Formative Assessments
Proportional Reasoning Cluster
Assessment One

Cluster & Content Standards *What content standards can be addressed by this formative assessment?* Ratio and Proportional Reasoning NC. 7. RP. 2 Recognize and represent proportional relationships between quantities. 1. Understand that a proportion is a relationship of equality between ratios. • Represent proportional relationships using tables and graphs. • ~~Recognize whether ratios are in a proportional relationship using tables and graphs~~.	**Mathematical Practice Standards** *What practice standards can be addressed by this formative assessment?* MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP7 Look for and make use of structure.
Learning Targets *What learning targets will be assessed?* Unit Rates Recognizing and representing proportional relationships	
Timing: During Instruction	

ASSESSMENT ONE

1. A can of concentrated fruit punch includes instructions “Mix one can of concentrate with 3 cans of cold water.”

   Find the missing value in each situation below. Provide evidence for your answers.

6 cans of concentrate : _____ cans of water	24 cans of water : _____ cans of concentrate
$3\frac{1}{2}$ cans of concentrate : _____ cans of water	10 cans of concentrate : _____cans of fruit punch

2. Jim is a member of the student council and is in charge of the “Welcome Back to School” dance. Jim wanted to figure out how many cans of concentrate he would need if he was responsible for beverages at the 7th grade “Welcome Back to School” dance. He knew that the coolers he planned to use could hold 144 cups of “stuff” (1 cup of water = 1 can of water). He used the following strategy to figure out how many cans of concentrate he needed. Jamie was also on this committee, but she used a similar strategy but came up with a different amount of concentrate needed. Who do you agree with? Explain why you agree with this person.

Jim
I wrote a series of equivalent fractions using a ratio table

Cans of concentrate	1	2	4	48
Cans of water	3	6	12	144

Jim says that 48 cans of concentrate are needed for the punch at the dance.

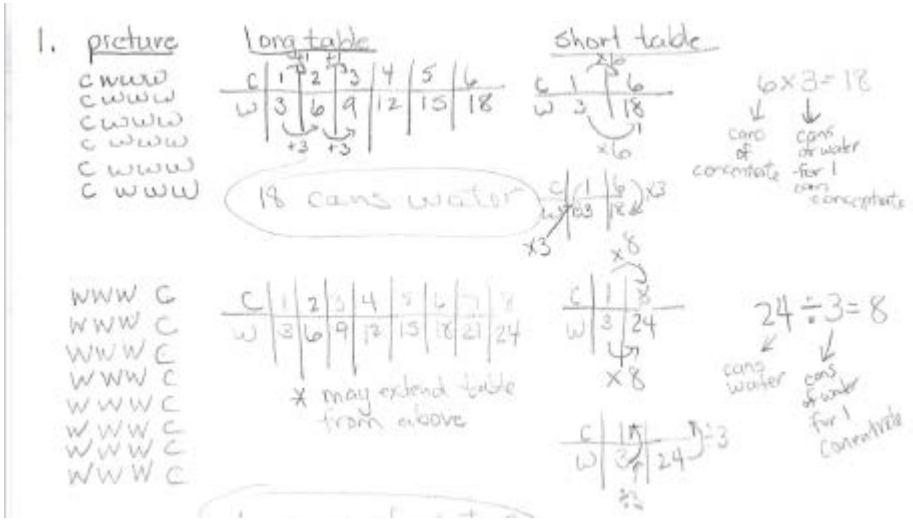
Jamie
I also wrote a series of fractions using a ratio table

