4.1 Percents Greater than 100%
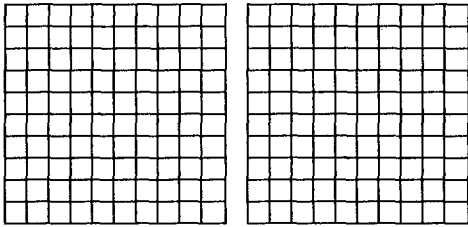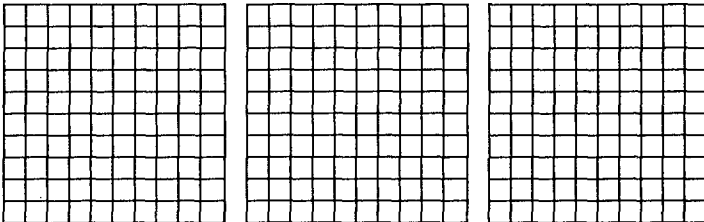
Represent and interpret percents greater than 100%.

1. Represent each percent on the 10-by-10 grids.
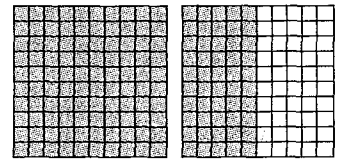   Use one full grid to represent 100%.

   a) 175%

   b) 280%

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Percent means "per one hundred."
To represent a percent greater than 100%, first represent 100%.
Use this representation to show percents greater than 100%.

For example, represent 150% using 10-by-10 grids:

one grid is 100%

100% + 50% = 150%

For example, 150% of 30 = ?
100% of 30 = 30
50% of 30 = 15
150% of 30 = 30 + 15 = 45

2. Solve.

   a) 140% of 80 = _____

   b) 210% of 11 = _____

   c) 160% of 30 = _____

   d) 350% of 50 = _____

3. Calculate each amount.

   a) 250% of $30 = _____

   b) 175% of $30 = _____

   c) 350% of $30 = _____

4. There are 500 students enrolled in David's school.
   This is 175% of the enrollment in the school when it opened 10 years ago.
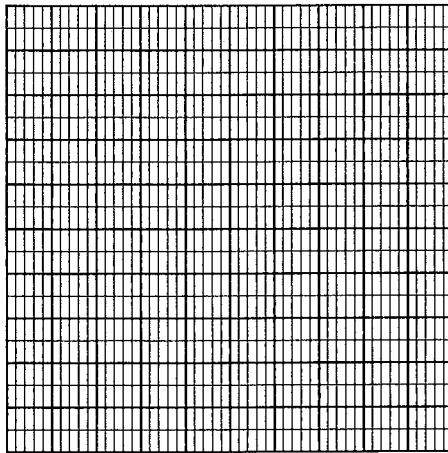   How many students were in David's school when it opened?
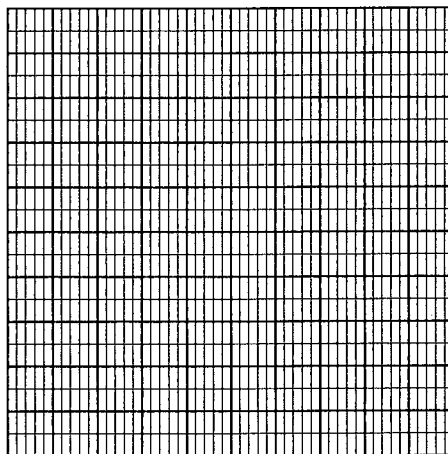
4.2 Fractional Percents

1. Represent each percent on a thousandths grid.

   a) 25.5%

   b) 4.3%

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To represent percents that involve parts of 1%, divide 1% into parts.

For example, you can express 2.5% as 2% + 0.5%. 0.5% is half of 1%.

