

Chapter 6 Review

Objective [6.1a] Write three kinds of notation for percent.		
Brief Procedure	Example	Practice Exercise
<p>Using a ratio, write $n\%$ (the ratio of n to 100) as $\frac{n}{100}$.</p> <p>Using fractional notation, write $n\%$ as $n \times \frac{1}{100}$.</p> <p>Using decimal notation, write $n\%$ as $n \times 0.01$.</p>	<p>Write three kinds of notation for 67%.</p> <p>Ratio: $67\% = \frac{67}{100}$</p> <p>Fractional notation: $67\% = 67 \times \frac{1}{100}$</p> <p>Decimal notation: $67\% = 67 \times 0.01$</p>	<p>1. Which is not correct notation for 13%?</p> <p>A. 13×0.01</p> <p>B. $\frac{13}{100}$</p> <p>C. $13 \times \frac{1}{100}$</p> <p>D. $\frac{0.13}{100}$</p>
Objective [6.1b] Convert from percent notation to decimal notation.		
Brief Procedure	Example	Practice Exercise
<p>To convert from percent notation to decimal notation,</p> <p>a) replace the percent symbol % with $\times 0.01$, and</p> <p>b) multiply by 0.01, which means move the decimal point two places to the left.</p>	<p>Find decimal notation for 4.3%.</p> <p>a) Replace the percent symbol with $\times 0.01$.</p> <p style="padding-left: 20px;">4.3×0.01</p> <p>b) Move the decimal point two places to the left.</p> <p style="padding-left: 20px;">0.043</p> <p style="padding-left: 20px;">↑</p> <p>Thus, $4.3\% = 0.043$.</p>	<p>2. Find decimal notation for 54.8%.</p> <p>A. 0.0548</p> <p>B. 0.548</p> <p>C. 5.48</p> <p>D. 548</p>
Objective [6.1c] Convert from decimal notation to percent notation.		
Brief Procedure	Example	Practice Exercise
<p>To convert from decimal notation to percent notation, multiply by 100%. That is,</p> <p>a) move the decimal point two places to the right, and</p> <p>b) write a % symbol.</p>	<p>Find percent notation for 0.09.</p> <p>a) Move the decimal point two places to the right.</p> <p style="padding-left: 20px;">0.09</p> <p style="padding-left: 20px;">↓</p> <p>b) Write a percent symbol: 9%</p> <p>Thus, $0.09 = 9\%$.</p>	<p>3. Find percent notation for 1.5.</p> <p>A. 0.015%</p> <p>B. 0.15%</p> <p>C. 15%</p> <p>D. 150%</p>

Objective [6.2a] Convert from fractional notation to percent notation.		
Brief Procedure	Example	Practice Exercise
<p>To convert from fractional notation to percent notation,</p> <p>a) find decimal notation by division, and</p> <p>b) convert the decimal notation to percent notation.</p>	<p>Find percent notation for $\frac{3}{5}$.</p> <p>Find decimal notation by division.</p> $\begin{array}{r} 0.6 \\ 5 \overline{)3.0} \\ \underline{30} \\ 0 \end{array}$ <p>$\frac{3}{5} = 0.6$</p> <p>Convert to percent notation.</p> <p>0.60.</p> $\begin{array}{c} \square \uparrow \\ \frac{3}{5} = 60\% \end{array}$ <p>When the denominator of the fraction is a factor of 100, we can also find percent notation by first multiplying by 1 to get 100 in the denominator:</p> $\frac{3}{5} = \frac{3}{5} \cdot \frac{20}{20} = \frac{60}{100} = 60\%.$	<p>4. Find percent notation for $\frac{7}{8}$.</p> <p>A. 62.5%</p> <p>B. 0.875%</p> <p>C. 78%</p> <p>D. 87.5%</p>
Objective [6.2b] Convert from percent notation to fractional notation.		
Brief Procedure	Example	Practice Exercise
<p>To convert from percent notation to fractional notation,</p> <p>a) use the definition of percent as a ratio, and</p> <p>b) simplify, if possible.</p>	<p>Find fractional notation for 40%.</p> $40\% = \frac{40}{100} = \frac{20 \cdot 2}{20 \cdot 5} = \frac{20}{20} \cdot \frac{2}{5} = \frac{2}{5}$	<p>5. Find fractional notation for 85%.</p> <p>A. $\frac{11}{20}$</p> <p>B. $\frac{13}{20}$</p> <p>C. $\frac{17}{20}$</p> <p>D. $\frac{19}{20}$</p>
Objective [6.3a] Translate percent problems to equations.		
Brief Procedure	Example	Practice Exercise
<p>Keep in mind that</p> <p>“of” translates to “.”, or “\times”;</p> <p>“what” translates to any letter; and</p> <p>“is” translates to “=”.</p>	<p>Translate to an equation: What is 12% of 84?</p> <p><u>What</u> is 12% of 84?</p> $\begin{array}{ccccccc} \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & & \\ a & = & 12\% & \cdot & 84 & & \end{array}$	<p>6. Translate to an equation: 16% of what is 224?</p> <p>A. $a = 16\% \cdot 224$</p> <p>B. $16\% \times b = 224$</p> <p>C. $16 = n \times 224$</p> <p>D. $16\% = a \times 224$</p>