Cans of concentrate	1	3	36
Cans of “stuff”	4	12	144

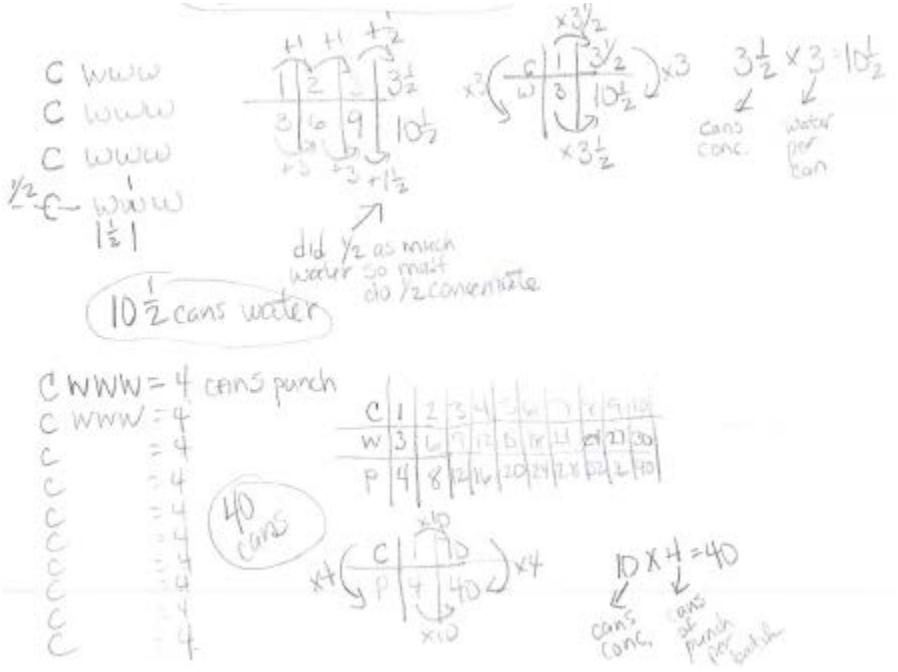
Jamie says that the committee needs to buy 36 cans of concentrate for the dance.

Think of an alternate way to help Jim and Jamie to figure out how many cans of concentrate they need to buy for the dance.

Anticipated Student Reasoning



8 cans



2. Jim is a member of the student council and is in charge of the "Welcome Back to School" dance. Jim wanted to figure out how many cans of concentrate he would need if he was responsible for beverages at the 7th grade "Welcome Back to School" dance. He knew that the coolers he planned to use could hold 144 cups of "stuff" (1 cup of water = 1 can of water). He used the following strategy to figure out how many cans of concentrate he needed. Jamie was also on this committee, but she used a similar strategy but came up with a different amount of concentrate needed. Who do you agree with? Explain why you agree with this person. Though both Jim and Jamie's strategies are mathematically sound I agree with Jamie because the cooler can only hold 144 cups. When Jaime gets 144 he has 144 cups of water and he would need to add the two

Jim

I wrote a series of equivalent fractions using a ratio table

Cans of concentrate	1	2	4	48
Cans of water	3	6	12	144

×4

Jim says that 48 cans of concentrate are needed for the punch at the dance.

Jamie ~~48+144 = 192 cups~~

I also wrote a series of fractions using a ratio table

Cans of concentrate	1	3	36
Cans of "stuff"	4	12	144

×3

Jamie says that the committee needs to buy 36 cans of concentrate for the dance.

Think of an alternate way to help Jim and Jamie to figure out how many cans of concentrate they need to buy for the dance.

Can use a proportion

$\frac{1}{4} = \frac{x}{144}$ or $\frac{1}{3} = \frac{x}{144-x}$

Draw & Extend a pic

CWWW] 2 cups concentrate
CWWW] 6 cups of water

You would need 18 of these pictures

$2(18) = 36$
$6(18) = 108$
144

Formative Assessments
Proportional Reasoning Cluster
Assessment Two

Cluster & Content Standards *What content standards can be addressed by this formative assessment?* Ratios and Proportional Reasoning NC. 7. RP.1 Compute unit rates associated with ratios of fractions to solve real-world and mathematical problems. NC. 7. RP. 2 Recognize and represent proportional relationships between quantities. 1. Understand that a proportion is a relationship of equality between ratios. • Represent proportional relationships using tables and graphs. • Recognize whether ratios are in a proportional relationship using tables and graphs. • ~~Compare two different proportional relationships using tables, graphs, equations, and verbal descriptions.~~ o ~~Identify the unit rate (constant of proportionality) within two quantities in a proportional relationship using tables, graphs, equations, and verbal descriptions.~~ o ~~Create equations and graphs to represent proportional relationships.~~ o ~~Use a graphical representation of a proportional relationship in context to:~~ • Explain the meaning of any point (x, y). • ~~Explain the meaning of (0, 0) and why it is included.~~ • ~~Understand that the y-coordinate of the ordered pair (1, r) corresponds to the unit rate and explain its meaning.~~	**Mathematical Practice Standards** *What practice standards can be addressed by this formative assessment?* MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics.
Learning Targets *What learning targets will be assessed?* Recognizing and representing proportional relationships Representing and recognizing proportional relationships in tables Representing and recognizing proportional relationships in graphs	
Timing: During Instruction	