Represent 2.5% on a thousandths grid.
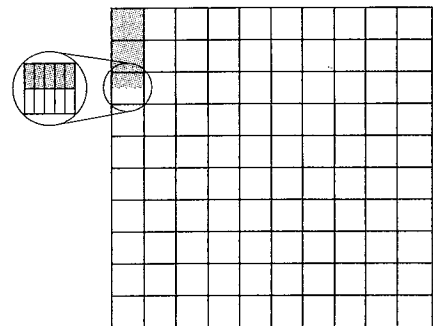
25 thousandths, or $\frac{25}{1000}$

2. Suppose 4% of a container of ice cream is 16 mL. Calculate each amount of ice cream.

   a) 1% = _____   b) 0.1% = _____   c) 1.6% = _____

3. There are 28 students in Darren's class. They make up 18.3% of students in his school. How many students are in his school? _____

4. Is 3.9% of a number always very close to 4% of the same number? Explain.

4.3 Relating Percents to Decimals and Fractions
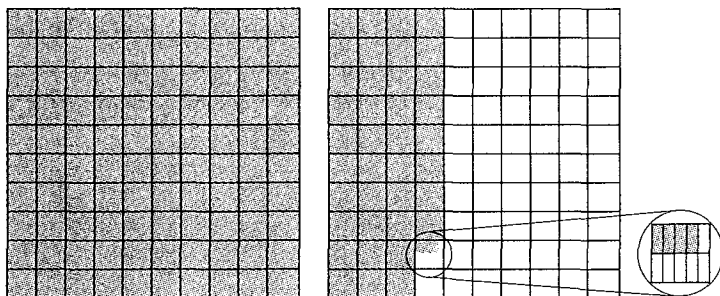
1. Describe the shaded area as a fraction, a decimal, and a percent. Use one full grid to represent 100%.

fraction = _____

decimal = _____

percent = _____%

2. Katie's DVD collection is 350% larger than Mike's. Write the ratio as a fraction and a decimal.

fraction = _____   decimal = _____

3. Complete the table.

Percent	Equivalent fraction	Equivalent decimal
4.8%		
		0.052
	$\frac{133}{100}$	
2.5%		

4.4 Solving Problems Using a Proportion

Solve a percent problem using an equivalent ratio.

1. Solve.

   a) 410% of 89 = _____

   b) 83.5% of 67 = _____

   c) 640% of _____ = 22

2. Sylvia answered 62% of the questions on a math test correctly.
   There were 30 questions on the test.
   How many questions did Sylvia answer correctly?

   _____

3. In 2004, there were 576 students in Daniel's school.
   In 2008, the number of students in Daniel's school was 135.4% of that number.
   How many students were in Daniel's school in 2008?

   _____

4. What number is 75% of 4?

   _____

5. 8 is 40% of what number?

   _____

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To solve a percent problem, you can set up a proportion using an equivalent ratio.

For example, suppose 40 is 160% of a number and you want to solve for the number. Set up a proportion:

$$\frac{40}{\blacksquare} = \frac{160}{100} \Rightarrow \frac{40}{\blacksquare} = \frac{160}{100}$$

$$4\times$$

Since $40 \times 4 = 160$, then $\blacksquare \times 4 = 100$.
Since $25 \times 4 = 100$, then $\blacksquare = 25$.

4.5 Solving Percent Problems Using Decimals

GOAL

Use the decimal representation of a percent to solve a problem.

1. Write equations involving decimals you can use to solve each, then solve the equations.

   a) 13.2% of 87

   b) 85.5% of 298

   c) 146% of 50

   d) 0.5% of 9

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To express a percent as a decimal, express it as a number of hundredths.

For example, what is 124% of 18?

124% is 124 hundredths, or 1.24.

$$124\% \text{ of } 18 = 1.24 \times 18$$
$$= 22.32$$

For example, if 200 is 40% of a number, what is the number?

$$40\% \text{ of number} = 200$$
$$0.40 \times \text{number} = 200$$
$$\text{number} = 200 \div 0.40$$
$$= 500$$

2. Calculate.

   a) 12% of 90 = _____

   b) 175% of 30 = _____

   c) 3.2% of 300 = _____

3. Mike's parents bought him a new computer for $999.
   It was on sale for 75% of the original cost.
   What was the original price?

