McGraw-Hill Ryerson

Mathematics 10

Exercise and Homework Book

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Overview

Mathematics plays an important role in many exciting activities, from art and music to industrial design and engineering, from sports management and astronomy to forensic sciences and archeology, and from air and water conservation to flying and space technology. The skills needed for many of these activities are provided in *McGraw-Hill Ryerson Mathematics 10* student book. This *McGraw-Hill Ryerson Mathematics 10 Exercise and Homework Book* is designed to complement the student book.

Exercise and Homework Book Organization

Like the student book, the exercise and homework book is divided into four units, each with a number of chapters.

Unit 1—Unit 1 investigates linear measurement, surface area, and volume using the SI and imperial measurement systems.

In Chapter 1, you use referents for linear measurements and make measurements in both imperial and SI units. You review similarities and differences between the SI system and the imperial system and estimate linear measurements in both imperial and SI units. You use a variety of techniques to convert linear measurements within and between imperial and SI systems.

Chapter 2 extends your knowledge of SI and imperial measurements to work with surface area and volume of 3-D objects. You determine the surface area and volume of right cones, right pyramids, spheres, right cylinders, right prisms, and composite objects. As part of these calculations, you may need to determine square roots and cube roots of numbers.

Chapter 3 deals with the relationships among sides and angles of a right triangle. You use primary trigonometric ratios (sine, cosine, and tangent) to determine missing sides or missing angles. You may also use the Pythagorean relationship to determine the missing side of a right triangle given two other sides.

Unit 2—Unit 2 extends your knowledge of powers and exponents. You solve problems involving square roots and cube roots and apply the exponent laws to expressions involving powers with integral and rational exponents. You represent, identify, and order irrational numbers. You also develop and use algebraic skills for multiplying and factoring polynomials.

In Chapter 4, you determine square roots and cube roots and solve problems involving square roots and cube roots. You apply the exponent laws to expressions involving rational numbers or variables as bases and integers and rational numbers as exponents. You also convert between powers with rational exponents and radicals, and mixed radicals and entire radicals, and solve problems involving radicals.

In Chapter 5, you multiply and factor polynomial expressions. You use algebra tiles to examine patterns that occur when multiplying polynomials. You also work with special products and factor the difference of squares and perfect square trinomials.

Unit 3—Unit 3 deals with graphing functions and relations in a variety of ways, including with technology. This unit also deals with three different forms of writing linear equations: slope-intercept form, general form, and slope-point form. You determine the y-intercept, slope, and x-intercept and use this information to graph linear equations.

In Chapter 6, you graph functions and relations in a variety of ways. You distinguish between a function and a relation and determine the domain and range of a function or relation. You also express the domain and range in different formats, including interval notation. You use function notation to express and work with functions. Finally, you explore the slope of a line, including lines that are horizontal or vertical.

Chapter 7 introduces three different forms of writing linear equations:

- slope-intercept form ($y = mx + b$),
- general form ($Ax + By + C = 0$), and
- slope-point form [$y - y_1 = m(x - x_1)$].

You use the information that can easily be obtained from each form to graph linear equations. You also convert linear equations among the three forms presented and write the equation of a line given a graph.

Unit 4—Unit 4 extends your knowledge of linear relations. You identify the solution to a system of linear equations shown on a graph and use algebraic manipulation to solve a linear system. You analyse various types of linear systems where the system of equations may have no solution, one solution, or an infinite number of solutions.

In Chapter 8, you graph and solve systems of linear equations with two variables. You work with systems expressed algebraically, as well as in words, and solve the systems graphically. You examine various systems of equations and identify the possible number of solutions.

Chapter 9 continues the work with linear systems. You construct a system of linear equations from a problem and then solve the linear system algebraically. You compare algebraic methods of substitution and elimination with the graphical methods used in Chapter 8. You decide on and use strategies to determine which method is most appropriate and efficient for a particular problem.

