Prerequisite Skills: Lowest Common Denominator

Principles of Mathematics 9, *Student Skills Book*, **pages 1–2**

Practise

1. Use multiples to find the LCD for each pair of fractions.

   a) $\dfrac{1}{3}, \dfrac{1}{4}$

   b) $\dfrac{1}{2}, \dfrac{1}{5}$

   c) $\dfrac{1}{8}, \dfrac{1}{9}$

2. Use multiples to find the LCD for each pair of fractions.

   a) $\dfrac{1}{5}, \dfrac{1}{6}$

   b) $\dfrac{1}{7}, \dfrac{1}{8}$

   c) $\dfrac{1}{5}, \dfrac{1}{10}$

3. Use prime factors to find the LCD for each pair of fractions.

   a) $\dfrac{1}{3}, \dfrac{1}{5}$

   b) $\dfrac{1}{4}, \dfrac{1}{8}$

   c) $\dfrac{1}{8}, \dfrac{1}{12}$

4. Use prime factors to find the LCD for each pair of fractions.

   a) $\dfrac{1}{6}, \dfrac{1}{9}$

   b) $\dfrac{1}{10}, \dfrac{1}{12}$

   c) $\dfrac{1}{10}, \dfrac{1}{16}$

5. Find the LCD for each set of fractions.

   a) $\dfrac{1}{2}, \dfrac{1}{3}, \dfrac{1}{6}$

   b) $\dfrac{1}{3}, \dfrac{1}{5}, \dfrac{1}{15}$

6. Find the LCD for each set of fractions.

   a) $\dfrac{1}{6}, \dfrac{1}{9}, \dfrac{1}{18}$

   b) $\dfrac{1}{3}, \dfrac{1}{4}, \dfrac{1}{5}$

7. Use the LCD to write equivalent fractions.

   a) $\dfrac{3}{4}, \dfrac{5}{6}$

   b) $\dfrac{5}{8}, \dfrac{4}{10}$

8. Use the LCD to write equivalent fractions.

   a) $\dfrac{1}{3}, \dfrac{3}{4}, \dfrac{5}{8}$

   b) $\dfrac{1}{2}, \dfrac{2}{3}, \dfrac{3}{8}$

Prerequisite Skills: Add and Subtract Fractions

Principles of Mathematics 9, **Student Skills Book**, pages 3–4

Practise

1. Find each sum or difference. Express your answers in lowest terms.

    a) $\dfrac{3}{7} + \dfrac{4}{7}$

    b) $\dfrac{5}{6} + \dfrac{4}{6}$

    c) $\dfrac{4}{5} - \dfrac{1}{5}$

    d) $\dfrac{7}{8} - \dfrac{5}{8}$

2. Find each sum.

    a) $\dfrac{5}{8} + \dfrac{1}{4}$

    b) $\dfrac{7}{12} + \dfrac{5}{6}$

    c) $\dfrac{5}{14} + \dfrac{3}{7}$

3. Find each sum.

    a) $\dfrac{3}{4} + \dfrac{5}{6}$

    b) $\dfrac{3}{4} + \dfrac{2}{5}$

    c) $\dfrac{2}{3} + \dfrac{2}{7}$

4. Find each difference.

    a) $\dfrac{5}{6} - \dfrac{2}{3}$

    b) $\dfrac{5}{14} - \dfrac{1}{7}$

    c) $\dfrac{7}{10} - \dfrac{2}{5}$

5. Find each difference.

    a) $\dfrac{5}{6} - \dfrac{2}{5}$

    b) $\dfrac{5}{7} - \dfrac{1}{3}$

    c) $\dfrac{7}{9} - \dfrac{1}{4}$

6. Find each difference.

    a) $4\dfrac{3}{5} - 2\dfrac{2}{3}$

    b) $5\dfrac{1}{4} - 3\dfrac{1}{6}$

    c) $2\dfrac{2}{7} - 1\dfrac{4}{5}$

7. During one week, Diwani studied for $3\dfrac{1}{2}$ h on Monday, $2\dfrac{1}{4}$ h on Tuesday, and $2\dfrac{5}{6}$ h on Wednesday.

    a) Find the total number of hours that Diwani studied for this week.

    b) For how much longer did she study on Monday than on Wednesday?

    c) For how much longer did she study on Wednesday than on Tuesday?

Prerequisite Skills: Multiply and Divide Fractions
Principles of Mathematics 9, **Student Skills Book**, pages 5–6

Practise
Express your answers in lowest terms.

1. Multiply.

a) $\dfrac{2}{7} \times \dfrac{3}{5}$

b) $\dfrac{4}{7} \times \dfrac{7}{9}$

c) $\dfrac{3}{8} \times \dfrac{4}{5}$

d) $\dfrac{2}{3} \times \dfrac{7}{10}$

2. Multiply.

a) $\dfrac{3}{4} \times 1\dfrac{2}{3}$

b) $2\dfrac{3}{5} \times \dfrac{1}{6}$

c) $5\dfrac{1}{7} \times 2\dfrac{1}{6}$

d) $3\dfrac{4}{5} \times 4\dfrac{1}{2}$

3. Divide.

a) $\dfrac{5}{8} \div \dfrac{5}{6}$

b) $\dfrac{6}{7} \div \dfrac{4}{5}$

c) $\dfrac{3}{14} \div \dfrac{7}{10}$

d) $\dfrac{3}{4} \div \dfrac{5}{18}$

4. Divide.

a) $1\dfrac{2}{3} \div \dfrac{3}{4}$

b) $\dfrac{5}{8} \div 2\dfrac{1}{2}$

c) $1\dfrac{5}{9} \div 4\dfrac{2}{3}$

d) $3\dfrac{2}{7} \div 4\dfrac{1}{3}$

5. A bowl filled with lollipops is $\dfrac{3}{4}$ full. $\dfrac{2}{3}$ of these lollipops are green. What fraction of the full bowl are the green lollipops?

6. A box of blueberries is $\dfrac{2}{5}$ full. Janet and her friends had each eaten $\dfrac{1}{10}$ of a box of blueberries. How many people ate blueberries?

