

Use a double number line to answer Problems 1–5.

1. Tanner collected 360 cans and bottles while fundraising for his baseball team. This was 40% of what Reggie collected. How many cans and bottles did Reggie collect?
2. Emilio paid \$287.50 in taxes to the school district that he lives in this year. This year's taxes were a 15% increase from last year. What did Emilio pay in school taxes last year?
3. A snowmobile manufacturer claims that its newest model is 15% lighter than last year's model. If this year's model weighs 799 lb., how much did last year's model weigh?
4. Student enrollment at a local school is concerning the community because the number of students has dropped to 504, which is a 20% decrease from the previous year. What was the student enrollment the previous year?
5. The color of paint used to paint a race car includes a mixture of yellow and green paint. Scotty wants to lighten the color by increasing the amount of yellow paint 30%. If a new mixture contains 3.9 liters of yellow paint, how many liters of yellow paint did he use in the previous mixture?

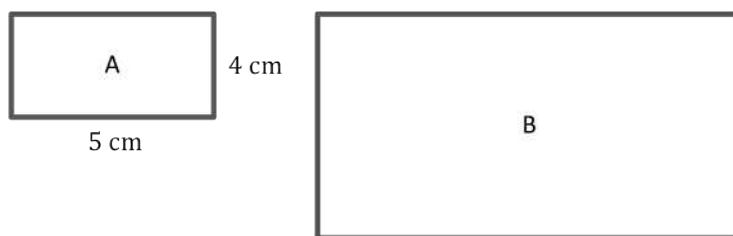
Use factors of 100 and mental math to answer Problems 6–10. Describe the method you used.

6. Alexis and Tasha challenged each other to a typing test. Alexis typed 54 words in one minute, which was 120% of what Tasha typed. How many words did Tasha type in one minute?
7. Yoshi is 5% taller today than she was one year ago. Her current height is 168 cm. How tall was she one year ago?
8. Toya can run one lap of the track in 1 min. 3 sec., which is 90% of her younger sister Niki's time. What is Niki's time for one lap of the track?
9. An animal shelter houses only cats and dogs, and there are 25% more cats than dogs. If there are 40 cats, how many dogs are there, and how many animals are there total?

10. Angie scored 91 points on a test but only received a 65% grade on the test. How many points were possible on the test?

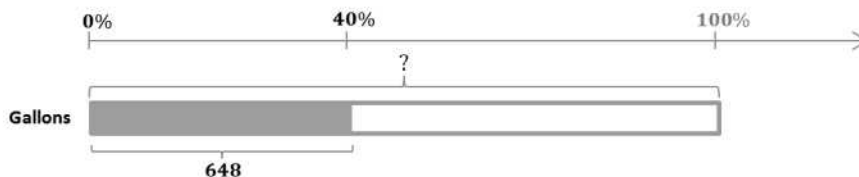
For Problems 11–17, find the answer using any appropriate method.

11. Robbie owns 15% more movies than Rebecca, and Rebecca owns 10% more movies than Joshua. If Rebecca owns 220 movies, how many movies do Robbie and Joshua each have?
12. 20% of the seventh-grade students have math class in the morning. $16\frac{2}{3}\%$ of those students also have science class in the morning. If 30 seventh-grade students have math class in the morning but not science class, find how many seventh-grade students there are.
13. The school bookstore ordered three-ring notebooks. They put 75% of the order in the warehouse and sold 80% of the rest in the first week of school. There are 25 notebooks left in the store to sell. How many three-ring notebooks did they originally order?
14. In the first game of the year, the modified basketball team made 62.5% of their foul shot free throws. Matthew made all 6 of his free throws, which made up for 25% of the team's free throws. How many free throws did the team miss altogether?
15. Aiden's mom calculated that in the previous month, their family had used 40% of their monthly income for gasoline, and 63% of that gasoline was consumed by the family's SUV. If the family's SUV used \$261.45 worth of gasoline last month, how much money was left after gasoline expenses?
16. Rectangle A is a scale drawing of Rectangle B and has 25% of its area. If Rectangle A has side lengths of 4 cm and 5 cm, what are the side lengths of Rectangle B?



