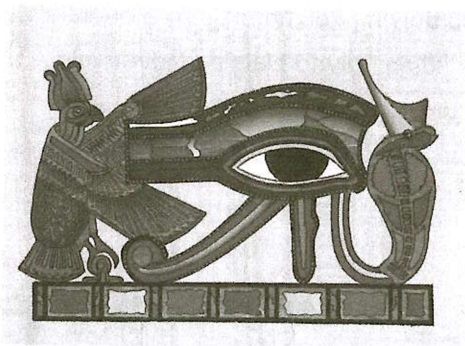
Contents



CHAPTER 4

Scale Factors and Similarity

CHAPTER 5

Introduction to Polynomials

CHAPTER 6

Linear Relations

CHAPTER 7

Multiplying and Dividing Polynomials

CHAPTER 8

Solving Linear Equations

STARS
HIGH SCHOOL
REACH FOR THE STARS

How should our school spend the money in the activity budget?
We need more baseball equipment.
Spend it on better baseball equipment.

To the User

Welcome to the *MathLinks 9* Practice and Homework Book. This print resource provides additional opportunities for you to develop the skills you used in the *MathLinks 9* student resource.

- Each chapter begins with a Get Ready that can be used to help you reinforce the skills you will need to be successful with that chapter.
- The chapter content is divided into sections. Each section starts with a review of the Key Ideas. This is followed by a series of questions that allow you to practise and apply the skills and concepts from that section in the *MathLinks 9* student resource.
- The end of each chapter includes a Chapter Link page that challenges you to combine the skills and concepts you learned during the chapter to solve problems.
- The final page of each chapter is a Vocabulary Link that reviews the key words and other important words from each chapter in the form of a word puzzle of some kind.
- The final spread of each chapter provides a cumulative review. This will reinforce the skills and concepts you learn throughout the *MathLinks 9* program.
- There is a Practice Final Exam for the year starting on page 144.
- Answers for all questions appear at the end of the practice and homework book starting on page 153.

Additional activities, as well as games and puzzles, are available in McGraw-Hill Ryerson's Online Learning Centre. Go to **www.mathlinks9.ca** and follow the links to the Student Centre or to the Parent Centre. The Parent Centre also includes suggestions for helping your child in mathematics.

Authors
MathLinks 9 Practice and Homework Book

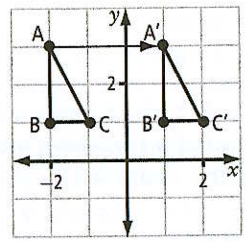
Get Ready

Date: ______________________

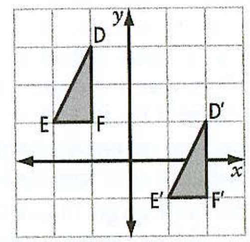
Using Translations

Transformations include translations, reflections, and rotations. A *translation* is a slide along a straight line. The slide can be horizontal, vertical, or oblique.

> A'B'C' is used to label the image of ABC after the translation. A'B'C' is read "A prime, B prime, C prime."

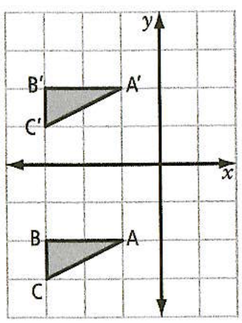


This is a translation 3 units horizontally to the right.

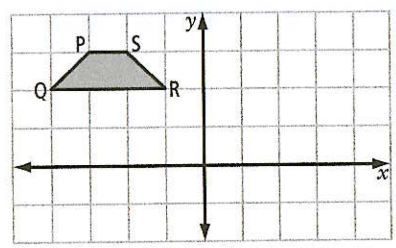


This is a translation 3 units horizontally to the right and 2 units vertically down.

1. Describe the translation.

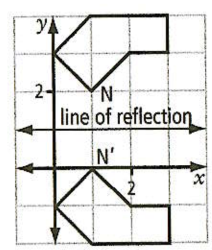


2. If figure PQRS is translated 6 units horizontally to the right, what are the coordinates of P'?



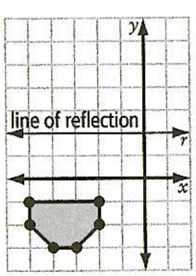
Drawing Reflections

A *reflection* is a mirror image in a line of reflection. A point and its reflection are the same distance from the line of reflection.
The line of reflection here is a horizontal line at $y = 1$.
Both N and N' are 1 unit from the line of reflection.

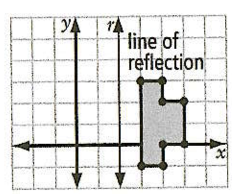


3. Draw the reflection image for each figure.

a)

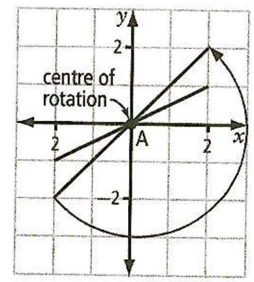


b)



Drawing Rotations

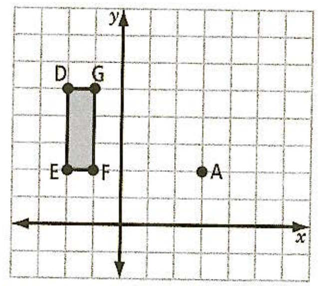
A *rotation* is a turn about a point or centre of rotation. The rotation can be clockwise or counter-clockwise.
The centre of rotation here is at A.
The rotation is 180° counter-clockwise about A.



4. Figure DEFG is rotated 90° clockwise about its centre of rotation, A.

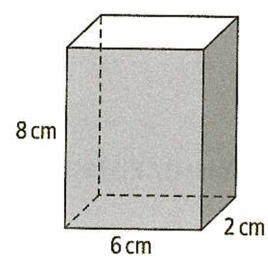
a) Draw the rotation image D′E′F′G′. Label the coordinates.

b) Describe the rotation if it had been in a counter-clockwise direction.

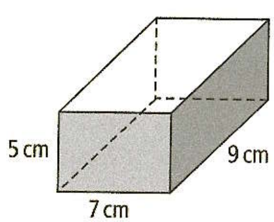


Using Surface Area

Surface area is the sum of the areas of all the faces of a 3-D object.
A right rectangular prism has six faces. Three of its faces are different sizes.
Front and back have the same area: $A = 6 \times 8 = 48$
Top and bottom have the same area: $A = 6 \times 2 = 12$
Two ends have the same area: $A = 2 \times 8 = 16$
Total surface area $= 2(48 + 12 + 16) = 152$
The surface area is 152 cm².



5. Calculate the surface area of the right rectangular prism.



6. How many faces does each solid have?

a) right triangular prism

b) cylinder

Date: ____________________

1.1 Line Symmetry

***MathLinks 9*, pages 6–15**

Key Ideas Review

Decide whether each of the following statements is true or false. Circle the word True or False. If the statement is false, rewrite it to make it true.

1. **True/False** A strategy for completing a symmetric drawing is folding one half in the line of symmetry.

____

____

2. **True/False** An isosceles triangle has no line of symmetry.

____

____

3. **True/False** You can find a line of symmetry using a grid.

____

____

4. **True/False** A shape that has a line of symmetry is asymmetrical.

____

____

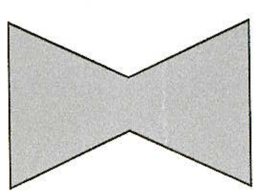
5. **True/False** A curved shape cannot have lines of symmetry.

____

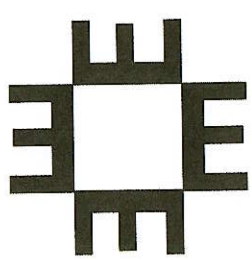
____

Check Your Understanding

6. Draw two lines of symmetry in the following figure.

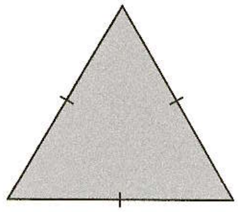


7. Use the first letter of your name or use a number to create a design that uses at least two lines of symmetry. Example:



Date: ______________________

8. How many lines of symmetry does an equilateral triangle have? Show them.

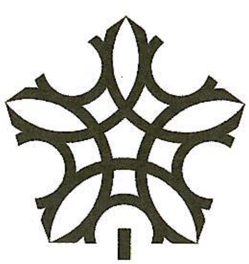


9. a) How many lines of symmetry does a square have? Show them.

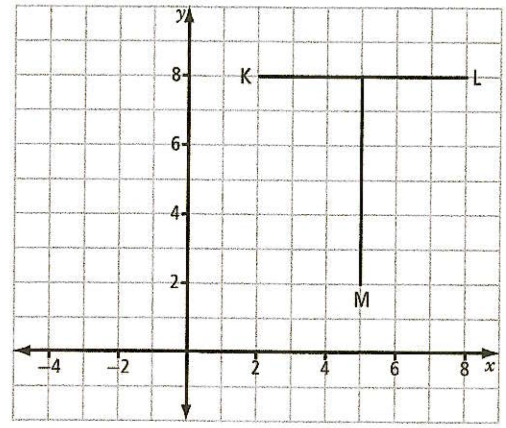
b) How many of the lines are oblique?

