McGraw-Hill Ryerson

Principles of Mathematics 9

Exercise and Homework Book

AUTHOR

Mary Card
B.A., B.Ed.
Toronto District School Board

REVIEWERS

Bryce Bates
Toronto District School Board

Rob Gleason
Bluewater District School Board

Carol Miron
Toronto District School Board

Andrzej Pienkowski
Toronto District School Board

Sunil Singh
Toronto District School Board

McGraw-Hill Ryerson

Toronto Montréal Boston Burr Ridge, IL Dubuque, IA Madison, WI New York
San Francisco St. Louis Bangkok Bogotá Caracas Kuala Lumpur Lisbon London
Madrid Mexico City Milan New Delhi Santiago Seoul Singapore Sydney Taipei

McGraw-Hill Ryerson
Principles of Mathematics 9 Exercise and Homework Book

Copyright © 2006, McGraw-Hill Ryerson Limited, a Subsidiary of The McGraw-Hill Companies. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, or stored in a data base or retrieval system, without the prior written permission of McGraw-Hill Ryerson Limited, or, in the case of photocopying or other reprographic copying, a licence from the Canadian Copyright Licensing Agency (Access Copyright). For an Access Copyright licence, visit *www.accesscopyright.ca* or call toll free to 1-800-893-5777.

Any request for photocopying, recording, taping of this publication shall be directed in writing to Access Copyright.

ISBN-13: 978-0-07-097346-6
ISBN-10: 0-07-097346-6

http://www.mcgrawhill.ca

1 2 3 4 5 6 7 8 9 0 MP 0 9 8 7 6

Printed and bound in Canada

Care has been taken to trace ownership of copyright material contained in this text. The publishers will gladly take any information that will enable them to rectify any reference or credit in subsequent printings.

The Geometer's Sketchpad®, Key Curriculum Press, 1150 65th Street, Emeryville, CA 94608, 1-800-995-MATH.

Statistics Canada information is used with the permission of Statistics Canada. Users are forbidden to copy the data and redisseminate them, in an original or modified form, for commercial purposes, without permission from Statistics Canada. Information on the availability of the wide range of data from Statistics Canada can be obtained from Statistics Canada's Regional Offices, its World Wide Web site at http://www.statcan.ca, and its toll-free number 1-800-263-1136.

PUBLISHER: Linda Allison
ASSOCIATE PUBLISHER: Kristi Clark
PROJECT MANAGER: Maggie Cheverie, Janice Dyer
DEVELOPMENTAL EDITOR: Julia Cochrane, Jackie Lacoursiere
MANAGER, EDITORIAL SERVICES: Crystal Shortt
SUPERVISING EDITOR: Janie Deneau
EDITORIAL ASSISTANT: Erin Hartley
MANAGER, PRODUCTION SERVICES: Yolanda Pigden
PRODUCTION COORDINATOR: Zonia Strynatka
COVER DESIGN: Pronk & Associates; Dianna Little
ELECTRONIC PAGE MAKE-UP: Jackie Lacoursiere
COVER IMAGE: Paul Rapson/Science Photo Library

Contents

Prerequisite Skills 1

Chapter 1 Mathematical Processes

1.1 Focus on Problem Solving 27
1.2 Focus on Communicating 28
1.3 Focus on Connecting.....29
1.4 Focus on Representing.....30
1.5 Focus on Selecting Tools and Computational Strategies.....31
1.6 Focus on Reasoning and Proving.....32
1.7 Focus on Reflecting 33
Chapter 1 Review.....34

Chapter 2 Relations

2.1 Hypotheses and Sources of Data.....35
2.2 Sampling Principles 37
2.3 Use Scatter Plots to Analyse Data 39
2.4 Trends, Interpolation, and Extrapolation 41
2.5 Linear and Non-Linear Relations.....44
2.6 Distance-Time Graphs 47
Chapter 2 Review.....49

Chapter 3 Polynomials

3.1 Build Algebraic Models Using Concrete Materials.....51
3.2 Work With Exponents.....53
3.3 Discover the Exponent Laws 55
3.4 Communicate With Algebra 57
3.5 Collect Like Terms 60
3.6 Add and Subtract Polynomials.....62
3.7 The Distributive Property 65
Chapter 3 Review.....67

Chapter 4 Equations

4.1 Solve Simple Equations 69
4.2 Solve Multi-Step Equations 71
4.3 Solve Equations Involving Fractions 73
4.4 Modelling With Formulas 75
4.5 Modelling Wit Algebra 77
Chapter 4 Review 79

Chapter 5 Modelling With Graphs

5.1 Direct Variation 81
5.2 Partial Variation 83
5.3 Slope 85
5.4 Slope as a Rate of Change 87
5.5 First Difference 90
5.6 Connecting Variation, Slope, and First Differences 93
Chapter 5 Review 95

Chapter 6 Analyse Linear Relations

6.1 The Equation of a Line in Slope y-Intercept Form: $y = mx + b$ 97
6.2 The Equation of a Line in Standard Form: $Ax + By + C = 0$ 100
6.3 Graph a Line Using Intercepts 102
6.4 Parallel and Perpendicular Lines 104
6.5 Find an Equation for a Line Given the Slope and a Point 107
6.6 Find an Equation for a Line Given Two Points 109
6.7 Linear Systems 112
Chapter 6 Review 115

Chapter 7 Geometric Relationships

7.1 Angle Relationships in Triangles 117
7.2 Angle Relationships in Quadrilaterals 119
7.3 Angle Relationships in Polygons 122
7.4 Midpoints and Medians in Triangles 125
7.5 Midpoints and Diagonals in Quadrilaterals 127

Chapter 7 Review....129

Chapter 8 Measurement Relationships

8.1 Apply the Pythagorean Theorem....131
8.2 Perimeter and Area of Composite Figures....134
8.3 Surface Area and Volume of Prisms and Pyramids....137
8.4 Surface Area of a Cone....139
8.5 Volume of a Cone....141
8.6 Surface Area of a Sphere....144
8.7 Volume of a Sphere....146
Chapter 8 Review....149

Chapter 9 Optimizing Measurements

9.1 Investigate Measurement Concepts....151
9.2 Perimeter and Area Relationships of a Rectangle....154
9.3 Minimize the Surface Area of a Square-Based Prism....156
9.4 Maximize the Volume of a Square-Based Prism....159
9.5 Maximize the Volume of a Cylinder....161
9.6 Minimize the Surface Area of a Cylinder....163
Chapter 9 Review....165

Challenge Questions....167

Answers....177