INTRODUCTION

Trades workers use percent to calculate proportions of mixtures and discounts and increases for equipment and material purchases or rentals. Percent is also used to calculate wages, taxes, and increases or decreases in production.

When you have completed this chapter you will be able to:

- ❒ Convert between fractions, decimals and percentages.
- ❒ Calculate percentage increases and decreases.
- ❒ Solve percentage word problems.
- ❒ Solve applications using percent.

WHAT IS PERCENT?

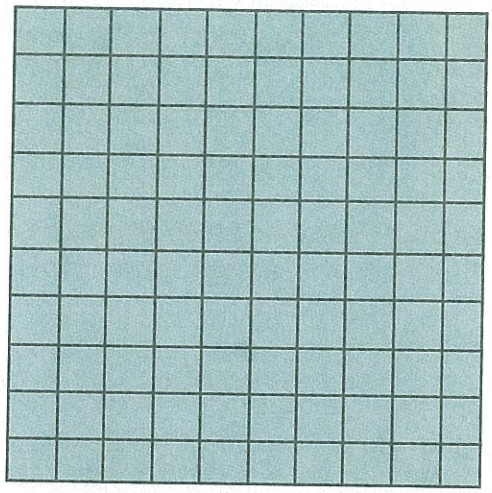
Percent is used to calculate interest, mark-up, discounts and tax rates. Trades Workers use percent to calculate proportions of mixtures, waste, swell factors and shrink factors.

Percent means per hundred and is a ratio that expresses a quantity out of one hundred. It is shown by the sign %.

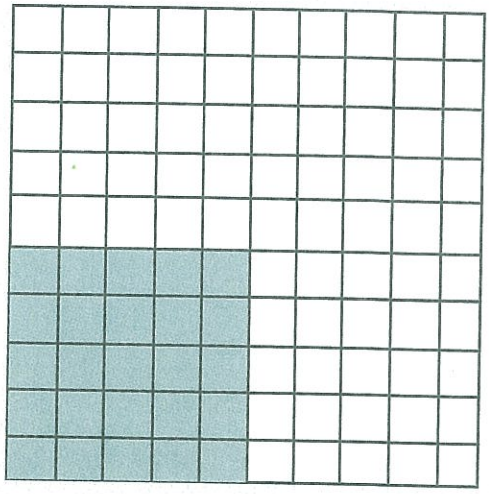
Hint:

Percent is similar to "decimals of a foot", working to two decimal places. Example: 7" = .58" or 58% of 12"

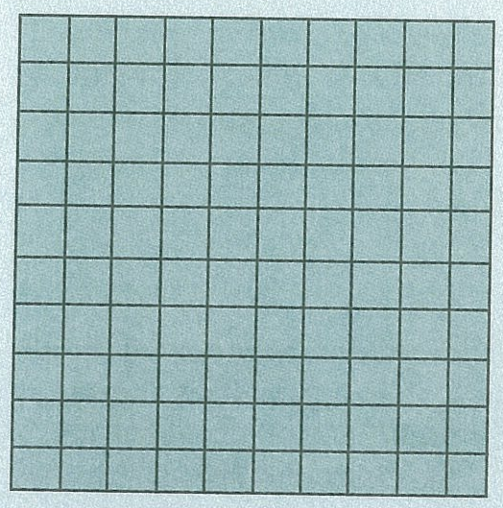
Example :

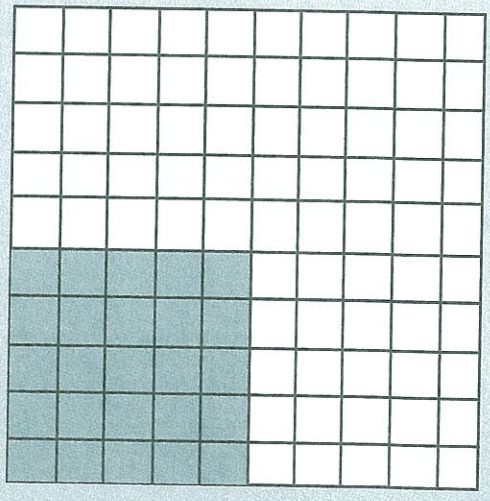


100% = 1 hundred parts or one whole object



25% = 25 parts out of a hundred





125% = 1 one whole object and 25 parts of another

Converting Between Percents, Decimals and Fractions

To make it easier to use your calculator and perform percent calculations, you need to know how to convert between percents, decimals and fractions.

