Lesson 6: Fluency with Percents

Student Outcomes

- Students solve various types of percent problems by identifying the type of percent problem and applying appropriate strategies.
- Students extend mental math practices to mentally calculate the part, the percent, or the whole in percent word problems.

Lesson Notes

This lesson provides further development of mental math strategies with percents, additional exercises involving a variety of percent problems from Lessons 2–5, and a Sprint exercise.

Classwork

Opening Exercise (4 minutes)

The Opening Exercise reviews concepts learned in Lesson 5; students continue to use mental math strategies with other percent problems in Example 1. Provide two minutes for students to find a solution to the problem, and then ask for students to share their strategies with the class.

Opening Exercise

Solve the following problem using mental math only. Be prepared to discuss your method with your classmates.

Cory and Everett have collected model cars since the third grade. Cory has 80 model cars in his collection, which is 25% more than Everett has. How many model cars does Everett have?

The number of cars that Everett has is the whole; 25% more than Everett would be 125% of Everett's cars. 80 cars is 125% of Everett's number of cars. There are five intervals of 25% in 125%, so I have to divide both 125% and 80 by 5. 80 divided by 5 is 16. Therefore, 25% of the cars would be 16 cars. Everett has 64 model cars.

- What made this problem fairly easy to solve in our heads?
  - *The numbers were easily compatible and shared factors with 100.*

Example 1 (10 minutes): Mental Math and Percents

In Lesson 5, students practiced using mental math strategies to calculate the whole when given the part and its corresponding percent. In this example, students extend those strategies to mentally calculate the part when given its corresponding percent and the whole.

Example 1: Mental Math and Percents

a. 75% of the students in Jesse's class are 60 inches or taller. If there are 20 students in her class, how many students are 60 inches or taller?

- Is this question a comparison of two separate quantities, or is it part of the whole? How do you know?
  - *The problem says that the students make up* 75% *of Jesse's class, which means they are part of the whole class; this is a part of the whole problem.*
- What numbers represent the part, whole, and percent?
  - *The part is the number of students that are* 60 *inches or taller, the whole is the* 20 *students that make up Jesse's class, and the percent is* 75%.

Instruct students to discuss the problem with a partner; challenge them to solve it using mental math only. After 1–2 minutes of discussion, ask for students to share their mental strategies with the class.

> *Scaffolding:*
>
> Challenge struggling students to solve these problems by writing down as little as possible, internalizing their strategy, and repeating it without paper.

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- *Possible strategies:*
  - 75% *is the same as* $\frac{3}{4}$ *of* 100%. *We know that* 20 *students represent* 100%, *and* $20 = 4(5)$, *so* $3(5) = 15$, *which means* 15 *is* $\frac{3}{4}$ *of* 20.
  - 75% *is the same as* $\frac{3}{4}$ *of* 100%; $20 \times 3 = 60$, *and* $60 \div 4 = 15$, *which means that* 15 *is* 75% *of* 20.

Have students write a description of how to mentally solve the problem (including the math involved) in their student materials.

- Was this problem easy to solve mentally? Why?
  - *The numbers involved in the problem shared factors with* 100 *that were easy to work with.*

b. Bobbie wants to leave a tip for her waitress equal to 15% of her bill. Bobbie's bill for her lunch is $\$18$. How much money represents 15% of the bill?

- Is this question a comparison of two separate quantities, or is it part of a whole? How do you know?
  - *She is leaving a quantity that is equal to* 15% *of her bill, so this is a comparison of two separate quantities.*
- What numbers represent the part, the whole, and the percent? Is the part actually part of her lunch bill?
  - *The part is the amount that she plans to leave for her waitress and is not part of her lunch bill but is calculated as if it is a part of her bill; the whole is the* $\$18$ *lunch bill, and the percent is* 15%.

Instruct students to discuss the problem with a partner; challenge them to solve it using mental math only. After 1–2 minutes of discussion, ask for students to share their mental strategies with the class.