Prerequisite Skills: Add Integers
Principles of Mathematics 9, *Student Skills Book*, **page 7**

Practise

1. Use a number line to model each sum.

   a) $-3 + 5$

   b) $-4 + 2$

   c) $5 + (-4)$

   d) $4 + (-6)$

2. Use a number line to model each sum.

   a) $-1 + (-3)$

   b) $-2 + 2$

   c) $3 + (-3)$

   d) $0 + (-5)$

3. Find each sum.

   a) $5 + (-7)$

   b) $-3 + 6$

   c) $-3 + 2$

   d) $-5 + (-2)$

4. Find each sum.

   a) $-5 + 5$

   b) $6 + (-6)$

   c) $0 + (-3)$

   d) $-8 + 0$

5. Find each sum.

   a) $-6 + (-4)$

   b) $3 + (-1)$

   c) $4 + (-5)$

   d) $0 + (-2)$

6. Find each sum.

   a) $-4 + (-5) + 3$

   b) $6 + (-3) + 3$

   c) $3 + (-2) + (-4)$

   d) $-5 + 4 + (-3)$

7. Find each sum.

   a) $-2 + 6 + (-3)$

   b) $-5 + (-4) + (-3)$

   c) $3 + (-8) + 7$

   d) $4 + (-12) + 3$

8. Find each sum.

   a) $-3 + 2 + (-4) + 1$

   b) $6 + (-2) + (-5) + 3$

   c) $-8 + 4 + (-5) + (-3)$

   d) $5 + (-7) + 3 + (-9)$

9. Find each sum.

   a) $9 + (-5) + (-1) + 4$

   b) $-2 + 6 + (-3) + (-7)$

   c) $6 + (-8) + 4 + (-3)$

   d) $-2 + 1 + (-9) + 8$

10. The temperature in Stratford starts at $-5°C$, rises $18°C$, and then falls $8°C$. What is the final temperature?

11. On Monday the price of a company's stock is $35 per share. On Tuesday the price drops $4, on Wednesday it rises $7, on Thursday it drops $6, and on Friday it rises $7. What was the price of the stock per share at the end of the week?

Prerequisite Skills: Subtract Integers
Principles of Mathematics 9, Student Skills Book, page 8

Practise

1. Subtract.
   a) $7 - 5$
   b) $6 - 8$
   c) $4 - (-3)$
   d) $5 - (-2)$

2. Subtract.
   a) $4 - 4$
   b) $(-5) - (-5)$
   c) $0 - 9$
   d) $0 - (-6)$

3. Subtract.
   a) $0 - 4$
   b) $0 - (-8)$
   c) $-8 - 2$
   d) $-5 - 3$

4. Subtract.
   a) $-3 - (-8)$
   b) $-4 - (-2)$
   c) $-6 - (-6)$
   d) $-7 - 0$

5. Copy each question and fill in the ☐ with the correct integer.
   a) $-4 - \boxed{} = -7$
   b) $\boxed{} - 5 = 4$
   c) $0 - \boxed{} = -7$

6. Copy each equation and fill in the ☐ with the correct integer.
   a) $\boxed{} - (-3) = 5$
   b) $0 - \boxed{} = 3$
   c) $6 - \boxed{} = -2$

7. Evaluate.
   a) $10 - 8 - 5$
   b) $2 - 9 - (-1)$
   c) $-3 - (-4) - 11$
   d) $-15 - (-5) - (-7)$

8. Evaluate.
   a) $16 - 12 - 5$
   b) $5 - 12 - (-4)$
   c) $-4 - (-2) - 8$
   d) $-18 - (-3) - (-13)$

9. Which expressions have the same result?
   a) $9 - 4$
   b) $-5 - (-2)$
   c) $-8 - (-3)$
   d) $-2 - (-7)$
   e) $-8 - (-5)$
   f) $-9 - (-4)$

10. The average low temperature in Tobermorey in October is 5°C. In February it is 23°C lower. What is the average low temperature in Tobermorey in February?

11. The air temperature is –8°C. With the wind blowing at a speed of 18 km/h, this temperature feels like –15°C. How many degrees does the temperature change because of the wind chill?

Prerequisite Skills: Multiply and Divide Integers

Principles of Mathematics 9, *Student Skills Book*, **page 9**

Practise

1. Find each product.
   a) 5×7
   b) $4 \times (-3)$
   c) $(-3) \times 6$
   d) $(-2) \times (-8)$

2. Find each product.
   a) $0(9)$
   b) $(-4)(7)$
   c) $6(-7)$
   d) $(-6)(-8)$

3. Find each quotient.
   a) $18 \div 6$
   b) $12 \div (-3)$
   c) $(-16) \div 2$
   d) $(-15) \div (-5)$

4. Find each quotient.
   a) $\dfrac{0}{-4}$
   b) $\dfrac{35}{-7}$
   c) $\dfrac{-24}{6}$
   d) $\dfrac{-28}{-4}$

5. Multiply.
   a) $(-8) \times 3 \times 2$
   b) $5 \times (-2) \times 0$
   c) $6 \times (-1) \times (-3)$

6. Multiply.
   a) $(-3) \times (-5) \times (-4)$
   b) $(-6) \times 2 \times (-4)$
   c) $4 \times (-3) \times (-2)$

7. List all integers that divide evenly into each.
   a) 18
   b) −15

8. List all integers that divide evenly into each.
   a) 24
   b) −30

9. Write a multiplication expression and a division expression that would have each result.
   a) −8
   b) −15

10. Determine how each multiplication or division pattern is formed. Then, write the next two numbers.
    a) 1, 4, 16, …
    b) −400, −200, −100, …

Prerequisite Skills: Distributive Property

Principles of Mathematics 9, *Student Skills Book*, page 10

Practise

1. Use the distributive property to evaluate.
   a) $5(70 + 1)$
   b) $3(60 - 1)$
   c) $4(20 + 3)$
   d) $6(30 - 4)$

2. Use the distributive property to evaluate.
   a) $0.4(10 + 0.2)$
   b) $0.3(10 - 0.4)$
   c) $0.5(20 + 0.7)$
   d) $0.2(30 - 0.9)$

3. Use the distributive property to evaluate.
   a) $6(100 + 30 + 8)$
   b) $5(100 + 20 + 9)$
   c) $3(200 + 50 + 4)$
   d) $2(400 + 10 + 7)$

4. Use the distributive property to evaluate.
   a) $5(4 + 0.3 + 0.02)$
   b) $2(3 + 0.4 + 0.03)$
   c) $4(6 + 0.5 + 0.03)$
   d) $7(5 + 0.6 + 0.08)$

5. Evaluate using the distributive property.
   a) $5(41)$
   b) $3(97)$
   c) $8(43)$
   d) $9(86)$

6. Evaluate using the distributive property.
   a) $3(104)$
   b) $6(202)$
   c) $5(410)$
   d) $9(360)$

7. Evaluate using the distributive property.
   a) $7(198)$
   b) $4(227)$
   c) $3(514)$
   d) $3(799)$

8. Evaluate using the distributive property.
   a) $3(3.2)$
   b) $5(7.8)$
   c) $6(4.1)$

9. Evaluate using the distributive property.
   a) $7(8.09)$
   b) $4(6.03)$
   c) $8(9.04)$

10. Evaluate using the distributive property and mental math.
    a) $2(3.17)$
    b) $4(5.24)$
    c) $9(8.63)$

11. Evaluate using the distributive property and mental math.
    a) $30(21)$
    b) $40(29)$
    c) $50(47)$

12. Evaluate using the distributive property and mental math.
    a) $60(310)$
    b) $50(420)$
    c) $40(670)$

Prerequisite Skills: Order of Operations
Principles of Mathematics 9, *Student Skills Book*, **page 11**