ASSESSMENT TWO

1. Write your own word problem that must be solved using ratios and proportions.

2. Create a table of values and a graph that models your "real-world" situation.

3. Pick one of your points in your table of values and explain its meaning in the context of your situation.

4. Explain how you know that your situation is proportional?

Anticipated Responses/Strategies:

ASSESSMENT

Generate a "real-world" situation that is proportional.

Jill earns $7.50 per hour at Chick-Fil-A.

Create a table of values and a graph that models your "real-world" situation.

hours	$
1	7.50
2	15.00
3	22.50
4	30.00

Pick one of your points in your table of values and explain it's meaning in the context of your situation.

(2, 15) if Jill works 2 hours she will earn $15.00

Explain how you know that your situation is proportional?

I can always take the # of hours time 7.50 to get Jill's earnings.
Also at 0 hours Jill earns 0 dollars.

Formative Assessments
Proportional Reasoning Cluster
Assessment Three

Cluster & Content Standards
What content standards can be addressed by this formative assessment?
Ratios and Proportional Reasoning
NC. 7. RP.1 Compute unit rates associated with ratios of fractions to solve real-world and mathematical problems.

NC. 7. RP. 2 Recognize and represent proportional relationships between quantities.
1. Understand that a proportion is a relationship of equality between ratios.
- Represent proportional relationships using tables and graphs.
- Recognize whether ratios are in a proportional relationship using tables and graphs.
- ~~Compare two different proportional relationships using tables, graphs, equations, and verbal descriptions.~~
  - ~~Identify the unit rate (constant of proportionality) within two quantities in a proportional relationship using tables, graphs, equations, and verbal descriptions.~~
  - ~~Create equations and graphs to represent proportional relationships.~~
  - ~~Use a graphical representation of a proportional relationship in context to:~~

- Explain the meaning of any point (x, y).
- Explain the meaning of (0, 0) and why it is included.
- Understand that the y-coordinate of the ordered pair (1, r) corresponds to the unit rate and explain its meaning.

Mathematical Practice Standards
What practice standards can be addressed by this formative assessment?

MP1 Make sense of problems and persevere in solving them.

MP2 Reason abstractly and quantitatively.

MP3 Construct viable arguments and critique the reasoning of others.

MP4 Model with mathematics.

MP6 Attend to precision.

Learning Targets
What learning targets will be assessed?
Unit Rates
Constants of Proportionality
Identify proportional relationships within tables, graphs, and equations.

Timing: During Instruction

ASSESSMENT THREE

1. A local market sells 4 tomatoes for $3.20.
   a. Complete the table below.

number of tomatoes (*t*)	1	2	3	4	5
Cost (*C*)					

b. How much would it cost you to buy 100 tomatoes? Explain how you arrived at your answer.

c. How many tomatoes could you buy for $12? Explain how you arrived at your answer.

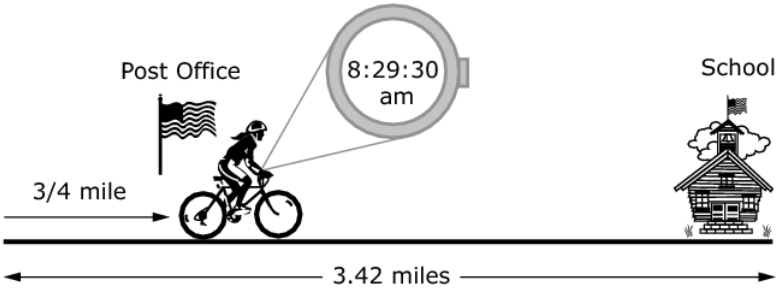
d. Sketch and describe a graph of what your data would look like. Name a point on your graph and describe that points meaning in the context of this situation.

e. What is the constant of proportionality? Explain how you know?

f. Write an equation that relates the number of tomatoes, ***t***, to the cost, ***C***.