10. a) The Olympic rings are a symbol based on five circles. Draw the line or lines of symmetry. How many are there?

b) When the 1988 Winter Olympic Games were held in Calgary, the organizers used the Olympic rings to create a new design. Draw the line or lines of symmetry. How many are there?



11. Use the coordinate grid to complete the following questions.



a) What are the coordinates of figure KLM?

b) Translate the figure 6 units to the left.

c) What are the coordinates of the new figure K′L′M′?

d) Do the original figure and the translated figure show symmetry with each other? Explain.

e) For the combined image of the original figure and the translated figure, where is the line of symmetry?

Date: ______________________

1.2 Rotation Symmetry and Transformations

***MathLinks 9*, pages 16–25**

Key Ideas Review

Unscramble the words to complete the sentences below.

1. a) ______________ symmetry means that a figure can be turned and fitted
NRTAIOTO
over itself.

b) The number of times a figure can be placed over itself is called the

______________.
DEORR

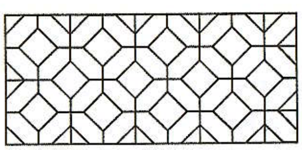
c) A line of ______________ divides a figure into two reflected parts.
YYSRMTEM

d) A ______________ is a point on which a figure turns.
RETNEC

e) The number of degrees in a ______________ is 360.
ELCRIC

Check Your Understanding

2. Look at the design shown. Explain if the design has line symmetry, rotation symmetry, or both.



3. Using the design shown above, complete the table.

Shape	Lines of Symmetry	Order of Rotation	Angle of Rotation
Small square			
Octagon			

4. a) Choose a letter from the alphabet. Create a design using this letter at least four times. Repeat using two other letters.

b) Which letters that you chose have line symmetry? Explain.

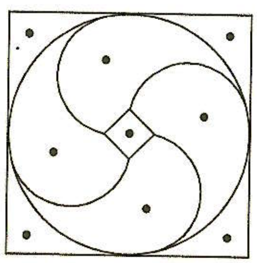
c) Which patterns show rotational symmetry? Justify your response.

Date: ______________________

5. a) Use the figure below to create a tessellation, repeating the figure at least six times to establish the pattern.

b) Through what angles did you have to turn your figure to rotate it as you built your tessellation?

6. Susan wants to make a pinwheel pattern quilt design based on the pattern piece below. She is going to make all the pieces different colours and will repeat the pattern many times.



a) Determine the order of rotation for the pattern shown above.

b) Can Susan create a quilt design with more than one type of symmetry? Explain your answer.

7. Draw a large capital letter H on a blank piece of paper. Place a point in the middle of the letter H. Use your point as a centre and turn your letter H on this point.

a) What is the order of rotation for the letter H?

b) Fold the letter through the centre point. How many lines of symmetry can you find by folding your letter H?

c) Repeat the exercise using the capital letter X. What is the order of rotation for the letter X?

d) How many lines of symmetry can you find by folding your letter X?

e) What other block letters have rotation symmetry?

f) What other block letters have line symmetry?

Date: ______________________

1.3 Surface Area

***MathLinks 9*, pages 26–35**

Key Ideas Review

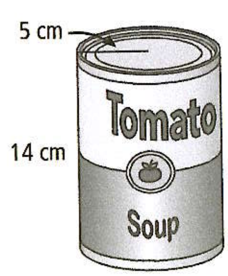
1. Complete the chart below, using the first row as a sample. Show your answer to the nearest tenth.

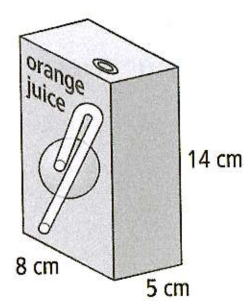
Shape	Formula	Example	Surface Area
Square	$A = l \times w$	One side of a paper napkin: 10 cm by 10 cm	100 cm^2
a) Rectangle	$A = l \times w$	One side of an envelope: 30 cm by 22.5 cm	
b) Circle	$A = \pi r^2$	One side of a clock face: 30 cm across, or radius of 15 cm	
c) Rectangular prism	$A = 2$(area of base) + (perimeter of base) $\times$ height	Tissue box: 25 cm by 12 cm by 12 cm	
d) Cylinder	$A = 2\pi r^2 + 2\pi rh$	Candle: 15 cm high and 8 cm across	
e) Triangle	$A = \frac{1}{2}b \times h$	End wall of a tent: 2 m along base and 1.5 m high	

2. Define *surface area* in your own words.

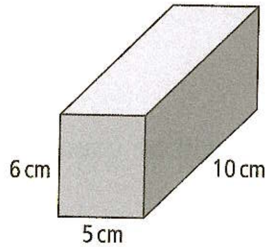
Check Your Understanding

3. Which container has the greater surface area? How much more surface area does one have than the other? Show your answer to the nearest tenth.





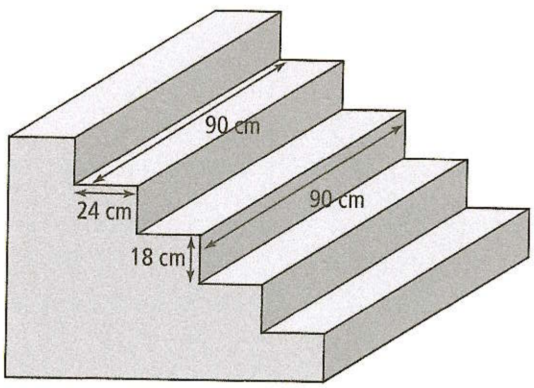
4. The diagram shows a right rectangular prism.



a) Determine the surface area of the prism.

b) If the height is doubled, what is the new surface area?

5. Silvio wants to cover the stairs to his basement. There are 14 treads, or steps, and 14 risers. Each step is 90 cm wide and 24 cm deep. Each riser is 90 cm wide and 18 cm high. The diagram shows some of the stairs.



a) What is the surface area of the step treads?

b) What is the surface area of the risers?

c) What is the total surface area of the part of the stairs Silvio plans to cover?

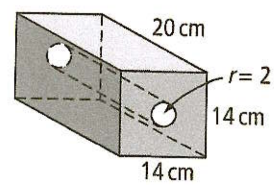
6. The Great Pyramids at Giza, Egypt, are one of the greatest engineering accomplishments ever. The largest pyramid is 146.7 m high. The length of each side of the square base is approximately 230.6 m. Show all answers to the nearest tenth.

a) What is the surface area of the base of the pyramid?

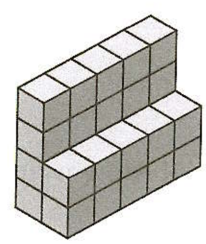
b) What is the surface area of each triangular side?

c) What is the total surface area of the pyramid?

7. The rectangular box has a tube running through it. What is its total surface area to the nearest tenth?



8. a) This object has been constructed from centimetre cubes. Calculate its surface area.



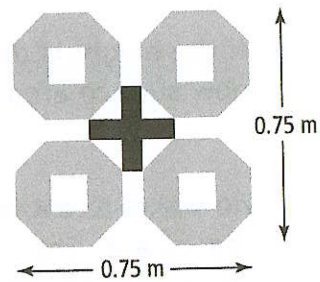
b) If the length of the object is increased from five cubes to eight cubes, what is the new surface area?

Date: ______________________

Chapter Link

You have been hired to create a rug design that will be used in homes all over the country. Your design must

- have at least two lines of symmetry (vertical, horizontal, or oblique)
- have a minimum order of rotation of 2
- use at least two different shapes



Label the dimensions of your design. The design will be repeated to create the finished rug. The finished rug must fit in a room that is 4.5 m by 6.5 m. The design shown here is one example that would meet all criteria. What can you design?

1. How many lines of symmetry does your design have? Show them.

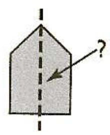
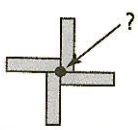
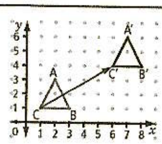
2. What is the order of rotation of your design?

3. What is the maximum number of times your design can be repeated, without exceeding the size of the room?

Date: ____________________

Vocabulary Link

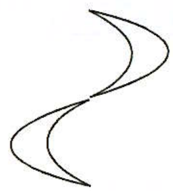
Unscramble the letters of each term in column B. Use the clues in column A to help you. Each term is one to three words long.

