Proportional Reasoning

Ratio

Rate

Proportion

Can you recall what these are??

Ratio:

a comparison between
two numbers
with the same units

Example: $\frac{\text{length}}{\text{width}} = \frac{8m}{6m} = \frac{4m}{3m}$

$\frac{16}{20}$

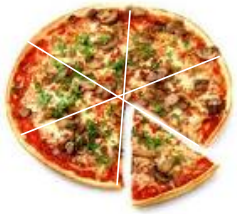
Rate:

a comparison between
two numbers
with different units

Ex: $\frac{\text{distance}}{\text{time}} = \frac{60km}{1hr}$

Proportion:

a fractional statement
of equality
between two ratios or rates



$\frac{3}{6} = \frac{1}{2}$

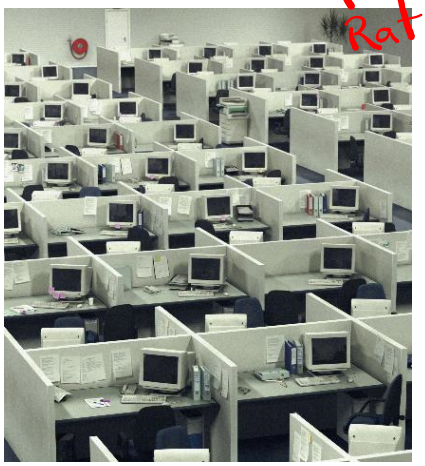
State two more ways to write the ratio 3/4.

$\frac{3}{4} = \frac{6}{8} = \frac{15}{20}$

$3:4 = 6:8 = 15:20$

Jean-Luc, a builder, works in Kentville, Nova Scotia. He has found that he can arrange the work cubicles of his employees best if the ratio between the length and the width of a room is 20:2. If a room is 6 m long, how wide should the room be?

Ratio (20/2) length



1. State the variable and Set up ratio.

Let Width = x

$$\frac{\text{Length}}{\text{Width}}$$

2. Fill in ratio (Fill in what you know)

$$\frac{20}{2}$$

Jean-Luc, a builder, works in Kentville, Nova Scotia. He has found that he can arrange the work cubicles of his employees best if the ratio between the length and the width of a room is 20:2. If a room is 6 m long, how wide should the room be?

Length / Width

3. Use ratio to create proportion.

$$\frac{20}{2} = \frac{6}{x}$$

4. Solve for the unknown.

$$\frac{20}{2} = \frac{6}{x}$$

$$\frac{20x}{20} = \frac{12}{20}$$

$$x = \frac{12}{20} = \frac{6}{10} = \frac{3}{5} = 0.6$$

The width should be 0.6 m.

If halibut steaks cost $2.49 for 94 g, how much will it cost to buy 250 g of halibut steaks?

1. State the variable and Set up ratio or rate.
2. Fill in rate
3. Use rate to create proportion.
4. Solve for the unknown.

① Let cost = x

$\frac{\text{cost}}{\text{weight}}$ (rate)

② $\frac{\$2.49}{94\,g}$

③ $\frac{\$2.49}{94\,g} = \frac{x}{250\,g}$

④ $\frac{622.5}{94} = \frac{94x}{94}$

$\$6.62 = x$

It will cost $6.62 for 250 g of halibut.

Recipe #1

3 cups of concentrate
7 cups of water

If you only have 2 cups of concentrate of recipe #1, how many cups of water will you need?

① Let cups of water = x

$$\frac{\text{cups of concentrate}}{\text{cups of water}}$$ (ratio)

② $\frac{3}{7}$

③ $\frac{3}{7} = \frac{2}{x}$

④ $\frac{3x}{3} = \frac{14}{3}$

$x = 4.\overline{6}$

you will need $4.\overline{6}$ cups of water.

You Try!!

A chainsaw's engine uses a mixture of 31 L of gas to 2 L of oil. How much oil must you mix with 15 L of gas?

① Let amount of oil = x

$\frac{\text{gas}}{\text{oil}}$ (ratio)

② $\frac{31\text{ L}}{2\text{ L}}$

③ $\frac{31}{2} = \frac{15}{x}$

④ $\frac{31x}{31} = \frac{30}{31}$

$x = 0.97\text{L}$ of oil

you should mix 0.97 L of oil with 15 L of gas.


TRY
Page 21, Questions 1-7 (Omit #4)

Recipe #2

2 cups of concentrate
5 cups of water

1. State the variable and Set up ratio or rate.
2. Fill in rate /ratio
3. Use rate to create proportion.
4. Solve for the unknown.