Problem #2

Emily leaves her house at exactly 8:25 am to bike to her school, which is 3.42 miles away. While she passes the post office, which is $^3/_4$ of a mile away from her home, she looks at her watch and sees it is 30 seconds past 8:29 am.



If Emily's school starts at 8:50 am, can Emily make it to school on time without increasing her rate of speed? Show and/or explain the work necessary to support your answer.

Problem #2 taken from SBAC Mathematics Practice Test item #3286

Anticipated Responses/Strategies:

ASSESSMENT

* students may not read carefully and do ...

1	2	3
3.20	6.40	9.60 ...

A local market sells 4 tomatoes for $3.20.

- Complete the table below.

Number of tomatoes	1	2	3	4	5
Cost ($)	.80	1.60	2.40	3.20	4.00

- How much would it cost you to buy 100 tomatoes? Explain how you arrived at your answer.

1	100
.80	80

.80 ... .80

each tom = $.80

100 × .80 = $80

total bought ... cost for 1

1	100
.80	

x100 ... x100

I'd need to do this 100 times

- How many tomatoes could you buy for $12? Explain how you arrived at your answer.

5	15
4.00	12.00

x3 ... x3

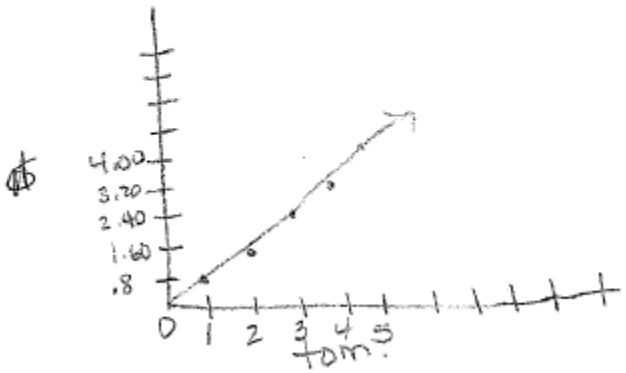
* extend table

5	6	7
4	4.80	5.60

+.8 +.8

4.00 - 5
4.00 - 5
4.00 - 5
$12 15 tomatoes

- Sketch and describe a graph of what your data would look like. Name a point on your graph and describe that point's meaning in the context of this situation.



(2, 1.60)
2 tomatoes cost $1.60

- What is the constant of proportionality? Explain how you know.

  # .80 every tomato cost 80¢ I can multiply the # of tomatoes by .8 and always get the correct total

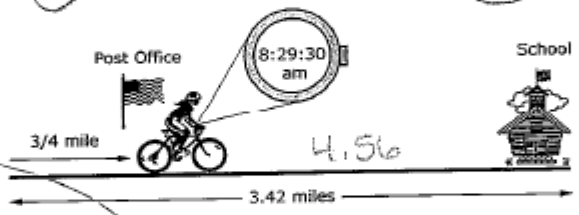
- Write an equation that relates the number of tomatoes, ***t***, to the cost, **C**.

  C = .8t

Problem #2

Emily leaves her house at exactly 8:25 am to bike to her school, which is 3.42 miles away. While she passes the post office which is $\frac{3}{4}$ of a mile away from her home. She looks at her watch and sees that is 30 seconds past 8:29 am.

8:25 to 8:50 is 25 minutes this indicates it should take about 21 minutes



If Emily's school starts at 8:50 am, can Emily make it to school on time without increasing her rate of speed? Show and/or explain the work necessary to support your answer.

time (min)	4½	÷3 → 1.5	×4 → 6	×3.42 → 20.52
distance (mi)	.75	.25	1	3.42
		÷3	×4	×3.42

1 mile in 6 minutes

20.52 minutes to get there

time left

20.52 − 4.5 = 16.02

8:29:30 to 8:50: 20 min and 30 sec

so yes!

