Four oxen are as strong as five horses.

An elephant is as strong as one ox and two horses.

5. Which animals will win the tug-of-war below? Give a reason for your prediction.

Source: Comparing Quantities (MIC)

MT decides to hold a jumping contest. The three contestants are Sunny, Cal, and Legs. In this contest, all of a frog's steps are the same size. Also, when a frog jumps, he always travels the same distance (the referee's frog-jumping rule applies). For the contest, each frog must complete two jump sequences and then take steps to end up in the same place. Your problem is to find out which frog has the longest jump.

■ Sunny's Results:

When Sunny jumps 4 times and takes 11 steps **forward**, he lands in the same place as when he jumps 5 times and takes 4 steps **forward**.
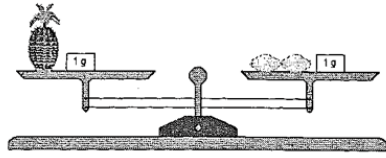
■ Cal's Results:

When Cal jumps 3 times and takes 6 steps **forward**, he lands in the same place as when he jumps 4 times and takes 2 steps **backward**.
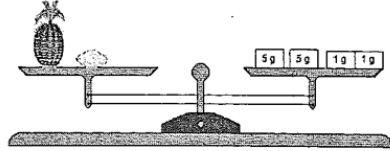
■ Legs' Results:

When Legs jumps 2 times and takes 13 steps **forward**, he lands in the same place as when he jumps 4 times and takes 5 steps **backward**.
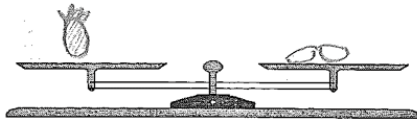
Source: (MiTC)

Student 1

Consider the balance scales on the left. Find the weight of one lemon and one pineapple using a *substitution strategy*.

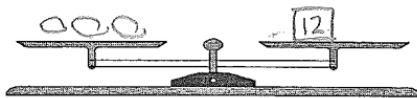For each step, draw the balance scales and explain your method.

Step 1:

What did you do? Subtract 1g from each side.

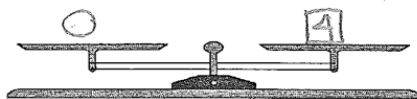Why will the scale remain balanced? I took the same amount away from both sides.

Step 2:

What did you do? Substituted the pineapple for 2 lemons.

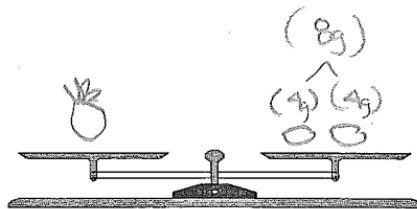Why will the scale remain balanced? The substitution weight was equivalent.

Step 3:

What did you do? Divided both sides by 3 on each side.

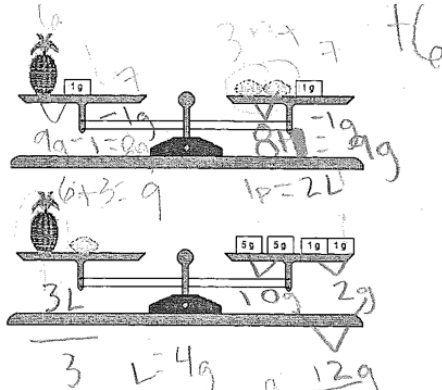Why will the scale remain balanced? I did the exact same thing to both sides.

Step 4:

What did you do? Substituted the lemons for 4g each to show that the pineapple was = to 8 grams

Why will the scale remain balanced?

_____4_____ grams per lemon   _____8_____ grams per pineapple
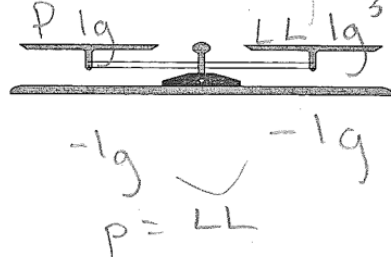
P = pineapple
L = Lemon

1p + 1L = 12g

$3L = L = 4g$ $\frac{12g}{3}$

Consider the balance scales on the left.
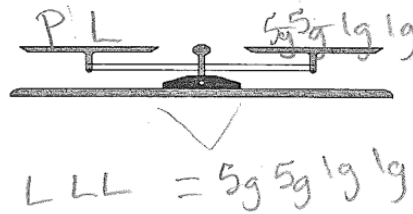Find the weight of one lemon and one pineapple using a *substitution strategy*.