If you had 5 cups of concentrate of recipe #2, how many cups of water will you need?

① Let cups of water = x

$$\frac{\text{cups of concentrate}}{\text{cups of water}}$$ (ratio)

② $\frac{2}{5}$

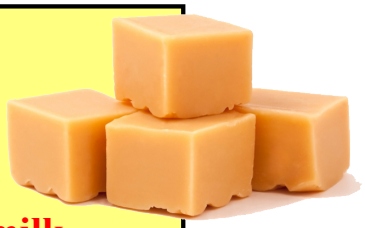
③ $\frac{2}{5} = \frac{5}{x}$

④ $\frac{2x}{2} = \frac{25}{2}$

$x = 12.5$

You would need 12.5 cups of water

Fudge Recipe



1/2 cups of brown sugar
3 cups of white sugar
1 3/4 cups of condensed milk
1 cup of butter

a) What is the ratio of butter to white sugar?

$\frac{\text{butter}}{\text{white sugar}} = \frac{1}{3}$

b) What is the ratio of brown sugar to white sugar?

$\frac{\text{brown sugar}}{\text{white sugar}} = \frac{1/2}{3}$

$= \frac{1}{2} \times \frac{1}{3}$

$= \frac{1}{6}$

Ultimate Question

c) Choose the correct answer that represents the ratio of condensed milk to butter?

i) 3/4 ii) 7/4 iii) 2/5 iv) 7/2

$\frac{\text{condensed milk}}{\text{butter}} = \frac{1\ 3/4}{1}$

$= \frac{7/4}{1}$

$= 7/4$

Recipe #1

3 cups of concentrate
7 cups of water

You only want to make 8 cups of Recipe #1. How many cups of concentrate and how many cups of water will you need? Explain your solution.

- **This is a question dealing with totals!!!!!!**
- **We will determine the total of the batch & set up a total ratio.**

Recipe Total

# of concentrate = 3
# of water = 7

Total # = 10

Recipe #1

3 cups of concentrate
7 cups of water

You only want to make 8 cups of Recipe #1. How many cups of concentrate and how many cups of water will you need? Explain your solution.

(Total Question)

Recipe Total

# of concentrate = 3
# of water = 7

3 + 7

Total # = 10

Total Ratio

Let x = concentrate (cups of)

$$\frac{\text{\# of concentrate}}{\text{Total}}$$

$$\frac{3}{10} = \frac{x}{8}$$

$$10x = 24$$

$$\frac{10x}{10} = \frac{24}{10}$$

$$x = 2.4$$

2.4 cups of concentrate

Water = Total # - Concentrate

Water = 8 - 2.4

Water = 5.6

5.6 Cups of Water!!!!

Let y = (cups of) water

$$\frac{\text{\# of water}}{\text{Total}}$$

$$\frac{7}{10} = \frac{y}{8}$$

$$\frac{10y}{10} = \frac{56}{10}$$

$$y = 5.6$$

Recipe #2

2 cups of concentrate
5 cups of water

You want to make 12 cups of Recipe #2. How many cups of concentrate and water will you need?

Recipe Total

# of concentrate = 2
# of water = 5

Total # = 7

Recipe #2
2 cups of concentrate
5 cups of water

You want to make 12 cups of Recipe #2. How many cups of concentrate and water will you need?

Recipe Total

# of concentrate = 2
# of water = 5

(2 + 5)

Total # = 7

Total Ratio

Let x = cups of concentrate

$$\frac{\text{\# of concentrate}}{\text{Total}}$$

$$\frac{2}{7} = \frac{x}{12}$$

$$\frac{7x}{7} = \frac{24}{7}$$

x = 3.4 c

3.4 cups of concentrate

Water = Total # - Concentrate

Water = 12 - 3.4

Water = 8.6

Fruit Juice Recipe
2 cups pineapple juice
3 cups cranberry juice
5 cups apple juice

You need to make only 4 cups of juice for a taste test. How much of each ingredient will you need?

Batch Total

# of pineapple =
# of cranberry =
# of apple =

Total # =

Fruit Juice Recipe
2 cups pineapple juice
3 cups cranberry juice
5 cups apple juice

You need to make only 4 cups of juice for a taste test. How much of each ingredient will you need?

