Employment and
Social Development Canada

Emploi et
Développement social Canada

**Now and Tomorrow
Excellence in Everything We Do**

Essential Skills and Apprenticeship

Essential Skills Workbook for the Trades

with Answer Guide

This workbook will help you practice your reading, writing, numeracy and document use skills though a variety of exercises. An answer guide is included to help you understand how to reach the right answer.

INTERPROVINCIAL STANDARD
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Table of Contents

Introduction

Having strong Essential Skills such as reading, writing, numeracy and document use will help you succeed on the job.

The nine Essential Skills are:

Reading

Document Use

Numeracy

Writing

Oral Communication

Working with Others

Thinking

Computer Use

Continuous Learning

What are Essential Skills?

Essential Skills are used in all trades, in different ways and at different levels of complexity. Here are some examples:

- Reading and understanding specification sheets, manuals and code books
- Entering numbers and information into tables, checklists and forms
- Making calculations using formulas
- Writing short notes in logbooks and completing incident reports
- Talking to others to share information, coordinate work, ask questions and discuss issues
- Resolving problems using a troubleshooting process
- Using a computer to look up information, write an email or create a spreadsheet
- Participating in training and mentoring

Using this workbook

Use this workbook to help you identify which of your Essential Skills are strong and which may need improvement. The workbook includes exercises that look at four of the nine Essential Skills (reading, document use, numeracy and writing) and provides examples of how the skills are used in the skilled trades.

Instructions:

1. Review the *Tips for completing this workbook* on page 5.

2. Read each question carefully. Check to see if there is any additional information required. Refer to the *Formula and Conversion Sheet* on page 22 to help with some questions in the numeracy section.

3. Write your answers in the space provided. For the questions in the numeracy section, be sure to include all your calculations.

4. Try to complete as many questions as you can. If you do not know the answer to a question, make a note of it so you can return to it later.

5. Check your answers against the *Answer Guide* and make a note of areas that may need improvement.

Tips for completing this workbook

1 Skim

Skim through everything
Look over the entire workbook to get an idea of everything that is in it.
Consider these questions:
- How are the questions set up?
- What symbols and words are important?
- What skills will I need to use?
- How does this relate to what I have learned before?

2 Read

Read each question
Carefully read through each question and consider
these questions:
- What is this question asking or looking for?
- How does this information relate to what I already know?
- What words will help me to identify relevant information and answer the question?
- What words tell me about the task I need to complete?

3 Answer

Answer each question
Make and carry out a plan for each question. Consider:
- What actions should I take to find the answer?
- What math steps might I need to follow? Is there a formula I need to use?
- What is the next logical step?
- How does information relate to what I already know?
- What conclusion can I make?
- Have I completed the question?

4 Check

Check each answer
Double check your answer by reviewing your work
- Does this answer make sense?
- Does this answer need a number? A word? A sentence?
- Have I given a complete answer?

Reading

Understanding material written in sentences and paragraphs that may be found in reports, memos and manuals.

Read the following safety and health information and then answer the questions.

Material Safety Data Sheet (MSDS) – A Safe Read

In Canada, every material that is controlled by the Workplace Hazardous Materials Information System (WHMIS) must be labelled and have an accompanying Material Safety Data Sheet (MSDS) that is specific to the product or material. Both the product name and supplier on the MSDS must match the material in use. An MSDS is a document prepared by the chemical manufacturer or supplier that contains information on the potential health, fire and reactivity hazards of the product. The MSDS also describes how to use, store and handle the product safely and what to do in an emergency. It tells how to recognize symptoms of exposure and what first aid and other procedures might be necessary.

MSDSs come from many sources and may not all look the same, but they must include these nine (9) categories of information:

1. Product Information – e.g. product identifier (name), manufacturer and supplier's names, addresses and emergency telephone numbers

2. Hazardous Ingredients

3. Physical Data – e.g. physical state, odour and boiling point

4. Fire or Explosion Hazard Data

5. Reactivity Data – e.g. conditions under which the product is chemically unstable and the names of other substances the product is incompatible with

6. Toxicological Properties – health effects

7. Preventive Measures – e.g. personal protective equipment and engineering controls

8. First Aid Measures

9. Preparation Information

The law doesn't expect you to know everything about all chemicals, but you must get to know the hazards, control measures and emergency procedures for each chemical product you work with. Familiarize yourself with this information from the MSDS before you start to use the product. In addition, your employer should supplement the MSDS information with site-specific information and training regarding first aid measures, hazard controls (e.g. required ventilation, gloves) and what to do in case of an emergency (e.g. spill or leak).