17. Ted is a supervisor and spends 20% of his typical work day in meetings and 20% of that meeting time in his daily team meeting. If he starts each day at 7:30 a.m., and his daily team meeting is from 8:00 a.m. to 8:20 a.m., when does Ted's typical work day end?

1. A tank that is 40% full contains 648 gallons of water. Use a double number line to find the maximum capacity of the water tank.



I divided the percent line into intervals of 20% making five intervals of 20% in 100%. I know that I have to divide $\frac{40}{2}$ to get 20, so I divided $\frac{648}{2}$ to get 324 that corresponds with 20%. Since there are five 20% intervals in 100%, there are five 324 gallon intervals in the whole quantity, and $324 \cdot 5 = 1,620$. The capacity of the tank is 1,620 gallons.

2. Loretta picks apples for her grandfather to make apple cider. She brings him her cart with 420 apples. Her grandfather smiles at her and says "Thank you, Loretta. That is 35% of the apples that we need."

Use mental math to find how many apples Loretta's grandfather needs. Describe your method.

420 is 35% of 1,200. 35 is not a factor of 100, but 35 and 100 have a common factor of 5. There are seven intervals of 5% in 35%, so I divided 420 apples into seven intervals; $\frac{420}{7} = 60$. There are 20 intervals of 5% in 100%, so I multiplied as follows:

$$60 \cdot 20$$

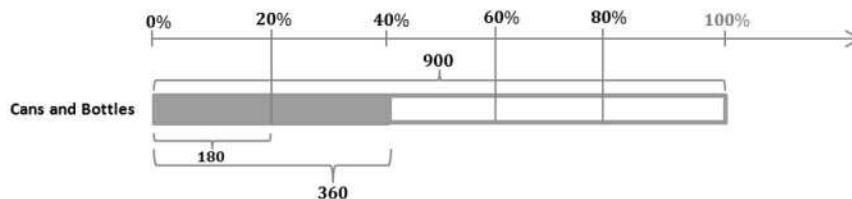
$$60 \cdot 2 \cdot 10$$

$$120 \cdot 10 = 1,200$$

Loretta's grandfather needs a total of 1,200 apples to make apple cider.

Use a double number line to answer Problems 1–5.

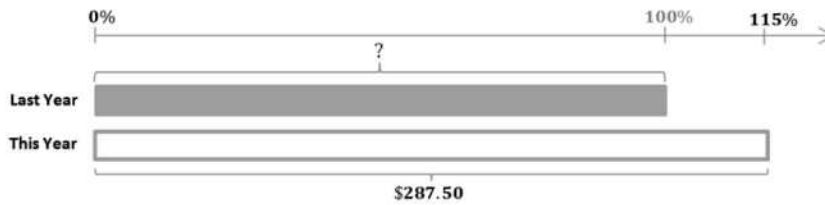
1. Tanner collected 360 cans and bottles while fundraising for his baseball team. This was 40% of what Reggie collected. How many cans and bottles did Reggie collect?



The greatest common factor of 40 and 100 is 20.

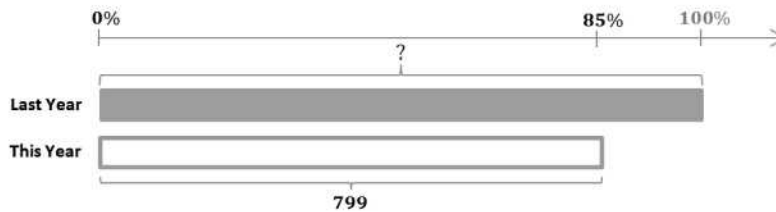
$\frac{1}{2}(40\%) = 20\%$, and $\frac{1}{2}(360) = 180$, so 180 corresponds with 20%. There are five intervals of 20% in 100%, and $5(180) = 900$, so Reggie collected 900 cans and bottles.

2. Emilio paid \$287.50 in taxes to the school district that he lives in this year. This year's taxes were a 15% increase from last year. What did Emilio pay in school taxes last year?