- *Possible strategy includes the following:*

  $15\% = 10\% + 5\%$; 10% *of* $\$18$ *is* $\$1.80$; *half of* 10% *is* 5%, *so* 5% *of* $\$18$ *would be equal to* $\frac{1}{2}(\$1.80) = \$0.90$; *therefore,* $\$1.80 + \$0.90 = \$2.70$.
- Was this problem easy to solve mentally? Why?
  - *The numbers involved in the problem shared factors with* 100 *that were easy to work with.*

- Could you use this strategy to find 7% of Bobbie's bill?

  Yes; $7\% = 5\% + 2(1\%)$*; 1% of* $\$18$ *is* $\$0.18$*, so 2% of* $\$18$ *would be equal to* $\$0.36$*; therefore,* $\$0.90 + \$0.36 = \$1.26$.

  So, 7% of $\$18$ *is equal to* $\$1.26$.

Have students write a description of how to mentally solve the problem in their student materials including the math involved.

Exercises (12 minutes)

The following exercises should be completed independently or with a partner. Students must apply their understanding of percents from previous lessons and choose an appropriate strategy to solve each problem.

Exercises

1. **Express 9 hours as a percentage of 3 days.**

   3 days is the equivalent of 72 hours since $3(24) = 72$.

   72 hours represents the whole.

   $Quantity = Percent \times Whole$. *Let* p *represent the unknown percent.*

   $$9 = p(72)$$
   $$\frac{1}{72}(9) = p(72) \cdot \frac{1}{72}$$
   $$\frac{9}{72} = p(1)$$
   $$\frac{1}{8} = p$$
   $$\frac{1}{8}(100\%) = 12.5\%$$

2. **Richard works from 11:00 a.m. to 3:00 a.m. His dinner break is 75% of the way through his work shift. What time is Richard's dinner break?**

   The total amount of time in Richard's work shift is 16 *hours since* $1 + 12 + 3 = 16$.

   16 hours represents the whole.

   $Quantity = Percent \times Whole$. *Let* b *represent the number of hours until Richard's dinner break.*

   $$b = 0.75(16)$$
   $$b = 12$$

   Richard's dinner break is 12 *hours after his shift begins.*

   12 hours after 11:00 a.m. is 11:00 p.m.

   Richard's dinner break is at 11:00 p.m.

3. At a playoff basketball game, there were 370 fans cheering for school A and 555 fans cheering for school B.

a. Express the number of fans cheering for school A as a percent of the number of fans cheering for school B.

The number of fans for school B is the whole.

$Quantity = Percent \times Whole$. Let p represent the unknown percent.

$$370 = p(555)$$
$$\frac{1}{555}(370) = p(555)\left(\frac{1}{555}\right)$$
$$\frac{370}{555} = p(1)$$
$$\frac{2}{3} = p$$
$$\frac{2}{3}(100\%) = 66\frac{2}{3}\%$$

The number of fans cheering for school A is $66\frac{2}{3}\%$ of the number of fans cheering for school B.

b. Express the number of fans cheering for school B as a percent of the number of fans cheering for school A.

The number of fans cheering for school A is the whole.

$Quantity = Percent \times Whole$. Let p represent the unknown percent.

$$555 = p(370)$$
$$\frac{1}{370}(555) = p(370)\left(\frac{1}{370}\right)$$
$$\frac{555}{370} = p(1)$$
$$\frac{3}{2} = p$$
$$\frac{3}{2}(100\%) = 150\%$$

The number of fans cheering for school B is 150% of the number of fans cheering for school A.

c. What percent more fans were there for school B than for school A?

There were 50% more fans cheering for school B than for school A.

4. Rectangle A has a length of 8 cm and a width of 16 cm. Rectangle B has the same area as the first, but its length is 62.5% of the length of the first rectangle. Express the width of Rectangle B as a percent of the width of Rectangle A. What percent more or less is the width of Rectangle B than the width of Rectangle A?

To find the length of Rectangle B:

The length of Rectangle A is the whole.

$Quantity = Percent \times Whole$. *Let l represent the unknown length of Rectangle B.*

$$l = 0.625(8) = 5$$

The length of Rectangle B is 5 cm.

