

Shopping Spree



Institute Notes

Concept: Use number and fraction models to develop understanding of discount and sales price.

TEKS Focus: **6.1B**—The student is expected to select and use appropriate forms of rational numbers to solve real-life problems including those involving proportional relationships.

7.5A—The student is expected to use concrete models to solve equations and use symbols to record the actions; and

8.3B—The student is expected to estimate and find solutions to application problems involving percents and proportional relationships such as similarity and rates.

Overview: Participants will develop an understanding of discount and sales problems by finding solutions to percent decrease problems by: modeling with a number bar; modeling with fraction bars; writing and solving equations; and estimating.

Materials: 8-inch paper strips

- Procedure:**
1. Pose the opening problem: Compare the discount and sales price of a \$240 item at different rates.
 2. Hand out Activity 1. For exercise 1, model the first problem, $\frac{1}{2}$ of 240, by folding a strip in half and tearing it. Label each piece with 120. Then label the bars on the transparency.
 3. Participants should work through the problems folding their strips and tearing off the discount, labeling the remaining pieces. Have participants **share their solutions**.
 4. Connect the work with fraction bars to exercise 2. Work through the $\frac{1}{2}$ -off problem with them.

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5. Ask participants to complete parts b and c and present their results to the group.
6. For exercise 3, go back and write equations under each bar. Develop multiplying $\frac{1}{2}$ times 240 with the group. Show simplification:

$$\frac{1}{2} \cdot \overset{120}{240} = \text{salesprice}$$

1
2
1

7. Have participants write equations for the other problems and discuss the solutions.
8. Hand out Activity 2. Pose the problem: Suppose we have \$240. We want to know how much original price merchandise we can afford at $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$ off, ignoring sales tax.
9. Take a strip and tear it in half. Label it 240. Label the other 240 to show that you can afford a 480 item if the discount is $\frac{1}{2}$.
10. For the second problem, fold a strip in quarters. $\frac{3}{4}$ corresponds to 240, so label each piece 80. Add 80 to show 320 for the solution.
11. Have them do the third one in the first exercise and discuss as a group.
12. In exercise 2, model the first fraction bar with the group. Double the 240 to get 480. Have them do the others and discuss solutions.
13. Lay the foundation for the connection to the equation solution method in the following way. Look at the $\frac{1}{4}$ -off problem. $\frac{3}{4}$ of some number is 240. What did we do? We cut the three first pieces up into 80's and counted up another 80 to get 320. This is equivalent to dividing by 3 and multiplying by 4. Show solution equation .

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$$\frac{3}{4} \cdot n = 240$$

$$n = \frac{4}{3} \cdot 240$$

$$n = \frac{4}{3} \cdot 240 = 320.$$

Repeat with part c.

14. Assign Activity 3 and have the participants present their results.

Extensions: Describe how we can use the fractions models as a bridge to solving percent problems.

Assessment: Write a journal entry describing a method from moving students from concrete models to equation solving. Give examples.

Notes:

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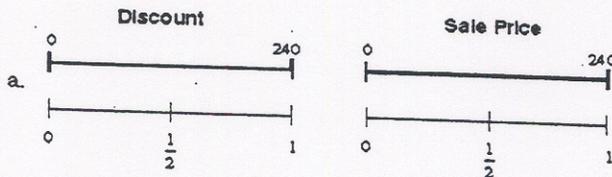
Activity 1

You are going to buy a new CD player. When you get to the store, they are having a sale where you scratch-off a card to determine your discount rate. Determine the discount and sale price for each discount rate if the original price was \$240.

1. Use the paper strips to find the discount and sale price.

Model	Discount	Sale Price
	$\frac{1}{2}$ off	
	$\frac{1}{4}$ off	
	$\frac{1}{3}$ off	

2. Use the bars to find the discount and sale price.



Reason and Communicate:

- How is the paper model similar to and different from the number line model?