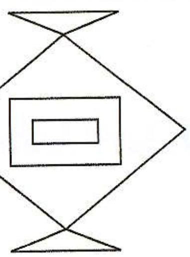
A	B
1.  ____________ ______ ____________	LMYIFYSEMNTOER
2. a type of symmetry in which an image or object can be divided into two identical reflected halves by a line of symmetry ____________ ____________	LRYENYSITMEM
3.  this figure has ____________ ____________	TINOEOYYRRAMMSTT
4. an object or image has this if it is balanced and can fit onto itself either by reflection or rotation ____________	ERYMMYST
5.  ____________ ______ ____________	IFOANEROETOTNTRC
6.  the graph shows a ____________	ANOSRNLAITT
7. the minimum measure of the angle needed to turn a shape or design on itself ____________ ______ ____________	NELOOTAGOFAINRT
8. the sum of the areas of all faces of an object ____________ ____________	AERUSAFRAEC
9. adjective to describe a shape or design that has symmetry ____________	MSMYRETLIAC

Date: ____________________

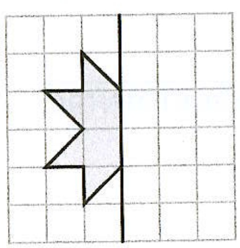
Chapter 1 Review

1. Describe the types of symmetry in each figure. Use the terms *vertical, horizontal, oblique*, and *rotational*.

   a) 

   b) 

2. Using the given line of symmetry, complete the drawing.



3. Describe each of the following types of symmetry. Make your own sketch of each type. Label the lines of symmetry.

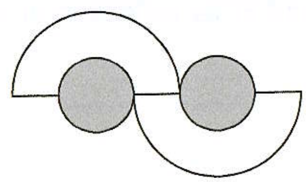
   a) vertical symmetry

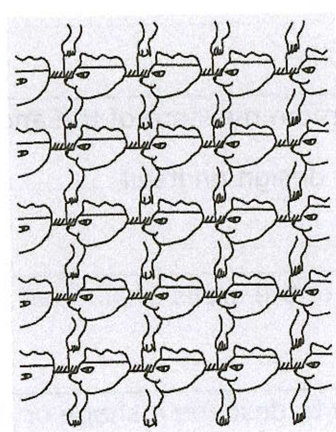
   b) horizontal symmetry

   c) oblique symmetry

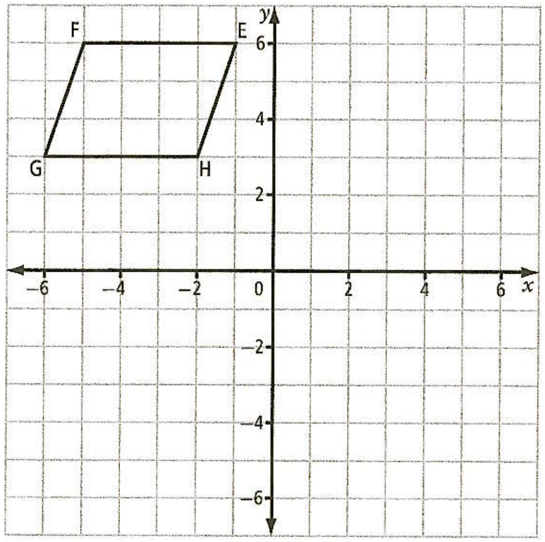
   d) rotational symmetry

4. Does each design have line symmetry, rotation symmetry, both, or neither? For the designs with symmetry, mark the line(s) of symmetry and/or the centre of rotation. For the designs with no symmetry, describe what changes would make the designs symmetrical.

   a) 

   b) 

5. A parallelogram was drawn on a coordinate grid.

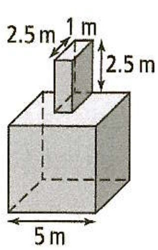


a) Complete the diagram so that it has rotation symmetry of order 2 about the origin. Label the vertices and coordinates of the new image.

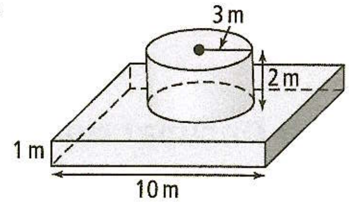
b) Use line symmetry to make two new images. First, use the *y*-axis and then use the *x*-axis as the line of symmetry. Label the vertices and the coordinates of the vertices of each new image.

6. Calculate the surface area of each of the following shapes. Show your thinking. Show your answer to the nearest tenth, where necessary.

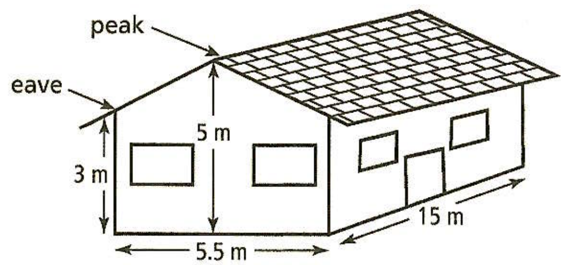
a)



b)



7. A contractor needs to put new siding on a house. There are eight identical windows that measure 1 m by 0.5 m and a door that measures 2.1 m by 0.75 m. Siding does not go on the roof.



a) What is the area of the house that needs new siding?

b) One piece of siding covers 1 m by 0.1 m. How many pieces of siding does the contractor need? Assume that there is no overlap or wasted material.

Get Ready

Date: ____________________

Working With Decimal Numbers

Estimation can help you work with decimal numbers. For example, you can use estimation to place the decimal point in the correct position in the answer.

16.94 + 3.41 + 81.07 = 10 142

Estimate: 17 + 3 + 80 = 100

Calculation: 101.42

Place the decimal so that the answer is close to 100.

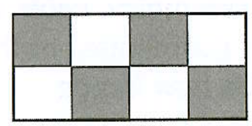
1. Without calculating the answer, place the decimal point in the correct position to make a true statement.
   a) 149.8 ÷ 0.98 = 15285714
   b) 2.7 × 100.9 = 272430
   c) 40.6 × 9.61 = 39016600

2. Is 349 × 0.9 greater than, less than, or equal to 349? How do you know?

Understanding Fractions

A fraction can represent parts of a whole.

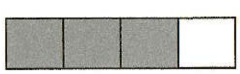
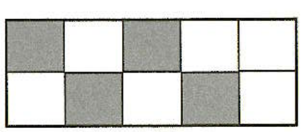
The shaded part of the diagram shows $\frac{4}{8}$ or $\frac{1}{2}$ or 0.5.



Compare $\frac{3}{8}$ and $\frac{2}{6}$. Use denominators that are the same.

$$\frac{3}{8} \overset{\times 3}{=} \frac{9}{24} \qquad \frac{2}{6} \overset{\times 4}{=} \frac{8}{24}$$

$\frac{9}{24} > \frac{8}{24}$, therefore $\frac{3}{8} > \frac{2}{6}$

3. Give the fraction and decimal value for the shaded part of each diagram.
   a) 
   b) 

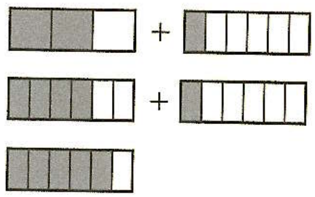
4. Compare each set of fractions by arranging them from smallest to largest.
   a) $\frac{3}{4}$ and $\frac{7}{10}$
   b) $\frac{3}{8}$, $\frac{2}{7}$, and $\frac{1}{3}$

Adding or Subtracting Fractions

When adding or subtracting fractions, work with parts of the whole that are of equal size. You can

- use diagrams

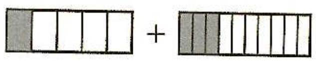
$$\frac{2}{3} + \frac{1}{6}$$
$$= \frac{4}{6} + \frac{1}{6}$$
$$= \frac{5}{6}$$

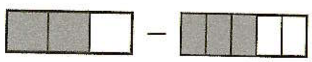


- use a common denominator

$$\frac{2}{3} - \frac{5}{8}$$
$$= \frac{16}{24} - \frac{15}{24}$$
$$= \frac{1}{24}$$

5. Write each statement shown by the fraction strips.

a) 

b) 

6. Determine the sum or difference. Give your answer in lowest terms.

a) $\frac{1}{2} + \frac{3}{8}$

b) $\frac{5}{6} - \frac{3}{4}$

Multiplying and Dividing Fractions

To multiply two proper fractions, you can multiply the numerators and multiply the denominators. $\frac{1}{2} \times \frac{2}{3} = \frac{1 \times 2}{2 \times 3}$

$$= \frac{2}{6}$$
$$= \frac{1}{3}$$

To divide two fractions, you can

- use a common denominator and divide the numerators

$$\frac{7}{10} \div \frac{2}{5} = \frac{7}{10} \div \frac{4}{10}$$
$$= \frac{7}{4} \text{ or } 1\frac{3}{4}$$

- multiply by the reciprocal of the second fraction

$$\frac{7}{10} \div \frac{2}{5} = \frac{7}{10} \times \frac{5}{2}$$
$$= \frac{35}{20} \text{ or } \frac{7}{4} \text{ or } 1\frac{3}{4}$$

7. Multiply. Give your answer in lowest terms.

a) $\frac{3}{4} \times \frac{5}{6}$

b) $\frac{11}{2} \times \frac{3}{4}$

8. Divide.

a) $\frac{15}{2} \div \frac{3}{4}$

b) $1\frac{2}{3} \div \frac{1}{2}$

2.1 Comparing and Ordering Rational Numbers

MathLinks 9, pages 46–54

Key Ideas Review

1. a) Circle the rational number(s).