To find the width of Rectangle B:

The area of Rectangle B is 100% *of the area of Rectangle A because the problem says the areas are the same.*

$\text{Area} = \text{length} \times \text{width}$. *Let A represent the unknown area of Rectangle A.*

$A = 8 \text{ cm}(16 \text{ cm}) = 128 \text{ cm}^2$

$\text{Area} = \text{length} \times \text{width}$. *Let w represent the unknown width of Rectangle B.*

$$128 \text{ cm}^2 = 5 \text{ cm } (w)$$
$$25.6 \text{ cm} = w$$

The width of Rectangle B is 25.6 cm.

To express the width of Rectangle B as a percent of the width of Rectangle A:

The width of Rectangle A is the whole.

$\text{Quantity} = \text{Percent} \times \text{Whole}$. *Let p represent the unknown percent.*

$$25.6 \text{ cm} = p(16 \text{ cm})$$
$$1.6 = p$$

$1.6(100\%) = 160\%$; *The width of Rectangle B is* 160% *of the width of Rectangle A.*

Therefore, the width of Rectangle B is 60% *more than the width of Rectangle A.*

5. A plant in Mikayla's garden was 40 inches tall one day and was 4 feet tall one week later. By what percent did the plant's height increase over one week?

4 *feet is equivalent to* 48 *inches since* $4(12) = 48$.

40 *inches is the whole.*

$Quantity = Percent \times Whole$. *Let p represent the unknown percent.*

$$8 = p(40)$$
$$\frac{1}{5} = p$$
$$\frac{1}{5} = \frac{20}{100} = 20\%$$

The plant's height increased by 20% *in one week.*

6. Loren must obtain a minimum number of signatures on a petition before it can be submitted. She was able to obtain 672 signatures, which is 40% more than she needs. How many signatures does she need?

The number of signatures needed represents the whole.

$Quantity = Percent \times Whole$. *Let s represent the number of signatures needed.*

$$672 = 1.4(s)$$
$$480 = s$$

Loren needs to obtain 480 *signatures on her petition.*

Fluency Exercise 7 (12 minutes): Percent More or Less

Students complete two rounds of a Sprint exercise included at the end of this lesson (Percent More or Less) that focuses on finding the part, the whole, and the percent more or percent less. Please provide one minute for each round of the Sprint. Refer to the Sprints and Sprint Delivery Script sections in the Module Overview for directions to administer a Sprint. The Sprint exercises and answer keys are provided at the end of the lesson.

Closing (2 minutes)

- Describe how to find the percent that 12 is of 60.
  - *Since* 12 *and* 60 *have a common factor of* 6 *(or* 12*),* $\frac{12}{60} = \frac{2}{10}$ *and* $\frac{2}{10} = \frac{20}{100} = 20\%$.
- Describe how you can mentally determine the whole given that 15 is 30% of a number.
  - *Divide both* 15 *and* 30% *by* 3 *to get* 5 *and* 10%. *If* 5 *is* 10% *of the number, then* 50 *is* 100%. *Therefore, the whole is* 50.

Lesson Summary

- **Identify the type of percent problem that is being asked as a comparison of quantities or a part of a whole.**
- **Identify what numbers represent the part, the whole, and the percent, and use the representation**

$$\textbf{Quantity} = \textbf{Percent} \times \textbf{Whole}.$$

- **A strategy to solving percents using mental math is to rewrite a percent using 1%, 5%, or 10%. These percents can be solved mentally. For example: $13\% = 10\% + 3(1\%)$. To find 13% of 70, find 10% of 70 as 7, and 1% of 70 as 0.7, so 13% of 70 is $7 + 3(0.7) = 7 + 2.10 = 9.10$.**

Exit Ticket (5 minutes)

The use of a calculator is recommended for the Exit Ticket.

Name _____ Date _____

Lesson 6: Fluency with Percents

Exit Ticket

1. Parker was able to pay for 44% of his college tuition with his scholarship. The remaining $\$10{,}054.52$ he paid for with a student loan. What was the cost of Parker's tuition?

2. Two bags contain marbles. Bag A contains 112 marbles, and Bag B contains 140 marbles. What percent fewer marbles does Bag A have than Bag B?

3. There are 42 students on a large bus, and the rest are on a smaller bus. If 40% of the students are on the smaller bus, how many total students are on the two buses?

