

# Learn About

## Using Algebra: Per cents and Proportions

Some equations include **per cents**. Equations with per cents have three parts – the per cent, the base and the percentage. Equations with per cents can be written as **proportions** by placing the per cent over 100 and the percentage over the base.

Equation with a per cent	Proportion
$10\% \times 200 = 20$ per cent    base    percentage	$\frac{10}{100} = \frac{20}{200}$ per cent    percentage base

To solve an equation with a per cent, follow these steps:

- Write a proportion using a variable as the unknown.
- Solve the proportion for the variable.

Look at the problem. Find the percentage.

Jill has 24 bracelets, and 25% of the bracelets are made of silver. How many of Jill's bracelets are made of silver?



First, write an equation with a per cent. Then change the equation to a proportion. Finally, solve the proportion for the variable.

$$25\% \times 24 = s$$

$$\frac{25}{100} = \frac{s}{24}$$

$$25 \times 24 = 100s$$

$$600 = 100s$$

$$6 = s$$

Jill has **6** bracelets that are made of silver.



Equations with **per cents** have three parts – the per cent, the base and the percentage. To solve an equation with a per cent, change the equation to a **proportion**.

Look at the answer choices for each question.  
Read why each answer choice is correct or not correct.

1. The table shows the number of minutes Megan spent practising for the first five weeks after she got her guitar. According to the function rule, how many minutes did Megan practise during week 5?

Week ( $n$ )	1	2	3	4	5
Minutes ( $f(n)$ )	14	26	38	50	?

- Ⓐ 60 minutes

This answer is not correct because the function rule for this table is  $f(n) = 12n + 2$ , and  $(12 \times 5) + 2 = 62$ , not 60.

- 62 minutes

This answer is correct because the function rule for this table is  $f(n) = 12n + 2$ , and  $(12 \times 5) + 2 = 62$ .

- Ⓒ 65 minutes

This answer is not correct because the function rule for this table is  $f(n) = 12n + 2$ , and  $(12 \times 5) + 2 = 62$ , not 65.

- Ⓓ 70 minutes

This answer is not correct because the function rule for this table is  $f(n) = 12n + 2$ , and  $(12 \times 5) + 2 = 62$ , not 70.

2. Megan's guitar was on sale when her parents bought it. The regular price of the guitar was \$164, but it was on sale for 15% off. How much did Megan's parents pay for her guitar?

- Ⓐ \$131.20

This answer is not correct because the equations for this problem are  $15\% \times 164 = y$ , and  $164 - y = x$ . The equation  $15\% \times 164 = y$  written as a proportion is  $\frac{15}{100} = \frac{y}{164}$ , and  $y = 24.6$ . Substituting 24.6 into the second equation yields  $164 - 24.6 = 139.4$ , not 131.2.

- \$139.40

This answer is correct because the equations for this problem are  $15\% \times 164 = y$ , and  $164 - y = x$ . The equation  $15\% \times 164 = y$  written as a proportion is  $\frac{15}{100} = \frac{y}{164}$ , and  $y = 24.6$ . Substituting 24.6 into the second equation yields  $164 - 24.6 = 139.4$ .

- Ⓒ \$149.00

This answer is not correct because the equations for this problem are  $15\% \times 164 = y$ , and  $164 - y = x$ . The equation  $15\% \times 164 = y$  written as a proportion is  $\frac{15}{100} = \frac{y}{164}$ , and  $y = 24.6$ . Substituting 24.6 into the second equation yields  $164 - 24.6 = 139.4$ , not 149.

- Ⓓ \$188.60

This answer is not correct because the equations for this problem are  $15\% \times 164 = y$ , and  $164 - y = x$ . The equation  $15\% \times 164 = y$  written as a proportion is  $\frac{15}{100} = \frac{y}{164}$ , and  $y = 24.6$ . Substituting 24.6 into the second equation yields  $164 - 24.6 = 139.4$ , not 188.6.

# Lesson

# 4

Read the passage.  
Then do Numbers 1–5.

## The Artist at Work

Tabitha loves to paint. Every year at the local arts festival, Tabitha displays a collection of her paintings. She typically sells six or seven paintings from her collection.

All of the paintings in her collection this year are either landscapes or portraits. She has a specific way of calculating the cost of each type of painting. For landscape paintings, she multiplies the perimeter in centimetres of the painting by \$4 and adds \$25 to the product. For portraits, she multiplies the perimeter in centimetres of the painting by \$3 and adds \$49 to the product.



