Lesson 4-5
Solve Markup and Markdown Problems

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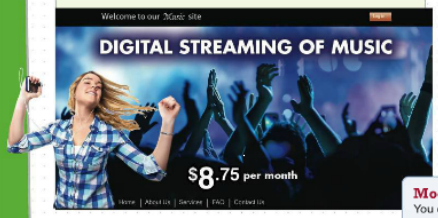
I can...
solve problems involving percent markup and markdown.

Solve & Discuss It!

Clare subscribes to an online music streaming service for a yearly fee of $96. Starting next month, there will be a 12% increase in the fee.

The ad for another music streaming service is shown below. Should Clare switch? Explain.



Model with Math
You can use the percent equation to determine the percent increase.

Focus on math practices

Make Sense and Persevere What is another problem-solving method you could use to check that your solution makes sense?

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Essential Question How are the concepts of percent markup and percent markdown related to the percent equation?

EXAMPLE 1 Find the Percent Markup

Scan for Multimedia

Marty buys plain cell phone cases and then decorates them to resell online at a higher price. What is the percent markup on each phone case?

Markup is the amount of increase from the cost of an item to its selling price. The markup as a percent increase from the original cost is the **percent markup**.

STEP 1 Draw a bar diagram to represent the problem and to find the markup.

STEP 2 Use the percent equation to find the percent markup.

markup = percent markup • cost

$4.05 = P \cdot 7.20$

$\frac{4.05}{7.20} = P$

$0.5625 = P$

Remember to express the decimal value as a percent.

The percent markup on each cell phone case is about 56%.

Try It!

What is the percent markup on a $300 phone sold for $465?

markup = percent markup • cost

$\square = P \cdot 300$

$\square = P$

The percent markup on the phone is $\square$%.

Convince Me! How does the percent equation help solve markup problems?

EXAMPLE 2 Find the Selling Price

The local furniture store pays $110 for a chest of drawers and sells it with a 40% markup. What is the selling price of the chest of drawers?

STEP 1 Draw a bar diagram to represent the problem.

STEP 2 Use the percent equation to find the markup and the selling price.

markup = percent markup • cost
$a = 0.40 \cdot 110$
$a = 44$

The markup is $44.

$110 + 44 = 154$

The selling price of the chest of drawers is $100 + $44 or $154.

Try It!

What is the selling price for a $45 pair of shoes with a 15% markup?

EXAMPLE 3 Find Markdown and Sales Tax

Edward wants to buy a snowboard that is on sale. If the sales tax in Edward's state is 7.5%, how much will he pay for the snowboard?

Markdown is the decrease from the original price of an item to its sale price. The markdown as a percent decrease of the original price is the **percent markdown**.

STEP 1 Use the percent equation to find the marked down price of the snowboard.

markdown = percent markdown • original price
$m = 0.30 \cdot 180$
$m = 54$

The sale price is $180 − $54, or $126.

STEP 2 Use the percent equation to find the sales tax board.

sales tax = percent • sale price
$s = 0.075 \cdot 126$
$s = 9.45$

Edward will pay 126 + 9.45, or $135.45, for the snowboard.

Try It!

Find the percent markdown for an $80 jacket that is on sale for $48.

KEY CONCEPT

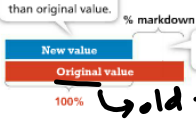
% markup or markdown = $\frac{\text{markup/down \$} - \text{old \$}}{\text{old \$}}$

You can solve markup and markdown problems using the percent equation.

New value is greater than original value.

markup = percent markup • original value

New value is less than original value.



markdown = percent markdown • original value

old → "regular price" ↳ for markdown

Do You Understand?

1. **Essential Question** How are the concepts of markup and markdown related to the percent equation?

2. **Reasoning** What does the amount of the markup or markdown represent in the percent equation?

3. **Generalize** When an item is marked up by a certain percent and then marked down by the same percent, is the sale price equal to the price before the markup and markdown?

Do You Know How?

4. An item costs $4 before tax and $4.32 after sales tax. What is the sales tax rate?

old → new

d to % → 2

sales tax rate $\frac{4.32-4.00}{4.00}$

$\frac{0.32}{4.00} = 0.08 = 8\%$

5. Sheila buys two concert tickets from her friend. She pays $90 for the two tickets. She looks at the tickets and sees that each ticket has a face value of $52.50.

a. How much of a markdown did her friend give Sheila? Explain how you know.

$45 per ticket

$\frac{45-52.50}{52.50} = \frac{-7.50}{52.50} = -0.142857\ldots$

The markdown is $7.50/ticket.

b. What was the percent markdown, rounded to the nearest whole percent?

$\approx 14\%$

6. Find the sale prices.

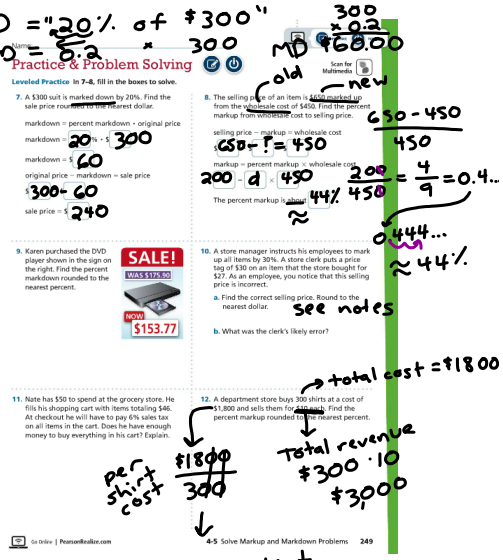
a. $4,200 with a 35% markdown

b. $5,000 with a 44% markdown

MD = "20% of $300"

MD = 0.2 × 300

300 ×.02 MD $60.00



Practice & Problem Solving

Leveled Practice In 7–8, fill in the boxes to solve.

7. A $300 suit is marked down by 20%. Find the sale price rounded to the nearest dollar.

markdown = percent markdown × original price

markdown = $ 20% × $ 300

markdown = $ 60

original price − markdown = sale price

$ 300 − 60

sale price = $ 240

8. The selling price of an item is 200% marked up from the wholesale cost of $450. Find the percent markup from wholesale cost to selling price.

selling price − markup = wholesale cost

$650 − ? = 450

markup = percent markup × wholesale cost

200 − d × 450

The percent markup is about 44%

old new

650 − 450 / 450

200/450 = 4/9 = 0.4...

0.444... ≈ 44%

9. Karen purchased the DVD player shown in the sign on the right. Find the percent markdown rounded to the nearest percent.

SALE! WAS $175.50 NOW $153.77

10. A store manager instructs his employees to mark up all items by 30%. A store clerk puts a price tag of $30 on an item that the store bought for $27. As an employee, you notice that this selling price is incorrect.

a. Find the correct selling price. Round to the nearest dollar.

b. What was the clerk's likely error?

See notes

11. Nate has $50 to spend at the grocery store. He fills his shopping cart with items totaling $46. At checkout he will have to pay 6% sales tax on all items in the cart. Does he have enough money to buy everything in his cart? Explain.

12. A department store buys 300 shirts at a cost of $1,800 and sells them for a profit. Find the percent markup rounded to the nearest percent.

total cost = $1800

per shirt cost: $1800 / 300

Total revenue: $300 · 10 = $3,000

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$6 per shirt cost

% markup = (10 − 6)/6 = 4/6 = 2/3

0.66666...

2

66.666...%

≈ 67% markup

10) wholesale cost = $27

markup = 30% of $27

30% × $27

30% → 2 → $8.10

Selling price = $27.00 + $8.10 = $35.10

$0.6(\$776) = \$465.60$

13. Make Sense and Persevere A computer store buys a computer system at a cost of $465.60. The selling price was first at $776, but then the store advertised a 30% markdown on the system.

a. Find the current sale price. Round to the nearest cent if necessary.

$0.7(\$776) = \$543.20$

b. Members of the store's loyalty club get an additional 10% off their computer purchases. How much do club members pay for the computer with their discount?

$0.9(543.20) = \$488.90$

14. Higher Order Thinking A sporting goods store manager was selling a ski set for a certain price. The manager offered the markdowns shown on the right, making the one-day sale price of the ski set $328. Find the original selling price of the ski set.

1st

2nd

$0.7(0.9r) = \$328$

$0.7(0.9r) = 328$

$0.63r = 328$

$\frac{0.63r}{0.63} = \frac{328}{0.63}$

$r = \$520.634$

$r = \$520.63$

$\times 0.6$

$\$312.38$

Assessment Practice

15. Eliza cannot decide which of two bicycles to buy. The original price of each is $380. The first is marked down by 50%. The second is marked down by 30% with an additional 20% off.

PART A

Find the sale price of each bicycle. Show your work.

1st: 50% of $380

$\frac{1}{2} \times \$380 = \$190$

PART B

Which bicycle should Eliza buy if the bicycles are the same except for the selling price?

2nd: $(0.8)(0.7)(380) = \$212.80$

Eliza should buy the 1st option so she can save $22.80.

16. A shoe store uses a 50% markup for all of the shoes it sells. What would be the selling price of a pair of shoes that has a wholesale cost of $57?