The Controlled Products Regulations specify that an MSDS for a controlled product must be no more than three years old. It's up to the supplier to update the product label and MSDS. Employers must ensure that every controlled product entering the workplace is accompanied by a current MSDS. The company's MSDS collection must be widely accessible to workers who may be exposed to the controlled products, and to the health and safety committee or representative. They can be stored in a binder or digitally on a computer network, as long as everyone in the workplace has easy access to them at all times.

The Canadian Centre for Occupational Health and Safety (CCOHS) – e-Newsletter, December 2007
http://www.ccohs.ca/newsletters/hsreport/issues/2007/11/ezine.html#oshanswers

1. What two things must an employer do with materials controlled by the Workplace Hazardous Materials Information System (WHMIS)?

2. Why do you think reactivity data information must be listed on each Material Safety Data Sheet (MSDS)?

3. How often must each MSDS be updated for a controlled product?

4. Why is it important for all employees to have access to MSDS information?

Document Use

Finding, understanding or entering information such as text, symbols and numbers in documents such as tables or forms.

WHMIS Symbols

Look at the following health and safety poster and answer the questions on the following page.

Health Canada / Santé Canada

Canada

Do You Know These Vital Signs?

THE HAZARD SYMBOLS OF WHMIS

CLASS A Compressed Gas

CLASS D-2 Poisonous and Infectious Material (material causing other toxic effects)

CLASS B Flammable and Combustible Material

CLASS D-3 Poisonous and Infectious Material (Biohazardous Infectious Material)

CLASS C Oxidizing Material

CLASS E Corrosive Material

CLASS D-1 Poisonous and Infectious Material (material causing immediate and serious effects)

CLASS F Dangerously Reactive Material

WHMIS provides you with information on the safe use, storage, handling and disposal of hazardous materials at Canadian workplaces.

Workplace Hazardous Materials Information System

For more information, consult the MSDS, and visit the Health Canada WHMIS Web site: http://www.hc-sc.gc.ca/whmis

1. What does "WHMIS" stand for?

2. What harm can corrosive materials have on your skin?

3. Class D-1 deals with poisonous and infectious materials. How soon after contact with these materials would you see a reaction?

4. If you worked with materials labelled with the following symbol, what precautions would you take?

Numeracy

Using numbers to solve problems and complete tasks.

Answer the following questions. Be sure to show your work. You may use a calculator unless the instructions state you should not.

Basic math

1. You should NOT use a calculator for this section.

a)	9 + 84	=	
b)	72 - 35	=	
c)	25 x 15	=	
d)	36 ÷ 9	=	
e)	7.6 + 3.2	=	
f)	12.4 – 2.7	=	
g)	7.0 x 0.25	=	
h)	14 ÷ 0.5	=	

Equivalent fractions, decimals and percentages

2. Fill in each of the missing values.

	Fraction		Decimal		Percentage
a)	$\dfrac{5}{8} = \dfrac{}{16}$	=	0.	=	%
b)	$\dfrac{9}{12} = \dfrac{}{4}$	=	0.	=	%
c)	$\dfrac{3}{16} = \dfrac{}{64}$	=	0.	=	%
d)	$\dfrac{10}{12} = \dfrac{}{36}$	=	0.	=	%
e)	$\dfrac{2}{5} = \dfrac{}{40}$	=	0.	=	%

Basic operations with fractions

3. You should NOT use a calculator for this section.

a)	$\dfrac{1}{2} + \dfrac{3}{4}$	=	
b)	$\dfrac{17}{32} - \dfrac{5}{16}$	=	
c)	$2\dfrac{15}{16} + 1\dfrac{5}{8}$	=	
d)	$1\dfrac{1}{4} - \dfrac{9}{16}$	=	
e)	$3\dfrac{3}{16} - 1\dfrac{7}{8}$	=	
f)	$2\dfrac{1}{2} + \dfrac{5}{16}$	=	
g)	$\dfrac{3}{4} \times \dfrac{1}{2}$	=	
h)	$2\dfrac{1}{2} \times 8$	=	
i)	$220 \div \dfrac{3}{4}$	=	
j)	$\dfrac{11}{16} \div \dfrac{1}{8}$	=	

Conversions

4. Fill in each of the missing values.

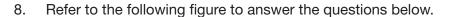|					
a)	1440 minutes	=			hours
b)	220 inches	=	feet		inches
c)	2.5 hours	=			minutes
d)	90 inches	=			cm
e)	1 fluid cup	=			ounces
f)	120 mm	=			cm

Word problems

5. Please answer the following questions about a first-year apprentice's rate of pay and earnings. The minimum wage rate for a first-year apprentice is 180 percent of a province's minimum wage, which is $8.50 an hour.

   a) What is the hourly wage for a first-year apprentice?