Batch Total

# of pineapple =
# of cranberry =
# of apple =

Total # =

Total Ratio

Let x =

=

=

=

Total Ratio

Let y =

=

=

=

Apple =

=

cups of apple

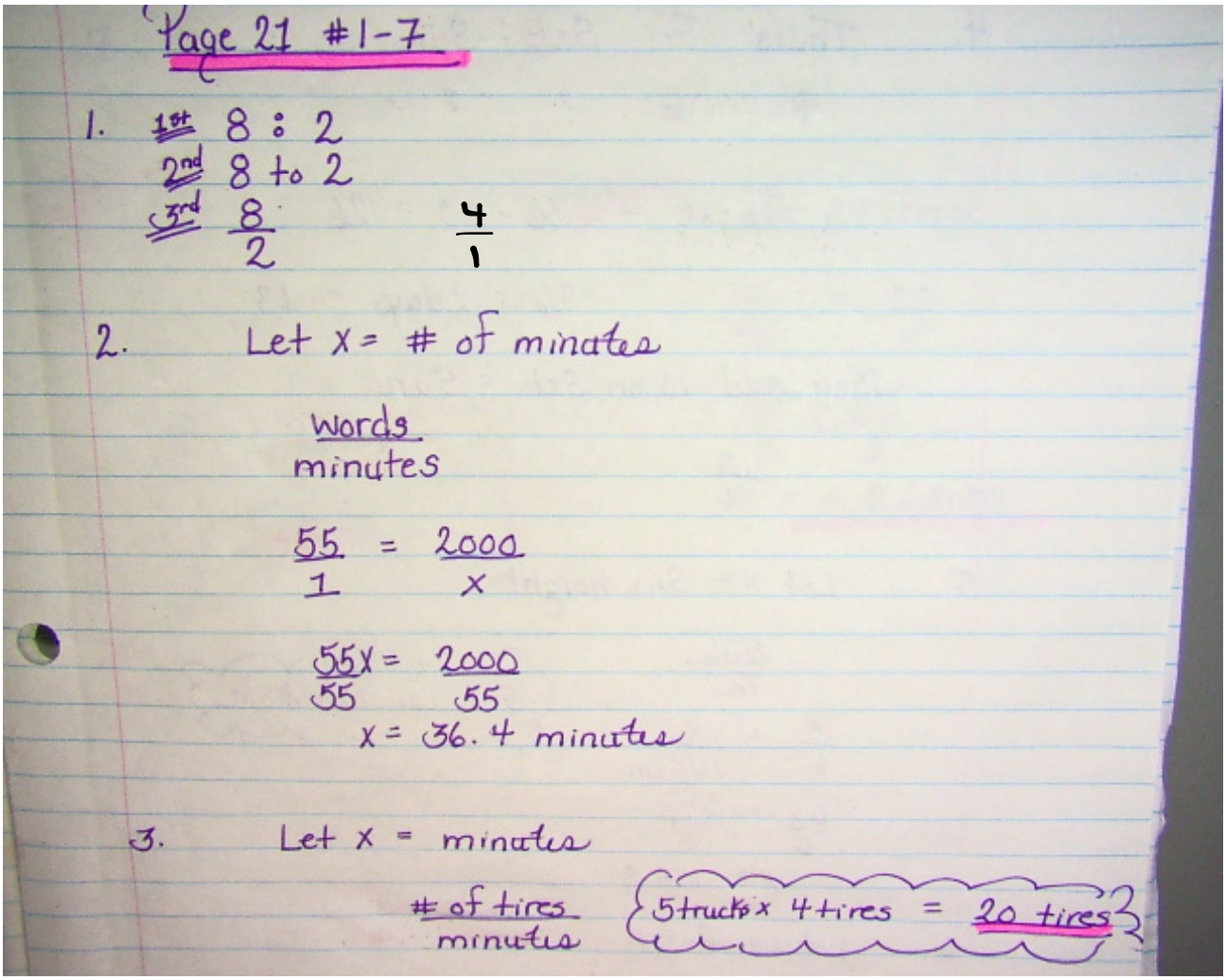
① Let x = time (mins)