Math Notes:

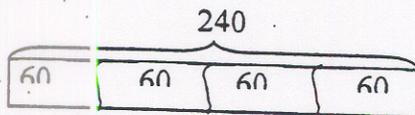
Referring to the sale price as the “percent on” is a nice complement to the percent off. This will help some people make connections easier.

On the first exercise, the spaces on the bars should be labeled. On the second exercise, the marks on the bars should be labeled.

Point out that when we use the number line model, we are finding both the discount and sale price from left to right. This helps us write the corresponding equations.

Answers:

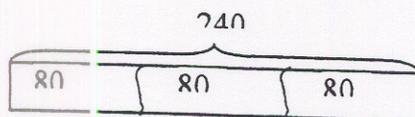
1b.



Discount = \$60

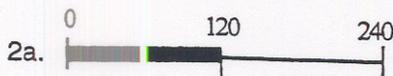
Sale Price = \$180

1c.

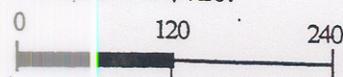


Discount = \$80

Sale Price = \$160



The discount is \$120.



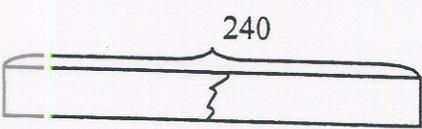
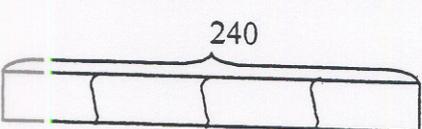
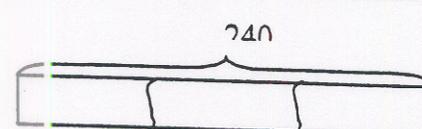
The sale price is \$120.

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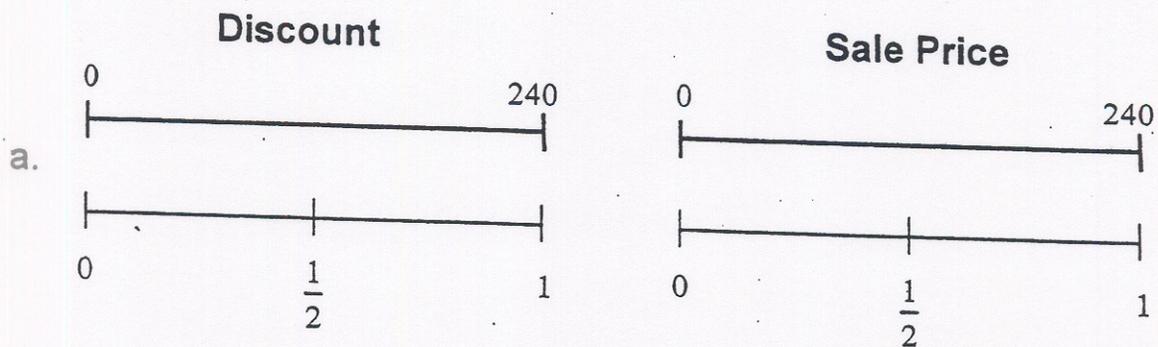
Activity 1

You are going to buy a new CD player. When you get to the store, they are having a sale where you scratch-off a card to determine your discount rate. Determine the discount and sale price for each discount rate if the original price was \$240.

1. Use the paper strips to find the discount and sale price.

Model	Discount	Sale Price
	$\frac{1}{2}$ off	
	$\frac{1}{4}$ off	
	$\frac{1}{3}$ off	

2. Use the bars to find the discount and sale price.

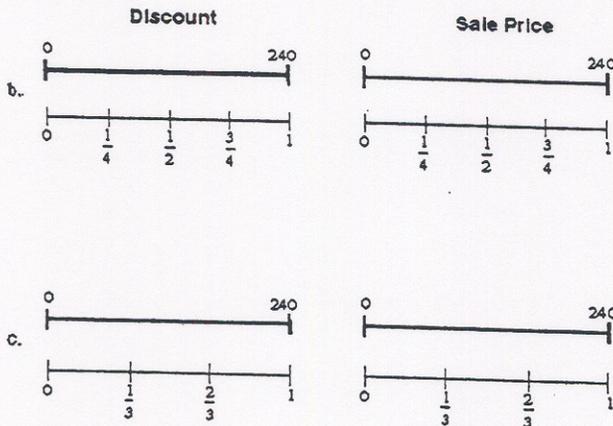


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Activity 1, cont.