Study Guide Features

- Each section begins with Key Concepts that summarize the concepts needed to complete the exercises.
- The sections continue with a worked example that guides you through the skills needed to complete the exercises.
- Exercises are organized into four sections: A Practise, B Apply, C Extend, and D Create Connections.
- A review of all sections is included at the end of each chapter.
- Each chapter includes Extend It Further questions that cover the concepts in the chapter, as well as extending your thinking and combining concepts from previous chapters.
- A cumulative review of the skills and concepts handled so far in the exercise and homework book is included at the end of each chapter.
- Selected questions in each section are marked by a star indicating that complete solutions are provided at the back of the book.
- The final two pages of each chapter provide a Study Check that assists you in summarizing the important information in that chapter and identifying what skills and concepts you need to reinforce.
- The end of each unit includes unit review questions.
- A practice exam at the end of the study guide gives you the opportunity to determine if you are ready for the final examination.
- Answers to all questions—and solutions to questions marked with a star—are provided at the back of the book.

Symbols

SYMBOLS

Symbol	Meaning
$\in$	belongs to
$\approx$	is approximately
R	real numbers
N	natural numbers
∞	infinity

GREEK LETTERS

Symbol	Meaning
α	alpha (a)
β	beta (b)
θ	theta (th)
π	pi (p)

Unit Conversions

COMMON ABBREVIATIONS

SI	Imperial
mm = millimetre cm = centimetre m = metre km = kilometre	″ or in. = inch ′ or ft = foot yd = yard mi = mile

INTERNAL CONVERSIONS

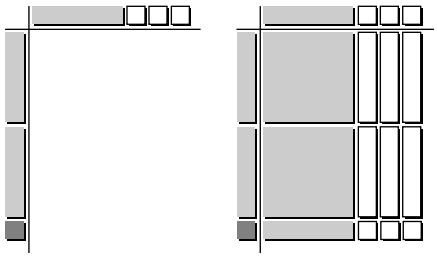
SI	Imperial
10 mm = 1 cm 100 cm = 1 m 1000 m = 1 km	12 in. = 1 ft 36 in. = 3 ft 3 ft = 1 yd 1760 yd = 1 mi 5280 ft = 1 mi

CONVERSIONS BETWEEN SYSTEMS

SI to Imperial	Imperial to SI
1 mm ≈ 0.0394 in. 1 cm ≈ 0.3937 in. 1 m ≈ 1.094 yd 1 m ≈ 3.281 ft 1 km ≈ 0.6214 mi	1 in. = 0.0243 m 1 in. = 2.54 cm 12 in. = 30.48 cm 1 ft = 30.48 cm 12 in. = 0.3048 m 1 ft = 0.3048 m 36 in. = 0.9144 m 1 yd = 0.9144 m 1 mi ≈ 1.609 km

Formulas

ALGEBRA

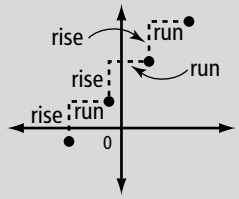
Square Roots	*Perfect Squares* $5^2 = (5)(5)$ $= 25$ $\sqrt{25} = \sqrt{(5)(5)}$ $= 5$	*Imperfect Squares* $\sqrt{5} = 2.236\ldots$
Cube Roots	*Perfect Cubes* $3^3 = (3)(3)(3)$ $= 27$ $\sqrt[3]{27} = \sqrt{(3)(3)(3)}$ $= 3$	*Imperfect Cubes* $\sqrt[3]{5} = 1.709\ldots$
Multiplying Polynomials	*Use the distributive property* $(3x - 2)(4x + 5) = (3x)(4x + 5) - 2(4x + 5)$ $= 12x^2 + 15x - 8x - 10$ $= 12x^2 + 7x - 10$ *Use algebra tiles*  $(x - 3)(2x + 1) = 2x^2 - 5x - 3$	
Factoring Polynomials	*Identify the GCF of the numerical coefficients* *In* $5a^2b - 30ab + 15ab^2$, the GCF is $5ab$. $5a^2b - 30ab + 15ab^2 = 5ab(a - 6 + 3b)$ *If the GCF is a binomial expression* $7(a - 2) + 2a(a - 2) = (a - 2)(7 + 2a)$	
Factoring Special Trinomials	*Difference of Squares* $(x - y)(x + y) = x^2 - y^2$ *Perfect Square Trinomial* $(x \pm y)^2 = x^2 \pm 2xy + y^2$	