Exit Ticket Sample Solutions

1. **Parker was able to pay for 44% of his college tuition with his scholarship. The remaining $\$10,054.52$ he paid for with a student loan. What was the cost of Parker's tuition?**

   Parker's tuition is the whole; 56% represents the amount paid by a student loan.

   $Quantity = Percent \times Whole$. Let t represent the cost of Parker's tuition.

   $$10,054.52 = 0.56(t)$$
   $$\frac{10,054.52}{0.56} = t$$
   $$17,954.50 = t$$

   Parker's tuition was $\$17,954.50$.

2. **Two bags contain marbles. Bag A contains 112 marbles, and Bag B contains 140 marbles. What percent fewer marbles does Bag A have than Bag B?**

   The number of marbles in Bag B is the whole.

   There are 28 fewer marbles in Bag A.

   $Quantity = Percent \times Whole$. Let p represent the unknown percent.

   $$28 = p(140)$$
   $$\frac{2}{10} = p$$
   $$\frac{2}{10} = \frac{20}{100} = 20\%$$

   Bag A contains 20% fewer marbles than Bag B.

3. **There are 42 students on a large bus, and the rest are on a smaller bus. If 40% of the students are on the smaller bus, how many total students are on the two buses?**

   The 42 students on the larger bus represent 60% of the students. If I divide both 60% and 42 by 6, then I get 7 students, which represents 10% of the whole group. Multiplying both by 10, I get 70, which represents 100% of the group of students. There are 70 total students on the buses.

Problem Set Sample Solutions

This problem set is a compilation of all types of percent problems from Lessons 2–6. For each problem, students should choose an appropriate strategy to find a solution. Students may also be asked to describe the mental math they used to solve the problem.

1. **Micah has 294 songs stored in his phone, which is 70% of the songs that Jorge has stored in his phone. How many songs are stored on Jorge's phone?**

   $Quantity = Percent \times Whole$. Let s represent the number of songs on Jorge's phone.

   $$294 = \frac{70}{100} \cdot s$$
   $$294 = \frac{7}{10} \cdot s$$
   $$294 \cdot \frac{10}{7} = \frac{7}{10} \cdot \frac{10}{7} \cdot s$$
   $$42 \cdot 10 = 1 \cdot s$$
   $$420 = s$$

   There are 420 songs stored on Jorge's phone.

2. Lisa sold 81 magazine subscriptions, which is 27% of her class's fundraising goal. How many magazine subscriptions does her class hope to sell?

$Quantity = Percent \times Whole$. Let s represent the number of magazine subscriptions Lisa's class wants to sell.

$$81 = \frac{27}{100} \cdot s$$
$$81 \cdot \frac{100}{27} = \frac{27}{100} \cdot \frac{100}{27} \cdot s$$
$$3 \cdot 100 = 1 \cdot s$$
$$300 = s$$

Lisa's class hopes to sell 300 magazine subscriptions.

3. Theresa and Isaiah are comparing the number of pages that they read for pleasure over the summer. Theresa read $2,210$ pages, which was 85% of the number of pages that Isaiah read. How many pages did Isaiah read?

$Quantity = Percent \times Whole$. Let p represent the number of pages that Isaiah read.

$$2,210 = \frac{85}{100} \cdot p$$
$$2,210 = \frac{17}{20} \cdot p$$
$$2,210 \cdot \frac{20}{17} = \frac{17}{20} \cdot \frac{20}{17} \cdot p$$
$$130 \cdot 20 = 1 \cdot p$$
$$2,600 = p$$

Isaiah read $2,600$ pages over the summer.

4. In a parking garage, the number of SUVs is 40% greater than the number of non-SUVs. Gina counted 98 SUVs in the parking garage. How many vehicles were parked in the garage?

40% greater means 100% of the non-SUVs plus another 40% of that number, or 140%.

$Quantity = Percent \times Whole$. Let d represent the number of non-SUVs in the parking garage.

$$98 = \frac{140}{100} \cdot d$$
$$98 = \frac{7}{5} \cdot d$$
$$98 \cdot \frac{5}{7} = \frac{7}{5} \cdot \frac{5}{7} \cdot d$$
$$14 \cdot 5 = 1 \cdot d$$
$$70 = d$$

There are 70 non-SUVs in the parking garage.