Recall the problem is: You are going to buy a new CD player. When you get to the store, they are having a sale where you scratch-off a card to determine your discount rate. Determine the discount and sale price for each discount rate if the original price was \$240.

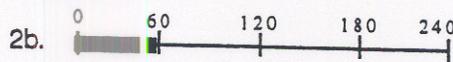


3. Write an equation for each problem and solve.

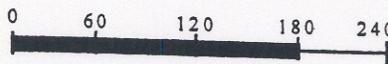
TEX EAMS Rethinking Middle School Mathematics: Numerical Reasoning
Summer 2001

Activity-117

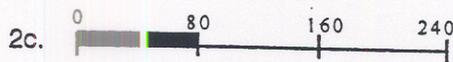
Answers:



The discount is \$60.



The sale price is \$180.



The discount is \$80.



The sale price is \$160.

3a. $\frac{1}{2} \cdot 240 = \text{discount}$

$120 = \text{discount}$

$\frac{1}{2} \cdot 240 = \text{saleprice}$

$\frac{1}{2} \cdot 240 = \text{saleprice} = 120$

3b. $\frac{1}{4} \cdot 240 = \text{discount}$

$60 = \text{discount}$

$\frac{3}{4} \cdot 240 = \text{saleprice}$

$\frac{3}{4} \cdot 240 = \text{saleprice} = 180$

Reason and Communicate:

- How can you use the bars to show how we multiply by fractions? e.g.,

For $\frac{1}{4}$ times 240, divide the bar into four pieces. Show the simplification. You divided the 240 into four equal pieces of 60 each. Count up three pieces to 180.

Math Notes:

2b. Divide the bar into four equal pieces and shade one for the discount amount and three for the sales price to lead into writing and solving equations.

Answers, cont:

$\frac{1}{3} \cdot 240 = \text{discount}$

3c. $80 = \text{discount}$

$\frac{2}{3} \cdot 240 = \text{saleprice}$

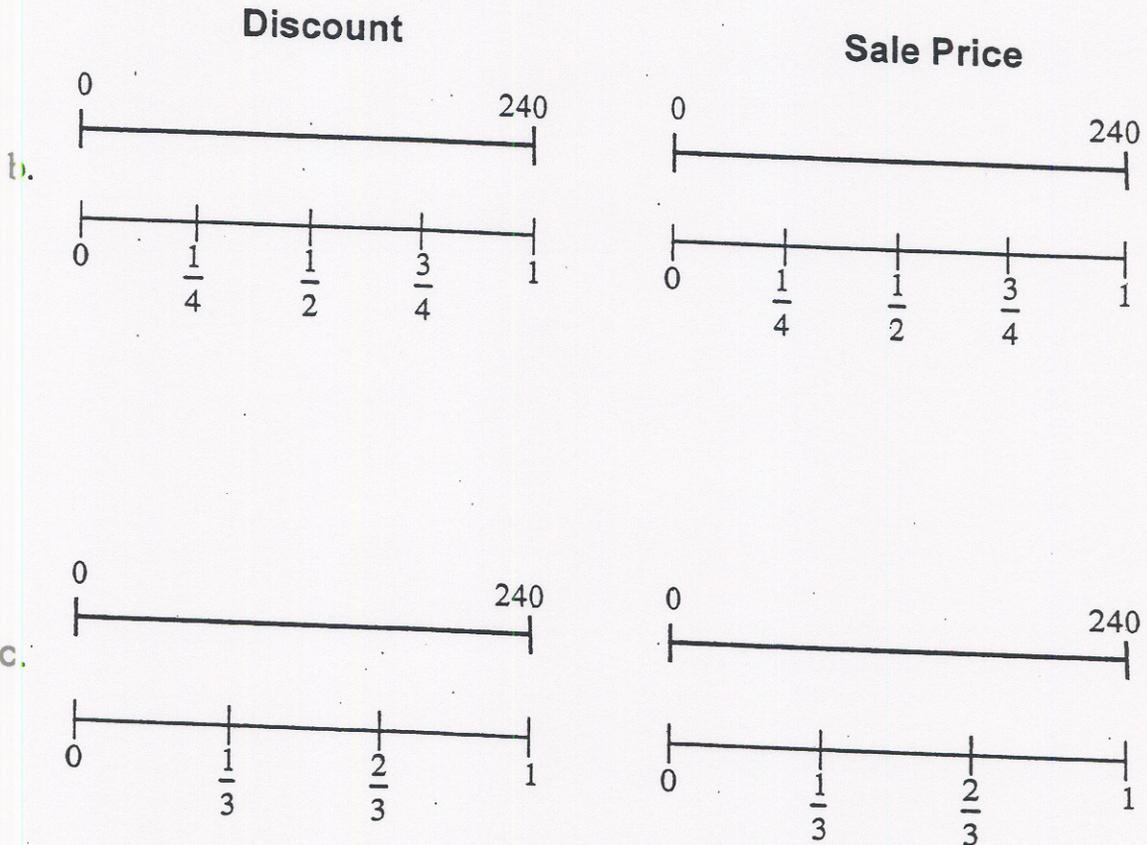
$\frac{2}{3} \cdot 240 = \text{saleprice}$