$2.1 \qquad -\frac{3}{2} \qquad \pi \qquad 3 \qquad \sqrt{2} \qquad -55$

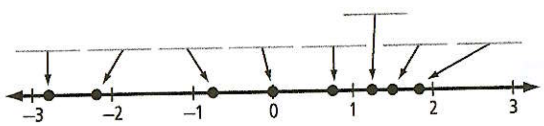
b) Circle the numbers that are equivalent to 3.

$-\frac{9}{3} \qquad 3.0 \qquad -\left(\frac{-15}{3}\right) \qquad \sqrt{9} \qquad \frac{-21}{-7} \qquad \frac{3}{1}$

Choose from the following rational numbers to complete #2.

$\frac{3}{4} \qquad -2.1 \qquad \frac{5}{4} \qquad \frac{0}{3} \qquad -\frac{3}{4} \qquad 1.8 \qquad -\frac{14}{5} \qquad \frac{6}{4}$

2. a) Fill in the blanks to identify the rational numbers.

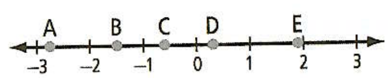


b) Circle the opposite numbers.

c) Which rational number lies between 0 and 1? ________

Check Your Understanding

3. Match each rational number to a point on the number line.



a) -0.6 ________

b) $-\frac{3}{2}$ ________

c) $-2\frac{3}{4}$ ________

d) 1.9 ________

e) $0.\overline{3}$ ________

f) Explain your thinking.

4. a) Fill in each blank using the correct rational number from the list.

$\frac{7}{8} \qquad -2.2 \qquad \frac{11}{6} \qquad -1.\overline{1} \qquad \frac{10}{8}$

b) Place the opposite of each number on the number line.

5. What is the opposite of each rational number?

a) $\frac{3}{2}$ ______ **b)** $-6.\overline{8}$ ______ **c)** $-2\frac{1}{5}$ ______

Date: ______________________

6. Compare $\frac{9}{8}$, 0.511, $-1\frac{2}{3}$, -1.7, and $\frac{6}{11}$.

   a) Write the fractions in decimal form.

   b) Write the numbers in ascending order.

7. Compare $\frac{5}{6}$, 0.7, $-\frac{12}{5}$, -2.1, and $-1\frac{3}{4}$.

   a) Write the fractions in decimal form.

   b) Write the numbers in descending order.

8. Express each fraction as an equivalent fraction.

   a) $-\frac{3}{4}$ b) $-\frac{4}{6}$

   c) $\frac{12}{8}$ d) $-\frac{5}{3}$

9. Write each rational number as an equivalent fraction.

   a) $\frac{5}{-8}$ b) $\frac{-7}{-9}$

   c) $\frac{-1}{4}$ d) $-\left(\frac{-8}{-7}\right)$

10. Circle the greater value in each pair.

    a) $\frac{1}{3}$, $-\frac{1}{3}$ b) $-\frac{4}{5}$, $\frac{3}{5}$

    c) $-1\frac{1}{6}$, $-1\frac{1}{3}$ d) $-\frac{3}{4}$, $-\frac{7}{8}$

11. Circle the smaller value in each pair.

    a) $\frac{2}{3}$, $\frac{4}{5}$ b) $-\frac{5}{6}$, $-\frac{11}{2}$

    c) $-\frac{5}{4}$, $-\frac{7}{4}$ d) $-2\frac{4}{5}$, $-2\frac{5}{6}$

12. Change each fraction to a decimal. Then, identify a decimal number between the given numbers.

    a) $\frac{1}{4}$, $\frac{1}{8}$

    b) $-\frac{2}{3}$, $-\frac{4}{5}$

13. The table lists the average low temperature of the coldest month in eight Canadian cities.

City	Average Low (°C)
Winnipeg	−23.6
Regina	−22.1
Edmonton	−17.0
Calgary	−15.7
Vancouver	0.1
Victoria	6.5
Whitehorse	−23.2
Yellowknife	−32.2

    a) Write the temperatures in descending order.

    b) What is the difference in temperature between Victoria and Calgary? Show your work.

14. Fill in each $\square$ with >, <, or = to make each statement true. Show your thinking.

    a) $-\frac{3}{4} \square -0.8$ b) $-\frac{5}{3} \square -\frac{11}{6}$

    c) $-0.81 \square -\frac{4}{5}$ d) $-\left(\frac{-12}{-5}\right) \square -2.4$

Date: ____________________

2.2 Problem Solving With Rational Numbers in Decimal Form

MathLinks 9, pages 55–62

Key Ideas Review

Circle the correct response to complete each statement.

1. One way to model the subtraction of rational numbers is by (adding/subtracting) the opposite on a number line.

2. The product or quotient of two rational numbers with different signs is (positive/negative).

3. The product or quotient of two rational numbers with the same sign is (positive/negative).

4. The order of operations for calculations involving rational numbers is:

   a) Perform operations inside parentheses (first/last).

   b) Divide and (subtract/multiply) in order from left to right.

   c) Add and (subtract/multiply) in order from left to right.

Check Your Understanding

5. Estimate and calculate. Show your work.

   a) $3.75 - 1.25$ **b)** $-7.05 - 10.82$

   c) $-4.51 + (-9.33)$ **d)** $8.04 + (-1.25)$

6. Estimate and calculate. Show your work.

   a) $-6.2 \times (-4.3)$

   b) $16.12 \div (-3.1)$

   c) $-3.9(8.9)$

7. Calculate. Express your answer to the nearest thousandth, if necessary. Show your work.

   a) $-3.2(7.8)$

   b) $-6.7 \div (-1.3)$

   c) $-5.7 \div 0.34$

8. Calculate. Show your work.

a) $-3.2(3.6 - 7.1)$

b) $-1.8 \times 6.1 + 3.8(-0.9)$

c) $-2.2[4.8 - (-1.7)]$

d) $9.7 + 4.8 - 19.24 \times 5.2$

e) $(7.04 - 9.26)(9.13 - 4.78)$

f) $8.07 + 3.1[9.5 - (-8.7)]$

9. Samir owns some company shares. The value of each share rose and dropped over a week, as shown in the table. What was the total change in value of each share after the week? Show your work.

Mon	Tues	Wed	Thurs	Fri
+0.21	−0.03	−0.11	−0.09	+0.02

10. Complete each statement.

a) $-12.5 - \boxed{} = -5.6$

b) $2.7 + \boxed{} = -7.1$

c) $-8.58 \div \boxed{} = 3.9$

d) $-3.2 \times \boxed{} = 24$

11. Determine the average of each set of numbers. Express your answer to the nearest hundredth, if necessary.

a) −3.6, 0.9, −4.5, −2.7, −0.5, 3.6, 1.7

b) 9.6, −8.9, −12.6, −2.7, −7.5, 23.6

12. The average high temperature in January in Winnipeg is −12.7 °C. In Victoria, it is 6.9 °C.

a) Write an expression to represent the difference between these temperatures.

b) Calculate the answer.

13. A submarine was floating on the surface of the water. It then descended at a rate of 0.5 m/s for 3 min. Then, it ascended at a rate of 0.7 m/s for 1 min and 15 s.

a) Write an expression to determine the depth of the submarine after these two moves.

b) Calculate the answer. Show your work.

Date: ____________________

2.3 Problem Solving With Rational Numbers in Fraction Form

MathLinks 9, pages 63–71

Key Ideas Review

Select words from column B to complete the statements in column A.

A	B
1. The addition of rational numbers can be modelled on a ____________________.	a) adding the opposite
2. Subtraction can be modelled on a number line by ____________________.	b) improper fractions
3. Rational numbers expressed as mixed numbers can be added, subtracted, multiplied, and divided by first writing them as ____________________.	c) multiplication and division
4. Rational numbers expressed as proper or improper fractions can be added, subtracted, multiplied, and divided in the same way as ____________________.	d) positive fractions
5. The sign of the product or quotient can be predicted from the sign rules for ____________________.	e) number line

Check Your Understanding

6. Estimate and calculate. Show your work.

a) $-\frac{3}{10} + \left(-\frac{7}{10}\right)$

b) $\frac{1}{3} + \frac{5}{6}$

c) $3\frac{1}{2} + \left(-1\frac{3}{4}\right)$

d) $3\frac{1}{4} - \left(-4\frac{5}{12}\right)$

7. Estimate and calculate. Show your work.

a) $\left(-\frac{3}{5}\right) \times \frac{2}{3}$

b) $\left(-\frac{4}{9}\right) \times \left(-\frac{3}{8}\right)$

c) $\left(-\frac{6}{7}\right)\left(-\frac{5}{12}\right)$

d) $-\frac{5}{6} \times 2\frac{1}{4}$

Date: ____________________

8. Estimate and calculate. Show your work.

a) $-\frac{7}{8} \div -\frac{3}{4}$

b) $1\frac{1}{2} \div \left(-1\frac{3}{8}\right)$

c) $-3\frac{2}{3} \div \left(-1\frac{1}{6}\right)$

d) $\frac{1}{3} \div \frac{3}{4}$

9. Luc has 1 h of homework to do. He has assignments to complete for social studies and math, and a science test to begin studying for. He spends $\frac{2}{5}$ of the time completing the social studies assignment, and $\frac{1}{3}$ of the time on math. How much time does Luc have left to study for the science test? Show two ways of answering this question.

