

Photo Credits

iv Big Ideas Learning, LLC; **viii top** ©iStockphoto.com/Angel Rodriguez, ©iStockphoto.com/Ann Marie Kurtz; **bottom** Evok20; **ix top** ©iStockphoto.com/Ron Summers, ©iStockphoto.com/Ann Marie Kurtz; **bottom** Apolofoto; **x top** ©iStockphoto.com/Angel Rodriguez, ©iStockphoto.com/Ann Marie Kurtz; **bottom** ©iStockphoto.com/daaronj; **xi top** Chiyacat, Zoom Team; **bottom** Apolofoto; **xii top** ©iStockphoto.com/Michael Flippo, ©iStockphoto.com/Ann Marie Kurtz; **bottom** ©iStockphoto.com/ronen; **xiii top** ©iStockphoto.com/Alistair Cotton; **bottom** Heather Prosch-Jensen; **xiv top** ©iStockphoto.com/Jonathan Larsen; **bottom** Peter Close; **xv top** Cigdem Cooper, ©iStockphoto.com/Andreas Gradin, stephan kerkhofs; **bottom** ©iStockphoto.com/ranplett; **xvi top** ©iStockphoto.com/Lisa Thornberg, ©iStockphoto.com/Ann Marie Kurtz; **bottom** Jane Norton; **xvii top** Varina and Jay Patel, ©iStockphoto.com/Ann Marie Kurtz; **bottom** ©iStockphoto.com/Thomas Perkins; **xviii** ©iStockphoto.com/Ekaterina Monakhova; **1** ©iStockphoto.com/Angel Rodriguez, ©iStockphoto.com/Ann Marie Kurtz; **2** This poem was written by two students in Dave Marain's math class and appeared on his blog, MathNotations (<http://mathnotations.blogspot.com>); **3** Nicole Gordine; **5** MONOPOLY® & ©2010 Hasbro, Inc. Used with permission.; **7** ©iStockphoto.com/WestLight; **12** ©iStockphoto.com/clu; **13** ©iStockphoto.com/Mladen Mladenov; **21** Wendy Nero; **25** Kateryna Larina; **40** Vivid Pixels; **42** Helder Almeida; **44 top** Aptyp_koK; **bottom** Andy Cash; **48** ©iStockphoto.com/Ron Summers, ©iStockphoto.com/Ann Marie Kurtz; **52** ©iStockphoto.com/Mark Stay; **53** MapMaster; **54** *Exercise 4* Stephanie Frey; *Exercise 8* Yobidaba; **60** ©iStockphoto.com/Paul Cowan; **61** ©iStockphoto.com/Thomas Gordon; **63** *Exercise 5* ©iStockphoto.com/chудо-yudo; *Exercise 9* ©iStockphoto.com/Vadym Volodin; **68** Terrance Emerson; **69** ©iStockphoto.com/bamse009; **75** Kharidehal Abhirama Ashwin; **78** *Exercise 7* ©iStockphoto.com/Hans Van IJzendoorn; *Exercise 8* ©iStockphoto.com/Andy Hwang; **80** *Exercise 2* ©iStockphoto.com/higyou; *Exercise 3* Laurent Renault; *Exercise 8* ©iStockphoto.com/Anastasiya Maksymenko; **84** ©iStockphoto.com/Angel Rodriguez, ©iStockphoto.com/Ann Marie Kurtz; **91** Avesun; **111** ©iStockphoto.com/Andrey Shadrin; **119** ©iStockphoto.com/MegapixelMedia; **123** ©iStockphoto.com/Karin Lau; **133 top** ©Rafael Laguillo/123RF; **bottom** ©Romanchuck|Dreamstime.com; **137** ©iStockphoto.com/Ron Masessa; **138** ©iStockphoto.com/Russell Du parcq; **146** Chiyacat, Zoom Team; **151** ©iStockphoto.com/Olivier Tuffé; **159** ©iStockphoto.com; **167** ©iStockphoto.com/Phil Berry; **173** ©iStockphoto.com/Joseph Abejon; **179** ©iStockphoto.com/proxyminder; **180** ©iStockphoto.com/Karen Rakow; **184** ©iStockphoto.com/Graham Heywood; **188** ©iStockphoto.com/Michael Flippo, ©iStockphoto.com/Ann Marie Kurtz; **194** ©iStockphoto.com/Aldo Murillo; **209** ©iStockphoto.com/Eric Isselée; **232** ©iStockphoto.com/Alistair Cotton; **239** ©iStockphoto.com/Vicki Reid; **243** ©iStockphoto.com/Jacob Wackerhausen; **244** ©iStockphoto.com/Gord