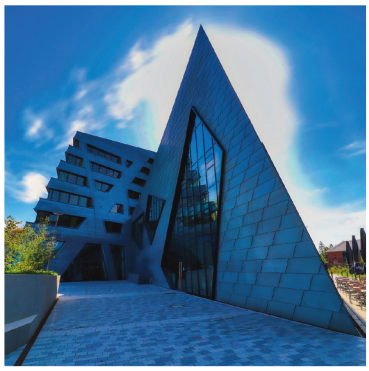

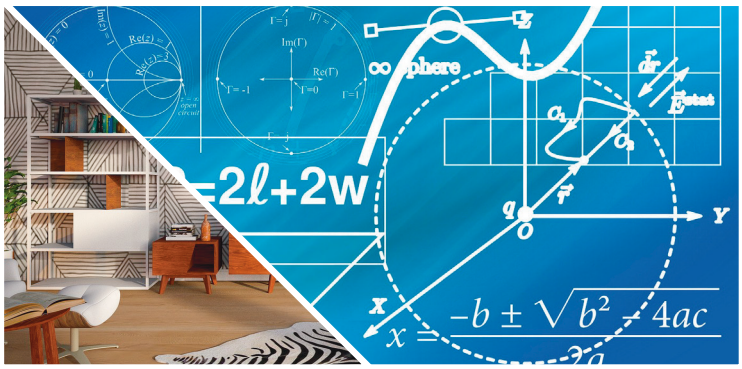

POWER BASICS Geometry

Teacher's Guide

WALCH®
MATHEMATICS

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To the Teacher

Overview

Power Basics® is a complete textbook program designed to meet the needs of students who are daunted by the length and complexity of traditional textbooks. The goal of all textbook programs is to provide students with important new information. However, in traditional textbook programs, this goal is often overshadowed by other considerations. Many textbooks are written for the above-average reader and cover a wide range of content. They are filled with photographs, illustrations, and other visual elements. For some students, the amount of material is overpowering, the visual elements are distracting, and the rapid pace is unnerving. In Power Basics®, we revisited the basic goal, developing a streamlined textbook program that presents the essential content students need to succeed.

Program Components

As with traditional textbook programs, Power Basics® includes a core textbook and ancillary products designed to round out the program. The student text provides coverage of the essential content in each subject area. A consumable workbook provides a variety of activities for each lesson, including practice activities, extension activities, and activities designed for different learning styles.

The student text includes a collection of station-based activities that provide students with opportunities to extend beyond the mathematical skills and concepts they are learning. These station-based activities foster a collaborative learning experience, while allowing students the opportunity to reflect on and synthesize their thinking. These activities can be found near the end of the book.

Teacher support materials include a teacher's guide and test pack for each student text. The teacher's guide includes the following: an overview of each unit in the student text; suggestions for extension activities; the student text glossary and appendixes; a complete answer key to all practice activities and unit reviews in the student text; an overview/answer key for the station activities; classroom record-keeping forms; and graphic organizers for student use.

For more detailed assessments, the test pack offers a pretest, unit tests for each unit in the student text, a posttest, scoring keys, and test-taking strategies for students. Finally, a practice pack provides additional exercises with a separate answer key, organized by unit.

Student Book Organization

The student text is divided into units. Each unit contains a series of lessons on related topics, with one lesson for each topic. Each lesson begins with a clear, student-centered goal and a list of key words that are introduced in the lesson. The definitions for these words are included in the teacher material for each lesson.

Next comes a brief introduction to the topic of the lesson, followed by instructional text that presents essential information in short, easy-to-understand sections. Each section of instructional text is followed by a practice activity that lets students apply what they have just learned. A Unit Review is provided at the end of each unit to assess students' progress. The review is followed by an Application Activity that encourages students to extend and apply what they have learned.

The student text also includes several special features. "Tip" sections give students useful hints to help them remember specific pieces of information in the student text. "Think About It" sections ask students to use critical-thinking skills. "In Real Life" sections show students how the material they are learning connects to their own lives, answering the perennial question, "When am I ever going to use this?"

The reference section at the back of the student text includes a summary of rules and other important information presented in the text, a glossary (with pronunciation guide) that includes all vocabulary in the Words to Know sections, and an index to help students locate information in the text.

Record-Keeping Forms

To make record-keeping easier, we have provided reproducible class charts that you can use to track students' progress. Fill in your students' names, and make copies of the chart for each unit in the student text. Add lesson numbers, lesson titles, and practice numbers as needed. We have also provided a generic grading rubric for the Application Activities in the student text so that these activities may be assigned for credit, if you wish. You may customize the rubric by adding more grading criteria or adapting the criteria on the sheet to fit your needs.