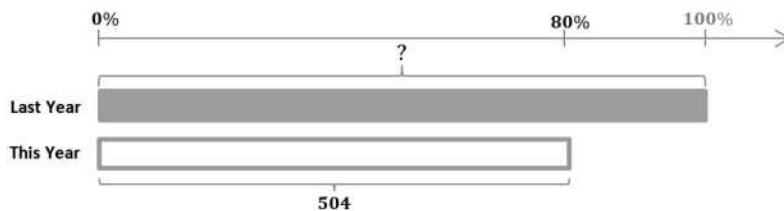
The greatest common factor of 100 and 115 is 5. There are 23 intervals of 5% in 115%, and $\frac{287.5}{23} = 12.5$, so 12.5 corresponds with 5%. There are 20 intervals of 5% in 100%, and $20(12.5) = 250$, so Emilio paid \$250 in school taxes last year.

3. A snowmobile manufacturer claims that its newest model is 15% lighter than last year's model. If this year's model weighs 799 lb., how much did last year's model weigh?



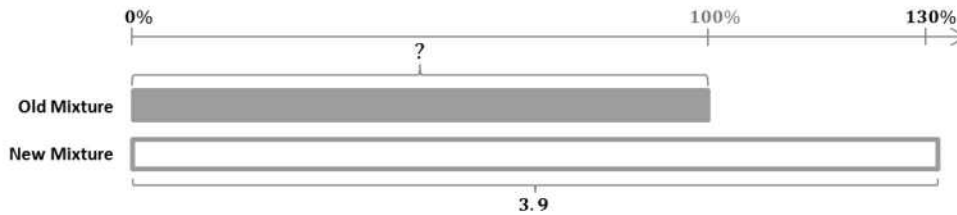
15% lighter than last year's model means 15% less than 100% of last year's model's weight, which is 85%. The greatest common factor of 85 and 100 is 5. There are 17 intervals of 5% in 85%, and $\frac{799}{17} = 47$, so 47 corresponds with 5%. There are 20 intervals of 5% in 100%, and $20(47) = 940$, so last year's model weighed 940 pounds.

4. Student enrollment at a local school is concerning the community because the number of students has dropped to 504, which is a 20% decrease from the previous year. What was the student enrollment the previous year?



A 20% decrease implies that this year's enrollment is 80% of last year's enrollment. The greatest common factor of 80 and 100 is 20. There are 4 intervals of 20% in 80%, and $\frac{504}{4} = 126$, so 126 corresponds to 20%. There are 5 intervals of 20% in 100%, and $5(126) = 630$, so the student enrollment from the previous year was 630 students.

5. The color of paint used to paint a race car includes a mixture of yellow and green paint. Scotty wants to lighten the color by increasing the amount of yellow paint 30%. If a new mixture contains 3.9 liters of yellow paint, how many liters of yellow paint did he use in the previous mixture?



The greatest common factor of 130 and 100 is 10. There are 13 intervals of 10% in 130%, and $\frac{3.9}{13} = 0.3$, so 0.3 corresponds to 10%. There are 10 intervals of 10% in 100%, and $10(0.3) = 3$, so the previous mixture included 3 liters of yellow paint.

Use factors of 100 and mental math to answer Problems 6–10. Describe the method you used.

6. Alexis and Tasha challenged each other to a typing test. Alexis typed 54 words in one minute, which was 120% of what Tasha typed. How many words did Tasha type in one minute?

The greatest common factor of 120 and 100 is 20, and there are 6 intervals of 20% in 120%, so I divided 54 into 6 equal-sized intervals to find that 9 corresponds to 20%. There are five intervals of 20% in 100%, so there are five intervals of 9 words in the whole quantity. $9 \cdot 5 = 45$, so Tasha typed 45 words in one minute.

7. Yoshi is 5% taller today than she was one year ago. Her current height is 168 cm. How tall was she one year ago?

5% taller means that Yoshi's height is 105% of her height one year ago. The greatest common factor of 105 and 100 is 5, and there are 21 intervals of 5% in 105%, so I divided 168 into 21 equal-sized intervals to find that 8 cm corresponds to 5%. There are 20 intervals of 5% in 100%, so there are 20 intervals of 8 cm in the whole quantity. $20 \cdot 8 \text{ cm} = 160 \text{ cm}$, so Yoshi was 160 cm tall one year ago.