Problem #2 taken from SBAC Mathematics Practice Test item #3286

Formative Assessments
Proportional Reasoning Cluster
Assessment Four

Cluster & Content Standards *What content standards can be addressed by this formative assessment?* Ratios and Proportional Reasoning NC. 7. RP.1 Compute unit rates associated with ratios of fractions to solve real-world and mathematical problems. NC. 7. RP. 2 Recognize and represent proportional relationships between quantities. 1. Understand that a proportion is a relationship of equality between ratios. • ~~Represent proportional relationships using tables and graphs.~~ • ~~Recognize whether ratios are in a proportional relationship using tables and graphs.~~ • Compare two different proportional relationships using tables, graphs, equations, and verbal descriptions. o Identify the unit rate (constant of proportionality) within two quantities in a proportional relationship using tables, graphs, equations, and verbal descriptions. o Create equations and graphs to represent proportional relationships. o Use a graphical representation of a proportional relationship in context to: • ~~Explain the meaning of any point (x, y).~~ • ~~Explain the meaning of (0, 0) and why it is included.~~ • ~~Understand that the y-coordinate of the ordered pair (1, r) corresponds to the unit rate and explain its meaning~~.	**Mathematical Practice Standards** *What practice standards can be addressed by this formative assessment?* MP1 Make sense of problems and persevere in solving them. MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP6 Attend to Precision MP7 Look for and make use of structure.
Learning Targets *What learning targets will be assessed?* Unit Rates Proportional relationships in tables, graphs, and equations	
Timing: During Instruction	

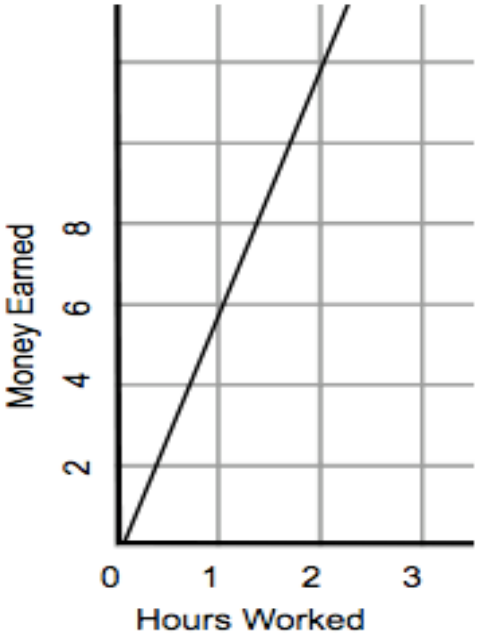
Assessment Four

Jimmy, Elvis, and Ricky all have after-school jobs at a local-fast food restaurant. They each have the money they earned last week.

Jimmy

Number of hours worked	Money earned
1.5 hours	$11.25
3.5 hours	$26.25
5 hours	$37.50

Elvis



Ricky

Ricky makes $7 per hour.

1. Who makes more money for working 8 hours? Explain or show your work.

2. Draw a graph that represents the money (***y***) Ricky would earn for working ***x*** hours. On the same axes, draw a graph that represents the money Jimmy would earn for working ***x*** hours. Compare the graphs of Jimmy and Ricky. Can you tell who makes the most money JUST by looking at the graphs? Explain your answer.

3. Write an equation showing the amount of money EACH PERSON would earn, ***y***, for working ***x*** hours. From looking at the equations, explain how you know who makes the most money for working the same amount of hours.

Anticipated Responses/Strategies:

Assessment

Jimmy, Elvis, and Ricky all have after-school jobs at a local-fast food restaurant. They each have the money they earned l
week.

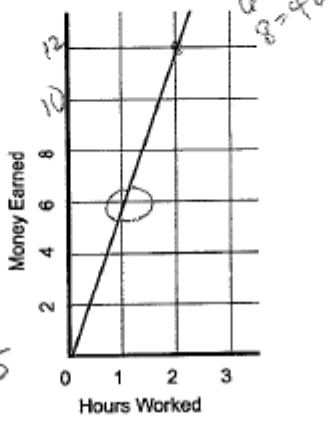
2 hrs = 15
1 hr = 7.50

Jimmy

Number of hours worked	Money earned
1.5 hours	$11.25
3.5 hours	$26.25
5 hours	$37.50

+2 +15 +11.25 +11.25 +11.25
+1/2 +1/2 +1/2
1 1/2 6 1/2 8
48.75 60

Elvis



2 = 12
4 = 24
6 = 36
8 = 48

about at 6 per hour
6 x 8 = 48

Ricky

Ricky know that he makes $7.00 per hour.