Percent has the same value as:

- a decimal with two places (hundredths)
  $25\% = .25$
- a fraction with a denominator of 100
  $25\% = \frac{25}{100}$

Converting Percents to Decimals

Step 1: Convert fractions to decimals.

Step 2: Drop the % symbol.

Step 3: Move the decimal point 2 places to the left.

Example 1:

Change 19% to a decimal.

19% = 19 Drop the % symbol.

19 = 0.19 Move the decimal point 2 places to the left.

Example 2:

Change 16.2% to a decimal.

16.2% = 16.2 Drop the % symbol.

16.2 = 0.162 Move the decimal point 2 places to the left.

Example 3:

Change 3% to a decimal.

3% = 3 Drop the % symbol.

3 = 0.03 Move the decimal point 2 places to the left.

Example 4:
Convert 127% to a decimal.
127% = 127 Drop the % symbol.
127 = 1.27 Move the decimal point 2 places to the left.

Example 5:
Convert $22\frac{1}{2}$% to a decimal.
$22\frac{1}{2}\% = 22.5\%$ Convert fractions to decimals.
22.5% = 22.5 Drop the % symbol.
22.5 = 0.225 Move the decimal point 2 places to the left.

Example 6:
Convert $\frac{1}{4}$% to a decimal.
$\frac{1}{4}\% = 0.25\%$ Convert fractions to decimals.
.25% = 0.25 Drop the % symbol.
0.25 = 0.0025 Move the decimal point 2 places to the left.

Convert the following percent to decimals.

1) 18%
2) 25%
3) 32%
4) 88%
5) 6%
6) 3%
7) 9%
8) 13.8%
9) 21.6%
10) 74.51%
11) 100%
12) 200%
13) $2\frac{1}{2}$%
14) $26\frac{1}{4}$%
15) $36\frac{1}{4}$%
16) $18\frac{7}{10}$%
17) $215\frac{1}{2}$%
18) $9\frac{1}{4}$%
19) $122\frac{3}{4}$%
20) $2\frac{4}{5}$%

Converting Decimals to Percents

Step 1: Move the decimal point two places to the right.

Step 2: Add the % symbol.

Example 1:

Convert 0.19 to a percent.

0.19 = 19 Move the decimal point two places to the right.

19 = 19% Add the % symbol.

Example 2:

Convert 0.225 to a percent.

0.225 = 22.5 Move the decimal point two places to the right.

22.5 = 22.5% Add the % symbol.

Example 3:

Convert 1.25 to a percent.

1.25 = 125 Move the decimal point two places to the right.

125 = 125% Add the % symbol.

Convert the following decimals to percents.

1) 0.25	2) 0.50	3) 0.75	4) 1.0
5) 0.11	6) 0.17	7) 0.39	8) 0.86
9) 0.04	10) 0.12	11) 0.07	12) 0.115
13) 0.256	14) 0.333	15) 1.74	16) 0.185
17) 0.74	18) 0.1234	19) 1.21	20) 0.998

Hint:

Refer to the decimals chapter for more information about working with decimals.

Converting Percents to Fractions

Step 1: Write the number over a denominator of 100 and drop the % symbol.

Step 2: Express the fraction in lowest terms.

Example 1:

Convert 80% to a fraction.

$80\% = \frac{80}{100}$ Write the number over a denominator of 100 and drop the % symbol.

$\frac{80}{100} = \frac{8}{10} = \frac{4}{5}$ Express the fraction in lowest terms.

Example 2:

Convert 170% to a fraction.

$170\% = \frac{170}{100}$ Write the number over a denominator of 100 and drop the % symbol.

$\frac{170}{100} = 1\frac{70}{100} = 1\frac{7}{10}$ Express the fraction in lowest terms.

Hint:

Refer to the chapter on fractions for more information about working with fractions.

Remember:

Express fractions in lowest terms.

Convert the following percent to fractions, whole numbers or mixed numbers.