Horne; **245** ©iStockphoto.com/Birgitte Magnus; **246** ©iStockphoto.com/Apatrimonio; **248** ©iStockphoto.com/John Pitcher; **249** ©iStockphoto.com/Bart Wolczyk; **251** ©iStockphoto.com/Katherine Moffitt; **256** ©iStockphoto.com/Eric Isselée; **263** ©iStockphoto.com/Eric Isselée; **269** ©iStockphoto.com/Dave Rodriguez; **272** ©iStockphoto.com/DNY59; **273 left** ©iStockphoto.com/Sue Mack; **right** ©iStockphoto.com/Murat Koc; **290** ©iStockphoto.com/Jonathan Larsen; **297 top right** ©iStockphoto.com/Steve Goodwin, ©iStockphoto.com/Joop Snijder, ©iStockphoto.com/Michael MacFadden; **center left** ©iStockphoto.com/Kenneth C. Zirkel; **302** ©iStockphoto.com/Mel Stoutsenberger; **304** ©iStockphoto.com/Jan Will, ©iStockphoto.com/Jeremy Wee; **305** ©iStockphoto.com/kreicher; **307** ©iStockphoto.com/Leo Blanchette; **310** ©iStockphoto.com/Sergei Butorin; **311** ©iStockphoto.com/Eric Isselée; **313** ©iStockphoto.com/David Verinder; **319** ©iStockphoto.com/Don Nichols; **321 top left** ©iStockphoto.com/Daniel Loiselle; **center right** ©iStockphoto.com/Matthew Cole; **327 top right** ©iStockphoto.com/Alexandru Magurean; **center left** ©iStockphoto.com/simon2579; **332** Jamie Wilson/BigStockPhoto.com; **336** Cigdem Cooper, ©iStockphoto.com/Andreas Gradin, stephan kerkhofs; **348** Sebastian Tomus; **350** ©iStockphoto.com/Hulton Archive/Getty Images; **351** Sir Cumference and the First Round Table Text copyright©1997 by Cindy Neuschwander Illustrations copyright ©1997 by Wayne Geehan Used with permission by Charlesbridge Publishing, Inc. All rights reserved.; **355 top row left and center** ©iStockphoto.com/Zentilia; **top row right** ©iStockphoto.com/

Dave Hopkins; **center row left** ©iStockphoto.com/Boris Yankov; **center row center** ©iStockphoto.com/Angel Rodriguez; **center row right** ©iStockphoto.com/iLexx; **bottom row** ©iStockphoto.com/alexander mychko; **357 center** ©iStockphoto.com/Hulton Archive/Getty Images; **bottom** ©iStockphoto.com/Marc Dietrich; **361** ©iStockphoto.com/Brian Sullivan; **362 top row left** ©iStockphoto.com/zentilia; **top row center and right** ©iStockphoto.com/Andrey Pustovoy; **bottom row left** ©iStockphoto.com/Marie-france Bélanger; **bottom row center** ©iStockphoto.com/Dave Hopkins; **bottom row right** ©iStockphoto.com/7nuit; **365 center row left** ©iStockphoto.com/DivaNir4a; **center row center** ©iStockphoto.com/saw; **center row right** ©iStockphoto.com/Creativeye99; **367** ©iStockphoto.com/Remigiusz Zalucki; **369 top** Bob the Wikipedian; **bottom** ©iStockphoto.com/Sherwin McGehee; **370** ©iStockphoto.com/David Marchal; **371 top** Arvind Balaraman; **center** ©iStockphoto.com/Jon Helgason; **bottom** Stankevich; **371** Rubik's Cube® Used By Permission of Seven Towns LTD. www.rubiks.com; **375** ©iStockphoto.com/William Britten; **377 center left** ©iStockphoto.com/Eduardo Jose Bernardino; **center bottom** ©iStockphoto.com/Jill Chen, ©iStockphoto.com/Long Ha; **378** ©iStockphoto.com/Graeme Purdy; **380** *Exercise 5* spaxiax; *Exercise 7* Robert B. Kee; *Exercise 9* Franz Pfluelg; *Exercise 10* Georgios Kollidas; **386** ©iStockphoto.com/Lisa Thornberg, ©iStockphoto.com/Ann Marie