   $_____

4. Rachel is planning to buy an MP3 player.
   It costs $299, which is 137% of the amount in her bank account.
   How much money has Rachel saved?

   $_____

5. There are 13 students in Marla's class who play in the local volleyball league.
   These students make up 9% of the league. How many students are in the league?

   $_____

4.6 Solve Problems by Changing Your Point of View

You may need a calculator for this lesson.

1. The local football team wants to sell their team photo as a poster for next season. The current photo is 30 cm × 24 cm and must be enlarged to 420% of its original size.

   a) What is the area of the rectangular photo?

   _____ cm²

   b) Explain how you can determine the area of the poster at 420% of the original size.

   _____

   _____

   _____

> **At-Home | Help**
>
> To determine the amount by which to enlarge or reduce an area, express the percent as a decimal.
>
> For example, to enlarge an area of 10.0 m² by 110%:
>
> 110% of 10.0 m² = 1.10 × 10.0
> $$= 11.0 \text{ m}^2$$

   c) Complete the table to show another way to solve the problem.

	Original size	Enlargement or reduction Part 1	Enlargement or reduction Part 2	Total enlargement
Area				
%	100%	20%	400%	420%

   d) How else can you solve this problem using the photo's measurements?

   _____

   _____

   _____

4.7 Solving Percent Problems Using Fractions

GOAL

Create and solve a percent problem using fractions.

1. Write each percent as a fraction.

   a) 75% = _____

   b) 25% = _____

   c) 60% = _____

   d) 15% = _____

2. Girls make up 50% of a Grade 8 math class.
   There are 32 students in the class.
   How many students are girls?

   _____

3. There are 20 students on the school hockey team.
   The hockey players make up 5% of the school's population.
   How many students attend this school?

   _____

4. Angelie saw 15 movies in the past three months.
   They made up 75% of the movies she has seen this year.
   How many movies has she seen this year?

   _____

5. Nathan read 16 graphic novels in the past few weeks.
   They made up 25% of the novels he has read this year.
   How many novels has he read this year?

   _____

4.8 Combining Percents

GOAL

Use percents to solve problems involving two percentages.

1. Determine each amount.

   a) 10% of 100 + 4% of 100

      = _____% of 100

   b) 7% of 100 + 10% of 100

      = _____% of 100

   c) 17% of 100 + 14% of 100

      = _____% of 100

> **At-Home | Help**
>
> You can add percents when they are both a percent of the same amount.
>
> For example,
> 5% of $50 is $2.50 and 7% of $50 is $3.50, so 12% of $50 is $2.50 + $3.50 = $6.00

2. Joan lives in Alberta, where the GST is 5% and there is no PST.
   She plans to buy an MP3 player that is on sale for 15% off the regular price of $99.95.
   Calculate the discounted price and the final cost.

3. Krista wants to buy a DVD. Store A sells the DVD at 10% off the regular price of $19.99.
   Store B sells the same DVD for $22.99, with 15% off. Which store has the better price?

4.9 Percent Change

1. Calculate each increase or decrease.

   a) 35% increase from 15 = _____

   b) 10% decrease from 27 = _____

2. Calculate each percent increase or decrease.

   a) from 150 to 200 = _____%

   b) from 400 to 125 = _____%

> **At-Home | Help**
>
> To calculate a percent increase or decrease, add or subtract that percent to 100% of the original amount.
>
> For example, a 20% increase from 40 is
> 100% of 40 + 20% of 40
> = 120% of 40
> = 1.2 × 40
> = 48
>
> For example, a 20% decrease from 40 is
> 100% of 40 − 20% of 40
> = 80% of 40
> = 0.8 × 40
> = 32

3. A football player increased in mass from 100 kg to 115 kg in the off-season. Muscle makes up $\frac{2}{5}$ of human body weight. What was the percent increase in amount of muscle?