1. Let  $p$  equal the perimeter of a painting. Which function will help you find the cost of a landscape painting?

(A)  $\$25p + \$4$   
(B)  $\$49p + \$3$   
(C)  $\$3p + \$49$   
(D)  $\$4p + \$25$

2. The first painting that Tabitha sold at the arts festival was a portrait with a perimeter of 128 centimetres. What was the selling price of this painting?

(A) \$335  
(B) \$433  
(C) \$513  
(D) \$595

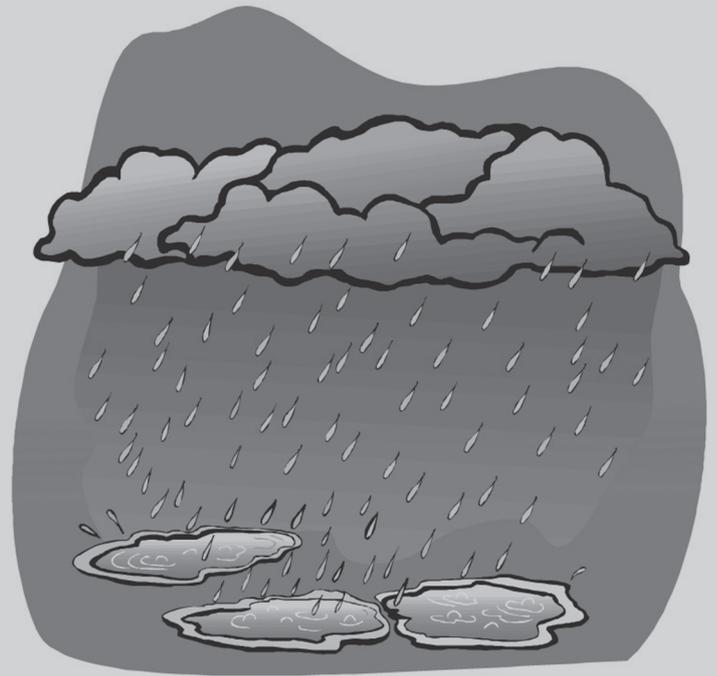
# Lesson 20

Read the passage.  
Then do Numbers 1–5.

## Rain, Rain, Go Away

Chloe stared out the window of the bus with disappointment – rain again. It was nearly impossible to see through the wall of raindrops parachuting from the sky. Chloe was beginning to feel soggy from the inside out. It had been raining continuously for three days, and the weather report was not promising. She wondered how long it would continue to rain and reminisced about warm, sunny summer days. She would welcome a long, hot, dry spell right about now.

When she arrived home, Chloe decided to do a little research on weather patterns and precipitation. Perhaps the weather *could* be worse.



1. Chloe learned that Santa Cruz, in the Canary Islands, averages 22 days of precipitation each year. What is the average annual per cent of rainy days in Santa Cruz? Round to the nearest per cent.

Ⓐ 1%  
Ⓑ 6%  
Ⓒ 17%  
Ⓓ 22%

2. Juneau, in Alaska, averages 223 days of precipitation each year. Which equation can help you find the average per cent of days per year that Juneau receives precipitation?

Ⓐ  $365 \div 223 = p$   
Ⓑ  $365 \times 2.23 = p$   
Ⓒ  $223 \div 365 = p$   
Ⓓ  $2.23 \div 365 = p$

# Self-Assessment 2

Lessons 6–10

*Answer these questions after you have completed Lessons 6–10. Before you begin, re-read what you wrote in Self-Assessment 1.*

## **FOCUS on Using Algebra, Book H**

Name \_\_\_\_\_ Date \_\_\_\_\_

1. Rate your work in Lessons 6–10. Circle your answer.

successful

somewhat successful

needs improvement

2. Did any of the questions give you trouble? \_\_\_\_\_

If so, what kind of trouble did you have?

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Is this the same kind of trouble you had in Lessons 1–5? \_\_\_\_\_

3. Did you find the questions easier or more difficult than those in Lessons 1–5?

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Why do you think this is so?

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4. Did you meet the goal you set for yourself for Lessons 6–10? \_\_\_\_\_

Why or why not?

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5. What is your goal for Lessons 11–15?

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Cut along the dotted line.