The total number of vehicles is the sum of the number of the SUVs and non-SUVs.

$70 + 98 = 168$. There is a total of 168 vehicles in the parking garage.

5. The price of a tent was decreased by 15% and sold for $\$76.49$. What was the original price of the tent in dollars?

If the price was decreased by 15%, then the sale price is 15% less than 100% of the original price, or 85%. $Quantity = Percent \times Whole$. Let t represent the original price of the tent.

$$\begin{aligned} 76.49 &= \frac{85}{100} \cdot t \\ 76.49 &= \frac{17}{20} \cdot t \\ 76.49 \cdot \frac{20}{17} &= \frac{17}{20} \cdot \frac{20}{17} \cdot t \\ \frac{1,529.8}{17} &= 1 \cdot t \\ 89.988 &\approx t \end{aligned}$$

Because this quantity represents money, the original price was $\$89.99$ after rounding to the nearest hundredth.

6. 40% of the students at Rockledge Middle School are musicians. 75% of those musicians have to read sheet music when they play their instruments. If 38 of the students can play their instruments without reading sheet music, how many students are there at Rockledge Middle School?

Let m represent the number of musicians at the school, and let s represent the total number of students. There are two whole quantities in this problem. The first whole quantity is the number of musicians. The 38 students who can play an instrument without reading sheet music represent 25% of the musicians.

$$\begin{aligned} Quantity &= Percent \times Whole \\ 38 &= \frac{25}{100} \cdot m \\ 38 &= \frac{1}{4} \cdot m \\ 38 \cdot \frac{4}{1} &= \frac{1}{4} \cdot \frac{4}{1} \cdot m \\ \frac{152}{1} &= 1 \cdot m \\ 152 &= m \end{aligned}$$

There are 152 musicians in the school.

$$\begin{aligned} Quantity &= Percent \times Whole \\ 152 &= \frac{40}{100} \cdot s \\ 152 &= \frac{2}{5} \cdot s \\ 152 \cdot \frac{5}{2} &= \frac{2}{5} \cdot \frac{5}{2} \cdot s \\ \frac{760}{2} &= 1 \cdot s \\ 380 &= s \end{aligned}$$

There is a total of 380 students at Rockledge Middle School.

7. At Longbridge Middle School, 240 students said that they are an only child, which is 48% of the school's student enrollment. How many students attend Longbridge Middle School?

$Quantity = Percent \times Whole$. Let s represent the number of students who attend Longbridge Middle School.

$$\begin{aligned} 240 &= \frac{48}{100} \cdot s \\ 240 \cdot \frac{100}{48} &= \frac{48}{100} \cdot \frac{100}{48} \cdot s \\ 500 &= s \end{aligned}$$

There are 500 students attending Longbridge Middle School.

8. Grace and her father spent $4\frac{1}{2}$ hours over the weekend restoring their fishing boat. This time makes up 6% of the time needed to fully restore the boat. How much total time is needed to fully restore the boat?

$Quantity = Percent \times Whole$. Let t represent the total time that is needed to restore the boat.

$$4\frac{1}{2} = \frac{6}{100} \cdot t$$
$$\frac{100}{6} \cdot \frac{9}{2} = \frac{6}{100} \cdot \frac{100}{6} \cdot t$$
$$\frac{900}{12} = t$$
$$75 = t$$

The total amount of time to restore the boat is 75 hours.

9. Bethany's mother was upset with her because Bethany's text messages from the previous month were 218% of the amount allowed at no extra cost under her phone plan. Her mother had to pay for each text message over the allowance. Bethany had $5,450$ text messages last month. How many text messages is she allowed under her phone plan at no extra cost?

$\text{Quantity} = \text{Percent} \times \text{Whole}$. *Let m represent the number of text messages Bethany's phone plan allows with no extra cost.*

$$5,450 = \frac{218}{100} \cdot m$$
$$\frac{100}{218} \cdot 5,450 = \frac{218}{100} \cdot \frac{100}{218} \cdot m$$
$$2,500 = m$$

Bethany is allowed $2,500$ text messages without extra cost.

10. Harry used 84% of the money in his savings account to buy a used dirt bike that cost him $\$1,050$. How much money is left in Harry's savings account?