For each step, draw the balance scales and explain your method.

Step 1:

P 1g   LL 1g

−1g   −1g

P = LL

What did you do?
I subtracted 1g from both side of the top scale

Why will the scale remain balanced? 1 pineapple = 2 lemons

Step 2:

P L   5g 5g 1g 1g

L LL = 5g 5g 1g 1g

What did you do?
I substituted the pineapple on the bottom scale for 2 lemons

Why will the scale remain balanced?
3L = 5g 5g 1g 1g

Step 3:

LLL   12g

$\frac{}{3}$ $\frac{}{3}$
     4

What did you do?
I divied both sides of the scale by 3.

Why will the scale remain balanced?
$\frac{3}{3} = 1$ 12/3 = 4

Step 4:

P 1g   LL 1g

9g − 1 = 8g   4g + 4g = 8g + 1g = 9g

What did you do?
I substituted the lemons for 4g on the right side then subtracted 1g from the left.

Why will the scale remain balanced?
1L = 4g   1p = 8g

_____4_____ grams per lemon   _____8_____ grams per pineapple

Student 3

I put my work on the back

Consider the balance scales on the left. Find the weight of one lemon and one pineapple using a *substitution strategy*.

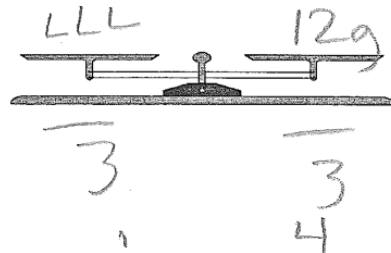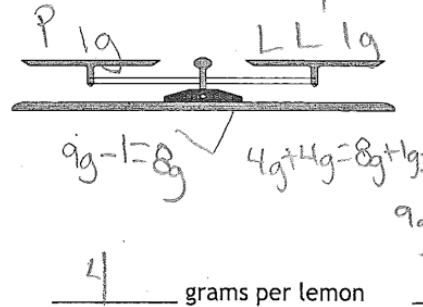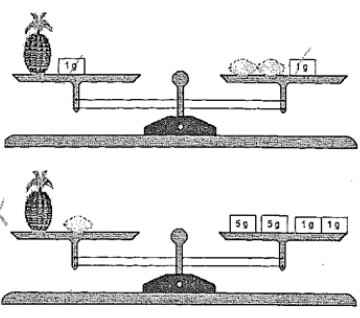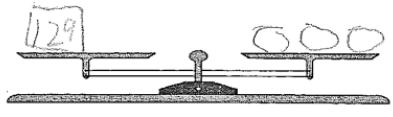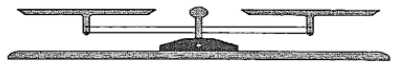For each step, draw the balance scales and explain your method.

Step 1:

What did you do? I took away one gram from both sides and substituted the pinear for 12 grams

Why will the scale remain balanced? because 12 g is equal to one pineapple and one lemon

Step 2:

What did you do?

$$1 P + 1 = 2L + 1$$
$$-1 -1$$
$$1P = 2L$$

$$1P + 1L = 12$$
$$2P + 2L = 24$$

1L is half of a P

$$12 = 3L$$
$$\frac{12}{3} = 1L$$
$$\left.\right) \div 3 \quad 1P = 6$$

$$4$$

$$1P + 4 = 12$$

_____4_____ grams per lemon   _____6_____ grams per pineapple

MIC (Mathematics in Context)

http://mathincontext.eb.com

Units:

Comparing Quantities

Graphing Equations

MiTC (Mathematics in the City)

http://mitcccny.org

http://www.contextsforlearning.com

Unit:

The California Frog-Jumping Contest: Algebra

DME (Digital Mathematics Environment)

http://dme.colorado.edu/dwo/colorado.html, or

http://www.fi.uu.nl/dwo/en (login as guest)

Math Secondary Education> Algebra> Lesson-Systems of equations

More information:

http://www.fisme.uu.nl/wisweb/en

RME conference in Boulder.

4th International RME Conference, 2013 sept 27-29, University of Colorado, Boulder

See for more information: www.fius.org

Utrecht Summer School on Mathematics and Science Education

August 19 - 30, 2013 in Utrecht, the Netherlands.

http://www.utrechtsummerschool.nl/index.php?type=courses&code=H7

http://www.utrechtsummerschool.nl

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