Kurtz; **388** NASA; **389** NASA; **391** ©iStockphoto.com/Egor Mopanko; **394** NASA; **399** ©iStockphoto.com/Andrew Penner; **401 top** Photo courtesy of Thomas Osha; **left** Studio 37; **top right** ©iStockphoto.com/james steidl; **bottom right** Photo by Woods Hole Oceanographic Institution; **403** Shane W Thompson; **404** Maxim Tupikov, PhotoSky 4t com, Juice Team; **407 top** NicolasMcComber; **bottom** ©iStockphoto.com/George Argyropoulos; **408 first** ©iStockphoto.com/Anneke Schram; **second** ©iStockphoto.com/nicholas belton; **third** ©iStockphoto.com/Chris Schmidt; **fourth** ©iStockphoto.com/Robert Dant; **412** NASA; **414** ©iStockphoto.com/George Peters; **415** ©iStockphoto.com/Anthony Ladd; **425** ©iStockphoto.com/Lawrence Sawyer; **426** ©iStockphoto.com/Victor Maffe; **434 right** A. L. Spangler; **left** ©iStockphoto.com/Algimantas Balezentis; **436** MAMEL; **438** ©iStockphoto.com/4x6; **442** Varina and Jay Patel, ©iStockphoto.com/Ann Marie Kurtz; **445** ryasick photography; **446 top** ©iStockphoto.com/sweetym; **center left** Big Ideas Learning, LLC; **447** ©iStockphoto.com/sweetym; **448** ©iStockphoto.com/Jo_Potato, ©iStockphoto.com/sweetym; **453** ©iStockphoto.com/Stefan Klein; **453** design56; **454 center right** Daniel Skorodyelov; **bottom left** Mitrofanova; **455 top** Jamie Wilson; **bottom** Michael Ansell Photography, NatUlrich, Yuryev Pavel; **457 top** ©iStockphoto.com/Doug Cannell; **center** Ragnarock; **458** ©iStockphoto.com/Jo_Potato, ©iStockphoto.com/sweetym; **459** ©iStockphoto.com/Jo_Potato, ©iStockphoto.com/sweetym; **462** ©iStockphoto.com/Enshpil; **463** ©iStockphoto.com/Oleg Kozlov; **464** ©iStockphoto.com/Wojciech Krusinski; **465** ©iStockphoto.com/Andrey Armyagov; **467** ©iStockphoto.com/Leo Blanchette; **469 top left** Robert J. Beyers II; **bottom right** ©iStockphoto.com/Lawrence Sawyer; **472 center left** ©iStockphoto.com/sweetym; **center right** ©iStockphoto.com/Alex Slobodkin; **bottom** Anette Linnea Rasmussen; **474** ©iStockphoto.com/Slowly; **476 top** ©iStockphoto.com/Frank Ramspott; **center** ©iStockphoto.com/7nuit; **A0** ©iStockphoto.com/Björn Kindler; **center left and bottom** ©iStockphoto.com/Grafissimo; **A1 top right** ©iStockphoto.com/Andrey Krasnov; **bottom left** ©iStockphoto.com/Dan Van Oss; **bottom right** ©iStockphoto.com/Victor Paez; **A4 top right** ©iStockphoto.com/Grafissimo; **center right** ©iStockphoto.com/Ragnarocks; **bottom left** ©iStockphoto.com/Linda Steward; **bottom right** ©iStockphoto.com/Rackermann; **A5 top right** ©iStockphoto.com/Rackermann; **bottom left** ©iStockphoto.com/Grafissimo; **bottom right** ©iStockphoto.com/Rackermann; **A6 top right** ©iStockphoto.com/Keith Webber Jr.; **bottom left** ©iStockphoto.com/Eliza Snow; **bottom right** ©iStockphoto.com/David Seymour; **A7 top right** ©iStockphoto.com/Andrey Krasnov; **bottom left** ©iStockphoto.com/Victor Paez; **A8 top right** ©iStockphoto.com/Dan Van Oss; **bottom left** ©iStockphoto.com/Tomasz Tulik; **A9 top right** ©iStockphoto.com/Tim Stapleton; **bottom left** ©iStockphoto.com/Liz Leyden; **bottom right** ©iStockphoto.com/Pauline Mills

Cartoon illustrations Tyler Stout
Cover image Lechner & Benson Design