   _____

   _____

4. Calculate the percent increase.

   a) A retailer buys a pair of jeans for $25 and sells the jeans for $95.

   _____

   b) An entertainment store buys CDs for $7 and sells them for $22.95.

   _____

Circle the letter of the correct answer.

1. Calculate the number that is 150% of 10.

   A. 1.5　　　　**B.** 15　　　　**C.** 150　　　　**D.** 0.15

2. Which set of grids represents 175%?

   A.

   C.

   B.

   D.
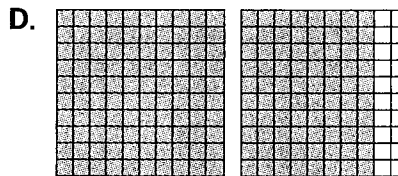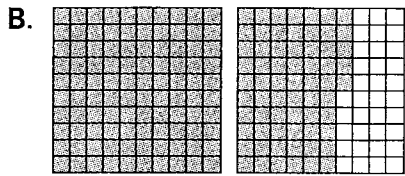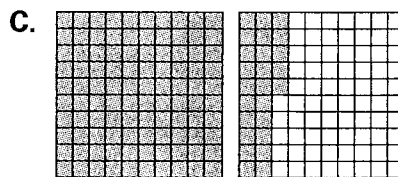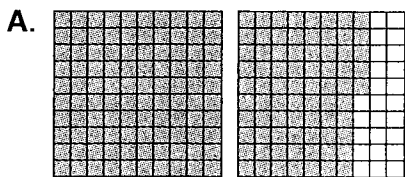
3. The 22 students in Sasha's class make up 8.8% of students in her school. How many students are in her school?

   A. 44　　　　**B.** 88　　　　**C.** 98　　　　**D.** 250

4. Suppose 8% of a yogurt container is 16 mL. How many millilitres are in 3.2%?

   A. 6.4 mL　　　　**B.** 100 mL　　　　**C.** 16 mL　　　　**D.** 8 mL

5. Brett's DVD collection is 225% larger than Jeremy's. Which fraction and decimal express this ratio?

   A. $2\frac{1}{4}$, 1.25　　　**B.** $2\frac{1}{4}$, 22.5　　　**C.** $2\frac{1}{4}$, 2.25　　　**D.** $1\frac{1}{2}$, 2.2

6. Calculate 180% of 42.

   A. 75.6　　　　**B.** 756　　　　**C.** 180　　　　**D.** 84

7. Calculate 135% of 20.

   A. 20   **B.** 40   **C.** 27   **D.** 135

8. Which percent is equivalent to 0.062?

   A. 62%   **B.** 6.2%   **C.** 0.062%   **D.** 0.62%

9. What number is 37.5% of 200?

   A. 72   **B.** 75   **C.** 7.5   **D.** 37.5

10. 42 is 350% of what number?

    A. 13   **B.** 9   **C.** 12   **D.** 15

11. What is 1.5% of 200?

    A. 3   **B.** 15   **C.** 9   **D.** 6

12. There is no provincial sales tax in Alberta. The G.S.T. is 5%. What is the final cost of an item priced at $85.00 in Alberta?

    A. $90.00   **B.** $89.25   **C.** $95.27   **D.** $86.25

13. A model car with a mass of 70 kg is 10% of the mass of the real car. What is the mass of the real car?

    A. 700 kg   **B.** 7000 kg   **C.** 5400 kg   **D.** 7 kg

14. An MP3 player sells for $397.98. What is the total cost including 5% G.S.T. and 7% P.S.T.?

    A. $445.74   **B.** $47.75   **C.** $425.83   **D.** $417.87

15. A DVD player sells for $299.98. What is the total cost including 5% G.S.T. and 7% P.S.T.?

    A. $299.98   **B.** $335.98   **C.** $314.98   **D.** $320.98

16. In Calgary, the average amount of snowfall is 12 cm in October and 16 cm in November. Which percent expresses this increase?

    A. 50%   **B.** 30%   **C.** 150%   **D.** 133%