Practise

1. Evaluate.

   a) $3^2 + 2(3+1)^2$

   b) $2^3 - 3(4-2)^2$

   c) $5 + 4(9 - 3 \times 2)$

   d) $7 - 3(8 - 2^2 \times 1)$

2. Evaluate.

   a) $5 + 3 \times (2^4 - 2^3)$

   b) $9 - 2^2 \times 3(4-6)$

   c) $5(4^2 - 3^2) + 8$

   d) $6[11 - (3+1)^2 + 3]$

3. Evaluate.

   a) $(15+3) \div (10 - 2^3)$

   b) $4 \times 3(24 \div 2^2) + 5$

   c) $(5^2 - 3^2) \div 4 + 8 \times 2$

   d) $6[4^3 \div (3+1)^2 - 3]$

4. Evaluate.

   a) $5(-4) + (-4)^2$

   b) $-20 \div (-4) - 3$

   c) $(-3)(-4) + (1-3)^2$

   d) $(1-5)^2 \div (1-3)$

5. Evaluate.

   a) $(-1)^5 - 8 \div (-4)$

   b) $(3-5)^3 \div (6-8)^2$

   c) $(2^3 - 3^2)^5 - (-16) \div (-8)$

   d) $[(-5)^2 - (-7)^2] \times 3 \div (-2)$

6. Evaluate.

   a) $5 - 2 \times 3.1 + 4.2$

   b) $(2.5 + 3^2) - 1.6$

   c) $0.2(11 - 7) + (0.4)^2$

   d) $2(0.7 + 0.2)^2 + 4.6$

7. Evaluate.

   a) $3.2 + 0.5 \times 3 - 4$

   b) $(2^2 + 4.3) - 1.2 \times 2$

   c) $(0.5)^2 + 0.4(9 - 5)$

   d) $8.2 + 2(1+2)^2$

8. Insert brackets to make each equation true.

   a) $16 \div 4 - 5 \times 2^2 = -4$

   b) $16 \div 4 - 5 \times 2^2 = -16$

   c) $16 \div 4 - 5 \times 2^2 = -64$

9. Copy each equation and use the symbols $+, -, \times, \div$, and ( ) to make it true.

   a) $4 \boxed{} 2 \boxed{} 3 = -2$

   b) $20 \boxed{} 5 \boxed{} 9 = -5$

   c) $-12 \boxed{} 3 \boxed{} -6 = 2$

   d) $10 \boxed{} 3 \boxed{} -2 = -14$

Prerequisite Skills: Bar Graphs

Principles of Mathematics 9, *Student Skills Book*, pages 12–13

Practise

1. This bar graph shows the number of people that visited a shopping mall during one week.
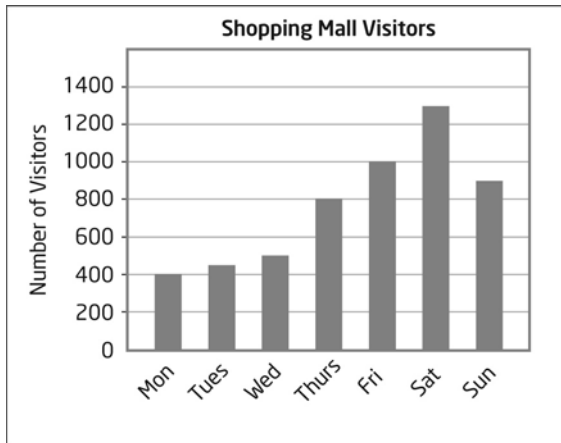
a) On which day did the fewest people visit the shopping mall? On which day did the most people visit the shopping mall?

b) Describe any trends in the number of customers during this week at the shopping mall.

2. This table shows the number of members attending a golf club during one week.

Day of the Week	Number of Members
Monday	238
Tuesday	245
Wednesday	220
Thursday	264
Friday	270
Saturday	350
Sunday	325

a) Make a bar graph of the data.

b) Describe any trends in member attendance during this week at the golf club.

3. This bar graph shows the number of visitors during the year 2005 to museum.
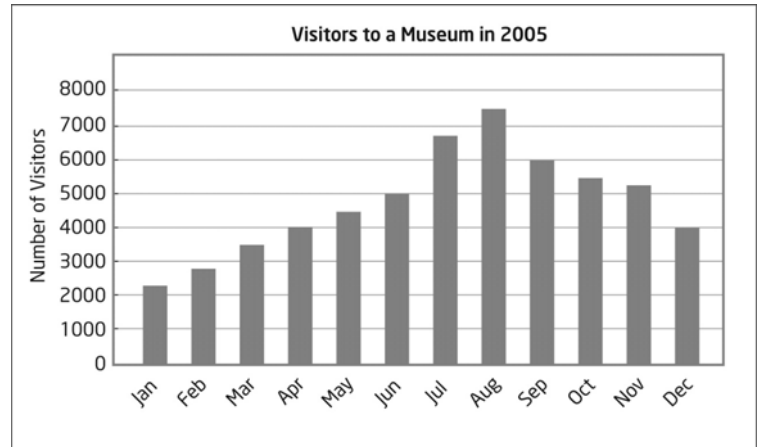
a) In which month were the fewest visitors in the museum? In which month were the most visitors in the museum?

b) Describe any trends in the number of visitors during this year at the museum.

4. This table shows the average cost of 1 L of milk in various cities across Canada for one week in July in 2006.

City	Average Cost of Milk ($/L)
St. John's, NL	1.15
Charlottetown, PE	1.11
Halifax, NS	1.15
Saint John, MB	1.17
Montreal, QC	1.08
Toronto, ON	1.05
Winnipeg, MB	1.03
Regina, SK	1.04
Calgary, AB	1.06
Vancouver, BC	1.08

a) Make a bar graph of the data.

b) In what regions was the average cost of milk the least? Why?

Prerequisite Skills: Measures of Central Tendency

Principles of Mathematics 9, **Student Skills Book**, pages 14

Practise

1. Find the mean, median, and mode for each set of data.

   a) 13, 15, 17, 14, 15
   b) 30, 35, 32, 30, 31
   c) 52, 55, 54, 55, 56
   d) 40, 42, 43, 43, 46
   e) 88, 83, 85, 88, 84
   f) 21, 25, 24, 26, 21

2. Find the mean, median, and mode for each set of data.

   a) 31, 32, 34, 32, 35, 37
   b) 51, 54, 56, 55, 57, 54
   c) 81, 85, 84, 82, 85, 87
   d) 60, 67, 68, 68, 62, 65
   e) 46, 45, 47, 44, 41, 47
   f) 90, 95, 94, 90, 93, 96

3. Find the mean, median, and mode for each set of data. Round to one decimal place, when necessary.

   a) 19, 23, 26, 21, 24, 17, 23
   b) 41, 34, 36, 34, 37, 34, 40
   c) 74, 65, 64, 72, 75, 66, 64
   d) 40, 54, 48, 48, 52, 45, 53

4. Find the mean, median, and mode for each set of data. Round to two decimal places, when necessary.

   a) 2.3, 2.1, 1.9, 1.9, 2.6
   b) 4.5, 4.3, 3.4, 3.8, 4.3
   c) 6.4, 6.5, 6.4, 7.4, 7.6, 6.4
   d) 8.0, 9.4, 8.8, 8.8, 9.2, 8.4

5. The masses, in kilograms, of twelve different models of bicycles are shown.

14.8	15.1	12.5	13.7
15.2	12.7	13.5	12.3
12.7	13.8	14.7	13.9

   Find the mean, median, and mode. Round to the nearest hundredth of kilogram, when necessary.