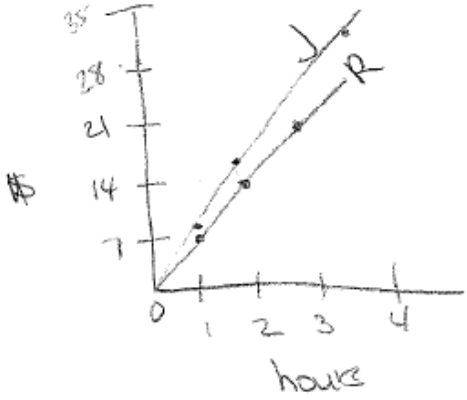
7 X 8 = 56

- Who makes more money for working 8 hours? Explain or show your work.

* could extend table and graph
* could find unit rate

Jimmy

- Draw a graph that represents **y**, the money Ricky would earn for working **x** hours, if he makes the same hourly rate.



- On the same coordinate plane, draw a graph that represents **y**, the money Jimmy would earn for working **x** hours, if he makes the same hourly rate.

- Compare the graphs of Jimmy and Ricky. Can you tell who makes the most money by looking at the graphs? Explain your answer.

Jimmy makes more because I can see his line is always higher than Ricky's

- Write an equation showing the amount of money each would earn, **y**, for working **x** hours. From looking at the equations, explain how you know who makes the most money for working the same amount of hours.

Jimmy $y = 7.50x$

Ricky $y = 7x$

the amount per hour for Jimmy is more. So if I plugged in 10 hrs, Jimmy would make $75 and Ricky only $70

Formative Assessments
Proportional Reasoning Cluster
Assessment Five

Cluster & Content Standards *What content standards can be addressed by this formative assessment?* Ratios and Proportional Reasoning NC.7.RP.3 Use scale factors and unit rates in proportional relationships to solve ratio and percent problems.	**Mathematical Practice Standards** *What practice standards can be addressed by this formative assessment?* MP2 Reason abstractly and quantitatively. MP3 Construct viable arguments and critique the reasoning of others. MP4 Model with mathematics. MP6 Attend to precision.
Learning Targets *What learning targets will be assessed?* Unit Rates Percents (discounts, sales tax, and commission)	
Timing: During Instruction	

Assessment Five

Question #1

Jimmy bought a $29 meal. He knows that sales tax in his state is 5%. Jimmy knows that sales tax can be calculated several different ways, which are listed below. Which of Jimmy's methods is correct? Please give evidence for supporting why these methods are correct.

Method 1

5% sales tax means for every dollar you spend, you are charged five cents ($0.05) sales tax. Since I am buying a meal that cost $29, I should be charged five cents 29 times. So cents, so my sales tax is $1.45.

Method 2

I could set up a proportion

$$\frac{\$0.05}{\$1.00} = \frac{x}{\$29.00}$$

All I need to do is solve for the missing value, x.

Method 3

I know that 10% of 29 is $2.90. Since 5% is half of 10%, the sales tax should be half of $2.90

Method 4

1% of 29 is $0.29, so 5% would be 5 times $0.29.

Method 5

I know that 5% = , so 5% of $29 is .

Of the correct methods, which one makes the most sense to you? Explain your choice.

Question #2

Jimmy purchased three video games for his X-box. The video games all cost the same amount. He paid 8% sales tax. He could see on receipt that $9.36 was added to his purchase. What was the cost of 1 video game, not including tax? Show your work below.

Question #3

Alfonso went to Sam's Famous Appliance Store and purchased a refrigerator and a stove. The sales price of the refrigerator was 40% off the original price and the sales price of the stove was 20% off the original price.

Which statement must be true to conclude that Alfonso received a 30% discount on the refrigerator and stove together? Explain why the statement is correct.