1) 75% 2) 25% 3) 50% 4) 60%

5) 39% 6) 45% 7) 119% 8) 125%

9) 300% 10) 800% 11) 1100% 12) 80%

13) 17.7% 14) 21.3% 15) 4.7% 16) 10.5%

Converting Fractions to Percents

Step 1: Convert the fraction to a decimal by dividing the numerator by the denominator.

Step 2: Move the decimal point two places to the right and add the % sign.

Example 1:

Convert $\frac{1}{4}$ to a percent.

$\frac{1}{4} = 0.25$ Convert the fraction to a decimal by dividing the numerator by the denominator.

$0.25 = 25\%$ Move the decimal point two places to the right and add the % sign.

Example 2:

Convert $1\frac{1}{4}$ to a percent.

$1\frac{1}{4} = 1.25$ Convert the fraction to a decimal by dividing the numerator by the denominator.

$1.25 = 125\%$ Move the decimal point two places to the right and add the % sign.

Convert the following fractions to percent.

1) $\frac{1}{4}$ 2) $\frac{1}{2}$ 3) $\frac{3}{4}$ 4) $\frac{1}{10}$

5) $\frac{1}{8}$ 6) $\frac{5}{8}$ 7) $\frac{7}{10}$ 8) $\frac{3}{16}$

9) $\frac{7}{8}$ 10) $\frac{7}{16}$ 11) $5\frac{4}{5}$ 12) $\frac{1}{16}$

13) 25 14) $9\frac{5}{16}$ 15) $\frac{3}{32}$ 16) $1\frac{1}{32}$

17) $\frac{11}{16}$ 18) $8\frac{3}{4}$ 19) $1\frac{1}{2}$ 20) $3\frac{9}{10}$

Complete the table below with the missing percent, decimal or fraction.

Percent	Decimal	Fraction
	0.0625	
		$\frac{1}{8}$
		$\frac{3}{16}$
25%		
31.25%		
	.375	
	.4375	
		$\frac{1}{2}$
		$\frac{9}{16}$
62.5%		
	.6875	
75%		
		$\frac{13}{16}$
		$\frac{7}{8}$
	.9375	
	1.00	

Calculating Percent

Percent describes a part of a whole. It compares two numbers: percent to the standard or base. You can calculate percent using either the percent formula or ratio/proportion. The examples demonstrate how to calculate percent using both methods. Try both methods and then decide which method you prefer.

- Percent formula:

P = B × R
P = Percentage or part that is being compared with the base.
B = Base or the total amount.
R = Rate is the percent or a number over one hundred.

- Ratio/proportion:

$$\frac{\text{percentage}}{\text{base}} = \frac{\text{rate}}{100}$$

Hint:
Refer to the Ratio/Proportion chapter for more information about working with ratios and proportions.

When you solve a problem using percent, you are calculating one of three things:

- the **Percentage** of a number
- the **Rate** or percent one number is of another
- the **Base** when the percent is known

Each of these is explained below.

Calculating the Percentage of a Number

Step 1: Write the formula.

Step 2: Convert percents to decimals.

Step 3: Substitute known values into the formula.
Multiply base (B) times rate (R).

Step 4: Check your answer. Substitute the answer into the formula.
Cross multiply.

Answers on both sides of the equal sign should be the same.

Example 1:

Calculate 25% of 350.

Using the Percent Formula

$P = B \times R$	Write the formula.
$25\% = .25$	Convert percents to decimals.
$P = 350 \times .25$	Substitute known values into the formula. Multiply B times R.
$P = 87.5$	Twenty-five percent of 350 is 87.5.

Example 2:

Calculate 25% of 350.

Using Ratio/Proportion

$\frac{\text{percentage}}{\text{base}} = \frac{\text{rate}}{100}$ Set up the proportion.

$\frac{P}{350} = \frac{25}{100}$ Substitute known values into the proportion and cross multiply.

$100P = 350 \times 25$

$100P = 8\,750$

$P = \frac{8\,750}{100}$

$P = 87.5$ Twenty-five percent of 350 is 87.5.

Hint:

Checking your Answer.
Step 1: Substitute your answer into the formula.
Step 2: Check your answer by cross multiplying to see that they are equal.

Calculate the following percents.

