

A Standards Guide for Families



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Reading
Writing
Mathematics
Science
Social Studies

What is Expected
in Grade

8



Standards now,
knowledge for a lifetime.

Dear Family,

Education in Ohio is changing. This change will help your child succeed in school. It also will better prepare your child for success in college or the work force upon high school graduation.

The basis of this change is new **academic content standards**, which define what your child should know and be able to do at every grade level. There are new standards in English language arts (reading and writing), mathematics, science and social studies.

These new standards let teachers know what they are expected to teach and students know what they are expected to learn. Standards also help educators identify and measure what students know and can do.

Part of this system will include achievement tests to determine how well your child is making progress toward these new standards. These tests will replace the current Ohio Proficiency Tests.

The information in this guide will give you a sample of some of the things your child will need to know and be able to do in reading, writing, mathematics, science and social studies for the eighth grade. The guide also has helpful practice problems, tips and activities you can do with your child to help him or her achieve the new standards.

*It is important to note that the information in this guide is **not** the complete set of standards; rather, this information is designed to highlight a select number of skills that your child should know and be able to do in the eighth grade.* The official standards documents, designed for teachers' use, are in some cases several hundred pages long. This booklet has been reduced to this size for your convenience.

To view the complete set of standards, visit the Ohio Department of Education Web site at www.ohioacademicstandards.com.

I sincerely thank you for the time, interest and energy you are investing in your child's education. I hope this guide is one of many tools you use to help your child reach these new standards and achieve success inside and outside the classroom.

Sincerely,

Susan Tave Zelman
Superintendent of Public Instruction

Tips 
and Activities

- ✓ Watch documentaries about U.S. history and programs that are set in another time period. You may notice that historians disagree about what happened. Discuss reasons that they might disagree like conflicting sources of information or details that have been lost over time.
- ✓ Young adolescents are concerned with fairness. This can be the basis for a discussion about the rights that are contained in the Constitution and how the interpretation of those rights has changed over time. Ask your child about the rights that people have today and why those rights are sometimes limited.
- ✓ The issue of taxation is important in early American history. Discuss with your child the kinds of taxes that the family pays and the purpose for them.
- ✓ Students will be learning about prejudice and stereotyping. Help them to identify examples that they see in the media.
- ✓ Students sometimes have difficulty understanding what issues are decided at the state level and what issues are decided at the national level. Help your child to find newspaper articles about state and national issues and discuss why each is being decided at that level.
- ✓ Students learn about early political parties. At election time point out examples of the roles of political parties. Help your child to know which candidates belong to a particular party and why voters might consider the party when voting.

Note: Some of the tips and activities in this guide were derived from "parent tips" posted on the Web sites of Georgetown County School District in South Carolina (www.gcsd.k12.sc.us) and Chelsea Publishing House (www.teachervisioin.com). These resources were used with permission of the authors whom we gratefully acknowledge.

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Citizenship Rights and Responsibilities

What this means: Preparing to become active citizens.

- Explain how the opportunities for civic participation increased during the first half of the 19th century.
- Evaluate the role of historical figures and political bodies and the impact they had on the rights of individuals.
- Show connections between the rights and responsibilities of citizenship including:
 - a) Voting and staying informed on issues;
 - b) Being tried by a jury and serving on juries;
 - c) Having rights and respecting the rights of others.



Social Studies Skills and Methods

What this means: Collecting information, organizing it and using it to make decisions.

- Compare the accuracy of the point of view of fiction and nonfiction sources about a particular event or era.
- Write a position paper or give a presentation that includes citations of sources.
- Organize and lead a discussion.
- Identify ways to manage conflict with a group.



Language Arts



Acquisition of Vocabulary

What this means: Being able to recognize clues in reading, ask questions, listen and converse with adults and peers.

- Know the difference between the meanings of connotation (the attitude and/or feelings associated with a word) and denotation (the actual meaning of a word).
- Understand the literal and figurative meaning of words including figurative language such as metaphors, similes and idioms.

Check your understanding: **Similes, Metaphors and Idioms**



Similes: Comparing two unlike things using *like* or *as* (e.g., Susan eats *like* a bird).

Metaphors: Comparing two unlike things using a form of the verb *to be* (e.g., Tyler *is* a stubborn mule).