$160 = \text{saleprice}$

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Activity 1, cont.

Recall the problem is: You are going to buy a new CD player. When you get to the store, they are having a sale where you scratch-off a card to determine your discount rate. Determine the discount and sale price for each discount rate if the original price was \$240.



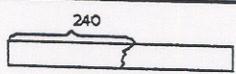
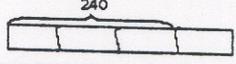
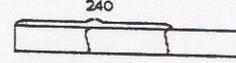
3. Write an equation for each problem and solve.

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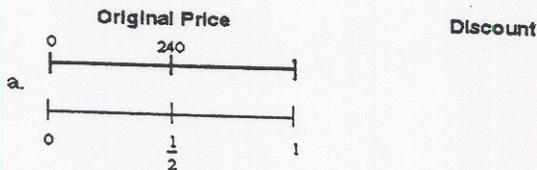
Shopping Spree Activity 2

You are going shopping and can afford to spend \$240. The Store is having a sale where you scratch-off a card to determine your discount rate. Determine the original price for each discount rate if the sale price is \$240. Disregard tax.

1. Use the paper strips to find the discount and the original price.

Model	Discount	Original Price
	$\frac{1}{2}$ off	
	$\frac{1}{4}$ off	
	$\frac{1}{3}$ off	

2. Use the bars to find the original price and the discount given the sale price of \$240.



Reason and Communicate:

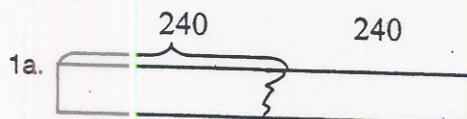
• How can you use the number line model to develop an equation solving strategy for these problems? *Note in 2b, for example, with the sale price at 240 and $\frac{1}{4}$ off, we divide the 240 into three equal pieces of 80 and count up 4×80 to get 320. This is exactly what we do when we multiply by the reciprocal $\frac{4}{3}$.*

• Explain how the reciprocal property is developed in 3c.

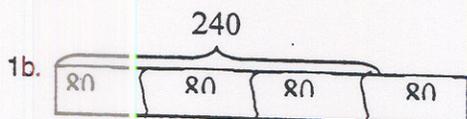
Math Notes:

Here we are undoing the operation from the previous activity. This sets us up to develop the reciprocal property for solving these simple equations. Make the connection between the paper model and the number line model.