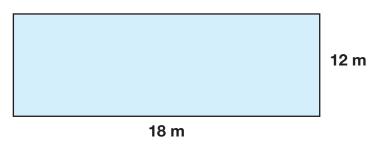   b) Using the hours listed in the following table, what was the first-year apprentice's pay for the week?

Monday	7.25 hours
Tuesday	6.0 hours
Wednesday	11.25 hours
Thursday	10.5 hours
Friday	5.0 hours

   c) The overtime rate of pay per hour is "time and a half." What would the first-year apprentice be paid per hour when working overtime?

6. You filled up the gas tank with 75L (litres) of fuel at $1.24/L (per litre). The attendant gives you a 4 percent discount. How much will you pay, in total, for the gas?

7. A vehicle travelled 33 000 km (kilometres) in two years.

   a) The oil is changed every 5 000 km. Each oil change uses five litres of oil. How many litres of oil were used in total?

   b) At the same usage rate, if a vehicle travels 33 000 km in two years, how many kilometres will the vehicle have travelled in 10 years?

Basic geometry

Show your work in the space provided below each question. The Formula and Conversion Sheet on page 22 is a helpful tool for this section.
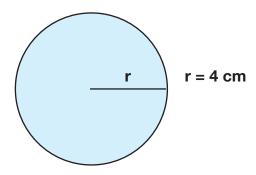
8. Refer to the following figure to answer the questions below.

12 m

18 m

a) What is the **perimeter** of this rectangle?

b) What is the **area** of this rectangle?
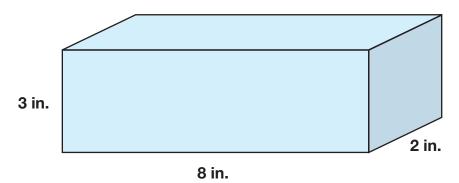
9. The **radius** of the circle below is 4 cm, as shown.
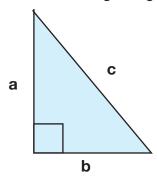
r   r = 4 cm

a) What is the **diameter** of this circle?

b) What is the **circumference** of this circle?

c) What is the **area** of this circle?

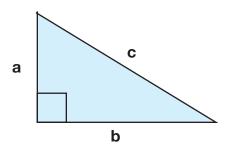10. What is the **volume** of this figure?

3 in.

2 in.

8 in.

11. Consider this right-angled triangle to answer the questions that follow.

c

a

b

side a = 12 m and side b = 9 m

a) How long is side c?

b) Place an "S" on the diagram to show the smallest angle of the triangle.

c) In degrees, what is the smallest angle in the triangle?

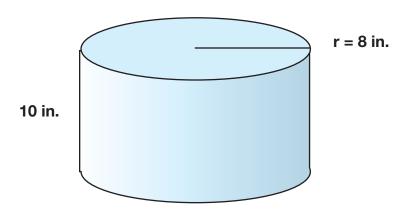12. Consider another right-angled triangle.

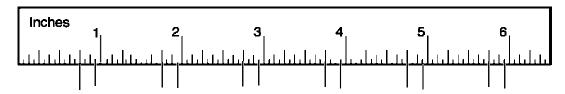side a = 9 cm and side c = 41 cm

a) How long is side b?

b) Place an "S" on the diagram to show the smallest angle of the triangle.

13. What is the volume of the shape below? The radius is 8 inches and the height is 10 inches. Include units in your answer.
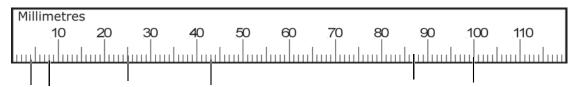

r = 8 in.

10 in.

Basic measurements
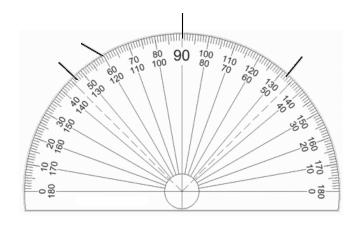
14. Indicate $\frac{3}{4}$ of an inch and $2\frac{15}{16}$ inches on the ruler below. (Ruler is not to scale)

Inches

1   2   3   4   5   6

15. Indicate 87 mm and 4.3 cm on the ruler below. (Ruler is not to scale)

Millimetres

10   20   30   40   50   60   70   80   90   100   110

16. Indicate a measure of 47 degrees on the protractor below.

Ratio, proportion and statistics

17. Fill in the blank for each of the following:

    a) 3:1 = _____ : 4   b) 5:6 = _____ : 3   c) 6.5:3 = _____ : 9

    d) $\dfrac{2}{9} = \dfrac{6}{}$ e) $\dfrac{1}{25} = \dfrac{}{625}$

18. Consider the list of nine lengths of pipe below to answer the questions that follow.

    8 cm, 15 cm, 3 cm, 8 cm, 80 cm, 12 cm, 8 cm, 25 cm and 15 cm

    a) List the lengths of pipe in order from shortest to longest.

    b) What is the middle (**median**) length of pipe?

    c) What is the most common (**mode**) length of pipe?

    d) What is the average (**mean**) of all the lengths of pipe?

    e) How would the **mean** length of pipe be affected if the longest length were removed from the list of pipe lengths?