1) 10% of 100 2) 25% of 200 3) 45% of 75 4) 7% of 50

5) 45% of 25 6) 11% of 60 7) 75% of 350 8) 39% of 80

9) 115% of 65 10) 125% of 200 11) 110% of 100 12) 14% of 35

13) 10.5% of 80 14) 30% of 180 15) 22.5% of 360 16) 37.5% of 600

CALCULATING THE RATE

Sometimes you know the base and the percentage, but need to calculate the rate. You use the same basic formula but need to move the variables around a bit so you can solve for R.

Step 1: Write the formula.

Step 2: Substitute known values into the formula. Divide percentage (P) by base (B).

Step 3: Convert the decimal to a percent. Move the decimal 2 places to the right.

Hint:

Whatever you do on one side of the equal sign you have to do on the other.

Example 1:

15 is what percent of 75?

Using the Percent Formula

$P = B \times R$	Write the formula.
$15 = 75 \times R$	Substitute known values into the formula.
$\frac{15}{75} = R$	Divide P by B.
$0.2 = R$	
$0.2 = 20\%$	Convert the decimal to a percent. Move the decimal 2 places to the right.

Fifteen is 20% of 75.

Example 2:

15 is what percent of 75?

Using Ratio/Proportion

$\frac{\text{percentage}}{\text{base}} = \frac{\text{rate}}{100}$	Set up the proportion.
$\frac{15}{75} = \frac{R}{100}$	Substitute known values into the proportion and cross-multiply.
$15 \times 100 = 75R$	
$\frac{1500}{75} = R$	
$20\% = R$	Notice that answer is the percent.

Fifteen is 20% of 75.

Calculate the following rates. Round off to the nearest tenth.

1) 25 is what percent of 525?

2) 7 is what percent of 65?

3) 65 is what percent of 1 700?

4) 11 is what percent of 45?

5) 4 is what percent of 15?

6) 75 is what percent of 180?

7) 34 is what percent of 100?

8) 14 is what percent of 199?

9) 10 is what percent of 100?

10) 10 is what percent of 200?

11) 9 is what percent of 100?

12) 41 is what percent of 100?

13) 36 is what percent of 3 255?

14) 8 is what percent of 70?

15) 186 is what percent of 750?

16) 95 is what percent of 220?

CALCULATING THE BASE

Sometimes you know the rate and the percentage, but need to calculate the base. You use the same basic formula but need to move the variables around a bit so you can solve for base (B).

Step 1: Write the formula.

Step 2: Convert the percent to a decimal.

Step 3: Substitute known values into the formula. Divide percent (P) by rate (R).

Example 1:

25% of what number is 8?

Using the Percent Formula

$P = B \times R$ Write the formula.

$25\% = 0.25$ Convert the percent to a decimal.

$8 = B \times 0.25$ Substitute known values into the formula. Divide P by R.

$\frac{8}{0.25} = B$

$32 = B$

Twenty-five percent of 32 is 8.

Example 2:

25% of what number is 8?

Using Ratio/Proportion

$\frac{\text{percentage}}{\text{base}} = \frac{\text{rate}}{100}$ Set up the proportion.

$\frac{8}{B} = \frac{25}{100}$ Substitute known values into the proportion and cross multiply.

$8 \times 100 = 25 \times B$

$\frac{800}{25} = B$

$32 = B$

Twenty-five percent of 32 is 8.

Calculate the following bases. Round answers to the nearest tenth.

1) 25% of what number is 30?

2) 10% of what number is 86?

3) 75% of what number is 5?

4) 14% of what number is 65?

5) 80% of what number is 45?

6) 12% of what number is 15?

7) 42% of what number is 21?

8) 15% of what number is 100?

9) 25% of what number is 4?

10) 12% of what number is 75?

11) 20% of what number is 100?

12) 10% of what number is 61.5?

13) 5% of what number is 14.7?

14) 75% of what number is 125?

15) 30% of what number is 21?

16) 7% of what number is 15.5?

Calculating Increases and Decreases Using Percent

Calculating an Increase

Trade workers often estimate the amount of materials needed to complete a job. Estimating materials means adding on a percentage for waste, for example, concrete spillage and soil swell factors.