We're pleased that you have chosen to Power Up your Basic Skills Curriculum with Power Basics®!

Guide to Icons

Teacher's Guide

Teaching Tips

Practical suggestions help you to engage students in the learning process.

Calculate It

Useful tips and tricks help students get the most from their calculators.

Mental Math

Oral math activities help learners develop strong mental arithmetic skills.

Differentiation

Different approaches to the content give all learners the opportunity to connect to the material.

Student Text

Tip

Tips give helpful hints to boost understanding and retention.

Think About It

These sections develop critical-thinking.

In Real Life

These features connect learning concepts to students' lives, answering the perennial question, "When am I ever going to use this?"

Workbook

Reinforcement

Reinforcement activities give students additional opportunities to practice what they have learned.

Multiple Intelligences

Different approaches capitalize on different learning styles and interests to help all students connect to the material.

Extension

Deepen and broaden learning with critical-thinking activities, real-life applications, and more.

Classroom Management

Lesson No.: _____ Title: _____

Student Name	*Practice #* ___	*Practice #* ___	*Practice #* ___	*Practice #* ___	*Practice #* ___	*Practice #* ___	*Practice #* ___	*Practice #* ___	*Unit Review Score*
1.									
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Application Activity Rubric

Name _____ Date _____

Unit _____ Activity _____

POINTS	4 all of the time	3 most of the time	2 some of the time	1 almost none of the time
followed directions				
organized material well				
used appropriate resources				
completed the entire activity				
showed an understanding of the content				
produced error-free materials				
drew logical conclusions				
where appropriate, listed sources used				

Use Chart

POWER BASICS WORKBOOK	STUDENT TEXT PRACTICE
Unit 1: Lines and Triangles	
Activity 1: Dimensions	Practice 1: What Is Geometry?
Activity 2: Parallel Lines	Practice 2: Parallel Lines
Activity 3: Measuring Line Segments	Practice 2: Parallel Lines
Activity 4: Constructing Congruent Line Segments Using a Compass	Practice 2: Parallel Lines
Activity 5: Constructing Congruent Line Segments Using a Safe-Drawing Compass	Practice 2: Parallel Lines
Activity 6: Angles, Angles Everywhere!	Practice 3: Angles
Activity 7: Acute, Obtuse, and Straight Angles	Practice 4: Perpendicular Lines and Right Angles
Activity 8: Measuring Angles	Practice 4: Perpendicular Lines and Right Angles
Activity 9: Constructing Perpendicular Lines	Practice 4: Perpendicular Lines and Right Angles
Activity 10: Using Equations to Find Complements	Practice 5: Complementary and Supplementary Angles
Activity 11: Using Equations to Find Supplements	Practice 5: Complementary and Supplementary Angles
Activity 12: Complementary and Supplementary Angles	Practice 5: Complementary and Supplementary Angles
Activity 13: Drawing Angles	Practice 6: Naming Angles
Activity 14: Angle Diagram	Practice 6: Naming Angles
Activity 15: Vertical and Adjacent Angles	Practice 7: Finding Equal Angles
Activity 16: Constructing Parallel Lines	Practice 8: Angles Formed by Parallel Lines
Activity 17: Street Angles	Practice 10: Finding the Measurements of Angles
Activity 18: Drawing Transversals	Practice 10: Finding the Measurements of Angles
Activity 19: Regular and Irregular Polygons	Practice 11: What Is a Triangle?
Activity 20: More Polygons	Practice 11: What Is a Triangle?
Activity 21: Quadrilaterals	Practice 11: What Is a Triangle?
Activity 22: Acute and Obtuse Triangles	Practice 14: The Parts of a Right Triangle
Activity 23: The Sum of the Angles of a Triangle	Practice 13: The Sum of the Angles of a Triangle
Activity 24: The Sum of the Angles in a Quadrilateral	Practice 13: The Sum of the Angles of a Triangle
Activity 25: Exponents	Practice 15: Finding the Length of the Hypotenuse of a Right Triangle
Activity 26: Squares and Square Roots	Practice 15: Finding the Length of the Hypotenuse of a Right Triangle
Activity 27: Drawing the Pythagorean Theorem	Practice 16: The Pythagorean Theorem
Activity 28: Pythagoras	Practice 16: The Pythagorean Theorem