10. Alyssa purchased 120 shares of ElecTeck stock for $1\frac{1}{4}$ dollars per share. She also purchased 200 shares of Apexal stock for $\frac{4}{5}$ of a dollar per share. After six months, the value of ElecTeck stock went up by $1\frac{1}{2}$ and Apexal lost $\frac{1}{4}$ of its value. What was the total value of Alyssa's stock after six months?

11. A pine tree growing on shallow soil has roots extend one-eleventh of its height below the surface. The roots extend 0.87 m deep. How high is the tree, to the nearest tenth? Draw a diagram to represent the situation. Justify your answer.

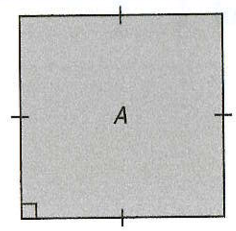
Date: ____________________

2.4 Determining Square Roots of Rational Numbers

***MathLinks 9*, pages 72–81**

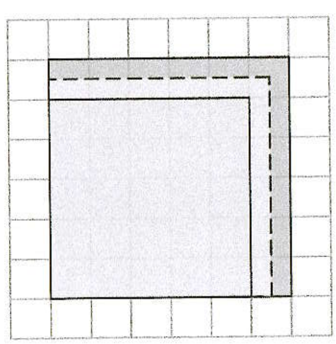
Key Ideas Review

Select words from column B to complete the statements in column A.

A	B
1. The side of a square is equal to ____________________. 	a) the product of two equal rational factors
2. The area of a square is equal to ____________________.	b) an exact answer
3. The square root of a perfect square is ____________________.	c) an approximation
4. The square root of a non-perfect square determined with a calculator is ____________________.	d) the square root of the area
5. A perfect square can be expressed as ____________________.	e) the square of the side

Check Your Understanding

6. a) Use the diagram to identify a rational number with a square root between 5 and 6.



b) Using the same thinking, what rational number has a square root between 3 and 4?

7. Estimate and calculate the number that has the given square root.

a) 2.2 **b)** 8.7

c) 11.3 **d)** 0.92

8. Estimate and calculate the area of each square, given its side length.

a) 14.7 cm **b)** 2.3 km

Date: ______________________

9. Is each of the following rational numbers a perfect square? Explain.

   a) $\frac{4}{9}$ b) 0.4

   c) 0.81 d) $\frac{1}{2}$

10. Determine whether each rational number is a perfect square. Show your thinking.

   a) 0.16 b) $\frac{90}{49}$

   c) 0.001 d) $\frac{8}{18}$

11. Evaluate.

   a) $\sqrt{289}$ b) $\sqrt{0.0361}$

   c) $\sqrt{1225}$ d) $\sqrt{5.29}$

12. Calculate the side length of each square from its area.

   a) 2.25 cm^2 b) 361 m^2

13. Calculate each square root.

   a) $\sqrt{25}$, $\sqrt{36}$ b) $\sqrt{49}$, $\sqrt{64}$

   c) $\sqrt{0.16}$, $\sqrt{0.25}$ d) $\sqrt{0.64}$, $\sqrt{0.81}$

14. Use your answers to #13 to help estimate each square root to the specified number of decimal places.

   a) $\sqrt{30}$, to the nearest tenth

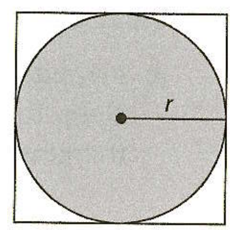
   b) $\sqrt{52}$, to the nearest tenth

   c) $\sqrt{0.18}$, to the nearest hundredth

   d) $\sqrt{0.78}$, to the nearest hundredth

15. A water fountain has a square pool with a surface area of 5.29 m^2. What is the length of the side of the pool?

16. A square has an area of 225 cm^2. What is the radius of the largest circle that can fit inside the square? Show your thinking.



17. Chu needs carpet for a square room with an area of 15 m^2. The store sells carpet from rolls 3.8 m wide. Will the store be able to install the carpet without a seam? Justify your answer.

Chapter Link

Ken has trouble sleeping and is trying some new strategies to get a better night's rest. Answer the questions below to help him evaluate his progress.

1. Experts say adults should sleep about $\frac{3}{8}$ of a 24-h day. How many hours of sleep are recommended?

2. Ken's doctor is reviewing his sleep record for the last week.

Monday	$\frac{2}{3}$ the recommended sleep
Tuesday	7.5 h
Wednesday	$\frac{3}{4}$ of the recommended sleep
Thursday	$4\frac{2}{8}$ h
Friday	6 h 30 min
Saturday	$\frac{9}{10}$ of the recommended sleep
Sunday	$\frac{4}{9}$ of the recommended sleep

a) Arrange the values from longest sleep to shortest. Show your thinking.

b) On what day did Ken get the most sleep?

3. A new bed may help Ken's sleep. He is admiring a square king-size bed that has sides $1\frac{9}{10}$ m long.

a) Estimate, then calculate, whether the bed will fit in his square bedroom with an area of $11\frac{11}{50}$ m^2.

b) Ken can choose from the following square rugs.

- flower rug: 10 m^2
- checker rug: 4-m sides
- geometric rug: $\frac{22}{10}$-m sides

Which one will stick out beyond the sides of the bed and still fit in the room? Explain.

4. Now that Ken is sleeping the recommended amount, he would like to make up the loss of sleep he recorded. How much extra sleep will he have to get each day over the next two weeks? Calculate the answer to the nearest minute.

Date: ______________________

Vocabulary Link

Use the clues to identify the Key Words from Chapter 2. Then, write the Key Words in the crossword puzzle blank.

Across

6. These cannot be expressed as the product of two equal rational numbers. Examples include 7, 8, 3.5, and $\frac{11}{13}$.

Down

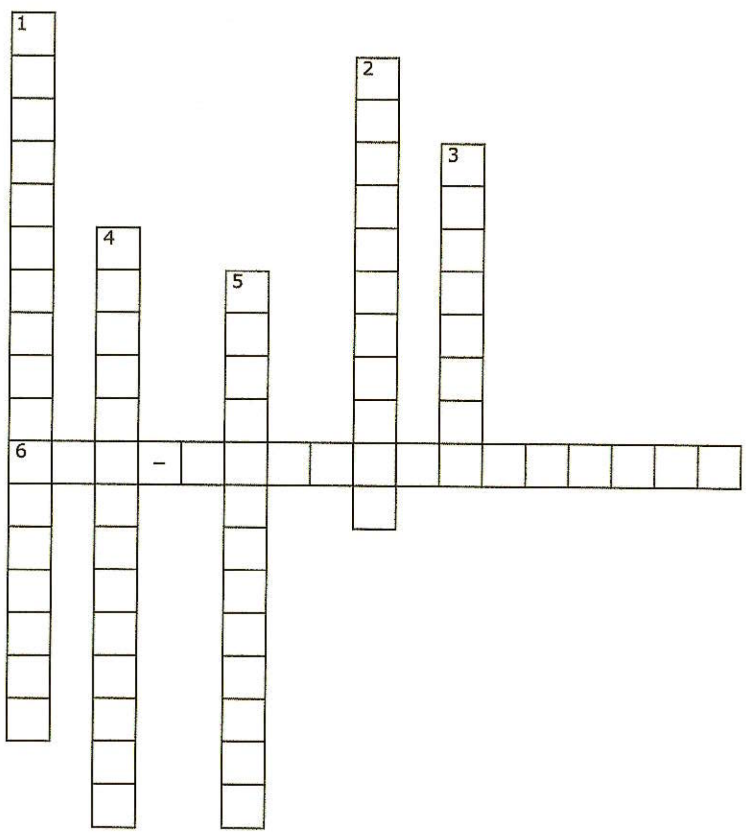
1. One set of these includes $\frac{24}{-6}$, $\frac{-32}{8}$, -4, and $-\left(\frac{-4}{-1}\right)$.

2. This is another name for brackets.

3. This is an answer to a division question.

4. Examples of this include -3, 4.5, $-\frac{1}{3}$, $2\frac{7}{13}$, and 0.

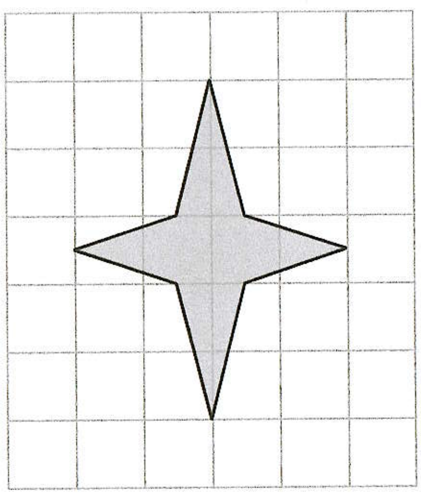
5. Examples of this include 0.36, 0.49, $\frac{16}{25}$, and $\frac{49}{81}$.



Chapters 1–2 Review

1. Compare 2.5, $-\frac{7}{4}$, $-3\frac{2}{5}$, $1\frac{1}{3}$, −0.7, and −2. Write the numbers in ascending order. Show your thinking.