When you calculate an increase, you work with percentages that are greater than one hundred. For example, you may include 5% waste for the hardwood flooring required to complete a job. This means adding 5% onto the actual amount of hardwood flooring required.

Example 1:

The estimated concrete volume required for a concrete wall and footing is 30 cubic yards. An additional 10% of concrete is needed for spillage and priming the concrete pump.

Calculate the total cubic yards of concrete required.

One way to solve this type of problem is to calculate 10% of 30 cubic yards and then add the 10% to the original 30 cubic yards.

Another way is to think of the required concrete, 30 cubic yards, as equal to 100% plus 10% for spillage and priming the concrete pump for a total of 110%. Solving the problem this way allows you to calculate the total concrete required using one calculation.

Using Percent

$P = B \times R$	Write the formula.
$110\% = 1.10$	Add the percent waste to 100%. Convert the percent to a decimal.
$P = 30 \times 1.10$	Substitute known values into the formula. Multiply B times R.
$P = 33$	

The total amount of concrete required is 33 cubic yards.

Example 2:

Using Ratio/Proportion

$\frac{\text{percentage}}{\text{base}} = \frac{\text{rate}}{100}$ Set up the proportion.

$\frac{P}{30} = \frac{110}{100}$ Substitute known values into the proportion and cross multiply.

$100 \times P = 30 \times 110$

$100P = 3\,300$

$P = \frac{3\,300}{100}$

$P = 33$

The total amount of concrete required is 33 cubic yards.

Calculate the following.

1) A contractor estimated 45 cubic yards of concrete was required to pour a concrete wall and footing, plus 10% for spillage and priming the concrete pump. Calculate the total cubic yards of concrete required. Hint: Calculate the percentage (P).

2) It was estimated that 392 lineal feet of strip flooring was required to cover a 12' by 14' room. It actually took 439 lineal feet to cover the room. Calculate the percentage of waste. Hint: Calculate the rate (R).

3) A contractor invoiced an owner for $13,500 including 12.5% profit. Calculate the contractor's original costs before profit. Hint: Find the base(B).

CALCULATING A DECREASE

A decrease is the opposite of an increase. When you calculate a decrease, you work with percentages that are less than one hundred. This means the decrease is subtracted from the original amount. For example, a discounted tool or piece of equipment has been reduced from the original price, an apprentice's rate of pay is a percentage of the journeyperson's rate of pay, and the breaking strength of rope with a bend or knot in it is a percentage of the breaking strength of rope without bends or knots.

Example 1:

The breaking strength of $\frac{3}{4}$" nylon rope is 2 800 pounds under tension. If a knot is tied in the nylon rope the strength is reduced by 50%. Calculate the breaking strength of $\frac{3}{4}$" nylon rope with a knot tied in it.

Using the Percent Formula

$P = B \times R$	Write the formula.
$50\% = 0.50$	Subtract the percent from 100 and change to a decimal.
$P = .50 \times 2\ 800$	Substitute the known values into the formula. Multiply B times R.
$P = 1\ 400$ pounds	

The breaking strength of $\frac{3}{4}$" nylon rope with a knot tied in it is 1 400 pounds.

Example 2:

Using Ratio/Proportion

$\frac{\text{percentage}}{\text{base}} = \frac{\text{rate}}{100}$ Set up the proportion.

$\frac{P}{2\ 800} = \frac{50}{100}$ Substitute known values into the proportion and cross multiply.

$P \times 100 = 50 \times 2\ 800$

$100P = 140\ 000$

$P = \frac{140\ 000}{100}$

$P = 1\ 400$ pounds

The breaking strength of $\frac{3}{4}$" nylon rope with a knot tied in it is 1 400 pounds.

Calculate the following decreases.

1) The breaking strength of $\frac{1}{2}$" polyester rope is 1 200 pounds under tension. If a hitch is tied in the polyester rope the strength is reduced by 25%. Calculate the breaking strength of $\frac{1}{2}$" polyester rope with a hitch tied in it.

2) The breaking strength of a $\frac{5}{8}$" nylon rope is 2 000 pounds. Its strength is reduced by 10% when it is wet. What would the breaking strength of the nylon rope be when it is wet?

3) A table saw that retails for $215 is on sale at 20% off. What is the sale price of the saw?