Use Chart, *continued*

POWER BASICS WORKBOOK	STUDENT TEXT PRACTICE
Unit 2: Perimeter, Circumference, and Area	
Activity 29: Using Formulas to Find the Perimeter of Rectangles and Squares	Practice 17: Finding the Perimeter of a Shape
Activity 30: Perimeter of Regular Polygons	Practice 17: Finding the Perimeter of a Shape
Activity 31: Area and Blueprints	Practice 18: Finding the Area of a Rectangle
Activity 32: Relating Area and Perimeter	Practice 18: Finding the Area of a Rectangle
Activity 33: Finding the Area of a Parallelogram I	Practice 19: Finding the Area of a Parallelogram
Activity 34: Finding the Area of a Parallelogram II	Practice 19: Finding the Area of a Parallelogram
Activity 35: Finding the Area of a Triangle	Practice 20: Finding the Area of a Triangle
Activity 36: Finding the Area of a Trapezoid	Practice 20: Finding the Area of a Triangle
Activity 37: Finding the Area of a Complex Figure	Practice 21: Finding the Area of an Irregular Shape
Activity 38: Drawing Circles	Practice 22: What Is a Circle?
Activity 39: Radii, Circumference, and Arcs I	Practice 23: Radii, Circumference, and Arcs
Activity 40: Radii, Circumference, and Arcs II	Practice 23: Radii, Circumference, and Arcs
Activity 41: Central Angles	Practice 25: Central Angles
Activity 42: Using Equations to Find Central Angles	Practice 25: Central Angles
Activity 43: Central Angles and Fractions	Practice 25: Central Angles
Activity 44: More about Pi (π)	Practice 27: Using the Diameter to Find the Circumference of a Circle
Activity 45: Perimeter of Complex Figures	Practice 27: Using the Diameter to Find the Circumference of a Circle
Activity 46: Percents	Practice 28: Finding the Length of an Arc of a Circle
Activity 47: Making Circle Graphs	Practice 28: Finding the Length of an Arc of a Circle
Activity 48: Area of a Circle	Practice 29: Using the Radius of a Circle to Find the Area
Activity 49: Using Radius or Diameter to Find the Area of a Circle	Practice 30: Using the Diameter of a Circle to Find the Area
Activity 50: Area of Complex Figures	Practice 30: Using the Diameter of a Circle to Find the Area
Activity 51: Changing Formulas	Practice 31: Using the Circumference of a Circle to Find the Area
Activity 52: Using Formulas	Practice 31: Using the Circumference of a Circle to Find the Area
Activity 53: Algebra, Formulas, and Circles	Practice 36: Finding the Diameter of a Circle Using Area
Activity 54: Using the Area and Circumference Formulas	Practice 36: Finding the Diameter of a Circle Using Area

Use Chart, *continued*

POWER BASICS WORKBOOK	STUDENT TEXT PRACTICE
Activity 55: Word Problems with Perimeter, Circumference, and Area	Practice 38: Word Problems with Circles
Unit 3: Volume	
Activity 56: Space Figures	Practice 39: What Is Volume?
Activity 57: Polyhedra	Practice 39: What Is Volume?
Activity 58: Platonic Solids	Practice 39: What Is Volume?
Activity 59: Finding Volume	Practice 39: What Is Volume?
Activity 60: Finding the Volume of Rectangular Prisms and Cubes	Practice 40: Finding the Volume of a Cube
Activity 61: Finding the Volume of Prisms	Practice 40: Finding the Volume of a Cube
Activity 62: Visualizing the Volume of a Cylinder	Practice 42: Finding the Volume of a Cylinder
Activity 63: Nets	Practice 42: Finding the Volume of a Cylinder
Activity 64: Finding the Volume of Cones and Pyramids	Practice 42: Finding the Volume of a Cylinder
Activity 65: Finding the Volume of Space Figures	Practice 42: Finding the Volume of a Cylinder
Activity 66: Surface Area of Rectangular Prisms	Practice 44: Word Problems with Volume
Activity 67: Surface Area of Cylinders	Practice 44: Word Problems with Volume
Activity 68: Word Problems with Volume	Practice 44: Word Problems with Volume
Unit 4: Coordinate Geometry	
Activity 69: Fractions on the Number Line	Practice 46: Fractions on the Number Line
Activity 70: Property of Density	Practice 46: Fractions on the Number Line
Activity 71: Graphing the Solution to an Equation or an Inequality on the Number Line	Practice 47: Graphing Intervals on the Number Line
Activity 72: Drawing the Coordinate Plane	Practice 49: Forming the Coordinate Plane
Activity 73: The Coordinate Plane	Practice 54: Graphing Zeroes on the Coordinate Plane
Activity 74: Graphing on the Four Quadrants of the Coordinate Plane	Practice 53: The Fourth Quadrant
Activity 75: Graphing Game	Practice 54: Graphing Zeroes on the Coordinate Plane
Activity 76: Transformations on the Coordinate Plane	Practice 54: Graphing Zeroes on the Coordinate Plane
Activity 77: Functions	Practice 56: The Table Method of Graphing Linear Equations
Activity 78: Linear Equations	Practice 56: The Table Method of Graphing Linear Equations
Activity 79: Using Intercepts to Graph Linear Equations	Practice 57: The Intercept Method of Graphing Linear Equations
Activity 80: Graphing Nonlinear Equations	Practice 57: The Intercept Method of Graphing Linear Equations