2. Draw the lines of symmetry in the following figure. Identify each type of symmetry. If there is rotational symmetry, name the order and the size of the angle of rotation.



3. Replace each $\square$ with >, <, or = to make each statement true.

   a) $-\frac{1}{3}$ $\square$ -0.3

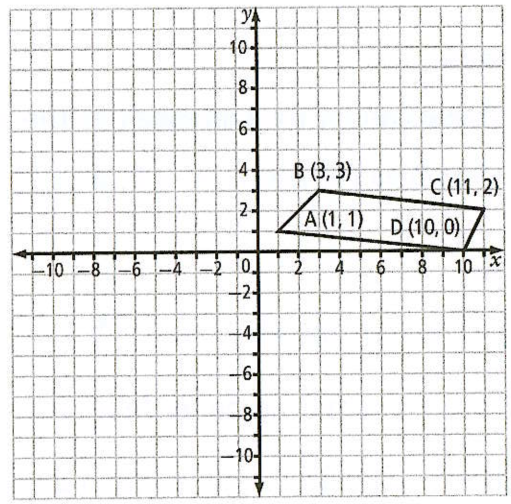
   b) $1\frac{5}{8}$ $\square$ $\frac{-13}{-8}$

   c) $-\frac{10}{15}$ $\square$ $-\frac{12}{16}$

   d) 1.75 $\square$ $\frac{17}{10}$

   e) $-\frac{8}{6}$ $\square$ $-\frac{4}{3}$

4. Use the coordinate grid to complete the following questions.



   a) What are the coordinates of figure ABCD?

   b) Rotate the figure about point A order 2.

   c) What are the coordinates of the new figure A'B'C'D'?

5. On January 15, 1972, Chinook winds in Loma, Montana caused the greatest recorded temperature change in 24 hours. The temperature rose from −48 °C to 9 °C. How many degrees did the temperature rise?

Date: ______________________

6. Estimate and Calculate.

a) $-1.3 \times 2.4 + 5.6 \times (-2.5)$

b) $(5.76 - 3.45)(2.34 - 1.57)$

7. Estimate.

a) $\frac{2}{3} + \frac{1}{6}$

b) $-1\frac{1}{7} - \left(-2\frac{1}{5}\right)$

c) $-\frac{7}{4} + \frac{1}{8}$

d) $-\frac{2}{9} - \frac{2}{9}$

8. Calculate.

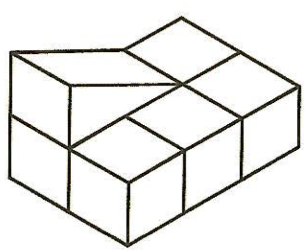
a) $\frac{4}{7} \div \frac{7}{8}$

b) $\left(2\frac{2}{3}\right)\left(1\frac{2}{5}\right)$

c) $\left(-1\frac{2}{5}\right) \div \left(3\frac{1}{2}\right)$

d) $-\frac{3}{4} \times \left(-\frac{2}{5}\right)$

9. This shape was constructed out of centimetre cubes and a triangular wedge. Calculate the exposed surface area of the entire shape.



10. Quentin has 96 retaining wall blocks. He uses $\frac{1}{4}$ of the blocks on the first day. The second day he uses $\frac{4}{9}$ of the remaining amount. How many does he have left over? Show your thinking.

11. Is each of the following numbers a perfect square? If it is, calculate the square root.

a) $\frac{1}{25}$

b) $\frac{7}{16}$

c) 0.0001

d) 0.49

12. Estimate each square root. Then, calculate it to the specified number of decimal places.

a) $\sqrt{52}$, to the nearest tenth

b) $\sqrt{0.67}$, to the nearest thousandth

13. You need to replace the fence in your backyard. It costs $75 to build each metre of fence, including new materials and labour.

a) If your garden is square with an area of 18 m^2, how much would it cost to replace the entire fence?

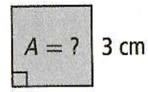
b) Can you enclose a larger area without paying for more fencing? Why or why not?

Get Ready

Date: ____________________

Squares and Square Roots

You can think of the *square* of a number as the area of a square.

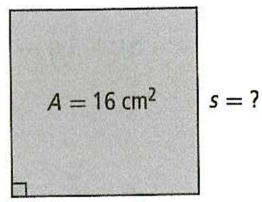


Area is $3^2 = 3 \times 3$

$= 9$

The area is 9 cm^2.

You can think of the *square root* of a number as the side length of a square.



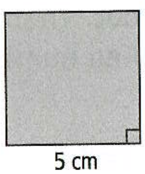
$s = \sqrt{16}$

$= 4$

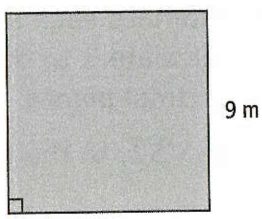
The side length is 4 cm.

1. What is the area of each square?

a)

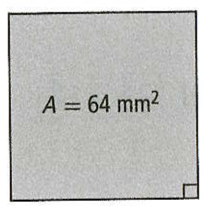


b)



2. What is the side length of each square?

a)



b) area of 36 cm^2

Substituting Into Formulas

A formula is a mathematical statement that shows the relationship between specific quantities. An example is $C = 2\pi r$, where C is the circumference and r is the radius of a circle.

What are the circumference and area of a circle with a radius of 10 cm?

Use 3.14 as an approximate value for π.

$$\begin{aligned} C &= 2\pi r \\ &= 2\pi(10) \\ &\approx 20(3.14) \\ &\approx 62.8 \end{aligned} \qquad \begin{aligned} A &= \pi r^2 \\ &= \pi(10)^2 \\ &\approx 3.14(100) \\ &\approx 314 \end{aligned}$$

The circumference is approximately 62.8 cm. The area is approximately 314 cm^2.

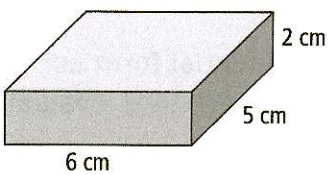
3. When a certain chemical is added to water, the water gets hotter. A formula for the water's temperature, t, in degrees Celsius, is $t = 24 + 8m$, where m is the amount of chemical added, in kilograms. Complete the following table of values for the missing values of m and t.

m (kg)	0		5		9
t (°C)		48		72	

Volume and Surface Area

You can determine the volume, V, of a right prism using the formula $V = Ah$, where A is the area of the base and h is the height of the prism.

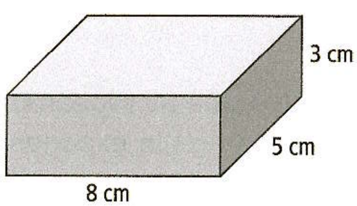
What is the volume of the rectangular prism?



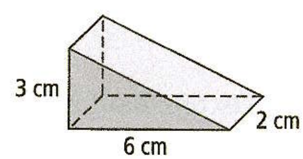
$$A = (5)(6)$$
$$= 30$$
$$h = 2$$
$$V = Ah$$
$$= 30(2)$$
$$= 60$$

The volume of the prism is 60 cm^3.

4. Determine the volume of the rectangular prism.



5. Determine the volume of the triangular prism.



Date: ____________________

3.1 Using Exponents to Describe Numbers

***MathLinks 9*, pages 92–98**

Key Ideas Review

Choose from the following terms to complete #1.

base	exponent	multiplication	power

1. a) A ____________________ is a short way to express repeated ____________________.

   b) In a power, the ____________________ represents the number of times you multiply the ____________________.

Check Your Understanding

2. Write each expression as a power. Then, evaluate.

   a) $3 \times 3 \times 3 \times 3$

   b) $(-5) \times (-5) \times (-5)$

   c) $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

3. Write each expression as a power and evaluate.

   a) $4 \times 4 \times 4$

   b) $(-7) \times (-7) \times (-7) \times (-7)$

   c) $8 \times 8 \times 8$

4. Rewrite each exponential form as repeated multiplication, then evaluate.

   a) 6^3

   b) $(-10)^5$

   c) -4^4

5. Show each value as repeated multiplication and in exponential form.

   a) 81

   b) 256

6. What alternative answers can you suggest for #5?

Date: ____________________

7. Evaluate each power.

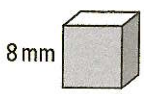
   a) 4^5

   b) $(-5)^4$

   c) -8^2

8. Does $-3^6 = (-3)^6$? Explain how you know.

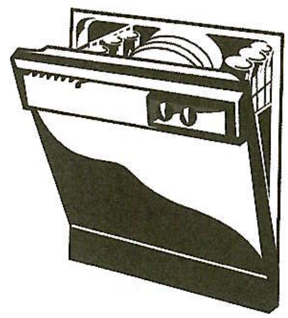
9. Write the volume of the cube in exponential form. Then, evaluate.



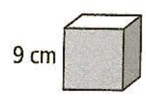
10. Arrange the powers from greatest to least value: 5^2, 4^3, 3^4, 2^5. Show your thinking.