PRACTICE

1) A contractor has to pay 7% PST plus 7% GST on $3 776 worth of building material.

   a) Calculate the total amount of tax paid on $3 776.

   b) Calculate the total paid including taxes.

2) A building had 35 cylindrical columns that needed to be poured. 60% of the columns were poured in the morning, and 40% were poured in the afternoon.

a) How many columns were poured in the morning?

b) How many columns were poured in the afternoon?

3) The total membership in a union is 3 208 members. 87.5% of the membership voted on the collective agreement. How many members voted?

4) A worker paid 21% income tax on his total earnings of $34 850. How much income tax did the worker pay?

5) A lumber supplier makes 16% profit on what is sold. If $2 845.50 of lumber is sold, what is the supplier's profit?

6) Twenty of a total of 32 joists were installed before coffee break. What percent was installed?

7) A worker had $256.20 deducted from his paycheck. His gross (total before deductions) earnings were $1 220.00. Calculate the percent of deductions.

Hint:

You are calculating a decrease.

8) A lot takes up 43 560 square feet. The house and outbuildings occupy 6 534 square feet of the property. What percentage of the lot is taken up by the house and outbuildings?

9) A tool store offered a 15% discount to union carpenters. Calculate the discount price on the following tools:

a) $254.80 saw

Hint:

You are calculating a decrease.

b) $12.60 crow bar

c) $38.40 level

10) Out of a total membership of 3 216 carpenters, 2 412 voted on a referendum.

a) What percentage of the membership voted?

b) What percentage did not vote?

11) The area of a floor is 125 square metres. There is a lumber allowance of 25% for waste and matching. How much flooring is needed?

12) The labour and material for renovating a building cost $4 375. Of this amount, 65% went for the cost of labour and the balance went for the cost of material.

a) What was the labour cost?

b) What was the material cost?

13) The labour and material for renovating a building cost $8 520. Seventy-eight percent of this amount was the cost for labour and the balance was the cost of material.

a) What was the labour cost?

b) What was the material cost?

14) It took a total of 8 545 hours to complete a job. Concrete formwork took 45% of the total hours. Calculate the number of hours spent on concrete formwork.

15) A double glazed window cost $585.00. The materials allowance to install the window is $4\frac{1}{2}\%$ of the cost. Calculate the total cost to the customer.

16)

The table, *Wage Scale as a Percentage of Employer's Journeyperson Wage.*, gives the percentage of a journeyperson's wage that an apprentice earns over a specific term. For example, an apprentice in the fifth month of apprenticeship would earn 50% of a journeyperson's wage. An apprentice in the first half of the third year of apprenticeship would earn 70% of a journeyperson's wage.

Calculate the hourly apprentice wage rates, based on a journeyperson rate of $25.40. The apprenticeship is a four-year term.

Wage Scale as a Percentage of Employer's Journeyperson Wage Period

Period (in months)	0-6	7-12	13-18	19-24	25-30	31-36	37-42	43-48	49-54	55-60
Five-year term	50%	55%	60%	65%	70%	75%	80%	80%	90%	90%
Four-year term	50%	55%	60%	65%	70%	75%	80%	90%		
Three-year term	50%	55%	65%	70%	80%	90%				
Two-year term	50%	60%	75%	90%						
One-year term	50%	90%								

a) What percentage of the journeyperson rate would an apprentice in the 34th month of apprentice earn?

b) How much does a carpentry apprentice in the 34th month of apprenticeship earn per hour?

c) How much does a carpentry apprentice in the first half of the third year apprenticeship earn per hour?

d) Calculate the hourly wage of a carpentry apprentice in the last half of the fourth year of apprenticeship.