$\frac{\text{words}}{\text{time}}$

rate $\frac{105}{1} = \frac{3200}{x}$

$\frac{105x}{105} = \frac{3200}{105}$

$x = 30.5$ mins



Page 21 #1-7

1. 1st 8 : 2
   2nd 8 to 2
   3rd $\frac{8}{2}$ $\frac{4}{1}$

2. Let x = # of minutes

   $\frac{\text{words}}{\text{minutes}}$

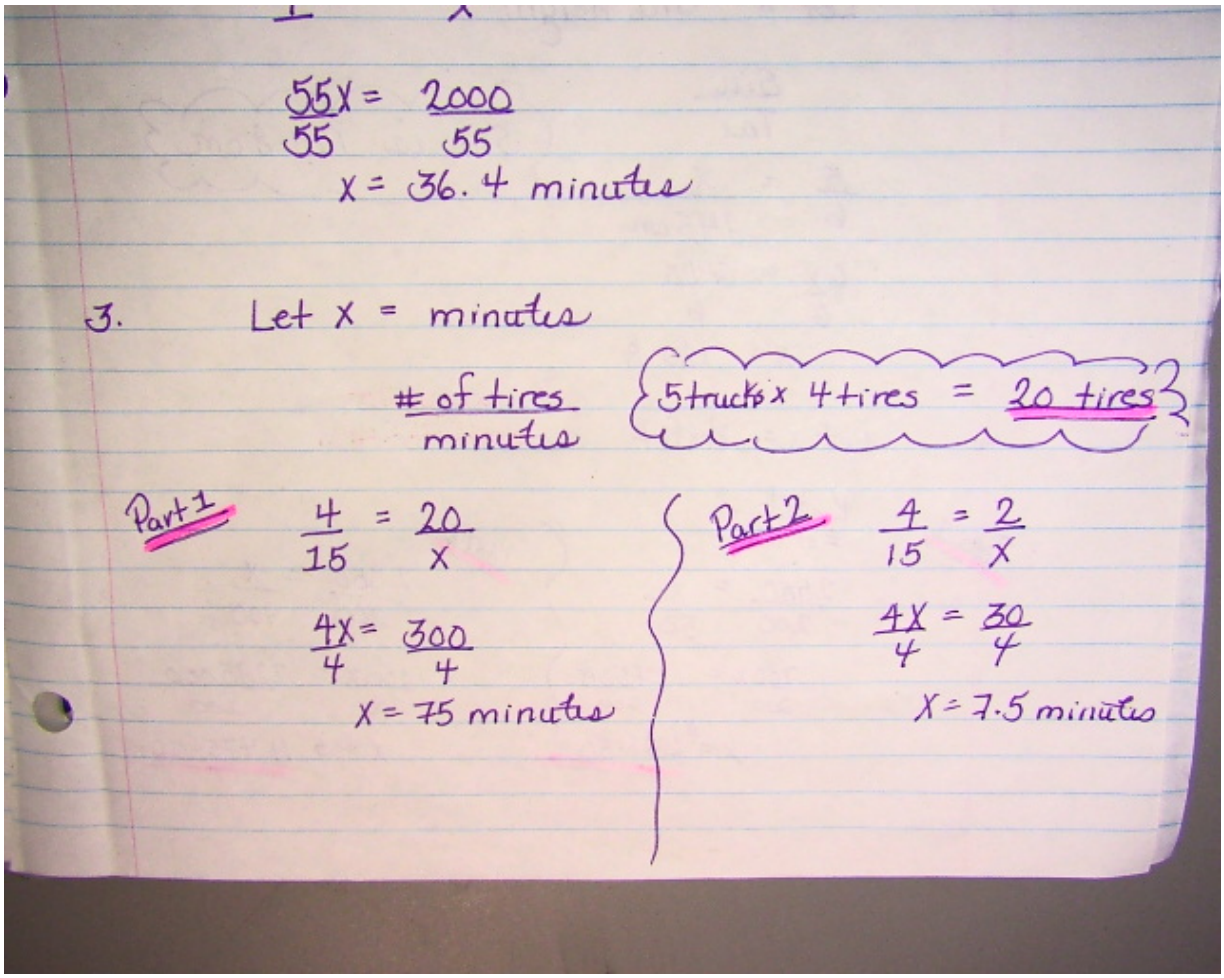
   $\frac{55}{1} = \frac{2000}{x}$

   $\frac{55x}{55} = \frac{2000}{55}$

   $x = 36.4$ minutes

3. Let x = minutes

   $\frac{\text{\# of tires}}{\text{minutes}}$ {5 trucks x 4 tires = 20 tires}



$\frac{55x}{55} = \frac{2000}{55}$

$x = 36.4$ minutes

3. Let x = minutes

$\frac{\#\text{ of tires}}{\text{minutes}}$ {5 trucks x 4 tires = 20 tires}

Part 1

$\frac{4}{15} = \frac{20}{x}$

$\frac{4x}{4} = \frac{300}{4}$

$x = 75$ minutes

Part 2

$\frac{4}{15} = \frac{2}{x}$

$\frac{4x}{4} = \frac{30}{4}$

$x = 7.5$ minutes

4. Thurs Fri Sat Sun

4 6 ? ?