6. For the mass data in question 5, which measure of central tendency best represents the "average" mass of bicycles? Explain.

7. The weights, to the nearest kilogram, of a group of 16-year-olds are shown.

67.2	68.3	59.7	67.5
58.3	70.3	62.3	69.4
72.5	58.2	62.5	71.3
68.4	90.2	69.4	72.3
69.4	71.4	72.4	67.5

   Find the mean, median, and mode.

8. For the weight data in question 7, which measure of central tendency represents the "average" weight of 16-year-olds? Explain.

Prerequisite Skills: Scatter Plots
Principles of Mathematics 9, *Student Skills Book*, **pages 15–16**

Practise

1. This table shows the ages and weekly incomes of 15 employees at a company.

Age (years)	Weekly Income ($)
27	692
29	705
30	650
32	725
33	700
35	740
38	600
42	750
45	780
46	760
47	800.
50	850
51	840
55	860
59	900

Make a scatter plot of the data. Put age on the horizontal axis and income on the vertical axis.

2. This table shows the lengths, from the nose to the end of the tail, and the masses of different types of cats.

Type of Cat	Length (cm)	Mass (kg)
Lion	300	180
Lioness	270	140
Cheetah	180	45
Mountain Lion	240	90
Jaguar	260	140
Leopard	265	70
Tiger	270	190
Tigress	240	135
Lynx	90	30

Make a scatter plot of the data. Put length on the horizontal axis and mass on the vertical axis.

3. This table shows approximate driving distances and times from North Bay, Ontario to various cities in Ontario.

City	Distance (km)	Driving Time (h)
Barrie	237	3.0
Haileybury	147	1.5
Kapuskasing	478	5.0
London	498	6.0
New Liskeard	149	1.5
Ottawa	365	4.0
Sault Ste Marie	434	4.5
Sudbury	125	1.5
Thunder Bay	1032	11.0
Timmins	350	4.0
Toronto	330	3.5
Windsor	675	8.0

Make a scatter plot of the data. Put distance on the *x*-axis and driving time on the *y*-axis. Label the axes, and include a title for the scatter plot.

4. This table shows the height and the circumference of a tree at different ages.

Age (years)	Height (m)	Circumference (cm)
1	1.1	15.2
2	1.1	18.2
3	2.4	20.7
4	2.5	23.2
5	3.1	27.0
6	4.3	29.5
7	4.5	32.0
8	5.3	33.9

Make a scatter plot of the data. Put height on the *x*-axis and circumference on the *y*-axis. Label the axes, and include a title for the scatter plot.

Prerequisite Skills: Linear Relationships
Principles of Mathematics 9, *Student Skills Book*, pages 17–18

Practise

1. This graph shows that the relationship between the cost of oranges and quantity of oranges, in kilograms, is linear.
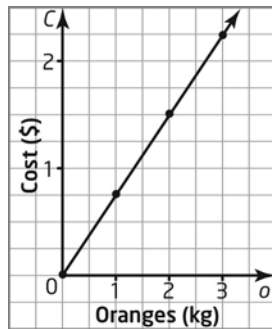
a) Copy and complete the table.

Oranges (kg)	Cost ($)
1	
2	
3	

b) Identify the coordinates where the graph crosses the vertical axis. Explain the meaning of this point.

2. This graph shows that the relationship between the cost of parking a car and the time, in hours, is linear.
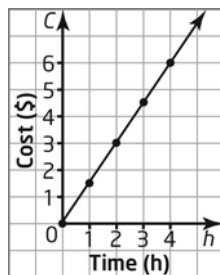
a) Copy and complete the table.

Time (h)	Cost ($)
1	
	3.00
3	
	6.00

b) Identify the coordinates where the graph crosses the vertical axis. Explain the meaning of this point.

3. Jean records the height of a bean plant after planting it in her garden.

Time (weeks)	Height (cm)
1	10
2	14
3	18
4	22
7	34

a) Graph this linear relationship.

b) When does the height of the tomato plant reach 30 cm?

c) Identify the coordinates where the graph crosses the vertical axis. Explain the meaning of this point.

4. This table shows how the distance a person walks changes with time.

Time (h)	Distance (km)
1	4
2	8
3	12
4	16

a) Graph this linear relationship.

b) How many hours does the person take to walk 14 km?

c) How far does the person walk in 1.5 h?

d) Identify the coordinates where the graph crosses the vertical axis. Explain the meaning of this point.

Prerequisite Skills: Rational Numbers
Principles of Mathematics 9, *Student Skills Book*, pages 19–20

Practise

1. In each part, decide which rational number is not equivalent to the others.

   a) $\dfrac{3}{5}$, 0.6, $\dfrac{-3}{-5}$, $\dfrac{3}{-5}$

   b) $-\dfrac{5}{8}$, $\dfrac{-5}{-8}$, -0.625, $\dfrac{-5}{8}$

   c) -0.25, $-\dfrac{1}{4}$, $\dfrac{-1}{-4}$, $\dfrac{-1}{4}$

   d) $\dfrac{-12}{5}$, 2.4, $2\dfrac{2}{5}$, , $\dfrac{-12}{-5}$

2. Express each rational number in decimal form.

   a) $\dfrac{4}{5}$

   b) $-\dfrac{7}{10}$

   c) $\dfrac{-3}{8}$

   d) $\dfrac{11}{4}$

3. Express each rational number as a quotient of two integers.

   a) $1\dfrac{2}{5}$

   b) 0.9

   c) $-3\dfrac{2}{9}$

   d) -4.3

4. Write three equivalent rational numbers for each number.

   a) $\dfrac{-5}{8}$

   b) $\dfrac{-4}{-3}$

   c) -0.75

5. Write three equivalent rational numbers for each number.

   a) $\dfrac{-6}{4}$

   b) $-\dfrac{4}{12}$

   c) $\dfrac{-12}{-10}$

6. Graph the rational numbers on a number line. Then, write the numbers in order, from least to greatest.

   $-3.2,\ 4,\ 1\dfrac{3}{10},\ 2.5,\ -3,\ -\dfrac{9}{5}$

7. Copy each math sentence. Fill in each $\square$ with the symbols <, >, or = to make the statement true.

   a) $\dfrac{2}{-5}\ \square\ \dfrac{-3}{8}$

   b) $\dfrac{5}{-3}\ \square\ \dfrac{-7}{2}$

   c) $\dfrac{5}{-4}\ \square\ \dfrac{-15}{12}$

Prerequisite Skills: Rates
Principles of Mathematics 9, Student Skills Book, page 21

Practise

1. Calculate each unit rate.
   a) A car travelled 750 km in 8 h.
   b) Janeena ran 10 km in 2 h.
   c) Jane swam 100 m in 80 s.