8. Toya can run one lap of the track in 1 min. 3 sec., which is 90% of her younger sister Niki's time. What is Niki's time for one lap of the track?

1 min. 3 sec. = 63 sec. The greatest common factor of 90 and 100 is 10, and there are nine intervals of 10 in 90, so I divided 63 sec. by 9 to find that 7 sec. corresponds to 10%. There are 10 intervals of 10% in 100%, so 10 intervals of 7 sec. represents the whole quantity, which is 70 sec. 70 sec. = 1 min. 10 sec. Niki can run one lap of the track in 1 min. 10 sec.

9. An animal shelter houses only cats and dogs, and there are 25% more cats than dogs. If there are 40 cats, how many dogs are there, and how many animals are there total?

25% more cats than dogs means that the number of cats is 125% the number of dogs. The greatest common factor of 125 and 100 is 25. There are 5 intervals of 25% in 125%, so I divided the number of cats into 5 intervals to find that 8 corresponds to 25%. There are four intervals of 25% in 100%, so there are four intervals of 8 in the whole quantity. $8 \cdot 4 = 32$. There are 32 dogs in the animal shelter.

The number of animals combined is $32 + 40 = 72$, so there are 72 animals in the animal shelter.

10. Angie scored 91 points on a test but only received a 65% grade on the test. How many points were possible on the test?

The greatest common factor of 65 and 100 is 5. There are 13 intervals of 5% in 65%, so I divided 91 points into 13 intervals and found that 7 points corresponds to 5%. There are 20 intervals of 5% in 100%, so I multiplied 7 points times 20, which is 140 points. There were 140 points possible on Angie's test.

For Problems 11–17, find the answer using any appropriate method.

11. Robbie owns 15% more movies than Rebecca, and Rebecca owns 10% more movies than Joshua. If Rebecca owns 220 movies, how many movies do Robbie and Joshua each have?

Robbie owns 253 movies, and Joshua owns 200 movies.

12. 20% of the seventh-grade students have math class in the morning. $16\frac{2}{3}\%$ of those students also have science class in the morning. If 30 seventh-grade students have math class in the morning but not science class, find how many seventh-grade students there are.

There are 180 seventh-grade students.

13. The school bookstore ordered three-ring notebooks. They put 75% of the order in the warehouse and sold 80% of the rest in the first week of school. There are 25 notebooks left in the store to sell. How many three-ring notebooks did they originally order?

The store originally ordered 500 three-ring notebooks.

14. In the first game of the year, the modified basketball team made 62.5% of their foul shot free throws. Matthew made all 6 of his free throws, which made up for 25% of the team's free throws. How many free throws did the team miss altogether?

The team attempted 24 free throws, made 15 of them, and missed 9.

15. Aiden's mom calculated that in the previous month, their family had used 40% of their monthly income for gasoline, and 63% of that gasoline was consumed by the family's SUV. If the family's SUV used \$261.45 worth of gasoline last month, how much money was left after gasoline expenses?

The amount of money spent on gasoline was \$415; the monthly income was \$1037.50. The amount left over after gasoline expenses was \$622.50.

16. Rectangle A is a scale drawing of Rectangle B and has 25% of its area. If Rectangle A has side lengths of 4 cm and 5 cm, what are the side lengths of Rectangle B?

$$\text{Area}_A = \text{length} \times \text{width}$$

$$\text{Area}_A = (5 \text{ cm})(4 \text{ cm})$$

$$\text{Area}_A = 20 \text{ cm}^2$$

The area of Rectangle A is 25% of the area of Rectangle B.

$$25\% \times 4 = 100\%$$

$$20 \times 4 = 80$$

So, the area of Rectangle B is 80 cm².

The value of the ratio of area A to area B is the square of the scale factor of the side lengths A: B.