Objective [6.3b] Solve basic percent problems (using equations).														
Brief Procedure	Example	Practice Exercise												
<p>Translate to an equation. Then solve the equation.</p>	<p>What percent of 60 is 21?</p> <p><i>Translate:</i></p> $\underbrace{\text{What percent of 60 is 21?}}_{\downarrow} \quad \downarrow \downarrow \downarrow \downarrow$ $n \quad \times 60 = 21$ <p><i>Solve:</i> We divide by 60 on both sides and convert the answer to percent notation.</p> $\frac{n \times 60}{60} = \frac{21}{60}$ $n = 0.35 = 35\%$ <p>Thus, 35% of 60 is 21. The answer is 35%.</p>	<p>7. 120% of \$80 is what?</p> <p>A. \$1.50 B. \$66.67 C. \$96 D. \$120</p>												
Objective [6.4a] Translate percent problems to proportions.														
Brief Procedure	Example	Practice Exercise												
<p>Translate as follows:</p> $\frac{\text{Number}}{100} = \frac{\text{Amount}}{\text{Base}}, \text{ or}$ $\frac{N}{100} = \frac{a}{b}.$ <p>Keep in mind that the base b usually follows the words “percent of” and $N\%$ always translates to $\frac{N}{100}$.</p> <p>We can also read the proportion from a comparison drawing:</p> <table style="margin-left: 20px;"> <tr> <td style="text-align: right;">Percents</td> <td style="text-align: center;"> </td> <td style="text-align: left;">Quantities</td> </tr> <tr> <td style="text-align: right;">0%</td> <td style="text-align: center;">—</td> <td style="text-align: left;">0</td> </tr> <tr> <td style="text-align: right;">N%</td> <td style="text-align: center;">—</td> <td style="text-align: left;">amount</td> </tr> <tr> <td style="text-align: right;">100%</td> <td style="text-align: center;">—</td> <td style="text-align: left;">base</td> </tr> </table>	Percents		Quantities	0%	—	0	N%	—	amount	100%	—	base	<p>7 is 15% of what?</p> <p style="margin-left: 40px;"> \downarrow \downarrow \downarrow amount number of base hundredths</p> $\frac{15}{100} = \frac{7}{b}$	<p>8. Translate to a proportion: 30 is what percent of 45?</p> <p>A. $\frac{N}{100} = \frac{30}{45}$ B. $\frac{30}{100} = \frac{N}{45}$ C. $\frac{100}{45} = \frac{30}{N}$ D. $\frac{N}{100} = \frac{45}{30}$</p>
Percents		Quantities												
0%	—	0												
N%	—	amount												
100%	—	base												