11. Explain why 45 cannot be expressed as a power in the form y^x.

12. Michelle will load and unload the dishwasher every day of the week. In return, her parents will pay her 2¢ for the first week, and twice as much as the previous week for each week thereafter. Use the expression 2^w to determine her weekly rate of pay, where w represents the number of weeks. How much will she earn, in dollars, in week 7, week 15, week 25, and week 30?



13. The volume of a cube with an edge length of 9 cm is 729 cm^3. Write the volume in repeated multiplication form and exponential form.



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3.2 Exponent Laws

***MathLinks 9*, pages 99–107**

Key Ideas Review

Match each exponent law in column A to an equation in column B.

A	B
1. You can simplify a quotient of powers with the same base by subtracting the exponents.	**a)** $(a \times b)^m = a^m \times b^m$
2. You can simplify a power that is raised to an exponent by multiplying the two exponents.	**b)** $a^m \div a^n = a^{m-n}$
3. When a product is raised to an exponent, you can rewrite each number in the product with the same exponent.	**c)** $a^0 = 1, a \neq 0$
4. When the exponent of a power is 0, the value of the power is 1 if the base is not equal to 0.	**d)** $(a^m)^n = a^{mn}$

Check Your Understanding

5. Write each expression as a single power. Then, evaluate.

a) $3^2 \times 3^3$ **b)** $(-2)^4 \times (-2)^3$

c) $4 \times 4^3 \times 4^4$ **d)** $[(-3)^2]^4$

6. Rewrite each expression as a single power. Then, evaluate.

a) $7^6 \div 7^4$ **b)** $(-5)^8 \div (-5)^5$

c) $\frac{8^2 \times 8^7}{8^5}$ **d)** $\frac{(-6)^2(-6)^4}{(-6)^3}$

7. Write each expression in exponential form.

a) $(5 \times 5 \times 5) \times (5 \times 5 \times 5) \times (5 \times 5 \times 5) \times (5 \times 5 \times 5)$

b) $[(-9) \times (-9)] \times [(-9) \times (-9)] \times [(-9) \times (-9)] \times [(-9) \times (-9)] \times [(-9) \times (-9)]$

8. Write each expression as a quotient of two powers, and then as a single power.

a) $(5 \times 5 \times 5 \times 5) \div (5 \times 5 \times 5)$

b) $\frac{(-2) \times (-2) \times (-2) \times (-2) \times (-2) \times (-2)}{(-2) \times (-2) \times (-2) \times (-2)}$

9. Tony was asked to solve $\frac{6^8 \times 6^4}{6^2}$. Find and explain the mistake in his solution. What is the correct answer?

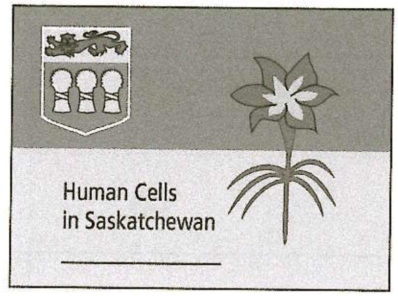
$$\frac{6^8 \times 6^4}{6^2} = \frac{6^{8+4}}{6^2}$$
$$= \frac{6^{12}}{6^2}$$
$$= 6^{12} \div 2$$
$$= 6^6$$
$$= 46656$$

10. Using $\frac{4^3}{4^3} = 4^{3-3}$ as an example, explain the exponent rule $b^0 = 1, b \neq 0$.

11. a) Write $(5^2)^3$ as a single power. Evaluate.

b) Write $[(-4)^3]^2$ as a single power. Evaluate.

12. The province of Saskatchewan has a population of approximately 1 million (10^6). There are approximately 100 billion (10^{11}) cells in the human body. Estimate the number of human cells in Saskatchewan. Write your answer in exponential and standard form.



13. Write three different products. Each product must be made up of two powers and must be equal to 6^7. Justify your choices.

Date: ____________________

3.3 Order of Operations

***MathLinks 9*, pages 108–113**

Key Ideas Review

1. Use the following words to label the table headings. Then, complete the table.

coefficient   power   repeated multiplication   value

Expression				
$-3(7)^2$	-3	7^2	$-3 \times 7 \times 7$	-147
$2(5)^4$				

2. Column A shows the solution to $5(-2) - (2 + 4)^2$. Match each step in column A to its description in column B.

A	B
Step 1 $= 5(-2) - (6)^2$	**a)** Evaluate the power.
Step 2 $= 5(-2) - 36$	**b)** Add and subtract from left to right.
Step 3 $= -10 - 36$	**c)** Simplify inside the brackets.
Step 4 $= -46$	**d)** Divide and multiply from left to right.

Check Your Understanding

3. Evaluate each expression.

a) $3(6)^2$

b) $2(-4)^2$

c) $7(10)^5$

d) $4(-3)^3$

4. Write each expression using a coefficient and a power.

a) $2 \times 3 \times 3 \times 3$

b) $5 \times (-7) \times (-7) \times (-7) \times (-7) \times (-7)$

c) $-2 \times 8 \times 8 \times 8 \times 8$

d) $6(9)(9)(9)(9)(9)$

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5. Evaluate. Where necessary, express your answer to the nearest tenth.

a) $5^2 - 3^2$

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

c) $4 - (2 + 3)^2 \div 25$

d) $45 \div (-2)^6$

6. Identify the step where Susan made an error. Explain her mistake. What is the correct answer?

$12 + 2(3 + 5)^2$

$= 12 + 2(8)^2$	Step 1
$= 12 + 2(16)$	Step 2
$= 12 + 32$	Step 3
$= 44$	Step 4

7. Evaluate.

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

b) $[(-7)^2 - (-2)^6]^2$

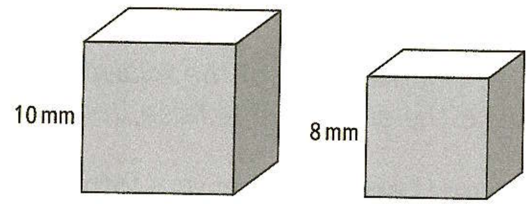
c) $\dfrac{-16 + (-3)^2}{(6 - 2)^2 - (-4)^2}$

d) $5(4)^3 \div (-2)^4$

8. Evaluate the expression $7a^2 - 3b^3$ when

a) $a = 4, b = -2$ **b)** $a = -8, b = 5$

9. Write an expression with powers to determine the difference between the surface areas of the two cubes. Then, solve.



10. The cube of the sum of 5 and 2 is decreased by the square of the product of 6 and 4. Write an expression that models this statement. Then, solve.

11. a) Evaluate -5^2 and $(-5)^2$.

b) Using the words *coefficient*, *base*, and *exponent*, explain why the two answers are not the same.

Date: ______________________

3.4 Using Exponents to Solve Problems

***MathLinks 9*, pages 114–119**

Key Ideas Review

Decide whether each of the following statements is true or false. Circle the word True or False. If the statement is false, rewrite it to make it true.

1. **True/False** A power in a formula represents a measurement.

____

____

2. **True/False** Powers are often used to keep formulas as short as possible.

____

____

3. **True/False** Patterns involving repeated multiplication can be modelled by an expression that contains only coefficients.

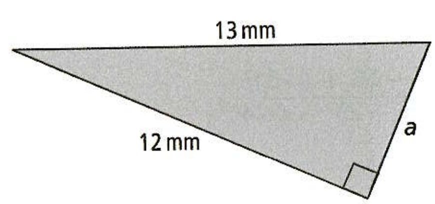
____

____

Check Your Understanding

4. What is the surface area of a cube with an edge length of 12 cm? Write an exponential expression to solve the problem.

5. What is the length of the missing leg of the right triangle? Write an exponential expression to solve the problem.



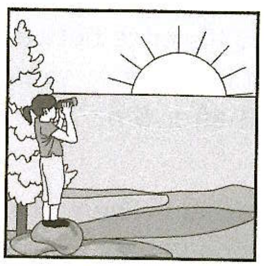
6. Right now there are 100 bacteria in sample P. This population doubles every hour. How many bacteria will there be after each number of hours?

a) n

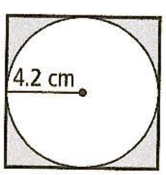
b) 5

c) 10

7. Due to Earth's curvature, objects, like the setting sun, seem to disappear over the horizon. The taller you are, the farther away the horizon appears to be. The formula $h = \frac{d^2}{12.8}$ is used to determine distance, d, in kilometres, to the horizon based on a person's height, h, in metres, above the ground. How tall is someone to whom the horizon appears to be 5.06 km away? Express your answer to the nearest metre.

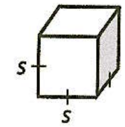


8. Write an exponential expression to determine the shaded area inside the square. Then, solve. Express your answer to the nearest tenth.