Writing

Communicating by arranging words, numbers and symbols on paper or computer screen.

Filling in documents

Fill in the Incident Report Form on the following page using the information in the note below.

Date: January 27

My name is Pat King and I'm a prep cook in the hotel kitchen. Yesterday, I was working the early morning shift by myself. My job was to deep-fry the potatoes to get them ready for the breakfast rush. It was just after 7:00 a.m. and I was running a little late. I went to take the last batch out of the deep fryer and when I shook the wire basket, my hand slipped and landed in the hot oil. I started yelling and shaking my hand to get the oil off but then the oil hit the flames on one of the burners and started a fire. The heat sensor on the exhaust hood must not have been working, because the fire damper didn't come on. The fire kept getting bigger and I couldn't reach the fire extinguisher. I kept yelling for help. Finally, one of the cleaning staff came, grabbed the fire extinguisher and put out the fire. He also called 9-1-1. Luckily, the fire only damaged the stove top and the exhaust hood is all black. When my supervisor came in, I told her everything that happened. Then the emergency workers came and gave me first aid for a minor burn. I took the rest of the day off and I'm not scheduled again until next week.

Incident Report Form

Name of worker: _____

Position: _____ Department: _____

Location of incident: _____

Date of incident: _____ Time: _____ AM   PM

Type of incident: Near miss ☐   Minor injury ☐   Serious injury ☐

Reported to: _____

Nature of injury (if any): _____

_____

Witnesses: _____

_____

Damage to equipment or property: _____

_____

Description of incident: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Signature: _____ **Date:** _____

Putting it all together

Many tasks will require you to use more than one Essential Skill. For example, to complete the following time sheet you will need to read instructions, locate and use information in a list, make mathematical calculations, fill in numbers in a table and write a short note providing an explanation.

Complete the following questions using this timesheet information for the period January 12 to January 18:

- Your Employee Number is 1235 and you work in Department 299.
- Your regular work hours are 40 hours per week, 8:00 a.m. to 4:30 p.m., Monday to Friday, with 1/2 hour unpaid lunch.
- Your overtime is paid after eight hours per day; overtime is also paid on weekends and holidays.
- Your rate of pay $15.00 per hour.
- Your overtime rate of pay is $22.00 per hour and you get a paid lunch on Saturdays and Sundays.
- Your hours worked for the week of January 12 to 18 are:

Monday	8:00 a.m.	-	4:30 p.m.
Tuesday	8:00 a.m.	-	6:00 p.m.
Wednesday	8:00 a.m.	-	4:30 p.m.
Thursday	8:00 a.m.	-	6:00 p.m.
Friday	8:00 a.m.	-	4:30 p.m.
Saturday	11:00 a.m.	-	5:00 p.m.

1. Complete this employee time sheet using the information provided on the previous page.

EMPLOYEE TIME SHEET				
Employee name:				
Employee number:				
Department:				
Date	Start Time	End Time	Regular Hours	Overtime Hours
Monday, January 12	8:00 a.m.	4:30 p.m.	8	–
Weekly Totals				

2. You need to make a request for time off for a medical reason. You will be having surgery on your knee and need to be off work from April 21 to April 28. Write your request here.

3. You will need to keep track of what you earn and check it against your pay stub. Calculate your gross pay (i.e. before deductions) for this week.

Formula and Conversion Sheet

Basic Conversions

1 tsp = 5 mL	
1 Tbsp = 15 mL	
1 cup = 250 mL	
1 fluid cup = 8 fluid ounces	

2.54 cm = 1 inch
12 inches = 1 foot
3 feet = 1 yard
1 yd^2 = 9 sq. ft.
1 yd^3 = 27 sq. ft.