$\text{Quantity} = \text{Percent} \times \text{Whole}$. *Let a represent the amount of money, in dollars, in Harry's bank account before buying the bike.*

$$1050 = \frac{84}{100} \cdot a$$
$$\frac{100}{84} \cdot 1050 = \frac{84}{100} \cdot \frac{100}{84} \cdot a$$
$$1250 = a$$

Harry started with $\$1,250$ in his account but then spent $\$1,050$ of it on the dirt bike.

$1,250 - 1,050 = 200$

Harry has $\$200$ left in his savings account.

11. 15% of the students in Mr. Riley's social studies classes watch the local news every night. Mr. Riley found that 136 of his students do not watch the local news. How many students are in Mr. Riley's social studies classes?

If 15% of his students do watch their local news, then 85% do not.

$Quantity = Percent \times Whole$. Let c represent the number of students in Mr. Riley's class.

$$136 = \frac{85}{100} \cdot c$$
$$\frac{100}{85} \cdot 136 = \frac{85}{100} \cdot \frac{100}{85} \cdot c$$
$$160 = c$$

There are 160 total students in Mr. Riley's social studies classes.

12. Grandma Bailey and her children represent about 9.1% of the Bailey family. If Grandma Bailey has 12 children, how many members are there in the Bailey family?

$Quantity = Percent \times Whole$. Let f represent the number of members in the Bailey family.

$$13 = \frac{9.1}{100} \cdot f$$
$$\frac{100}{9.1} \times 13 = \frac{9.1}{100} \cdot \frac{100}{9.1} \cdot f$$
$$143 = f$$

The Bailey family has 143 members.

13. Shelley earned 20% more money in tips waitressing this week than last week. This week she earned $\$72.00$ in tips waitressing. How much money did Shelley earn last week in tips?

$Quantity = Percent \times Whole$. Let m represent the number of dollars Shelley earned waitressing last week.

$$72 = \frac{120}{100} m$$
$$72 \left(\frac{100}{120}\right) = \frac{120}{100}\left(\frac{100}{120}\right) m$$
$$60 = m$$

Shelley earned $\$60$ waitressing last week.

14. Lucy's savings account has 35% more money than her sister Edy's. Together, the girls have saved a total of $\$206.80$. How much money has each girl saved?

The money in Edy's account corresponds to 100%. Lucy has 35% more than Edy, so the money in Lucy's account corresponds to 135%. Together, the girls have a total of $\$206.80$, which is 235% of Edy's account balance.

$Quantity = Pecent \times Whole$. Let b represent Edy's savings account balance in dollars.

$$206.8 = \frac{235}{100} \cdot b$$
$$206.8 = \frac{47}{20} \cdot b$$
$$206.8 \cdot \frac{20}{47} = \frac{47}{20} \cdot \frac{20}{47} \cdot b$$
$$\frac{4,136}{47} = 1 \cdot b$$
$$88 = b$$

Edy has saved $\$88$ in her account. Lucy has saved the remainder of the $\$206.80$, so $206.8 - 88 = 118.8$.

Therefore, Lucy has $\$118.80$ saved in her account.

15. Bella spent 15% of her paycheck at the mall, and 40% of that was spent at the movie theater. Bella spent a total of $\$13.74$ at the movie theater for her movie ticket, popcorn, and a soft drink. How much money was in Bella's paycheck?

If $\$13.74$ represents 40%, this amount can be divided by 4 to determine that $\$3.435$ represents 10%. Then, this amount can be multiplied by 10 to determine that $\$34.35$ represents 100% of the portion of the paycheck that was spent.

Bella spent $\$34.35$ at the mall.

Therefore, $\$34.35$ represents 15% of the entire paycheck. This can be divided by 3 to represent 5%. So, $\$11.45$ represents 5% of the paycheck. Now, to determine 100% of the paycheck, multiply by 20. $\$11.45 \times 20 = \$229$.

Bella's paycheck was $\$229$.

16. On a road trip, Sara's brother drove 47.5% of the trip, and Sara drove 80% of the remainder. If Sara drove for 4 hours and 12 minutes, how long was the road trip?