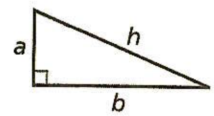


9. Simplify each formula using exponential notation.

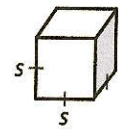
a) Surface area of a cube: $6 \times s \times s$



b) Pythagorean theorem:
$h \times h = a \times a + b \times b$



c) Volume of a cube: $s \times s \times s$



10. Use your answers to #9 to complete the table.

Power(s)	Base(s)	Exponent(s)	Coefficient
a)			
b)			
c)			

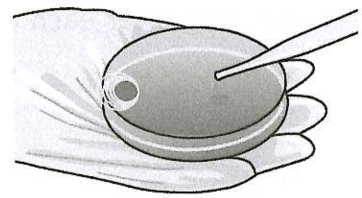
11. A large playground cube has sides 1.5 m long.

a) Calculate the volume of the cube to the nearest hundredth.

b) Calculate the surface area of the cube that would have to be painted if one end is open and both the inside and outside are painted. Express your answer to the nearest tenth.

Date: ____________________

Chapter Link



The two bacteria that a microbiologist is studying reproduce at different exponential rates as long as conditions are appropriate. Sample A starts with just 50 bacteria. The population triples every hour. Sample B starts with 600 bacteria and doubles every hour.

1. Create a chart to show the numbers of bacteria in each sample after 0 to 8 h.

2. Fill in the blanks.

a) The expression $50 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$ models the number of bacteria in sample ____________ after ____________ hours.

b) Write the expression in exponential form.

c) What number represents the coefficient?

3. What expression models the number of bacteria after a number of hours, n,

a) in sample A?

b) in sample B?

4. Use the chart to estimate the time when both samples will have the same number of bacteria. Explain your reasoning.

5. a) Write an exponential expression to determine the difference between the numbers of bacteria in sample A and sample B after 5 h.

b) Solve the expression. Then, check your answer using values from the chart.

6. What is the sum of the bacteria in both samples after each number of hours?

a) n

b) 6

c) 10

Date: ____________________

Vocabulary Link

Use the clues to identify the Key Words from Chapter 3. Then, write the Key Words in the crossword puzzle blank.

Across

5. This is one term for a shorter way of writing repeated multiplication, using a base and an exponent.

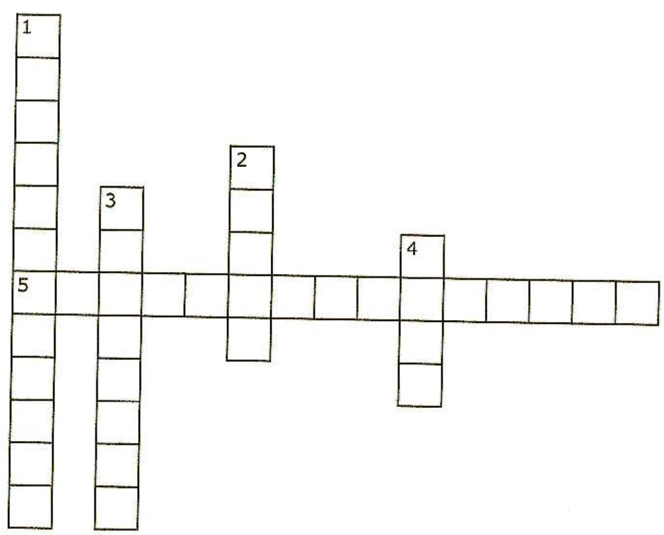
Down

1. This is another term for repeated multiplication such as $5^3 \times 5^2 = (5 \times 5 \times 5) \times (5 \times 5)$.

2. This is the term for an expression made up of a base and an exponent, such as 6^4.

3. This refers to the number of times you multiply the base in a power. For example, in 6^4, 4 is one of these.

4. This is the number you multiply by itself in a power. For example, in 9^5, 9 is one of these.

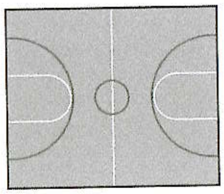


Date: ____________________

Chapters 1–3 Review

1. Write $3^3 \times (3^4)^2 \div 3$ as a single power. Then, evaluate.

2. What type(s) of line symmetry does this gym floor have? Show them.



3. Identify three rational numbers between the given endpoints. For each pair of endpoints, sketch a number line to illustrate.

   a) 1.37 and −2.56

   b) −0.6 and −0.61

   c) $\frac{-2}{3}$ and $\frac{1}{6}$

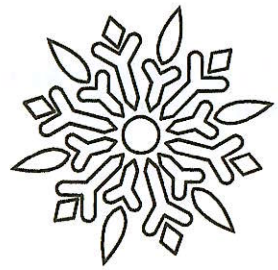
4. Evaluate.

   a) $8^2 + (3^3 - 2^2)^2(4^2 - 2^4)$

   b) $(-1)^3(-60)^0 - \left(\frac{5}{6}\right)^2$

   c) $\dfrac{[-5(-2)]^2 - 9^3 \div 3^2\left(\frac{2}{7}\right)^0}{(-13 + 4^2)^5}$

5. Does this picture have rotational symmetry? If so, state the order and angle of rotation.



6. Evaluate.

   a) $\left(-4\frac{1}{3}\right) + \left(-\frac{1}{2}\right) \times 3\frac{1}{5}$

   b) $1\frac{1}{7} \times \left(-2\frac{5}{6}\right) + \frac{3}{8}$

   c) $-5 \div \left(-\frac{2}{3}\right) + \left(-\frac{5}{9}\right) \times 2\frac{1}{2}$

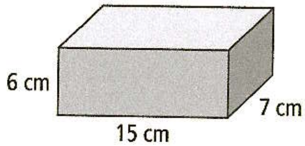
   d) $3\frac{3}{8} - \left(-2\frac{1}{3} + 4\right)\left(-2\frac{1}{3} + 4\right)$

7. Rewrite each expression using powers. Then, evaluate.

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

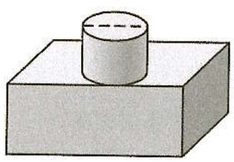
   b) $[5 \times 5 \times 2 \times 2 \times (-1) \times (-1) \times (-1)]\,[5 \times 5 \times 2 \times 2 \times (-1) \times (-1) \times (-1)] \div (5 \times 5 \times 5)$

8. **a)** Determine the surface area of the rectangular prism.



b) Determine the surface area of the cylinder. Express your answer to the nearest hundredth.

c) The cylinder is placed on top of the rectangular prism. What is the new surface area? How is it different from when the shapes were separate?



9. A school is having a badminton tournament for all of its grade 9 students. There are 160 students. During each round, r, half the players are eliminated. This situation can be represented by $p = 160(0.5)^r$. How many players, p, remain after five rounds?

10. Evaluate. Express your answer to the nearest hundredth where appropriate.

a) $1.5 + (-3.6) \div (-1.4) - 7.2$

b) $(-1.5) \times 0.8 - (-3.2)(-3.2)$

c) $\dfrac{5.6(-4.5 + 33.4)^3 + 5.6}{(-4.3) \div 0.03 - 0.3}$

11. Mandy wants to wallpaper her room. The dimensions of the floor are 5.2 m by 3.1 m. The walls are 2.5 m high. There is one window that is 1.2 m by 2.5 m. Her closet door and bedroom door are both 2.2 m by 0.75 m in dimension.

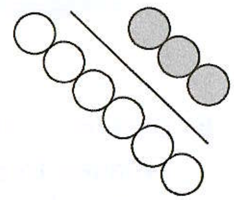
a) What is the total surface area that Mandy will wallpaper? Use a diagram to help you.

b) One roll of wallpaper covers 5.2 m^2. How many rolls of wallpaper does Mandy need?

Get Ready

Date: ____________________

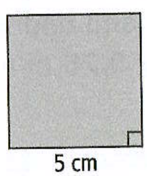
Using Two-Term Ratios



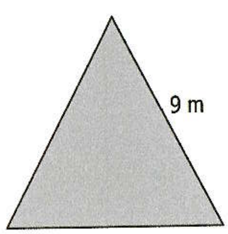
A *part-to-part ratio* compares different parts of a group to each other.
The ratio of white circles to grey circles is 6:3 or 6 to 3.
The ratio in lowest terms is 2:1 or 2 to 1.
A *part-to-whole ratio* compares one part of a group to the whole group.
The ratio of white circles to the total number of circles is 6:9 or 6 to 9.
The ratio in lowest terms is 2:3 or 2 to 3.
A part-to-whole ratio can be written as a fraction, a decimal, and a percent.
The ratio of $\frac{\text{grey}}{\text{total}}$ is $\frac{3}{9}$ or $\frac{1}{3}$, $0.\overline{3}$, $33.\overline{3}\%$.

1. For each regular polygon, what is the ratio of one side length to the perimeter? Use ratio notation.

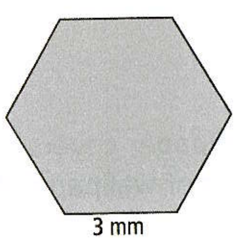
a)



b)



c)



2. Write each ratio in #1 as an equivalent ratio in lowest terms. Show your thinking.

3. Write each ratio in #1 as a decimal and a percent. Show your calculations.

4. Identify the missing value to make an equivalent fraction. Justify your response.

a) $\frac{3}{4} = \frac{\square}{8}$ **b)** $\frac{4}{7} = \frac{12}{\square}$

c) $\frac{\square}{5} = \frac{3}{15}$ **d)** $\frac{7}{\square} = \frac{49}{14}$