A. The sale prices of the refrigerator and the stove was the same.
B. The original prices of the refrigerator and the stove was the same.
C. The sale price of the refrigerator was twice the sale price of the stove.
D. The original price of the refrigerator was twice the original price of the stove.

Problem #2 taken from SBAC Mathematics Practice Test item #3635

Anticipated Responses/Strategies:

Method 1

$5\% = \frac{5}{100} = .05$

	× 29	
.05	1.45	
#	1	29

× 29

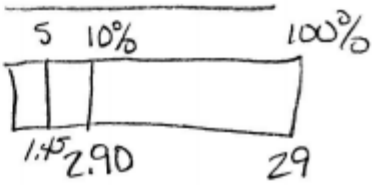
Method 2

$\frac{.05}{1.00} \overset{\times 29}{=} \frac{x}{29}$

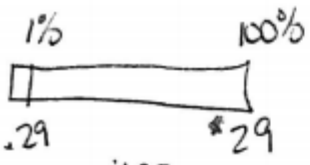
× 29

1.45

Method 3



Method 4



	÷100		× 5
%	100	1	5
#	29	.29	1.45

÷ 100 × 5

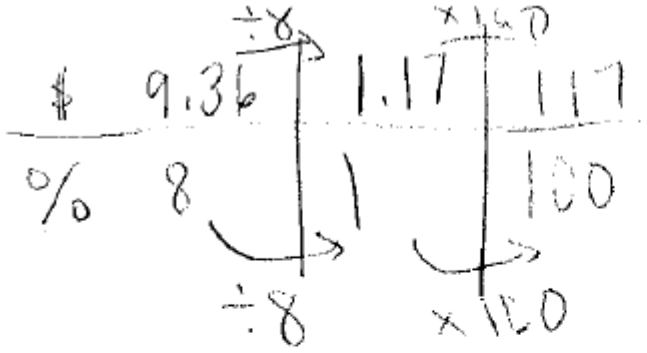
Method 5

$\frac{1}{20} \cdot \frac{29}{1} = \frac{29}{20} = \frac{145}{100} = 1.45$

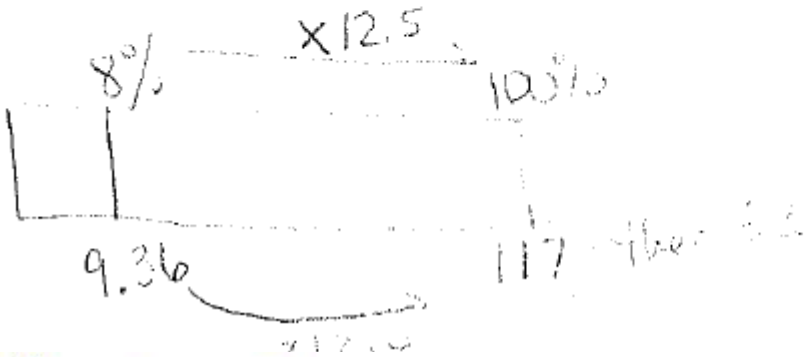
All are correct!

I like #4 best. I know when I find 1% I'm ÷100. That means I can move decimal 2 places left. Once I find 1% I can find any % by mult. what I got for 1% by the new %

#2



9.36 is 8%
1.17 is 1%
100% would be
117 ÷ 3 = $39



Question #3

Method #1 → Let the price of refrigerator be a set amount. I'll will use $100 in this case

S = discount (D)

A = Sales Prices are =

	Ref	Stove
S = sale price	S = .60(100)	S = $60
	S = $60	$\frac{60}{.80} = \frac{.80(x)}{.80}$