Trigonometry

Pythagorean Theorem
$a^2 + b^2 = c^2$

$$\sin Ø = \frac{\text{opp}}{\text{hyp}} \qquad \cos Ø = \frac{\text{adj}}{\text{hyp}} \qquad \tan Ø = \frac{\text{opp}}{\text{adj}}$$

Geometry formulas

$\pi = 3.14$

Circumference = 2 π × radius

$C = 2\pi r$

Area = π × radius^2

$A = \pi r^2$

$V = \pi r^2 h$

Area = length × width

$A = l \times w$

Volume = length × width × height

$V = l \times w \times h$

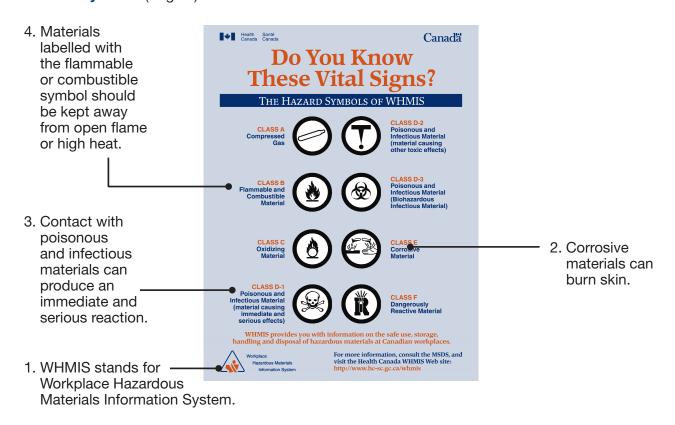Perimeter = 2(length + width)

$P = 2(l + w)$

Reading

Material Safety Data Sheet (MSDS) – A Safe Read (Page 6)

1. Materials controlled by WHMIS must be labelled and have an accompanying MSDS that is specific to the product or material.

2. The reactivity data information is included because you need to know conditions under which the product is chemically unstable and the names of other substances the product is incompatible with.

3. MSDS must be updated at least every three years.

4. Employees need access to the MSDS information because they need to know about the hazards of the chemicals they may be exposed to, as well as the safe usage, storage and handling of the product. Also, they must be able to recognize the symptoms of exposure and the first-aid response.

Document Use

WHMIS Symbols (Page 8)

4. Materials labelled with the flammable or combustible symbol should be kept away from open flame or high heat.

3. Contact with poisonous and infectious materials can produce an immediate and serious reaction.

1. WHMIS stands for Workplace Hazardous Materials Information System.

2. Corrosive materials can burn skin.

Health Canada / Santé Canada — Canada

Do You Know These Vital Signs?

THE HAZARD SYMBOLS OF WHMIS

CLASS A — Compressed Gas

CLASS D-2 — Poisonous and Infectious Material (material causing other toxic effects)

CLASS B — Flammable and Combustible Material

CLASS D-3 — Poisonous and Infectious Material (Biohazardous Infectious Material)

CLASS C — Oxidizing Material

CLASS E — Corrosive Material

CLASS D-1 — Poisonous and Infectious Material (material causing immediate and serious effects)

CLASS F — Dangerously Reactive Material

WHMIS provides you with information on the safe use, storage, handling and disposal of hazardous materials at Canadian workplaces.

Workplace Hazardous Materials Information System

For more information, consult the MSDS, and visit the Health Canada WHMIS Web site:
http://www.hc-sc.gc.ca/whmis

Numeracy

Basic math (Page 10)

1.

a) 93	b) 37	c) 375	d) 4
e) 10.8	f) 9.7	g) 1.75	h) 28

Equivalent fractions, decimals and percentages (Page 10)

2.

	Fraction		Decimal		Percentage
a)	$\frac{5}{8} \times \frac{2}{2} = \frac{10}{16}$	=	0.625 x 100	=	62.5%
b)	$\frac{9}{12} \times \frac{3}{3} = \frac{3}{4}$	=	0.75 x 100	=	75%
c)	$\frac{3}{16} \times \frac{4}{4} = \frac{12}{64}$	=	0.1875 x 100	=	18.75%
d)	$\frac{10}{12} \times \frac{3}{3} = \frac{30}{36}$	=	0.8333 x 100	=	83.33%
e)	$\frac{2}{5} \times \frac{8}{8} = \frac{16}{40}$	=	0.4 x 100	=	40%

How to reach the answers

When you change to equivalent fractions, you must begin by making the denominators (the bottom part of the fractions) the same. Then, whatever you do to one denominator to make it the same as the other denominator, you must also do to the numerator (top part of the fraction) of the same fraction.

In the example below, multiply the denominator of 8 by 2 to get 16 (the same as the other denominator as the other fraction), then multiply the numerator by that same number, in this case 2. This creates an equivalent fraction with a denominator of 16.

$$\frac{5}{8} \times \frac{2}{2} = \frac{10}{16}$$

To find the decimal, divide the denominator by the numerator.

To change a decimal to a percentage, you must multiply the decimal by 100.