There are two whole quantities in this problem. First, Sara drove 80% of the remainder of the trip; the remainder is the first whole quantity. $4 \text{ hr.}\, 12 \text{ min.}$ is equivalent to $4\frac{12}{60} \text{ hr.} = 4.2 \text{ hr.}$

$\text{Quantity} = \text{Percent} \times \text{Whole}$. Let h represent the remainder of the trip that Sara's brother did not drive, in hours.

$$4.2 = \frac{80}{100} \cdot h$$
$$\frac{100}{80} \cdot 4.2 = \frac{80}{100} \cdot \frac{100}{80} \cdot h$$
$$5.25 = h$$

The remainder of the trip that Sara's brother did not drive was 5.25 hours. He drove 47.5% of the trip, so the remainder of the trip was 52.5% of the trip, and the whole quantity is the time for the whole road trip.

$\text{Quantity} = \text{Percent} \times \text{Whole}$. Let t represent the total length of the trip, in hours.

$$5.25 = \frac{52.5}{100} t$$
$$\frac{100}{52.5} \cdot 5.25 = \frac{52.5}{100} \cdot \frac{100}{52.5} \cdot t$$
$$10 = t$$

The road trip was a total of 10 hours.

Percent More or Less—Round 1

Number Correct: _____

Directions: Find each missing value.

1.	100% of 10 is __?	
2.	10% of 10 is __?	
3.	10% more than 10 is __?	
4.	11 is __ % more than 10?	
5.	11 is __% of 10?	
6.	11 is 10% more than __ ?	
7.	110% of 10 is __?	
8.	10% less than 10 is __?	
9.	9 is __% less than 10?	
10.	9 is __% of 10?	
11.	9 is 10% less than __?	
12.	10% of 50 is __?	
13.	10% more than 50 is __?	
14.	55 is __% of 50?	
15.	55 is __% more than 50?	
16.	55 is 10% more than __?	
17.	110% of 50 is __?	
18.	10% less than 50 is __?	
19.	45 is __% of 50?	
20.	45 is __% less than 50?	
21.	45 is 10% less than __?	
22.	40 is __% less than 50?	

23.	15% of 80 is __?	
24.	15% more than 80 is __?	
25.	What is 115% of 80?	
26.	92 is 115% of __?	
27.	92 is __% more than 80?	
28.	115% of 80 is __?	
29.	What is 15% less than 80?	
30.	What % of 80 is 68?	
31.	What % less than 80 is 68?	
32.	What % less than 80 is 56?	
33.	What % of 80 is 56?	
34.	What is 20% more than 50?	
35.	What is 30% more than 50?	
36.	What is 140% of 50?	
37.	What % of 50 is 85?	
38.	What % more than 50 is 85?	
39.	What % less than 50 is 35?	
40.	What % of 50 is 35?	
41.	1 is what % of 50?	
42.	6 is what % of 50?	
43.	24% of 50 is?	
44.	24% more than 50 is?	

Percent More or Less—Round 1 [KEY]

Directions: Find each missing value.

1.	100% of 10 is __?	10
2.	10% of 10 is __?	1
3.	10% more than 10 is __?	11
4.	11 is __ % more than 10?	10
5.	11 is __% of 10?	110
6.	11 is 10% more than __ ?	10
7.	110% of 10 is __?	11
8.	10% less than 10 is __?	9
9.	9 is __% less than 10?	10
10.	9 is __% of 10?	90
11.	9 is 10% less than __?	10
12.	10% of 50 is __?	5
13.	10% more than 50 is __?	55
14.	55 is __% of 50?	110
15.	55 is __% more than 50?	10
16.	55 is 10% more than __?	50
17.	110% of 50 is __?	55
18.	10% less than 50 is __?	45
19.	45 is __% of 50?	90
20.	45 is __% less than 50?	10
21.	45 is 10% less than __?	50
22.	40 is __% less than 50?	20