Use Chart, *continued*

POWER BASICS WORKBOOK	STUDENT TEXT PRACTICE
Activity 81: Functions and Measurement	Practice 57: The Intercept Method of Graphing Linear Equations
Activity 82: Graphing Inequalities	Practice 57: The Intercept Method of Graphing Linear Equations
Activity 83: Slope I	Practice 58: Finding Linear Slope
Activity 84: Slope II	Practice 59: The Formula for Finding Slope
Activity 85: The Slope-Intercept Form of an Equation of a Line	Practice 61: Graphing a Line When You Know the Slope and One Point
Activity 86: Graphing a Line Using the Slope-Intercept Form of an Equation	Practice 61: Graphing a Line When You Know the Slope and One Point
Activity 87: Slope and Parallel and Perpendicular Lines	Practice 61: Graphing a Line When You Know the Slope and One Point
Activity 88: Systems of Equations	Practice 61: Graphing a Line When You Know the Slope and One Point
Activity 89: Graphing Equations and Inequalities to Solve Word Problems	Practice 61: Graphing a Line When You Know the Slope and One Point

Unit 1: Lines and Angles

This unit introduces the study of geometry. In Lesson 1, students learn the basic terms of geometry, such as dimensions, points, and lines. In Lesson 2, they begin to learn about angles, including right angles, complementary angles, and supplementary angles. Lesson 3 continues the exploration of angles, introducing students to naming angles, equal angles, and finding the measurements of angles. Lesson 4 moves on to the study of triangles, with a definition of a triangle and an explanation of the ways to describe triangles. Lesson 5 introduces students to the Pythagorean theorem.

Lesson 1—Points, Lines, and Dimensions

Goal: To learn basic terms of geometry

WORDS TO KNOW

dimension	a measure in one direction, such as length, width, or height
edges	the line segments where two faces of a solid figure meet
geometry	the area of mathematics that deals with the measurement and relationship of points, lines, angles, solids, and surfaces
line	a straight path that goes on forever in two different directions
line segment	a part of a line that includes two points, called endpoints, and all the points between the endpoints
parallel	lying in the same plane but not touching at any point
parallel lines	lines that are always the same distance apart but never meet
plane	a flat surface or area
point	an exact location in space, usually represented by a dot
ray	part of a line; it has one endpoint and continues without end in one direction
solid figure	a three-dimensional shape

Lesson 2—Angles

Goal: To learn properties of different types of angles

WORDS TO KNOW

angles	figures formed by two lines that extend from the same point

complement	the complement of an angle is the angle that, when added to the first angle, totals 90°
complementary angles	two angles whose measures add up to 90°
degrees	units for measuring angles, shown with the symbol °; based on dividing a circle into 360 equal parts
perpendicular	meeting at a right angle
right angles	angles whose measure is 90°
straight angle	an angle that measures 180°
supplement	the supplement of an angle is the angle that, when added to the first angle, totals 180°
supplementary angles	two angles whose measures add up to 180°

Lesson 3—Equal Angles

Goal: To find equal angles and figure out the measurements of angles based on their relationships to other angles

WORD TO KNOW

transversal	a line that crosses two or more lines at different points

Lesson 4—Triangles

Goal: To identify different types of triangles and find the measurements of angles in a triangle