Total = 36 - 10 = 26

26 ÷ 2days = 13

They sold 13 on Sat & Sun.

$\frac{13}{36}$

5. Let X = Siu height

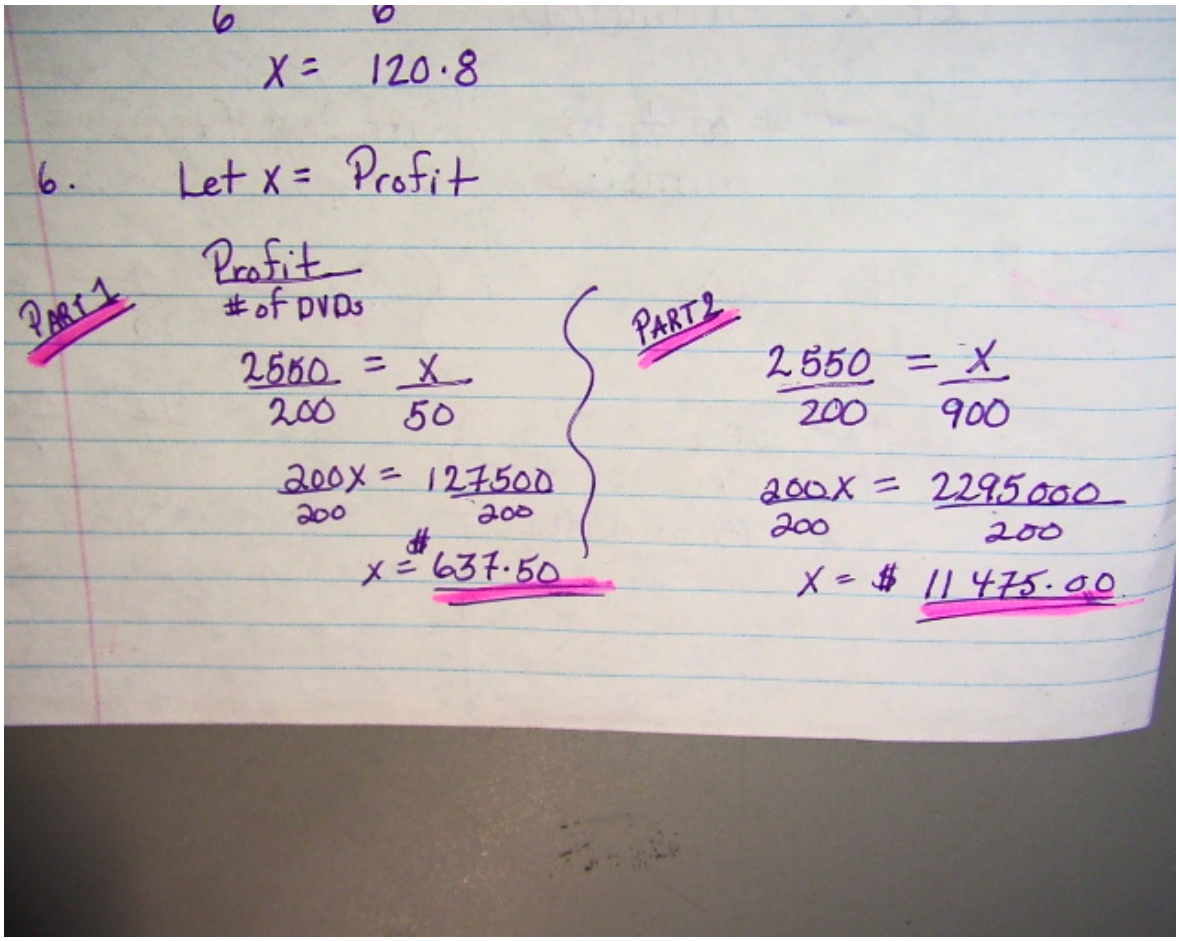
$\frac{\text{Siu}}{\text{Tai}}$

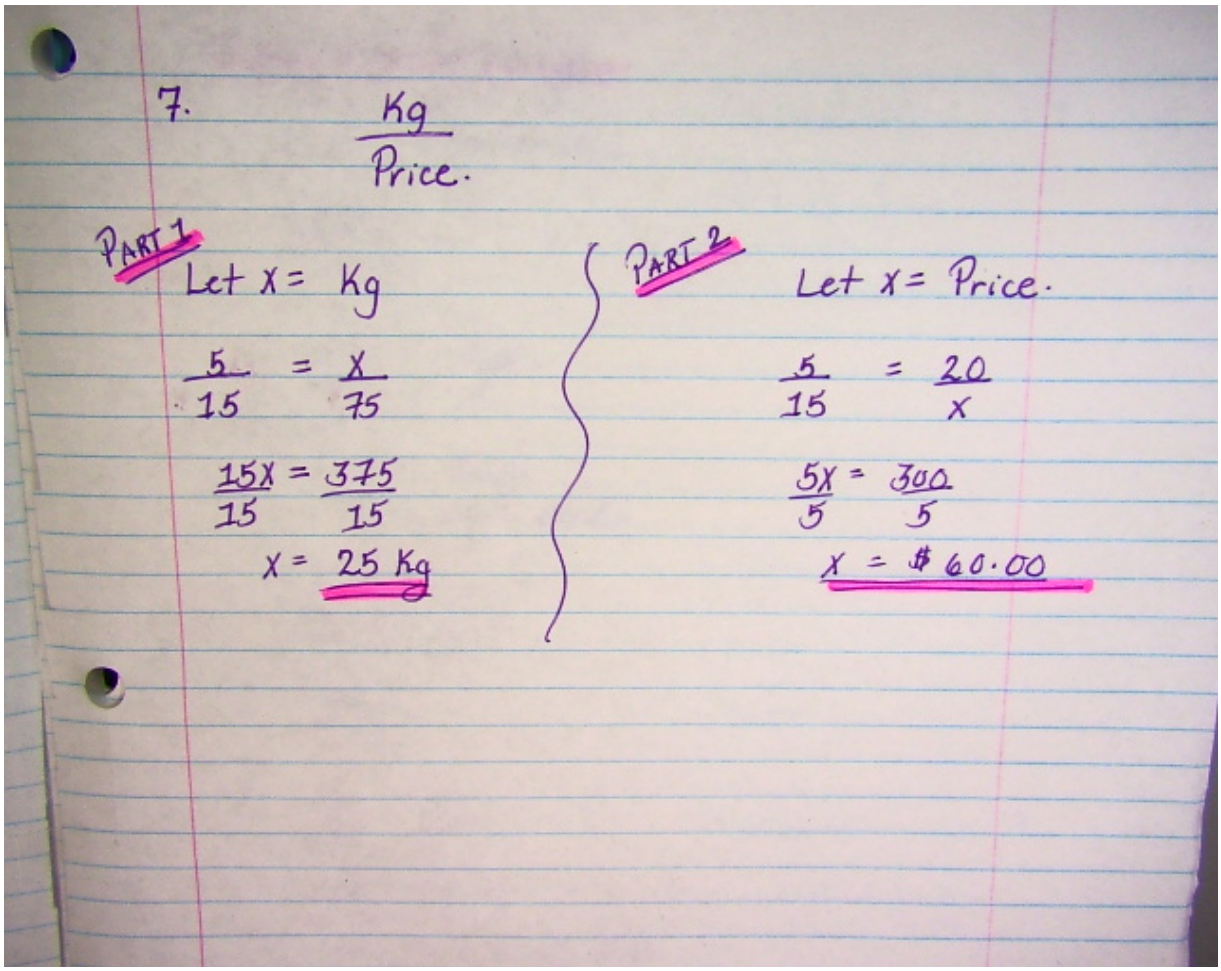
$\frac{5}{6} = \frac{x}{145\text{ cm}}$

$\frac{6x}{6} = \frac{725}{6}$

$x = 120.8$

Siu is 120.8 cm


6 6
X = 120.8
6. Let X = Profit
Profit
# of DVDs
PART 1
2550/200 = X/50
200X/200 = 127500/200
X = $637.50
PART 2
2550/200 = X/900
200X/200 = 2295000/200
X = $11475.00


7.
Kg
Price.
PART 1
Let x = Kg
5/15 = x/75
15x/15 = 375/15
x = 25 Kg
PART 2
Let x = Price.
5/15 = 20/x
5x/5 = 300/5
x = $60.00