Solving and Reasoning
(Common Core Math Standards: Mathematical Practices Grades 6 - 9)

Learn more

- Have student teams share and compare scenarios. Have teams create viable arguments and critique the reasoning of others.
- Choose a different target cost and create a new trail mix.
- Use different markup rates; compare resulting prices and discuss the advantages and disadvantages of different markup rates.
- Create problems using other currencies and units of measure.
- Explore other scenarios that use mixtures and create new mixture problems.

Related activities: See RAFT Idea Sheets:

***Brewing Coffee Mixtures* -**

<http://www.raft.net/ideas/Brewing Coffee Mixtures.pdf>

***Dive into Square Pools* -**

<http://www.raft.net/ideas/Dive into Square Pools.pdf>

***Modeling Simple Equations* -**

<http://www.raft.net/ideas/Modeling Simple Equations.pdf>

***Occasions for An Equation* -**

<http://www.raft.net/ideas/Occasions for an Equation.pdf>

***Shape Up with Algebra* -**

<http://www.raft.net/ideas/Shape Up with Algebra.pdf>

Resources

Visit www.raft.net/raft-idea?isid=696 for “how-to” video demos & more ideas!





See these websites for more information on the following topics:

- **Other types of algebraic mixture problems:**
<http://www.purplemath.com/modules/mixture.htm>
- **More about how to solve mixture problems:**
http://mathforum.org/library/drmath/sets/select/dm_mixture.html
- **Teacher designed math courses from the New Jersey Center for Teaching & Learning –** <https://njctl.org/courses/math>



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