WORDS TO KNOW

acute angle	an angle that has a measure greater than 0° and less than 90°
acute triangle	a triangle in which all three angles are acute, that is, greater than 0° and less than 90°
equilateral triangle	a triangle where all three sides are the same length
isosceles triangle	a triangle in which two sides are the same length
obtuse angle	an angle that has a measure greater than 90° and less than 180°
obtuse triangle	a triangle that has one obtuse angle (one angle that measures greater than 90° and less than 180°)

plane figure	a figure that lies on one plane; it has only two dimensions
right triangle	a triangle that has one right angle (an angle that measures 90°)
scalene triangle	a triangle in which no two sides are the same length
triangle	a flat shape with three sides
two-dimensional	measured in two dimensions, or directions, such as length and width; flat

Lesson 5—Right Triangles and the Pythagorean Theorem

Goal: To use the Pythagorean theorem to find the lengths of the sides of right triangles

WORDS TO KNOW

formula	a general rule for finding the value of something; often written with variables
hypotenuse	the side of a right triangle that is opposite the right angle
legs	in a right triangle, the two sides that form the right (90°) angle
Pythagorean theorem	a statement that says that, in any right triangle, the square of the side opposite the right angle (the hypotenuse) is equal to the sum of the squares of the other two sides. If one side is 2 cm long and the other side is 3 cm long, then the square of the hypotenuse is $2^2 + 3^2 = 4 + 9 = 13$.
square	a number multiplied by itself
square root	The square root of a number is the factor that, when multiplied by itself, gives the number.
square root symbol	The symbol for "square root of" is $\sqrt{\ }$, as in $\sqrt{9} = 3$.
theorem	an important mathematical statement that can be proved to be true

Notes on Application Activities in Student Text

Activity	Skills Applied	Product
Finding Lines and Angles	gathering information preparing visual demonstrations	drawings
Triangle Angles	visualizing shapes working with others	reconfigured triangle written paragraph

Additional Activity Suggestions

- People who work in the building trades work with lines and angles a great deal. Have learners contact a builder or carpenter, and ask what specific skills (such as measuring and calculating) and tools (such as levels and T-squares) are used to make sure a project is done accurately and holds together. Learners could also have a builder or carpenter demonstrate how to use these tools, or learners could demonstrate this themselves.

Teaching Tip

- To reinforce identification of various types of triangles, have learners search their school, home, workplace, and so on for examples of scalene, equilateral, and isosceles triangles. Have them bring in pictures or drawings of five examples of each. They should also note which are also right triangles.

Differentiation

- Students learning geometry can get caught up in a slew of definitions, propositions, theorems, formulas, and so on. All the numbers and symbols can make everything seem very abstract. You can help learners see how geometry is connected to reality by taking them on a mini-field trip through the building. Have them observe structural congruencies, examples of parallelism, the way components of the building are made up of the figures they are studying, and so on. This should help them realize that geometry is real. It is everywhere. It is not just a bunch of formulas and theorems. Once students can recognize and name geometrical figures, they'll feel less intimidated to work with them.
- Preview the vocabulary in each lesson by reading the Words to Know and their definitions to your students. For each definition, point to an object in the classroom that fits the definition. Then ask students to identify other objects that also fit the definition. This helps them have a concrete understanding of the new concepts.

Unit 2: Perimeter, Circumference, and Area

This unit introduces students to the essentials of plane geometry. Lesson 6 presents the concept of finding the perimeter of a shape. Lesson 7 introduces area, including finding the area of a rectangle and of a parallelogram. In Lesson 8, students learn how to find the area of triangles and of irregular shapes made up of triangles and rectangles. Lesson 9 introduces the parts of a circle, including radius, circumference, arcs, chords, tangents, and central angles. In Lesson 10, students learn how to find the circumference of a circle using either the radius or the diameter of the circle, as well as how to find the length of the arc of a circle. Lesson 11 introduces the area of a circle. Students learn how to find area using the radius, diameter, or circumference of the circle. Lesson 12 shows students how to work with formulas to find unknown measurements in circles, including finding the radius by using the circumference and finding the diameter using either the circumference or the area of the circle. In Lesson 13, students learn how to solve word problems that involve perimeter, circumference, and area.