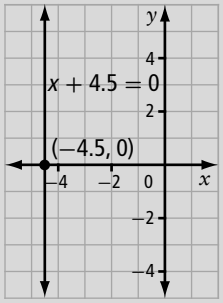
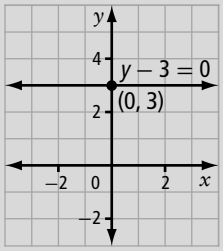
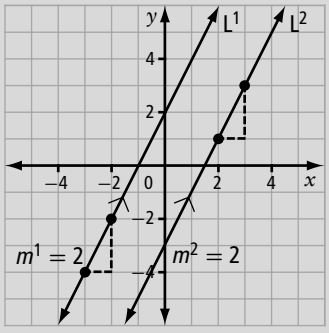
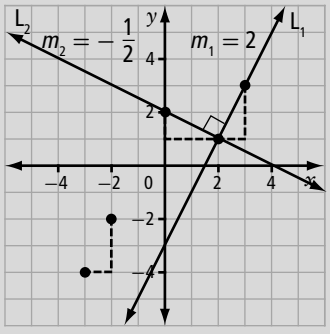
EXPONENT LAWS

Note that a and b are rational or variable bases and m and n are rational exponents.	
Product of Powers	$(a^m)(a^n) = a^{m+n}$
Quotient of Powers	$\frac{a^m}{a^n} = a^{m-n}, a \neq 0$
Power of a Power	$(a^m)^n = a^{mn}$

Power of a Product	$(ab)^m = a^m b^m$
Power of a Quotient	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}, b \neq 0$
Zero Exponent	$a^0 = 1, a \neq 0$
Negative Exponent	$a^{-n} = \frac{1}{a^n}, a \neq 0$ $\frac{1}{a^{-n}} = a^n, a \neq 0$ $\left(\frac{a}{b}\right)^{-n} = \frac{1}{\left(\frac{a}{b}\right)^n}$ $= \left(\frac{b}{a}\right)^n$
Power With Rational Exponent	$x^{\frac{3}{5}} = x^{0.6}$
Radicals and Fractional Exponents	$\sqrt[n]{x^m} = x^{\frac{m}{n}}$

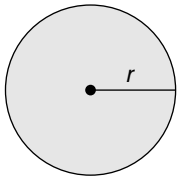
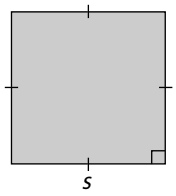
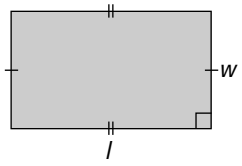
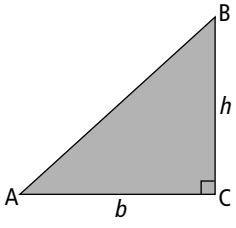
LINEAR RELATIONS AND FUNCTIONS

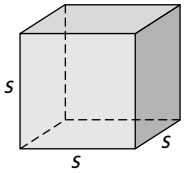
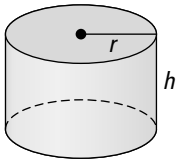
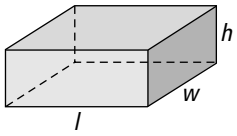
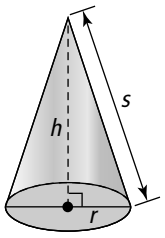
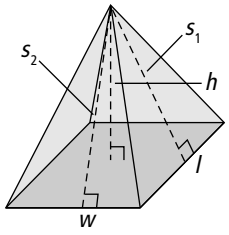
Slope  	$m = \frac{\text{rise}}{\text{run}}$ *or* $m = \frac{y_2 - y_1}{x_2 - x_1}$ *Slope-intercept form* $y = mx + b$, where b is the y-intercept *General form* $Ax + By + C = 0$, A, B, and C are real numbers and $B \neq 0$ *Slope-point form* $y - y_1 = m(x - x_1)$ 0 slope $m = \frac{\text{rise}}{\text{run}}$ $m = \frac{0}{5}$ $m = 0$ *Undefined slope* $m = \frac{\text{rise}}{\text{run}}$ $m = \frac{5}{0}$ $m =$ undefined

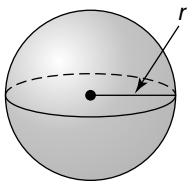
Vertical Lines 	These lines have an x-intercept but no y-intercept.
Horizontal Lines 	These lines have a y-intercept but no x-intercept.
Parallel Lines 	These lines have the same slope but different intercepts.
Perpendicular Lines  $m_1(m_2) = 2\left(-\frac{1}{2}\right)$ $m_1(m_2) = -1$	These lines have slopes that are negative reciprocals of each other.