Answer Key

Percent

Page 64, **Converting Percents to Decimals**

1) 0.18 2) 0.25 3) 0.32 4) 0.88

5) 0.06 6) 0.03 7) 0.09 8) 0.138

9) 0.216 10) 0.7451 11) 1.0 12) 2.0

13) 2.5 = 0.025 14) 26.25 = 0.2625

15) 36.25 = 0.3625 16) 18.7 = 0.187

17) 215.5 = 2.155 18) 9.25 = 0.0925

19) 122.75 = 1.2275 20) 2.8 = 0.028

Page 65, **Converting Decimals to Percents**

1) 25% 2) 50% 3) 75% 4) 100%

5) 11% 6) 17% 7) 39% 8) 86%

9) 4% 10) 12% 11) 7% 12) 11.5%

13) 25.6% 14) 33.3% 15) 174% 16) 18.5%

17) 74% 18) 12.34% 19) 121% 20) 99.8%

Page 66, **Converting Percents to Fractions**

1) $\frac{75}{100} = \frac{3}{4}$ 2) $\frac{25}{100} = \frac{1}{4}$ 3) $\frac{50}{100} = \frac{1}{2}$ 4) $\frac{60}{100} = \frac{6}{10} = \frac{3}{5}$

5) $\frac{39}{100}$ 6) $\frac{45}{100} = \frac{9}{20}$ 7) $\frac{119}{100} = 1\frac{19}{100}$ 8) $\frac{125}{100} = 1\frac{25}{100} = 1\frac{1}{4}$

9) $\frac{300}{100} = 3$ 10) $\frac{800}{100} = 8$ 11) $\frac{1100}{100} = 11$ 12) $\frac{80}{100} = \frac{8}{10} = \frac{4}{5}$

13) $\frac{177}{1000}$ 14) $\frac{213}{1000}$

15) $\frac{47}{1000}$ 16) $\frac{105}{1000} = \frac{21}{200}$

Page 67, **Converting Fractions to Percents**

1) 0.25 = 25%
2) 0.50 = 50%
3) 0.75 = 75%
4) 0.10 = 10%
5) 0.125 = 12.5%
6) 0.625 = 62.5%
7) 0.70 = 70%
8) 0.1875 = 18.75%
9) 0.875 = 87.5%
10) 0.4375 = 43.75%
11) 5.80 = 580%
12) 0.0625 = 6.25%
13) 25.00 = 2 500%
14) 9.3125 = 931.25%
15) 0.09375 = 9.375%
16) 1.03125 = 103.125%
17) 0.6875 = 68.75%
18) 8.75 = 875%
19) 1.50 = 150%
20) 3.90 = 390%

Page 68, **Complete the table below with the missing percent, decimal or fraction.**

Percent	Decimal	Fraction
6.25%	0.0625	$\frac{1}{16}$
12.5%	0.125	$\frac{1}{8}$
18.75%	0.1875	$\frac{3}{16}$
25%	0.25	$\frac{1}{4}$
31.25%	0.3125	$\frac{5}{16}$
37.5%	0.375	$\frac{3}{8}$
43.75%	0.4375	$\frac{7}{16}$
50%	0.50	$\frac{1}{2}$
56.25%	0.5625	$\frac{9}{16}$
62.5%	0.625	$\frac{5}{8}$
68.75%	0.6875	$\frac{11}{16}$
75%	0.75	$\frac{3}{4}$
81.25%	0.8125	$\frac{13}{16}$
87.5%	0.875	$\frac{7}{8}$
93.75%	0.9375	$\frac{15}{16}$
100%	1.00	1

Page 70, **Calculating the Percentage of a Number**

1) $0.10 \times 100 = 10$ 2) $0.25 \times 200 = 50$ 3) $0.45 \times 75 = 33.75$

4) $0.07 \times 50 = 3.5$ 5) $0.45 \times 25 = 11.25$ 6) $0.11 \times 60 = 6.6$

7) $0.75 \times 350 = 262.5$ 8) $0.39 \times 80 = 31.2$

9) $1.15 \times 65 = 74.75$ 10) $1.25 \times 200 = 250$

11) $1.10 \times 100 = 110$ 12) $0.14 \times 35 = 4.9$

13) $0.105 \times 80 = 8.4$ 14) $0.30 \times 180 = 54$

15) $0.225 \times 360 = 81$ 16) $0.375 \times 600 = 225$

Page 72, **Calculating the Rate**

1) $\frac{25}{525} = 0.048 = 4.8\%$ 2) $\frac{7}{65} = 0.108 = 10.8\%$ 3) $\frac{65}{1700} = 0.038 = 3.8\%$

4) $\frac{11}{45} = 0.244 = 24.4\%$ 5) $\frac{4}{15} = 0.267 = 26.7\%$ 6) $\frac{75}{180} = 0.417 = 41.7\%$