Lesson 6—Perimeter

Goal: To find the perimeter of shapes

WORDS TO KNOW

perimeter	the distance around the outside of a two-dimensional shape
rectangle	a four-sided figure in which all four angles are right angles
square	a rectangle in which all the sides are the same length and all the angles are right angles

Lesson 7—Area of Parallelograms

Goal: To find the area of squares, rectangles, and other parallelograms

WORDS TO KNOW

area	the measure of the surface inside a closed figure; the number of square units needed to cover a surface
base	a side of a polygon or a face of a solid figure
parallelogram	a four-sided figure that has two pairs of parallel sides

Lesson 8—Area of Triangles and Irregular Shapes

Goal: To find the area of triangles and irregular shapes made up of triangles and rectangles

Lesson 9—The Parts of a Circle

Goal: To identify the parts of a circle

WORDS TO KNOW

arc	part of the outer edge of a circle, from one point on the circle to another
central angle	an angle that has its vertex at the center of a circle
chord	a straight line that joins two points on a circle
circle	a closed plane figure made up of a curved line in which all points on the line are the same distance from the center of the figure
circumference	the distance around the outside of a circle
congruent	having the same shape and size
congruent circles	two different circles that have diameters the same length
diameter	a straight line from one side of a circle to the other that passes through the center
endpoints	points at either end of a line segment; used to name line segments, for example, segment TL names a line segment between points T and L that includes the endpoints.
major arc	an arc (part of the outer edge of a circle) that measures more than half the circle, or greater than 180°
minor arc	an arc (part of the outer edge of a circle) that measures less than half the circle, or less than 180°
radii	plural of radius
radius	the distance from the center of a circle to the edge, or circumference of the circle
semicircle	half of a circle
tangent	a straight line that touches a curve at only one point
vertex	the point where the rays of an angle or the sides of a polygon meet

Lesson 10—Finding Circumference Measurements

Goal: To use formulas and proportions to find circumference measurements and the lengths of arcs

WORDS TO KNOW

pi	the ratio of the circumference of a circle to its diameter; this ratio is the same for all circles. Its value is approximately 3.14. Pi is also written with the Greek letter π.
proportion	a statement that two ratios are equal
ratio	a way of comparing quantities; may be written as a fraction, with a colon, or with the word "to"

Lesson 11—Area of a Circle

Goal: To find the area of a circle using the circle's radius, diameter, and circumference

WORDS TO KNOW

exponent	a small, raised number that shows repeated multiplication of the same factor. The number in the exponent shows how many times the number is used as a factor, such as 5^3, in which 5 is used as a factor 3 times: 5 • 5 • 5.
parentheses	pair of curved marks ( ) that show that the number or numbers inside them should be multiplied by the number outside them; also used to separate mathematical expressions

Lesson 12—Diameter, Radius, Circumference, and Area

Goal: To learn how to work with formulas that use known measurements in circles to find unknown measurements

WORD TO KNOW

squared	multiplied by itself; can be shown with the exponent 2, as in 3^2, or 3 • 3

Lesson 13: Word Problems with Perimeter, Circumference, and Area

Goal: To solve word problems that involve perimeter, circumference, and area

Notes on Application Activities in Student Text

Activity	Skills Applied	Product
Pizza Prices	gathering information analyzing information solving problems	shapes solved problems
Circumference	gathering information solving problems taking measurements	measurements solved problems
Circles, Circles, Circles	taking measurements calculating analyzing information	solved problems

Additional Activity Suggestions

- To reinforce circle concepts and measurements, hold a circle "treasure hunt" in your classroom. Use items that are usually found in the room and bring in other objects to place around the room. Camouflage the circular objects by placing them in a sea of other objects. If the circles are very small or large, learners won't notice them first. Give each learner a ruler or tape measure and a worksheet that lists each of the circles in the room. You can also ask specific questions about them. For example, "What is the radius of the circle on the wall opposite the clock?"

- Many aspects of a plumber's work involve knowledge of circles, especially the varying diameters of pipes, wrenches, joints, wall allowances, and so on. Have learners research the plumbing business or speak with a plumber or pipe fitter, either in person or by telephone, to learn how day-to-day decisions on the job call for the ability to work with circles.

Calculate It

- Many calculators have a π key. You can use this key to help your students find diameter and circumference. For instance, have them solve the problem "Find the circumference of a circle with a diameter of 5 feet" both ways: once by entering 3.14 and a multiplicand and once using the π key. Getting the same results with both methods will show students that they can "trust" the key and will also give them a handy tool for future work.

Differentiation

- Show to learners how a compass is used to draw circles. Then provide them with materials such as string, paper clips, rulers, and toothpicks and have them invent their own tools for drawing perfect circles.

- Have students work individually or in small groups to measure the diameter and circumference of several circles. (The circumference is easiest to measure if the circle is actually the top of a cylindrical object, such as a tin can.) Next, have them use calculators to find the quotient of the circumference divided by the diameter. This will help them understand that π is a ratio that describes the relationship between the circumference and diameter of any circle.