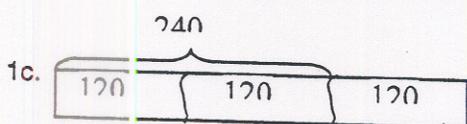
Answers:



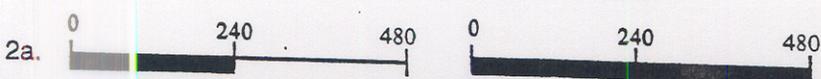
The discount is \$240 and the original price is \$480.



The discount is \$80 and the original price is \$320.



The discount is \$120 and the original price is \$360.



The discount is \$240 and the original price is \$480.

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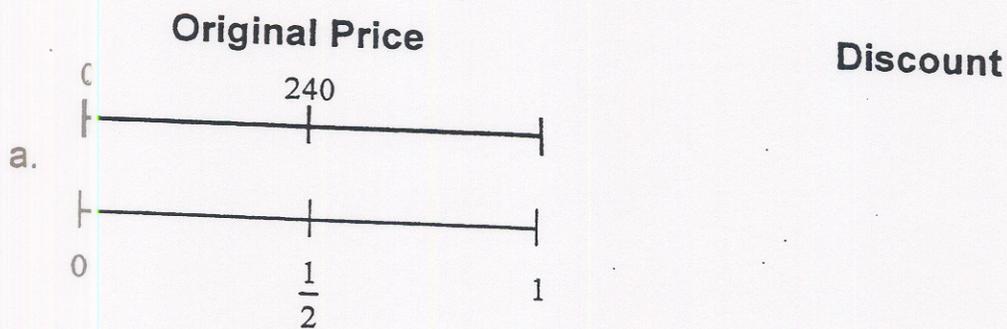
Activity 2

You are going shopping and can afford to spend \$240. The Store is having a sale where you scratch-off a card to determine your discount rate. Determine the original price for each discount rate if the sale price is \$240. Disregard tax.

- Use the paper strips to find the discount and the original price.

Model	Discount	Original Price
	$\frac{1}{2}$ off	
	$\frac{1}{4}$ off	
	$\frac{1}{3}$ off	

- Use the bars to find the original price and the discount given the sale price of \$240.

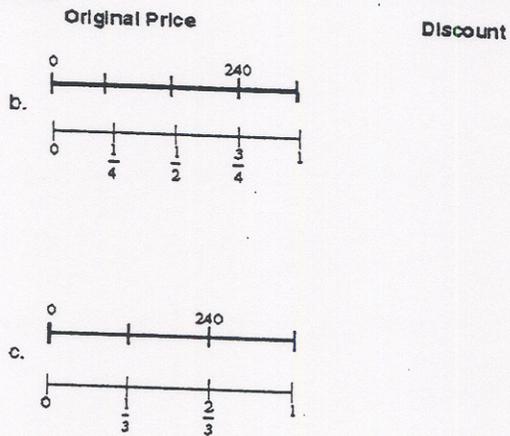


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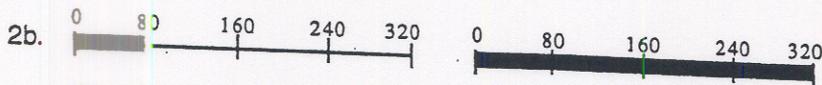
Activity 2, cont.

Recall the problem: You are going shopping and can afford to spend \$240. The Store is having a sale where you scratch-off a card to determine your discount rate. Determine the original price for each discount rate if the sale price is \$240. Disregard tax.

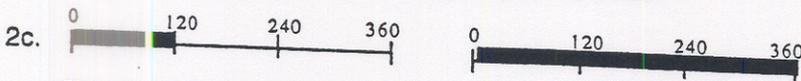


3. Write an equation for each problem and solve.

Answers:



The discount is \$80 and the original price is \$320.



The discount is \$120 and the original price is \$360.