2. Calculate each unit rate.
   a) Sushil walked 8 km in 4 h.
   b) A bus travelled 450 km in 5 h.
   c) A train travelled 380 km in 4 h.

3. Calculate each unit rate.
   a) Five limes cost $1.30.
   b) Two pairs of jeans cost $70.00.
   c) Twelve cornmeal muffins cost $15.00.

4. Calculate each unit rate.
   a) Eight bottles of water cost $9.60.
   b) Four apples cost $2.40.
   c) Three mugs cost $13.50.

5. Calculate each unit rate.
   a) A bag of cookies costs $3.20 for 800g.
   b) A box of crackers costs $2.25 for 750 g.
   c) A box of raisins costs $1.95 for 425 g.

6. Calculate each unit rate.
   a) A cookie recipe calls for 400 mL of chocolate chips to make 80 cookies.
   b) A photocopy machine prints 400 pages in 2 min.
   c) A ceiling fan makes 150 rotations in 5 min.

7. Which brand of jam is a better buy?
   Brand A: $3.55 for 300 g
   Brand B: $5.92 for 450 g

8. Which brand of corn syrup is a better buy?
   Brand A: $13.75 for 400 mL
   Brand B: $16.25 for 550 mL

9. Which brand of popcorn is a better buy?
   Brand A: $5.25 for 500 g
   Brand B: $4.80 for 450 g

10. Which brand of laundry soap is a better buy?
    Brand A: $17.00 for 2.2 kg
    Brand B: $13.95for 1.9 kg

11. Terri and José work part-time jobs at different convenience stores.
    Terri earns $38 for 4 h of work.
    Jose earns $90 for 10 h of work.
    a) Which person receives the better hourly rate of pay?
    b) How much better is the hourly rate of pay?

12. Colette and Glen work part-time jobs at different bookstores.
    Colette earns $45 for 6 h of work.
    Glen earns $29 for 4 h of work.
    a) Which person receives the better hourly rate of pay?
    b) How much better is the hourly rate of pay?

Prerequisite Skills: Ratio and Proportion
Principles of Mathematics 9, *Student Skills Book*, **page 22–23**

Practise

1. Write each ratio in simplest form.
   a) 4:14   **b)** 6:18
   c) 25:40   **d)** 100:40

2. Write each ratio in simplest form.
   a) 24:36   **b)** 140:49
   c) 44:121   **d)** 90:81

3. To make 1000 mL of lemonade Maanasa uses 350 mL of frozen concentrate and 650 mL of water.
   a) Write a ratio in simplest form, to compare the amount of frozen concentrate to the total amount of lemonade.
   b) Write a ratio, in simplest form, to compare the amount of water to the total amount of lemonade.
   c) Write a ratio, in simplest form, to compare the amount of frozen concentrate to the amount of water.

4. How much frozen concentrate and water are needed to make 1500 mL of the lemonade in question 3?

5. One recipe for fresh limeade uses 900 mL of lime juice, 3000 mL of water, and 500 mL of sugar.
   a) Write a ratio, in simplest form, to compare the amount of lime juice to the amount of water.
   b) Write a ratio, in simplest form, to compare the amount of lime juice to the amount of sugar.
   c) Write a ratio, in simplest form, to compare the amount of water to the amount of sugar.

6. Refer to the limeade recipe in question 5.
   a) Write a ratio, in simplest form, to compare the amount of lime juice to the total amount of limeade.
   b) Write a ratio, in simplest form, to compare the amount of water to the total amount of limeade.
   c) Write a ratio, in simplest form, to compare the amount of sugar to the total amount of limeade.

7. Use the limeade recipe in question 5.
   a) How much sugar is needed to mix with 540 mL of lime juice?
   b) How much water is needed to mix with 200 mL of sugar.

8. Three out of five people prefer Choco chocolate chip cookies. How many would prefer Choco chocolate chip cookies in a group of 200 people?

9. Five out of seven people prefer Cranba cranberry juice. How many would prefer Cranba cranberry juice in a group of 350 people?

10. Seven out of nine dogs prefer Crunch Chow dry dog food. How many dogs would prefer Crunch Chow dry dog food in a group of 180 dogs?

Prerequisite Skills: Percents

Principles of Mathematics 9, *Student Skills Book*, page 24–25

Practise

1. Express as a percent.
   a) 0.05
   b) 0.125
   c) 0.6
   d) 0.35
   e) 1.24

2. Express as a percent.
   a) $\dfrac{3}{4}$
   b) $\dfrac{5}{8}$
   c) $\dfrac{3}{5}$
   d) $\dfrac{8}{5}$

3. Express as a percent. Round to one decimal place, if necessary.
   a) $\dfrac{5}{11}$
   b) $\dfrac{1}{3}$
   c) $\dfrac{4}{9}$
   d) $\dfrac{2}{7}$
   e) $\dfrac{5}{3}$

4. Write as a decimal.
   a) 29%
   b) 38.5%
   c) 8%
   d) 115%

5. Amanda's height increased from 140 cm to 148 cm in one year.
   a) Find Amanda's increase in height as a percent. Round to one decimal place.
   b) How tall would Amanda have to grow to have a 4% increase in height over the year? Round to the nearest centimetre.

6. A coat was originally priced at $149.99. The coat is on sale for $104.99.
   a) Find the percent discount, to the nearest whole number.
   b) What sale price would represent a 25% discount?

7. The mass of a compound is made up of the following four elements.
   - oxygen 75%
   - carbon 15%
   - hydrogen 8%
   - nitrogen 2%
   a) Find the mass of each element in a compound with a mass of 8 kg.
   b) Find the mass of each element in a compound with a mass of 20 kg.

8. A retailer buys a sweater for $20, and sells the sweater for $47.99.
   a) Find the percent markup, to the nearest whole number.
   b) What selling price would represent a 120% markup?

Prerequisite Skills: Powers
Principles of Mathematics 9, *Student Skills Book*, **page 26–27**

Practise

1. Write each as a power in exponential form.
   a) $4 \times 4 \times 4 \times 4 \times 4 \times 4$
   b) $7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7$
   c) $3 \times 3 \times 3 \times 3$
   d) $11 \times 11 \times 11$

2. Write each as a power in exponential form.
   a) $2.8 \times 2.8 \times 2.8 \times 2.8 \times 2.8$
   b) $6.1 \times 6.1 \times 6.1$
   c) $3.4 \times 3.4 \times 3.4 \times 3.4 \times 3.4$
   d) $1.7 \times 1.7 \times 1.7 \times 1.7 \times 1.7 \times 1.7$

3. Write each as a power in exponential form.
   a) $(-1) \times (-1) \times (-1)$
   b) $(-6) \times (-6) \times (-6) \times (-6) \times (-6)$
   c) $(-3) \times (-3) \times (-3) \times (-3)$
   d) $(-7) \times (-7) \times (-7) \times (-7) \times (-7) \times (-7)$

4. Write each as a power in exponential form.
   a) $x \times x \times x \times x$
   b) $y \times y$
   c) $m \times m \times m$
   d) $d \times d \times d \times d \times d$