0.625 x 100 = 62.5%

24

Basic operations with fractions (Page 11)

3.

a) $1\frac{1}{4}$	b) $\frac{7}{32}$	c) $4\frac{9}{16}$	d) $\frac{11}{16}$	e) $1\frac{5}{16}$
f) $2\frac{13}{16}$	g) $\frac{3}{8}$	h) 20	i) $293\frac{1}{3}$	j) $5\frac{1}{2}$

When you are multiplying fractions you must multiply straight across the numerator and straight across the denominator of each fraction. It might be necessary to change the fraction into an improper fraction, multiply and then reduce. (See h below)

g) $\dfrac{3}{4} \times \dfrac{1}{2} = \dfrac{3 \times 1}{4 \times 2} = \dfrac{3}{8}$

h) $2\dfrac{1}{2} = \dfrac{2 \times 2 + 1}{2} = \dfrac{5}{2} \times 8 = \dfrac{5}{2} \times \dfrac{8}{1} = \dfrac{5 \times 8}{2 \times 1} = \dfrac{40}{2} = 20$

When you are dividing fractions you change the sign from division to multiplication and invert the fraction you are dividing by. Another way this is described is multiplying by the reciprocal.

i) $220 \div \dfrac{3}{4} = 220 \times \dfrac{4}{3} = \dfrac{220}{1} \times \dfrac{4}{3} = \dfrac{220 \times 4}{3 \times 1} = \dfrac{880}{3} = 293\dfrac{1}{3}$

j) $\dfrac{11}{16} \div \dfrac{1}{8} = \dfrac{11}{16} \times \dfrac{8}{1} = \dfrac{88}{16} = \dfrac{44}{8} = \dfrac{22}{4} = \dfrac{11}{2} = 5\dfrac{1}{2}$

Conversions (Page 11)

4. a) 24 hours
   b) 18 ft. 4 in.
   c) 150 minutes
   d) 228.6 cm
   e) 8 ounces
   f) 12 cm

How to reach the answers

When you are converting from one unit to another you must multiply the given quantity by an equivalent fraction that has the original units in the denominator and the desired units in the numerator. If the original units appear in the numerator and the denominator, then they will cancel each other out and leave only the desired unit.

Example: Convert 4 days into minutes.

$$\dfrac{4 \text{ days}}{1} \times \dfrac{24 \text{ hours}}{1 \text{ day}} \times \dfrac{60 \text{ min}}{1 \text{ hour}} = 4 \times 24 \times 60 \text{ min} = 5\,760$$

Notice that the units of 'days' will cancel (the unit is in the numerator and denominator) and the units of 'hours' will also cancel. This leaves the desired unit of minutes in the numerator. Multiply all of the numbers together to get 5 760 minutes.

a) $\dfrac{1\ 440\ \text{min}}{1} \times \dfrac{1\ \text{hour}}{60\ \text{min}} = 24\ \text{hours}$

b) $\dfrac{220\ \text{inches}}{1} \times \dfrac{1\ \text{foot}}{12\ \text{inches}} = 18.333\ \text{feet} = 18\ \text{feet}\ 4\ \text{inches}$

c) $\dfrac{2.5\ \text{hours}}{1} \times \dfrac{60\ \text{min}}{1\ \text{hour}} = 150\ \text{minutes}$

d) $\dfrac{90\ \text{inches}}{1} \times \dfrac{2.54\ \text{cm}}{1\ \text{inch}} = 228.6\ \text{cm}$

e) $\dfrac{1\ \text{fluid cup}}{1} \times \dfrac{8\ \text{ounces}}{1\ \text{fluid cup}} = 8\ \text{ounces}$

f) $\dfrac{120\ \text{mm}}{1} \times \dfrac{1\ \text{cm}}{10\ \text{mm}} = 12\ \text{cm}$

Word problems (Page 12)

5. a) $15.30/hour

How to reach the answer

Since percentage is really just a fraction that has a denominator of 100, 180% is 180/100.

$8.50 x 180/100 = $15.30

5. b) $612.00

How to reach the answer

Add up all the hours for the week.

7.25 + 6.0 + 11.25 + 10.5 + 5.0 = 40 hours

40 hours x $15.30 = $612.00

5. c) $22.95

How to reach the answer

Time and a half would be 1.5 times your hourly wage.

1.5 x $15.30 = $22.95 per hour

6. $89.28

How to reach the answer

The total cost would be 75 litres x $1.24 per litre = $93.00. With a 4% discount deducted from the bill, the total is $93.00 – $3.72 = $89.28.

7. a)   30 L

How to reach the answer

If an oil change is done every 5 000 km, then there would have been $\dfrac{33\ 000}{5\ 000}$ = 6.6 oil changes in total.