Objective [6.4b] Solve basic percent problems (using proportions).		
Brief Procedure	Example	Practice Exercise
Translate to a proportion. Then solve the proportion.	<p>75% of 150 is what?</p> <p><i>Translate:</i> $\frac{75}{100} = \frac{a}{150}$</p> <p><i>Solve:</i></p> $75 \cdot 150 = 100 \cdot a \quad \text{Equating cross products}$ $\frac{75 \cdot 150}{100} = \frac{100 \cdot a}{100} \quad \text{Dividing by 100}$ $\frac{11,250}{100} = a$ $112.5 = a$ <p>Thus, 75% of 150 is 112.5. The answer is 112.5.</p>	<p>9. 4% of what is 3.6?</p> <p>A. 14.4</p> <p>B. 60.5</p> <p>C. 90</p> <p>D. 111</p>
Objective [6.5a] Solve applied problems involving percent.		
Brief Procedure	Example	Practice Exercise
Use the five-step problem solving process.	<p>On a test of 40 items, James had 34 correct. What percent were correct?</p> <ol style="list-style-type: none"> <i>Familiarize.</i> The problem asks for a percent. Let n = the percent of test items that were correct. <i>Translate.</i> Rephrase the question and translate. <p style="text-align: center;"> $34 \text{ is what percent of } 40?$ $\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$ $34 = \quad n \quad \times 40$ </p> <i>Solve.</i> We divide by 40 on both sides and convert the answer to percent notation. <p style="text-align: center;"> $34 = n \times 40$ $\frac{34}{40} = \frac{n \times 40}{40}$ $0.85 = n$ $85\% = n$ </p> <i>Check.</i> We can repeat the calculation. The answer checks. <i>State.</i> 85% of the test items were correct. 	<p>10. The Collins spend 5% of their income on clothing. If their annual income is \$33,000, how much is spent on clothing in a year?</p> <p>A. \$165</p> <p>B. \$1650</p> <p>C. \$3300</p> <p>D. \$6600</p>

Objective [6.5b] Solve applied problems involving percent of increase or decrease.

Brief Procedure	Example	Practice Exercise								
<p>To find a percent of increase or decrease:</p> <p>a) Find the amount of increase or decrease.</p> <p>b) Then determine what percent this is of the original amount.</p>	<p>Jo's supervisor tells her that her weekly salary of \$450 will be increased to \$477. What is the percent of increase?</p> <p>1. <i>Familiarize.</i> We find the amount of increase and then make a drawing.</p> $\begin{array}{r} 477 \text{ New salary} \\ - 450 \text{ Original salary} \\ \hline 27 \text{ Increase} \end{array}$ <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td style="text-align: center;">\$450</td><td></td></tr> <tr><td style="text-align: center;">\$450</td><td style="text-align: center;">\$27</td></tr> <tr><td style="text-align: center;">100%</td><td></td></tr> <tr><td style="text-align: center;">100%</td><td style="text-align: center;">?%</td></tr> </table> <p>2. <i>Translate.</i> We rephrase the question and translate.</p> <p style="text-align: center;">\$27 is <u>what percent</u> of \$450?</p> $\begin{array}{ccccccc} \downarrow & \downarrow & & \downarrow & & \downarrow & \downarrow \\ 27 & = & & n & & \times & 450 \end{array}$ <p>3. <i>Solve.</i> We divide by 450 on both sides and convert the answer to percent notation.</p> $27 = n \times 450$ $\frac{27}{450} = \frac{n \times 450}{450}$ $0.06 = n$ $6\% = n$ <p>4. <i>Check.</i> Note that with a 6% increase, the new salary would be 106% of the original salary. Since 106% of \$450 = 1.06 × \$450 = \$477, the answer checks.</p> <p>5. <i>State.</i> The percent of increase is 6%.</p>	\$450		\$450	\$27	100%		100%	?%	<p>11. During a sale, the price of a jacket decreased from \$120 to \$102. What was the percent of decrease?</p> <p>A. 15%</p> <p>B. 18%</p> <p>C. 20%</p> <p>D. 25%</p>
\$450										
\$450	\$27									
100%										
100%	?%									

Objective [6.6a] Solve applied problems involving sales tax and percent.

Brief Procedure	Example	Practice Exercise
<p>Keep these facts in mind: $\text{Sales tax} = \text{Sales tax rate} \times \text{Purchase price}$ $\text{Total price} = \text{Purchase price} + \text{Sales tax}$</p>	<p>The sales tax rate in Indiana is 5%. How much tax is charged on a bread machine costing \$150? What is the total price?</p> <p>The sales tax is</p> $\underbrace{\text{Sales tax rate}}_{5\%} \times \underbrace{\text{Purchase price}}_{\$150}$ <p style="text-align: center;"> $\downarrow \qquad \times \qquad \downarrow$ $5\% \qquad \times \qquad \\$150,$ </p> <p>or 0.05×150, or 7.5. Thus, the sales tax is \$7.50.</p> <p>The total price is the purchase price plus the sales tax: $\\$150 + \\7.50, or \$157.50.</p>	<p>12. The sales tax rate in Connecticut is 8%. What is the total price of a digital camera that sells for \$550?</p> <p>A. \$44 B. \$575 C. \$594 D. \$615</p>

Objective [6.6b] Solve applied problems involving commission and percent.