5. Expand each power and then evaluate.
   a) 7^2
   b) 4^5
   c) 10^4
   d) 1^{13}
   e) 5^3
   f) 2^8

6. Evaluate.
   a) 2.3^4
   b) 1.4^5
   c) 0.3^3
   d) 0.25^2

7. Evaluate.
   a) 12.1^2
   b) 10.5^3
   c) 15.4^3
   d) 20.7^2

8. Express 16 as
   a) a power of 4
   b) a power of 2

9. Express 729 as
   a) a power of 27
   b) a power of 9
   c) a power of 3

10. Write each power.
   a) 512 as a power of 8
   b) 2401 as a power of 7
   c) 1 000 000 000 as a power of 10

11. Copy each equation. Find the correct number to make the equation true.
   a) $3^5 = \boxed{}$

   b) $2^{\boxed{}} = 256$

   c) $\boxed{}^4 = 6561$

## Prerequisite Skills: Classify Triangles
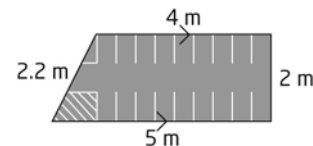*Principles of Mathematics 9, Student Skills Book, page 28–29*

Practise

1. Classify each triangle using its side lengths.

   a)

   5 cm   5 cm
   5 cm

   b)

   5 cm   3 cm
   7 cm

   c)

   8 m
   6 m
   8 m
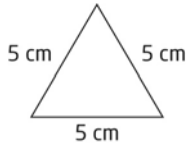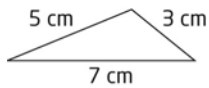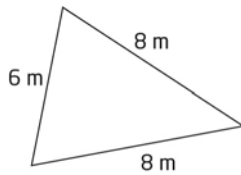
2. Classify each triangle as acute, right or obtuse.

   a)

   38°   32°
   110°

   b)

   28°
   62°

   c)

   62°
   68°
   50°

3. Classify each triangle in two ways.

   a)

   5 cm   7.1 cm
   5 cm

   b)

   4 cm
   5 cm
   6 cm

   c)

   45°
   120°   15°

   d)

   60°
   6 cm   6 cm
   60°   60°
   6 cm
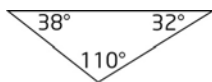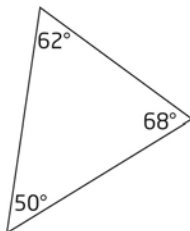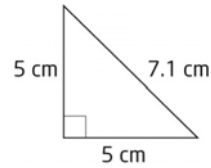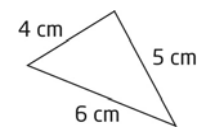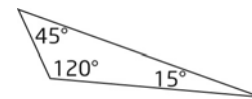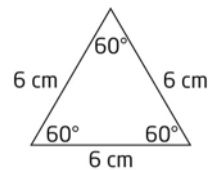
4. **a)** Name all triangles in the figure.
   b) Classify each triangle by its angle measures.

   A
   D
   B   C
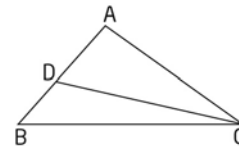
5. **a)** Name all triangles in the figure.
   b) Classify each triangle in two ways.

   M   N
   P
   O
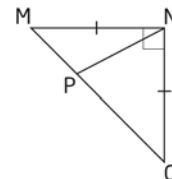
Prerequisite Skills: Classify Polygons
Principles of Mathematics 9, *Student Skills Book*, **page 30–31**

Practise

1. Classify each polygon according to its number of sides and tell whether it is regular or irregular.

a)
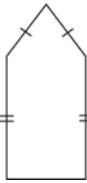
b)
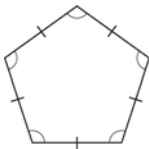
c)

d)
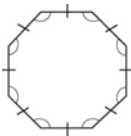
e)
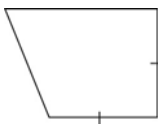
f)

g)
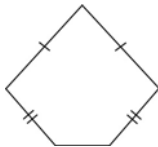
2. Classify each quadrilateral. Give reasons for your answer.

a)

b)
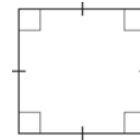
c)
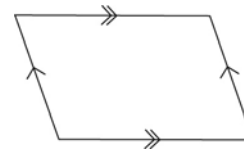
d)
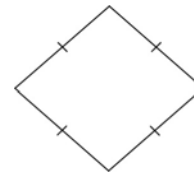
e)
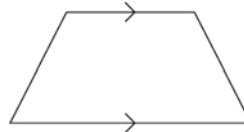
3. Name and classify the two quadrilaterals found in each of the following figures.

a)

b)
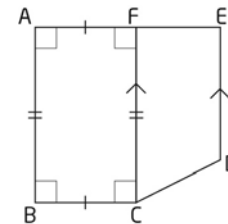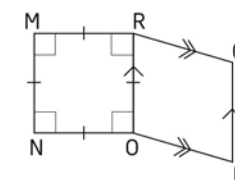
Prerequisite Skills: Angle Properties

Principles of Mathematics 9, *Student Skills Book*, **page 32-34**

Practise

1. Find the measure of angle *x*.
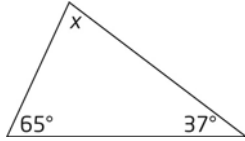
2. Find the measure of ∠ABC.
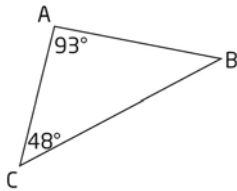
3. Find the measure of ∠PQR.
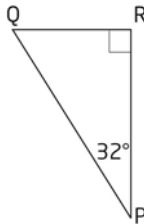
4. Find the measure of each unknown angle.

a)
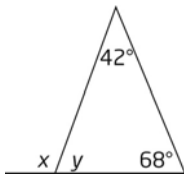
b)

c)
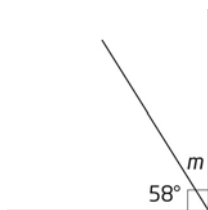
5. Find the measure of each unknown angle.

a)
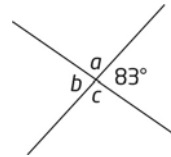
b)
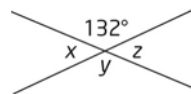
6. Find the measure of each unknown angle.

a)
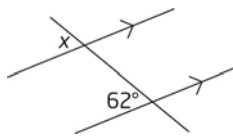
b)
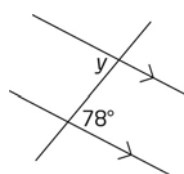
c)
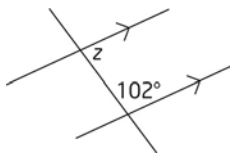
7. Find the measures of angles *x*, *y*, and *z*. Give reasons for each answer.