Since we cannot have part of an oil change, then we would be in between our sixth and seventh oil change. There would have been six actual oil changes. If there are five litres of oil used per oil change, then there would have been 6 oil changes x 5 L per oil change = 30 L of oil in total.

7. b)   165 000 km

How to reach the answer

$\dfrac{33\ 000}{2\ years}$ = 16 500/year

16 500 x 10 years = 165 000 km

Basic geometry (Page 13)

8. a)   60 m

How to reach the answer

The perimeter of any object is the distance around the outside of that object. In this case,

perimeter P = 2 (l + w).

P = 2 (12 m + 18 m) = 60 m

8. b) Area=216 m²

How to reach the answer

The area is A = l x w = 12 m x 18 m = 216 m².

9. a) Diameter = 8 cm

How to reach the answer

The radius is half the length of the diameter. Since r = 4 cm, the diameter will be 2 x 4 cm = 8 cm.

9. b) Circumference = 25.12 cm

How to reach the answer

The circumference of a circle is the distance around the outside (it is the perimeter of the circle).

Perimeter = Circumference = $2\pi r$ = 2(3.14)(4 cm) = 25.12 cm.

9. c) Area = 50.24 cm²

How to reach the answer

Area = πr^2 = $\pi (4 \text{ cm})^2$ = 50.24 cm²

A = 3.14 x (4) x (4)
A = 3.14 x 16
A = 50.24 cm²

Notice that area is two-dimensional and therefore has square units (cm²).

10. Volume = 48 in.³

How to reach the answer

Volume is the amount of space an object takes up.

V = l x w x h = 8 x 2 x 3 = 48 in.³

Notice that volume is a three-dimensional measure and therefore has cubic units (in.³).

11. a) side c= 15 m

How to reach the answer

Use the Pythagorean Theorem ($a^2 + b^2 = c^2$) to solve for side c. Remember: side c is the hypotenuse which is always opposite the right angle.
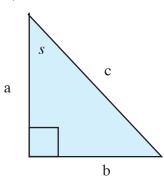
$$12 \ m^2 + 9 \ m^2 = c^2$$
$$144 \ m + 81 \ m = c^2$$
$$225 \ m = c^2$$
$$15 \ m = c$$

11. b)

How to reach the answer

The smallest angle of any triangle is opposite the smallest or shortest side in the triangle, and the largest angle is always opposite the longest side.

11. c) 36.87 degrees

How to reach the answer

Using right angled trigonometry:

$$\tan S = \frac{\text{Opposite}}{\text{Adjacent}}$$

$$\tan S = \frac{9}{12}$$

$$\tan^{-1} = \left(\frac{9}{12}\right) = S$$

$$S = 36.87°$$

12. a) side b = 40 cm

12. b)

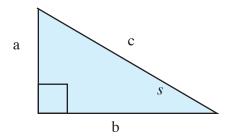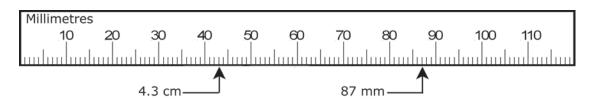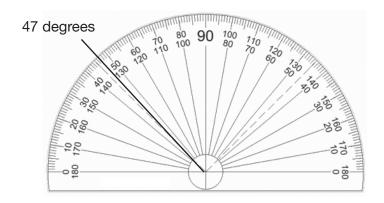13.   Volume = 2 009.6 in.³

Basic measurements (Page 16)

14. Indicate $\frac{3}{4}$ of an inch and $2\frac{15}{16}$ inches on the ruler below. (Ruler not to scale)

15. Indicate 87 mm and 4.3 cm on the ruler below. (Ruler not to scale)

Millimetres

| 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 |

4.3 cm ⌐

87 mm ⌐

16. Indicate a measure of 47 degrees on the protractor below.

47 degrees

Ratio, proportion and statistics (Page 17)

17. a) 12:4   b) 2.5:3   c) 19.5:9

   d) $\dfrac{6}{27}$ e) $\dfrac{25}{625}$

How to reach the answer   3:1 = ?:4

a) Convert ratios to fractions $\dfrac{3}{1} = \dfrac{?}{4}$

Cross multiply to find the
missing value   3 x 4 = 1 x ?

Solve   12 = ?

How to reach the answer   5:6 = ?:3

b) Convert ratios to fractions $\dfrac{5}{6} = \dfrac{?}{3}$

Cross multiply to find the
missing value   5 x 3 = 6 x ?

Divide both sides
to isolate the $\dfrac{5 \times 3}{6} = \dfrac{6 \times ?}{6}$
missing values

Solve $\dfrac{15}{6} = ?$

                                               2.5 = ?

