MATH@WORK™

CONNECTING MATH TO 21ST CENTURY CAREERS

LESSON 4

Percent Markups

In this lesson, students solve a multi-step problem by identifying percent markups of a whole and calculating a final sale price.

CCSS CONNECTIONS	LANGUAGE SUPPORT	
	MATH TERMS	**ACADEMIC LANGUAGE**

CCSS CONNECTIONS

- Find the percent of a quantity as a rate per 100, and solve problems. **6.RP.A.3c**

- Use proportional relationships to solve multi-step ratio and percent problems. **7.RP.A.3**

- Understand a problem context by rewriting expressions in different forms. **7.EE.A.2**

MATH TERMS

percent
part per 100

identity property
multiplying a number by 1 generates a product of 1

ACADEMIC LANGUAGE

sale price
price of clothes sold by stores to customers

wholesale price
price of clothes sold by designers to stores

SET UP

Introduce Chapter 5 from *Math Meets Fashion.*

Ask questions to review Lesson 3 and connect to Lesson 4.

For example: ***How did we use proportional reasoning to calculate how much fabric Jessalyn could buy?*** (We used proportional reasoning by identifying the unit price per $\frac{1}{4}$ yd; by using a ratio; or with mental math.)

How do you think designers choose a price to sell their clothing? (They add up the costs of paying their employees and buying materials, and include a profit.)

Review the definitions of *wholesale price* and *sale price* with students, and point out the difference between the two terms.

▶ **Play Chapter 5: Percent Markups.**

cost = $50
wholesale markup = 60%
store markup = 50%

[Pause at 01:26.]

PLAN

Create a plan to solve the problem.

Jessalyn spends $50 to make a dress. She wants to make a 60% profit on the wholesale price. The store will add a 50% markup to the wholesale price. Find the wholesale price and the final sale price of Jessalyn's dress.

Read the problem aloud to students.

Ask students to analyze the information in the problem, and use logical thinking to break it down into parts.

For example: ***What is the problem asking us to find?*** (the wholesale price and the final sale price of Jessalyn's dress)

How can you begin solving the problem? (Calculate the wholesale price: find 60% of $50, and then add the markup.)

Guide students to represent the unknown quantity with a variable, where *c* = cost of the dress. ($c + 0.6c = 1.6c$)

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From the Webisode:
Math Meets Fashion

featuring **Tim Gunn** *and* **Diane von Fürstenberg**

TEACHER

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LESSON 4

Percent Markups, *continued*

| STANDARDS FOR MATHEMATICAL PRACTICE | **Model With Mathematics** Students represent changing quantities, and apply proportional reasoning to create a solution. | **Use Repeated Reasoning** Students reason using the generalized structure of price markups as a percentage of a whole. |

SOLVE

Have student pairs solve the problem as you circulate.

Encourage students to come up with multiple strategies, and represent the problem situation in different ways. Guide students to work backwards to check their work.

SUPPORT	**EXTEND**
Ask questions based on common errors to support student understanding.	Ask questions to encourage students to extend their thinking.

SUPPORT

- *Why do you need to find the wholesale price before you can find the sale price?*
- *How could you draw a model of the problem?*
- *Could you use a different solution strategy?*
- *How can you check your work?*

EXTEND

- *Did you represent the two percentages as fractions or decimals? Why?*
- *Why is it important to identify the percentage of two different wholes?*
- *What common error do you think someone could make when solving this problem?*

SHARE

Have students present their solutions.

Ask students from each pair to explain their solutions to the class. Show at least two different approaches to solving the problem, and one incorrect solution. To extend classroom discussion, call on students to explain the reasoning of the student who is presenting.

Possible student work:

Cost of dress (c) → $50
Wholesale price (w) → 160% of $50

$w = 1.6c$
$= 1.6 \times \$50$
$= \$50 + \$30$
$= \$80$

Final sale price → 150% of $80
$= 1.5 \times \$80$
$= \$80 + \$40$
$= \$120$

▶ **Play the Chapter 5 Solution from *Math Meets Fashion*.**
   Have students complete the Practice and Reflect sections on Student Page 2.

HOMEWORK IDEAS

Have students plan a pricing strategy!

Students choose an item and plan a wholesale and a sale price.

- *How much does the item cost to make?*
- *What is your profit as a percentage?*
- *What is the store profit from the sale price?*

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LESSON

4

Percent Markups

MATH TERMS

percent
part per 100

identity property
multiplying a number by 1 generates a product of 1

Jessalyn spends $50 to make a dress. She wants to make a 60% profit on the wholesale price. The store will add a 50% markup to the wholesale price. Find the wholesale price and the final sale price of Jessalyn's dress.

PLAN   Create a plan to solve the problem with your partner.

SOLVE   Use your plan to solve the problem.

LESSON

4

Percent Markups, *continued*

PRACTICE   Apply your skills to solve another problem.

Jessalyn spends $75 to make a winter coat. She makes a 40% profit on the wholesale price. The store adds a 35% markup to the wholesale price to create the sale price. Find the difference between the final sale price and the cost of making the coat.

REFLECT   Explain how you made sense of the math.

How could you use variables to represent the quantities in the problem?

I could use variables to represent the quantities by

_____

_____

How would you explain the problem to a younger student?

I would explain the problem by _____

_____

_____

SCORE ⓪ ① ② ③

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Your Name _____

LESSON 4

Percent Markups

POSSIBLE STUDENT WORK

MATH TERMS

percent
part per 100

identity property
multiplying a number by 1 generates a product of 1

Jessalyn spends $50 to make a dress. She wants to make a 60% profit on the wholesale price. The store will add a 50% markup to the wholesale price. Find the wholesale price and the final sale price of Jessalyn's dress.

PLAN Create a plan to solve the problem with your partner.

The original cost of the dress is $50.

I will draw models to show the percentage profit on the cost of making the dress, and the percentage profit on the wholesale price.
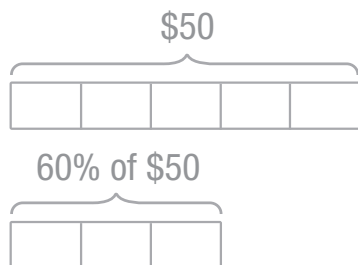
First, I find 60% of $50, and add this markup to $50 to find the wholesale price.

Then, I find 50% of the wholesale price, and add this markup to the wholesale price.

SOLVE Use your plan to solve the problem.
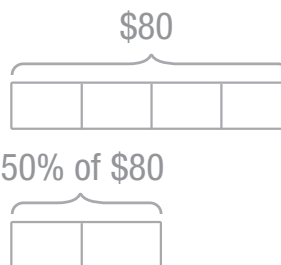
Wholesale price ➔ $50 + 60% of $50

$50

60% of $50

$\frac{60}{100} = 0.6$

$0.6 \times \$50 = \$30$

$\$50 + \$30 = \$80$

Final sale price ➔ $80 + 50% of $80

$80

50% of $80

$\frac{50}{100} = 0.5$

$0.5 \times \$80 = \$40$

$\$80 + \$40 = \$120$

The wholesale price of Jessalyn's dress is $80, and the final sale price is $120.

LESSON 4

Percent Markups, *continued*

POSSIBLE STUDENT WORK

PRACTICE Apply your skills to solve another problem.

Jessalyn spends $75 to make a winter coat. She makes a 40% profit on the wholesale price. The store adds a 35% markup to the wholesale price to create the sale price. Find the difference between the final sale price and the cost of making the coat.

First, I add the 40% profit markup to the cost of making the coat to find the wholesale price. Then, I add the 35% profit markup to the wholesale price to find the sale price. Finally, I find the difference between the final sale price and the original cost.

Cost of coat → $75

Wholesale price → $75 + 40% of $75

$\frac{40}{100} = 0.4$

$0.4 \times \$75 = \$30$

$\$75 + \$30 = \$105$

Final sale price → $105 + 35% of $105

$\frac{35}{100} = 0.35$

$0.35 \times \$105 = \$36.75$

$\$105 + \$36.75 = \$141.75$

Difference between the final sale price and the cost of the coat → $141.75 − $75 = $66.75.

REFLECT Explain how you made sense of the math.

How could you use variables to represent the quantities in the problem?

I could use variables to represent the quantities by writing the equation $w = 1.40c$, where $w =$ wholesale price and $c =$ the cost of the coat.

How would you explain the problem to a younger student?

I would explain the problem by drawing a model to represent the quantities in the problem, and show how the quantities change.

SCORE ⓪ ① ② ③