original price stove → $75 = x

Spends = 60 + 60 = $120

Is .70(100+75) $\stackrel{?}{=}$ 120

.70(175) $\stackrel{?}{=}$ 120

122.50 ≠ 120

Not part A

B. Original Prices =

Ref	Stove
S = .60(100)	S = .80(100)
S = $60	S = $80

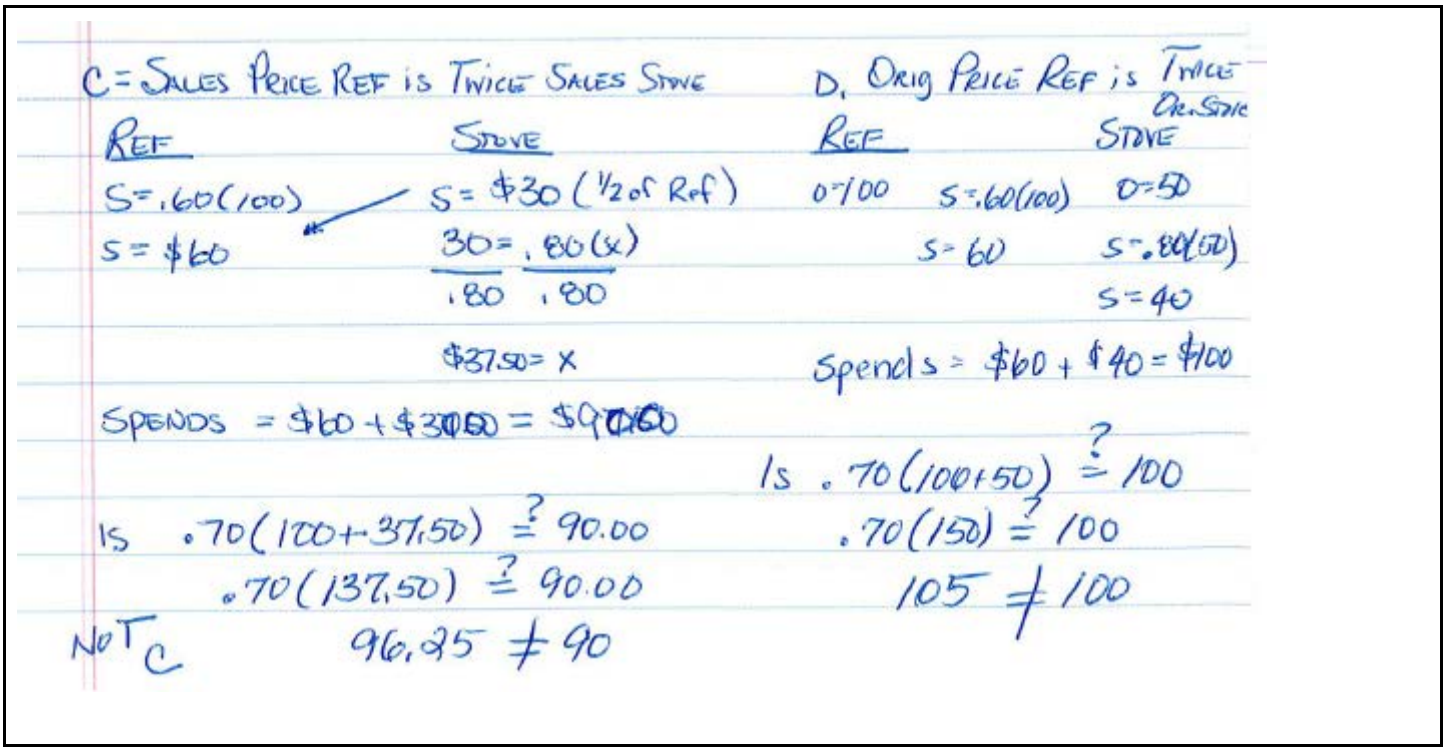
Spends = 60 + 80 = $140

Is .70(100+100) $\stackrel{?}{=}$ $140

.70(200) $\stackrel{?}{=}$ 140

140 = 140

Part B


C = Sales Price Ref is Twice Sales Stove
Ref
S = .60(100)
S = $60
Stove
S = $30 (½ of Ref)
30 = .80(x)
.80 .80
$37.50 = x
Spends = $60 + $37.50 = $97.50
Is .70(100+37.50) ? 90.00
.70(137.50) ? 90.00
96.25 ≠ 90
Not C
D. Orig Price Ref is Twice Or. Stove
Ref
0 = 100
S = .60(100)
S = 60
Stove
0 = 50
S = .80(50)
S = 40
Spends = $60 + $40 = $100
Is .70(100+50) ? 100
.70(150) ? 100
105 ≠ 100