32

How to reach the answer　　　　$6.5:3 = ?:9$

c) Convert　　　　$\dfrac{6.5}{3} = \dfrac{?}{9}$

　Cross multiply　　　$6.5 \times 9 = 3 \times ?$

　Divide　　　$\dfrac{6.5 \times 9}{3} = \dfrac{3 \times ?}{3}$

　Solve　　　$19.5 = ?$

How to reach the answer　　　$\dfrac{2}{9} = \dfrac{6}{?}$

d) Cross multiply　　　$2 \times ? = 6 \times 9$

　Divide　　　$\dfrac{2 \times ?}{2} = \dfrac{6 \times 9}{2}$

　Solve　　　$? = 27$

How to reach the answer　　　$\dfrac{1}{25} = \dfrac{?}{625}$

e) Cross multiply　　　$1 \times 625 = 25 \times ?$

　Divide　　　$\dfrac{1 \times 625}{25} = \dfrac{25 \times ?}{25}$

　Solve　　　$25 = ?$

18. a)　3 cm, 8 cm, 8 cm, 8 cm, 12 cm, 15 cm, 15 cm, 25 cm, 80 cm

18. b)　Median = 12 cm

How to reach the answer

The median is the middle number in any data set. To determine the median, place measurements in order from highest to lowest. Since there are nine measurements in this data set, the middle number is the fifth measurement. In this list the 5th measure is 12 cm.

18. c)   Mode = 8 cm

How to reach the answer
The most common (or mode) of the data is the number that occurs the most often. In this list the most common number is 8 cm so this is the mode.

18. d)   Mean (average) = 19.33 cm

How to reach the answer
The mean or average of a data set is calculated by adding up all the numbers and dividing by the amount of numbers in the data set.

$$\text{average} = \frac{8\text{ cm} + 15\text{ cm} + 3\text{ cm} + 8\text{ cm} + 80\text{ cm} + 12\text{ cm} + 8\text{ cm} + 25\text{ cm} + 15\text{ cm}}{9} = 19.33\text{ cm}$$

18. e)   The mean would decrease.

How to reach the answer
If the longest length of pipe were removed the average length would decrease. This can be proven with the same calculation as in (d).

$$\text{average} = \frac{8\text{ cm} + 15\text{ cm} + 3\text{ cm} + 8\text{ cm} + 12\text{ cm} + 8\text{ cm} + 25\text{ cm} + 15\text{ cm}}{8} = 11.75\text{ cm}$$

If you remove a number that is higher than the mean, the mean will decrease and if you remove a number that is below the mean, the mean will increase.

Writing

Filling in documents (Page 18)

Incident Report Form

Name of worker: *Pat King*

Position: *Prep Cook*   Department: *Kitchen*

Location of incident: *Hotel Kitchen*

Date of incident: *January 27*   Time: 7:00   (AM) PM

Type of incident: Near miss ☐   Minor injury ☒   Serious injury ☐

Reported to: *(Kitchen) supervisor*

Nature of injury (if any): *Hot oil burn to skin on worker's hand*

Witnesses: *Hotel cleaning staff saw the fire but not accident*

Damage to equipment or property: *Fire (smoke) damage to the stove top and exhaust hood*

Description of incident:

(Answers can vary, but they should follow this order.)

I was deep frying potatoes and my hand slipped and landed in the hot oil. The oil from my

hand touched the flames on the burner and started a fire. The cleaner put the fire out with the fire

extinguisher. The cleaner called 911. I reported the accident to my supervisor. The emergency

workers came and gave me first aid.

Signature: **Date:**

Putting it all together

1. Time sheet (Page 21)

EMPLOYEE TIME SHEET				
Employee name:				
Employee number:	1235			
Department:	299			
Date	Start Time	End Time	Regular Hours	Overtime Hours
Monday, January 12	8:00 a.m.	4:30 p.m.	8	-
Tuesday, January 13	8:00 a.m.	6:00 p.m.	8	1.5
Wednesday, January 14	8:00 a.m.	4:30 p.m.	8	-
Thursday, January 15	8:00 a.m.	6:00 p.m.	8	1.5
Friday, January 16	8:00 a.m.	4:30 p.m.	8	-
Saturday, January 17	11:00 a.m.	5:00 p.m.	0	6.0
Weekly Totals			40	9

2. I am requesting time off for a medical reason. I will need to be off work from April 21 to April 28.

3. Gross Pay = $798.00

How to reach the answer

40 regular hours x $15.00 = $600.00

9 hours of overtime x $22.00 = $198.00

$600 + $198 = $798

The gross (total) pay is $798.