a)

b)
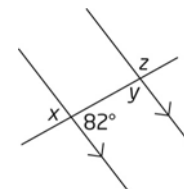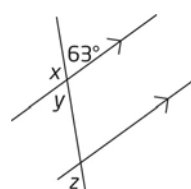
Prerequisite Skills: Calculate Perimeter and Circumference

Principles of Mathematics 9, Student Skills Book, page 35–36

Practise

1. Find the perimeter of each shape.

a)

4.7 cm

b)

6.5 cm

3.2 cm

c) 2.5 m

d)

16 mm

28 mm

e)

8 m

5 m

f) 4.2 cm

2.8 cm

2 cm
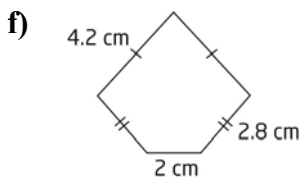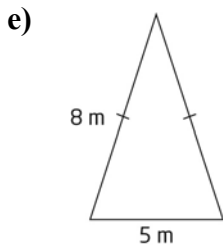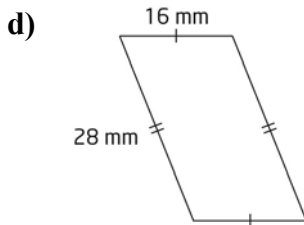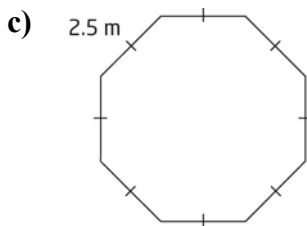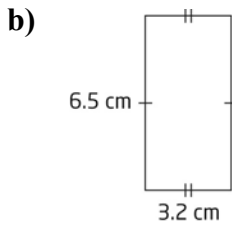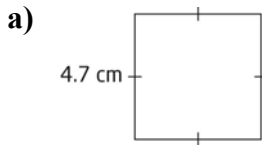
2. Calculate the circumference of each circle. Round answers to the nearest tenth of a unit.

a)

2.4 m

b)

9.1 mm

c)

6.8 cm

d)

12.3 m
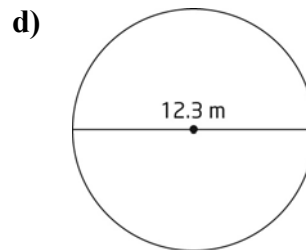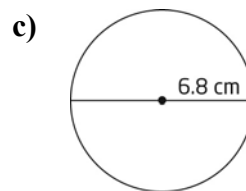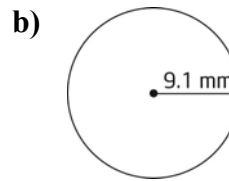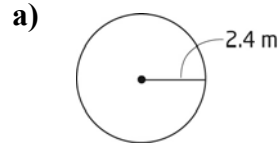
3. A parking area has the dimensions shown.

4 m

2.2 m

2 m

5 m

Find the perimeter of the parking area.

4. A patio has the dimensions shown.

4 m

2.2 m   2 m   2.2 m

6 m
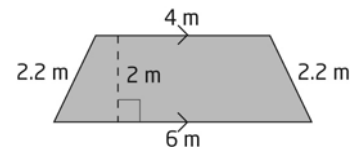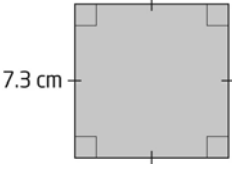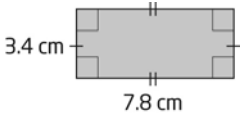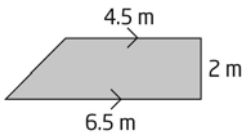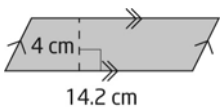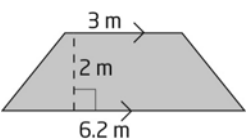
Find the perimeter of the patio.
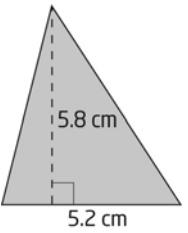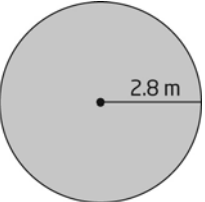
Prerequisite Skills: Apply Area Formulas

Principles of Mathematics 9, *Student Skills Book*, **page 37–38**

Practise
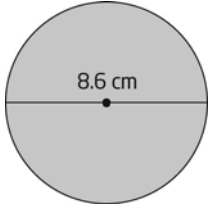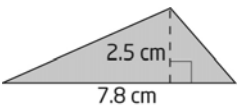
1. Determine the area of each shape.

a)

b)

c)

d)

e)
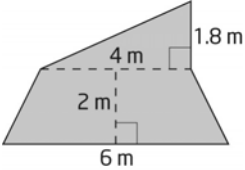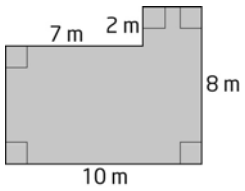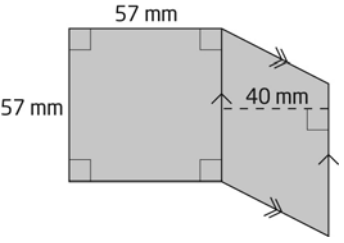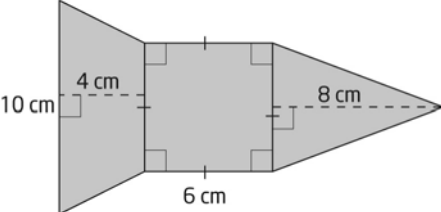
2. Determine the area of each shape. Round answers to the nearest tenth of a square unit.

a)

b)

3. Determine the area of each shape. Round answers to the nearest tenth of a square unit.

a)

b)

4. Determine the area of each shape.

a)

b)

c)

d)

Prerequisite Skills: Calculate Surface Area and Volume

Principles of Mathematics 9, *Student Skills Book*, **page 39–40**

Practise

1. Determine the surface area of each three-dimensional figure. If necessary, round answers to the nearest square unit.
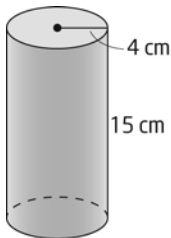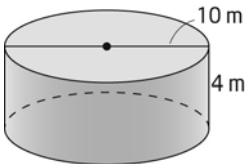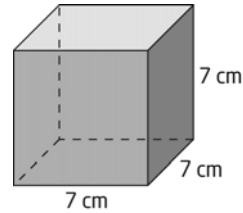
a)

5 cm
5 cm
5 cm

b)

7 m
3 m
4 m

c)

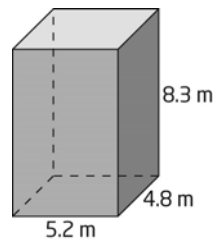4 cm
15 cm

d)

10 m
4 m
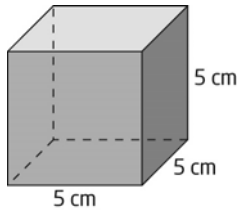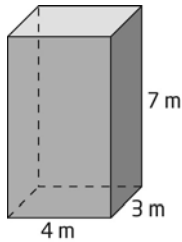
2. Determine the volume of each three-dimensional figure in question 1. If necessary, round answers to the nearest cubic unit.