MEASUREMENT

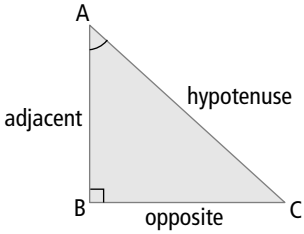
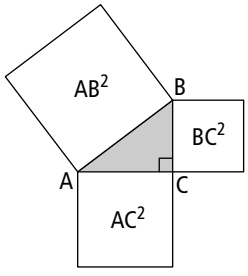
In the following, P represents the perimeter, C the circumference, A the area, V the volume, and SA the surface area.

2-D Shape	
Circle	 $C = 2\pi r$ *or* $C = \pi d$ $A = \pi r^2$
Square	 $P = 4s$ $A = s^2$
Rectangle	 $P = 2l + 2w$ $A = lw$
Triangle	 $P = s_1 + s_2 + s_3$ $A = \frac{1}{2}bh$

3-D Object	
Cube	 $SA_{\text{cube}} = 6s^2$ $V_{\text{cube}} = s^3$
Right Cylinder	 $SA_{\text{cylinder}} = 2\pi r^2 + 2\pi r$ $V_{\text{cylinder}} = \pi r^2 h$
Right Prism	 $SA_{\text{prism}} = 2lw + 2lh + 2wh$ $V_{\text{prism}} = lwh$
Right Cone	 $SA_{\text{cone}} = \pi r^2 + \pi rs$ $V_{\text{cone}} = \frac{1}{3}\pi\, r^2 h$
Right Pyramid	 $SA_{\text{pyramid}} = lw + 2\left[\frac{1}{2}\, ls_1\right] + 2[ws_2]$ $V_{\text{pyramid}} = \frac{1}{3}\, lwh$

Sphere	 $SA_{\text{sphere}} = 4\pi r^2$ $V_{\text{sphere}} = \frac{4}{3}\pi r^3$

TRIGONOMETRY

Primary Trigonometric Ratios 	$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$	$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$	$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$
Pythagorean Theorem 	$AC^2 + BC^2 = AB^2$	$BC^2 = AB^2 - AC^2$	$AC^2 = AB^2 - BC^2$

Tips for Success in MATH

IN CLASS

- ✓ Listen carefully to your teacher.
- ✓ Focus and pay attention to examples and their solutions.
- ✓ Think about the solutions.
- ✓ Ask questions when you don't understand.
- ✓ Use class time efficiently. Begin homework when time is given in class.
- ✓ Use proper form when solving questions. Show your thinking. Don't skip key steps.
- ✓ Ask about homework questions you had difficulty with. Make sure you understand how to do them.
- ✓ Create a Math Vocabulary/Formula List section in your notebook to record all important words, definitions, and formulas.
- ✓ Read the instructions to a question so that you are familiar with the wording.
- ✓ Make sure that you answer the question that has been asked.

AT HOME

- ✓ Complete your math homework after every class. Try each question assigned. Refer to the text and sample solutions to help you.
- ✓ Review examples and notes. Use them to help you with your homework.
- ✓ Memorize all formulas, definitions, vocabulary, and steps/procedures for solving longer questions.
- ✓ Check your answers with those at the back of the book. Highlight homework questions that you had difficulty with or could not do.
- ✓ For each lesson and chapter, prepare a summary sheet that contains important formulas, definitions, vocabulary, procedures for solutions, and solutions to questions from the homework that you found to be difficult.
- ✓ Update your study sheet after each lesson. This will save time when studying for tests and the exam.

PREPARING FOR A TEST

Studying for a math test should be easy if you have been keeping up throughout the chapter.

- ✓ DO NOT CRAM! Begin studying and reviewing at least three days prior to a test. Don't wait until the night before.
- ✓ Review the summary sheets that you have prepared.
- ✓ Review each section in the chapter to be tested. Redo homework questions that you found difficult.
- ✓ Do all review questions. Try extra questions.
- ✓ Memorize formulas, definitions, vocabulary, and steps for longer solutions.
- ✓ Study the wording of questions so that you will understand the instructions on a test.
- ✓ Try to categorize the types and variety of questions done over the entire chapter. Make sure that you understand how to solve each type of question.