23.	15% of 80 is __?	12
24.	15% more than 80 is __?	92
25.	What is 115% of 80?	92
26.	92 is 115% of __?	80
27.	92 is __% more than 80?	15
28.	115% of 80 is __?	92
29.	What is 15% less than 80?	68
30.	What % of 80 is 68?	85
31.	What % less than 80 is 68?	15
32.	What % less than 80 is 56?	30
33.	What % of 80 is 56?	70
34.	What is 20% more than 50?	60
35.	What is 30% more than 50?	65
36.	What is 140% of 50?	70
37.	What % of 50 is 85?	170
38.	What % more than 50 is 85?	70
39.	What % less than 50 is 35?	30
40.	What % of 50 is 35?	70
41.	1 is what % of 50?	2
42.	6 is what % of 50?	12
43.	24% of 50 is?	12
44.	24% more than 50 is?	62

Percent More or Less—Round 2

Number Correct: _____

Improvement: _____

Directions: Find each missing value.

1.	100% of 20 is __?	
2.	10% of 20 is __?	
3.	10% more than 20 is __?	
4.	22 is __ % more than 20?	
5.	22 is __% of 20?	
6.	22 is 10% more than __ ?	
7.	110% of 20 is __?	
8.	10% less than 20 is __?	
9.	18 is __% less than 20?	
10.	18 is __% of 20?	
11.	18 is 10% less than __?	
12.	10% of 200 is __?	
13.	10% more than 200 is __?	
14.	220 is __% of 200?	
15.	220 is __% more than 200?	
16.	220 is 10% more than __?	
17.	110% of 200 is __?	
18.	10% less than 200 is __?	
19.	180 is __% of 200?	
20.	180 is __% less than 200?	
21.	180 is 10% less than __?	
22.	160 is __% less than 200?	

23.	15% of 60 is __?	
24.	15% more than 60 is __?	
25.	What is 115% of 60?	
26.	69 is 115% of __?	
27.	69 is __% more than 60?	
28.	115% of 60 is __?	
29.	What is 15% less than 60?	
30.	What % of 60 is 51?	
31.	What % less than 60 is 51?	
32.	What % less than 60 is 42?	
33.	What % of 60 is 42?	
34.	What is 20% more than 80?	
35.	What is 30% more than 80?	
36.	What is 140% of 80?	
37.	What % of 80 is 104?	
38.	What % more than 80 is 104?	
39.	What % less than 80 is 56?	
40.	What % of 80 is 56?	
41.	1 is what % of 200?	
42.	6 is what % of 200?	
43.	24% of 200 is?	
44.	24% more than 200 is?	

Percent More or Less—Round 2 [KEY]

Directions: Find each missing value.

1.	100% of 20 is __?	20
2.	10% of 20 is __?	2
3.	10% more than 20 is __?	22
4.	22 is __ % more than 20?	10
5.	22 is __% of 20?	110
6.	22 is 10% more than __ ?	20
7.	110% of 20 is __?	22
8.	10% less than 20 is __?	18
9.	18 is __% less than 20?	10
10.	18 is __% of 20?	90
11.	18 is 10% less than __?	20
12.	10% of 200 is __?	20
13.	10% more than 200 is __?	220
14.	220 is __% of 200?	110
15.	220 is __% more than 200?	10
16.	220 is 10% more than __?	200
17.	110% of 200 is __?	220
18.	10% less than 200 is __?	180
19.	180 is __% of 200?	90
20.	180 is __% less than 200?	10
21.	180 is 10% less than __?	200
22.	160 is __% less than 200?	20

23.	15% of 60 is __?	9
24.	15% more than 60 is __?	69
25.	What is 115% of 60?	69
26.	69 is 115% of __?	60
27.	69 is __% more than 60?	15
28.	115% of 60 is __?	69
29.	What is 15% less than 60?	51
30.	What % of 60 is 51?	85
31.	What % less than 60 is 51?	15
32.	What % less than 60 is 42?	30
33.	What % of 60 is 42?	70
34.	What is 20% more than 80?	96
35.	What is 30% more than 80?	104
36.	What is 140% of 80?	112
37.	What % of 80 is 104?	130
38.	What % more than 80 is 104?	30
39.	What % less than 80 is 56?	30
40.	What % of 80 is 56?	70
41.	1 is what % of 200?	$\frac{1}{2}$
42.	6 is what % of 200?	3
43.	24% of 200 is?	48
44.	24% more than 200 is?	248