3. Calculate the surface area and volume of each three-dimensional figure. Round answers to the nearest tenth of a square unit or cubic unit.
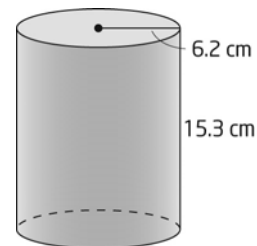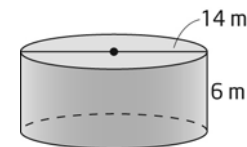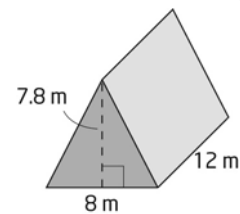
a)

7 cm
7 cm
7 cm

b)

8.3 m
4.8 m
5.2 m

c)

6.2 cm
15.3 cm

d)

14 m
6 m

4. Determine the surface area and the volume of the triangular prism.

7.8 m
12 m
8 m

Prerequisite Skills: Use *The Geometer's Sketchpad*®
Principles of Mathematics 9, *Student Skills Book*, **page 41–42**

Practise
Either draw a sketch of your results or
*choose **Print** from the **File** menu.*

1. Use *The Geometer's Sketchpad*® to create a triangle with each characteristic.
   a) a perimeter of 28 cm
   b) a perimeter of 15 cm
   c) a perimeter of 18 cm
   d) a perimeter of 30 cm

2. Use *The Geometer's Sketchpad*® to create a triangle with each characteristic.
   a) an area of 20 cm^2
   b) an area of 38 cm^2
   c) an area of 40 cm^2
   d) an area of 45 cm

3. Use *The Geometer's Sketchpad*® to create a circle with each characteristic.
   a) a circumference of 14 cm
   b) a circumference of 20 cm
   c) a circumference of 28 cm
   d) a circumference of 21 cm

4. Use *The Geometer's Sketchpad*® to create a circle with each characteristic.
   a) an area of 30 cm^2
   b) an area of 42 cm^2
   c) an area of 26 cm^2
   d) an area of 15 cm^2

5. Use *The Geometer's Sketchpad*® to create a quadrilateral with each characteristic.
   a) a perimeter of 16 cm
   b) a perimeter of 22 cm
   c) a perimeter of 36 cm
   d) a perimeter of 17 cm

6. Use *The Geometer's Sketchpad*® to create a quadrilateral with each characteristic.
   a) an area of 32 cm^2
   b) an area of 16 cm^2
   c) an area of 26 cm^2
   d) an area of 27 cm^2

7. Use *The Geometer's Sketchpad*® to create any triangle.
   a) Measure its perimeter and area.
   b) Create a quadrilateral that has approximately the same area as the triangle.
   c) Compare the perimeters of the two figures.

8. Use *The Geometer's Sketchpad*® to create any quadrilateral.
   a) Measure its perimeter and area.
   b) Create a circle that has approximately the same circumference as the perimeter of the quadrilateral.
   c) Compare the areas of the two figures.

Prerequisite Skills: Compare Figures
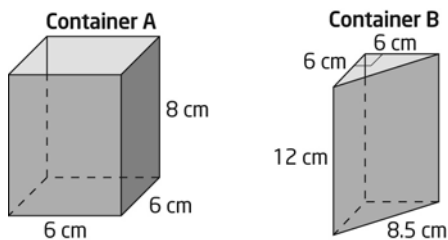*Principles of Mathematics 9*, *Student Skills Book*, page 43–44

Practise

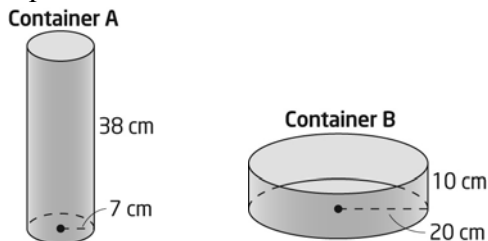**1. a)** Calculate the surface area and volume of the two open-topped containers.
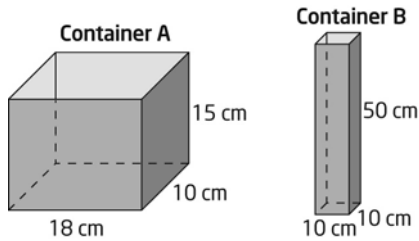
b) Which container has the larger surface area?

c) Which container has the larger volume?

2. a) Calculate the surface area and volume of the two open-topped containers.
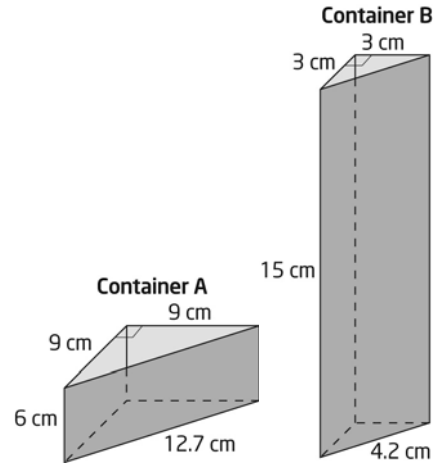

b) Which container has the larger surface area?

c) Which container has the larger volume?

3. a) Calculate the surface area and volume of the two open-topped containers. Round to the nearest square unit or cubic unit.
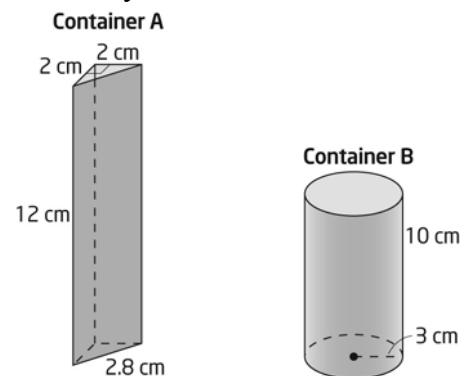

b) How do their surface areas and volumes compare?

4. a) Calculate the surface area and volume of the two open-topped containers.
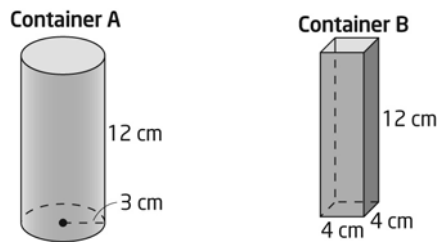

b) Which container has the larger surface area?

c) Which container has the larger volume?

5. a) Calculate the surface area and volume of the two open-topped containers. Round to the nearest square unit or cubic unit, if necessary.

b) Which container has the larger surface area?

c) Which container has the larger volume?

6. Compare the surface area and volume of the two open-topped containers. Round to the nearest square unit or cubic unit, if necessary.

Container A

Container B

12 cm

12 cm

3 cm

4 cm 4 cm

a) Which container has the largest capacity?

b) Which container requires the least amount of material to construct it?