3a. $\frac{1}{2} \cdot n = 240$
 $n = 240 \cdot 2$
 $n = 480$

3b. $\frac{3}{4} \cdot n = 240$
 $n = \frac{4}{3} \cdot 240$

3c. $\frac{2}{3} \cdot n = 240$

$$n = \frac{4}{3} \cdot 240 = 320$$

$$n = \frac{3}{2} \cdot 240$$

$$n = \frac{3}{2} \cdot 240 = 360$$

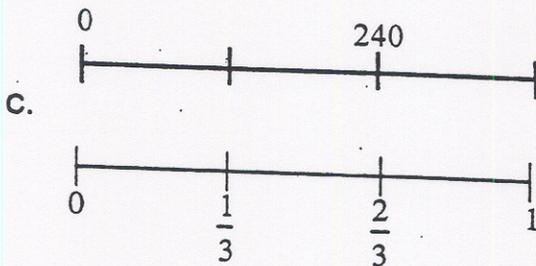
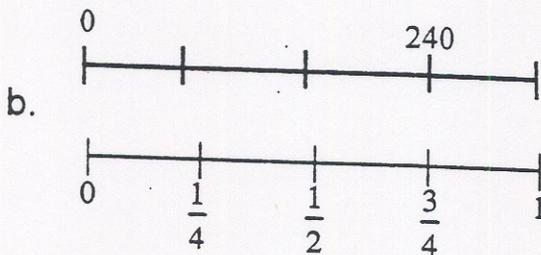
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Activity 2, cont.

Recall the problem: You are going shopping and can afford to spend \$240. The Store is having a sale where you scratch-off a card to determine your discount rate. Determine the original price for each discount rate if the sale price is \$240. Disregard tax.

Original Price

Discount



3. Write an equation for each problem and solve.

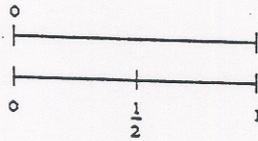
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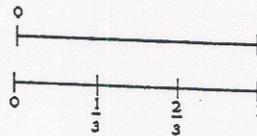
Activity 3

Use fraction bars and compatible numbers to estimate a solution. Then write an equation and solve.

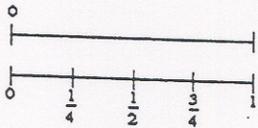
1. A DVD player that costs \$299.95 is offered at 50% off. What is the discount and sale price?



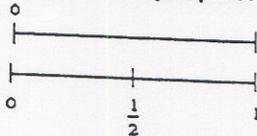
2. A TV / VCR combo that costs \$448.88 is offered at 33 1/3 % off. What is the discount and sale price?



3. A big screen TV that costs \$899 is offered at 25% off. What is the discount and sale price?



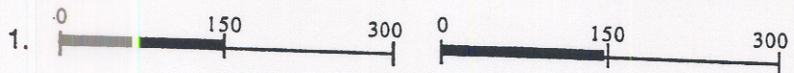
4. The discounted price of a new gadget is \$125. The discounted price is 50% off the original price. What was the original price?



Math Notes:

Look for the use of compatible numbers with estimation. Encourage participants to draw the bar picture for each problem as well.

Answers:

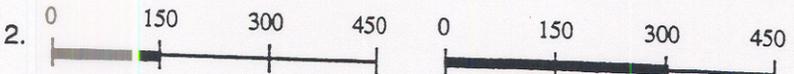


$$\frac{1}{2} \cdot 299.95 = \text{discount}$$

$$149.98 = \text{discount}$$

$$1 - \frac{1}{2} \cdot 299.95 = \text{salesprice}$$

$$149.98 = \text{salesprice}$$

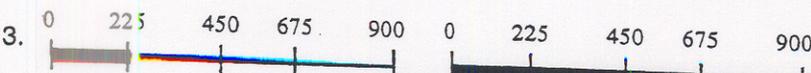


$$\frac{1}{3} \cdot 448.88 = \text{discount}$$

$$149.62 = \text{discount}$$

$$1 - \frac{1}{3} \cdot 448.88 = \text{salesprice}$$

$$299.23 = \text{salesprice}$$



$$\frac{1}{4} \cdot 899 = \text{discount}$$

$$224.75 = \text{discount}$$

$$1 - \frac{1}{4} \cdot 899 = \text{salesprice}$$

$$674.25 = \text{salesprice}$$

Answers, cont:



$$\frac{1}{2} \cdot n = 125$$

$$n = 125 \cdot 2$$

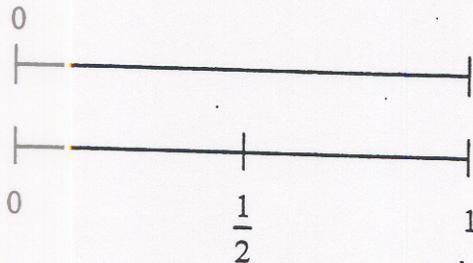
$$n = 250$$

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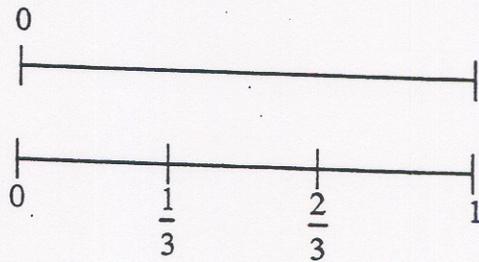
Activity 3

Use fraction bars and compatible numbers to estimate a solution. Then write an equation and solve.

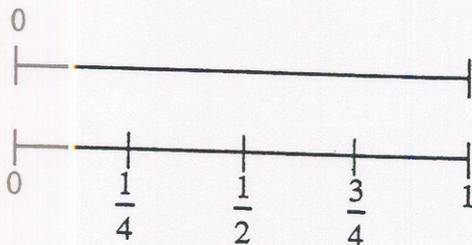
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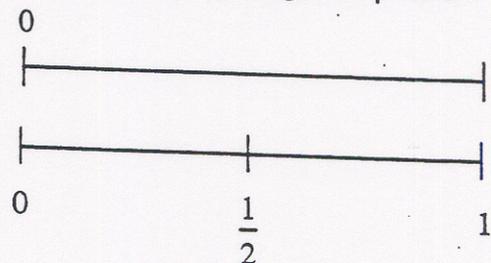
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3. A big screen TV that costs \$899 is offered at 25% off. What is the discount and sale price?



4. The discounted price of a new gadget is \$125. The discounted price is 50% off the original price. What was the original price?



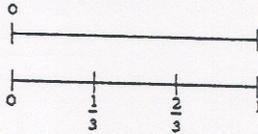
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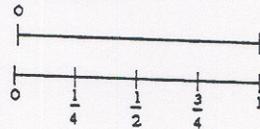
Activity 3, cont.

Use fraction bars and compatible numbers to estimate a solution. Then write an equation and solve.

5. The discounted price of a leather jacket is \$120. That is $33\frac{1}{3}\%$ off the original price. What was the original price?



6. The discounted price of a CD player is \$300. That is 25% off the original price. What was the original price?

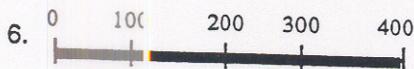


Math Notes:



$$\frac{2}{3} \cdot n = 120$$

$$n = 120 \cdot \frac{3}{2} = 180$$



$$\frac{3}{4} \cdot n = 300$$

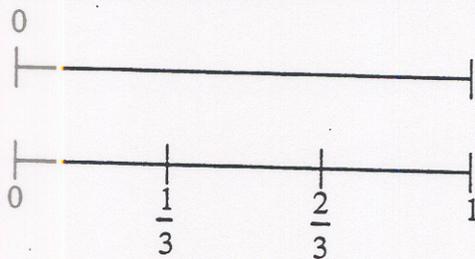
$$n = 300 \cdot \frac{4}{3} = 400$$

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Activity 3, cont.

Use fraction bars and compatible numbers to estimate a solution. Then write an equation and solve.

5. The discounted price of a leather jacket is \$120. That is $33\frac{1}{3}\%$ off the original price. What was the original price?



6. The discounted price of a CD player is \$300. That is 25% off the original price. What was the original price?