Brief Procedure	Example	Practice Exercise
<p>Keep this fact in mind: $\text{Commission} = \text{Commission rate} \times \text{Sales}$</p>	<p>Celina earns a commission of \$1750 selling \$25,000 worth of office equipment. What is the commission rate?</p> $1750 = r \times 25,000$ <p>To solve this equation we divide by 25,000 on both sides.</p> $\frac{1750}{25,000} = \frac{r \cdot 25,000}{25,000}$ $\frac{250 \cdot 7}{250 \cdot 100} = r$ $\frac{250}{250} \cdot \frac{7}{100} = r$ $\frac{7}{100} = r$ $7\% = r$ <p>The commission rate is 7%.</p>	<p>13. Frank's commission rate is 12%. He receives a commission of \$180 on the sale of sporting goods. How much did the sporting goods cost?</p> <p>A. \$1320 B. \$1500 C. \$4750 D. \$6500</p>

Objective [6.6c] Solve applied problems involving discount and percent.		
Brief Procedure	Example	Practice Exercise
<p>Keep these facts in mind: Discount = Rate of discount \times Original price Sale price = Original price $-$ Discount</p>	<p>A shirt marked \$45 is on sale at 20% off. What is the discount? the sale price?</p> $\text{Discount} = \text{Rate of discount} \times \text{Original price}$ $D = 20\% \times 45$ <p>We convert 20% to decimal notation and multiply.</p> $\begin{array}{r} 45 \\ \times 0.2 \\ \hline 9.0 \end{array}$ <p>The discount is \$9.</p> $\text{Sale price} = \text{Original price} - \text{Discount}$ $S = 45 - 9$ <p>We subtract.</p> $\begin{array}{r} 45 \\ - 9 \\ \hline 36 \end{array}$ <p>The sale price is \$36.</p>	<p>14. A sofa marked \$650 is on sale at 30% off. What is the sale price?</p> <p>A. \$195 B. \$375 C. \$455 D. \$515</p>
Objective [6.7a] Solve applied problems involving simple interest and percent.		
Brief Procedure	Example	Practice Exercise
<p>The simple interest I on principal P, invested for t years at interest rate r, is given by</p> $I = P \cdot r \cdot t.$	<p>What is the interest on \$4400 invested at an interest rate of 8% for $\frac{1}{2}$ year?</p> <p>Substitute \$4400 for P, 8% for r, and $\frac{1}{2}$ for t in the simple interest formula.</p> $I = P \cdot r \cdot t$ $= \$4400 \times 8\% \times \frac{1}{2}$ $= \frac{\$4400 \times 0.08}{2}$ $= \$176$ <p>The interest for $\frac{1}{2}$ year is \$176.</p>	<p>15. What is the interest on \$1200 invested at 6% for $\frac{1}{4}$ year?</p> <p>A. \$8 B. \$18 C. \$36 D. \$72</p>

Objective [6.7b] Solve applied problems involving compound interest.

Brief Procedure	Example	Practice Exercise
<p>If a principal P has been invested at interest rate r, compounded n times a year, in t years it will grow to an amount A given by</p> $A = P \cdot \left(1 + \frac{r}{n}\right)^{n \cdot t}$	<p>The Jensens invest \$2000 in an account paying 12%, compounded semi-annually. Find the amount in the account after $1\frac{1}{2}$ years.</p> <p>Substitute \$2000 for P, 12% for r, 2 for n, and $1\frac{1}{2}$, or $\frac{3}{2}$, for t in the compound interest formula.</p> $A = P \cdot \left(1 + \frac{r}{n}\right)^{n \cdot t}$ $= \$2000 \times \left(1 + \frac{0.12}{2}\right)^{2 \cdot \frac{3}{2}}$ $= \$2000 \times (1 + 0.06)^3$ ≈ 2382.03 <p>The amount in the account after $1\frac{1}{2}$ years is \$2382.03.</p>	<p>16. The Shaws invest \$3600 in an account paying 8%, compounded quarterly. Find the amount in the account after 1 year.</p> <p>A. \$3745.44 B. \$3880.00 C. \$3893.73 D. \$3896.76</p>