The value of the ratio of area A: B is $\frac{20}{80} = \frac{1}{4}$, and $\frac{1}{4} = \left(\frac{1}{2}\right)^2$, so the scale factor of the side lengths A: B is $\frac{1}{2}$.

So, using the scale factor:

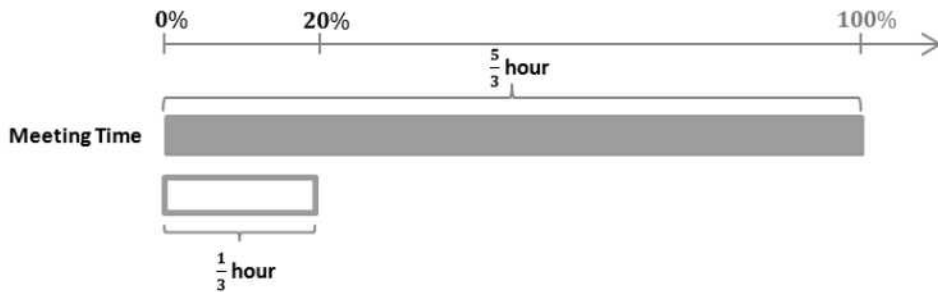
$$\frac{1}{2}(\text{length}_B) = 5 \text{ cm}; \text{length}_B = 10 \text{ cm}$$

$$\frac{1}{2}(\text{width}_B) = 4 \text{ cm}; \text{width}_B = 8 \text{ cm}$$

The dimensions of Rectangle B are 8 cm and 10 cm.



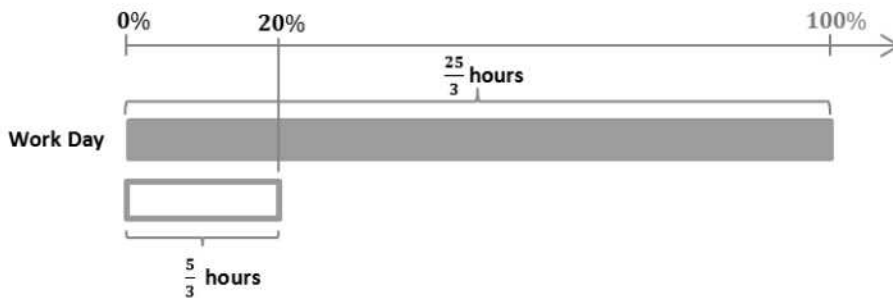
17. Ted is a supervisor and spends 20% of his typical work day in meetings and 20% of that meeting time in his daily team meeting. If he starts each day at 7:30 a.m., and his daily team meeting is from 8:00 a.m. to 8:20 a.m., when does Ted's typical work day end?



20 minutes is $\frac{1}{3}$ of an hour since $\frac{20}{60} = \frac{1}{3}$.

Ted spends $\frac{1}{3}$ hour in his daily team meeting, so $\frac{1}{3}$ corresponds to 20% of his meeting time. There are 5 intervals of 20% in 100%, and $5 \left(\frac{1}{3}\right) = \frac{5}{3}$, so Ted spends $\frac{5}{3}$ hours in meetings.

$\frac{5}{3}$ of an hour corresponds to 20% of Ted's work day.



There are 5 intervals of 20% in 100%, and $5 \left(\frac{5}{3}\right) = \frac{25}{3}$, so Ted spends $\frac{25}{3}$ hours working. $\frac{25}{3}$ hours = $8\frac{1}{3}$ hours.

Since $\frac{1}{3}$ hour = 20 minutes, Ted works a total of 8 hours 20 minutes. If he starts at 7:30 a.m., he works

4 hours 30 minutes until 12:00 p.m., and since $8\frac{1}{3} - 4\frac{1}{2} = 3\frac{5}{6}$, Ted works another $3\frac{5}{6}$ hours after 12:00 p.m.

$\frac{1}{6}$ hour = 10 minutes, and $\frac{5}{6}$ hour = 50 minutes, so Ted works 3 hours 50 minutes after 12:00 p.m., which is 3:50 p.m. Therefore, Ted's typical work day ends at 3:50 p.m.