7) $\frac{34}{100} = 0.34 = 34\%$ 8) $\frac{14}{199} = 0.07 = 7\%$ 9) $\frac{10}{100} = 0.1 = 10\%$

10) $\frac{10}{200} = 0.05 = 5\%$ 11) $\frac{9}{100} = 0.09 = 9\%$ 12) $\frac{41}{100} = 0.41 = 41\%$

13) $\frac{36}{3255} = 0.011 = 1.1\%$ 14) $\frac{8}{70} = 0.114 = 11.4\%$

15) $\frac{186}{750} = 0.248 = 24.8\%$ 16) $\frac{95}{220} = 0.432 = 43.2\%$

Page 74, **Calculating the Base**

1) $\frac{30}{0.25} = 120$ 2) $\frac{86}{0.10} = 860$ 3) $\frac{5}{0.75} = 6.7$

4) $\frac{65}{0.14} = 464.3$ 5) $\frac{45}{0.80} = 56.3$ 6) $\frac{15}{0.12} = 125$

7) $\frac{21}{0.42} = 50$ 8) $\frac{100}{0.15} = 666.7$ 9) $\frac{4}{0.25} = 16$

10) $\frac{75}{0.12} = 625$ 11) $\frac{100}{0.20} = 500$ 12) $\frac{61.5}{0.10} = 615$

13) $\frac{14.7}{0.05} = 294$ 14) $\frac{125}{0.75} = 166.7$ 15) $\frac{21}{0.30} = 70$

16) $\frac{15.5}{0.07} = 221.4$

Page 76, **Calculating an Increase**

1) P = 45 × 1.10 = 49.5
The total amount of concrete required is 49.5 cubic yards.

2) $\frac{439}{392}$ = R

1.119 = R
111.9%
111.989 – 100 = 11.989%
The percentage of waste is 12%.

3) $\frac{13\ 500}{1.125}$ = B

12 000 = B
The contractor's original costs were $12 000.

Page 78, **Calculating a Decrease**

1) P = 0.75 × 1 200 = 900 pounds

2) P = 0.90 × 2 000 = 1 800 pounds

3) P = 0.80 × $215 = $172.00

Page 78, **Practice**

1) Total tax = 7% PST + 7% GST = 14%
a) P = 0.14 × $3 776 = $528.64
b) Total paid = $3 776 + $528.64 = $4 304.64

2) a) P = 0.6 × 35 = 21 columns
b) P = 0.4 × 35 = 14 columns
You could also subtract 21 from 35 to get the number of columns poured in the afternoon.

3) P = .875 × 3 208 = 2 807

4) P = 0.21 × $34 850 = $7 318.50

5) P = 0.16 × $2 845.50 = $455.28

6) $\frac{20}{32}$ = R
0.625 = R
0.625 = 62.5%

7) $\frac{256.20}{1\ 220.00}$ = R

0.21 = R
0.21 = 21%

8) $\frac{6\ 534}{43\ 560} = R$

$0.15 = R$
$0.15 = 15\%$

9) a) $P = 0.85 \times \$254.80 = \$216.58$

b) $P = 0.85 \times \$12.60 = \$10.71$

c) $P = 0.85 \times \$38.40 = \$32.64$

10) a) $\frac{2\ 412}{3\ 216} = R$

$0.75 = R$
$0.75 = 75\%$

b) $100\% - 75\% = 25\%$

11) $P = 125\% \times 125 = 1.25 \times 125 = 156.25$ square metres

12) a) $P = 0.65 \times \$4\ 375 = \$2\ 843.75$

b) $\$4\ 375.00 - \$2\ 843.75 = \$1\ 531.25$

13) a) $P = 0.78 \times \$8\ 520 = \$6\ 645.60$

b) $\$8\ 520.00 - \$6\ 645.60 = \$1\ 874.40$

14) $P = 0.45 \times 8\ 545 = 3\ 845.25$ hours

15) $P = 1.045 \times \$585.00 = \$611.33$

16) a) 75%

b) $P = 0.75 \times \$25.40 = \$19.05$

c) $P = 0.7 \times \$25.40 = \$17.78$

d) $P = 0.9 \times \$25.40 = \$22.86$