Idioms: A combination of words that is not strictly in accordance with the correct grammatical rules and sometimes has a meaning other than its logical one (e.g., an easy test might be described as a *piece of cake*).

- Discuss ways that different events (e.g., cultural, political, social, technological, scientific) can affect the English language.
- Use knowledge of Greek, Latin and Anglo-Saxon roots, prefixes and suffixes to understand complex words (e.g., unknown words in science, mathematics and social studies).



Check your understanding: **Greek, Latin and Anglo-Saxon Roots and Affixes**



Root:	Root meaning:	Examples:
Ac-	Sharp	Acute, acid
Agr-	Field	Agriculture
Dem-	People	Democracy, epidemic
Metr-	Measure	Geometric, metric

- Determine the meanings of unknown words by using dictionaries, thesauruses, glossaries, technology, footnotes or sidebars.



Reading Process – Concepts of Print, Comprehension Strategies and Self-Monitoring Strategies

What this means: Through reading, students will understand the basic concepts and meanings of different types of print materials.

- Comprehend what is being read by making predictions, comparing and contrasting, summarizing or drawing conclusions.
- Answer literal (directly stated), inferential (indirectly stated), evaluative (requiring a judgment) and synthesizing (requires reader to combine separate elements into one concept) questions.
- Use criteria to choose own reading material (e.g., personal interest, knowledge of authors, recommendations of others).
- Monitor own comprehension when reading by adjusting the speed to fit the purpose or by skimming, scanning, reading on, looking back, note taking or summarizing what has been read so far.
- Read books for various purposes (e.g., for enjoyment, to gain information, to perform a task).

- Explain how the U.S. Constitution protects the rights of citizens, regulates the use of territory, manages conflict and establishes order and security.
- Explain the political concepts in the U.S. Constitution including democracy, federalism, bicameralism, separation of powers and checks and balances.

Check your understanding: **Political Concepts of the U.S. Constitution**



Democracy: A system of government in which political control is exercised by all the people either directly or through elected representatives.

Federalism: A political organization in which the power of the government is divided between a central government and territorial subdivisions. In the U.S. this would be the national and state governments.

Bicameralism: A system of government in which the legislative branch is made up of two houses (e.g., the Senate and the House of Representatives).

Separation of Powers: The division of government into executive, legislative and judicial branches which are equal in power.

Checks and Balances: The system that allows each of the three branches of the government to check the actions of the other two branches

- Explain how parts of the U.S. Constitution (including the Bill of Rights) limit powers of the government in order to protect the rights of individuals.
- Explain how the Northwest Ordinance established principles and procedures for the orderly expansion of the United States.
- Describe the process by which a bill becomes a law.

with the same places today to examine changes in land use and various characteristics.

- Analyze how traits of the environment influenced where people settled and the economic activities in the United States in the 18th and 19th centuries.



Economics

What this means: *Understanding how to make decisions in our economic system.*

- Explain how the uneven distribution of resources influenced historical events such as the Civil War.
- Explain the purpose and effects of trade barriers.

Check your understanding: **Trade Barriers**



Trade barriers: Prevent foreign products from entering a country.

Trade barriers limit supply and increase prices. They may be used to protect jobs or give new industries a chance to develop. Some trade barriers are used to protect industries that would be important for national security.

- Explain how the lack of power to regulate the economy contributed to the end of the Articles of Confederation and the creation of the U.S. Constitution.



Government

What this means: *Understanding why government is necessary and how it works.*

- Explain how political parties developed as a result of attempts to resolve issues in the early years of the United States.
- Explain how events (e.g., economic instability, government under the Articles of Confederation) showed the need for a stronger form of governance in the early years of the United States.



Reading Applications – Informational, Technical and Persuasive Text

What this means: *Reading, understanding, explaining and critiquing different kinds of written materials such as magazines, essays, maps and online sites.*

- Identify and use how the reading material is structured/organized such as in chronological order, compare-contrast, cause-effect or problem-solution.
- Compare (what is similar) and contrast (what is different) various sources of information such as books, magazines, newspapers and online resources to draw conclusions about a topic.
- Analyze information found in maps, charts, tables, graphs or diagrams.
- Identify the author's purpose and intended audience for the text.
- Understand how writers name facts, draw inferences (conclusions) and give opinions in the text.
- Distinguish the characteristics of consumer materials, work place documents and public documents.

Check your understanding: **Characteristics of Consumer Materials, