# 7.6 Percent Applications

**Goal:** Find markups, discounts, sales tax, and tips.

**Vocabulary**

Markup: when a quantity is increased by a certain percentage

Discount: When a quantity is decreased by a certain percentage

| wholesale price | retail price |
|---|---|
| $ it costs to make an item | cost it is sold for |

**Example 1** *Finding a Retail Price*

**Pillows** A store buys decorative pillows from a manufacturer for $2 each. The store marks up the price by 400%. What is the retail price?

**Solution** wholesale

***Method 1*** Add the markup to the wholesale price.

Retail price = Wholesale price + Markup

$= 2 + 400\% \cdot 2$ Substitute.

$= 2 + 4 \cdot 2$ Write 400% as a decimal.

$= 2 + 8$ Multiply.

$= \$10$ Add.

***Method 2*** Multiply the wholesale price by (100% + Markup percent).

Retail price = Wholesale price • (100% + Markup percent)

$= 2 \cdot (100\% + 400\%)$ Substitute.

$= 2 \cdot 500\%$ Add percents.

$= 2 \cdot 5$ Write 500% as a decimal.

$= 10$ Multiply.

**Answer:** The retail price of a decorative pillow is $10.

**Example 2** *Finding a Sale Price*

**Backpack** You buy a backpack that is on sale for 25% off the original price of $20. What is the sale price?

**Solution**

***Method 1*** Subtract the discount from the original price. "off"

Sale price = Original price − Discount

= 20 − 25% · 20 Substitute.

= 20 − 0.25 · 20 Write 25% as a decimal.

= 20 − 5 Multiply.

$15 Subtract.

***Method 2*** Multiply the original price by (100% − Discount percent). "on"

Sale price = Original price · (100% − Discount percent)

= 20 · (100% − 25%) Substitute.

= 20 · 75% "on" Subtract percents.

= 20 · 0.75 Write 75% as a decimal.

= 15 Multiply.

**Answer:** The sale price of the backpack is $15.

***Checkpoint***

**1.** In Example 1, what is the retail price of a decorative pillow if the markup percent is 250%?

① 2 + (250% · 2) → 2 + (2.5 · 2) → 2 + 5 = $7

② 2 · (100% + 250%) → 2 · 350% → 2 · 3.5 = $7

**2.** A pair of shorts that originally costs $15 is 40% off. Find the sale price.

① 15 − (40% · 15) → 15 − (0.4 · 15) → 15 − 6 → $9

② 15 · (100% − 40%) → 15 · 60% → 15 · 0.6 = $9

**Example 3** *Using Sales Tax and Tips*

**Pizza** You order pizza to be delivered. The bill is $18. You give the delivery person a 15% tip. The sales tax is 5%. What is the total cost of the pizza?

**Solution**

Sales tax and tips are calculated using a percent of the purchasing price. These amounts are then added to the purchase price.

Total = Food bill + Sales tax + Tip

$= 18 + 5\% \cdot 18 + 15\% \cdot 18$ Substitute.

$= 18 + 0.05 \cdot 18 + 0.15 \cdot 18$ Write percents as decimals.

$= 18 + 0.90 + 2.70$ Evaluate.

**Answer:** The total cost of the pizza is $21.60

***Checkpoint***

**3.** In Example 3, find the total cost of the pizza if the tip is 20%.

$18 + 0.90 + 20\% \cdot 18$

$18 + 0.90 \quad 0.2 \cdot 18$

$18 + 0.90 + 3.60 = \$22.50$

**Example 4** *Finding an Original Amount*

**Blender** A store marks up the wholesale price of a blender by 125%. The retail price is $30. What is the wholesale price?

**Solution**

Let $x$ represent the wholesale price.

Retail price = Wholesale price • (100% + Markup percent)

$30 = x \cdot (100\% + 125\%)$ Substitute.

$30 = x \cdot 225\%$ Add percents.

$30 = x \cdot 2.25 \;/\; 2.25$ Write 225% as a decimal.

$\$13.33 \approx x$ Divide each side by 2.25

**Answer:** The wholesale price of the blender is about $3.33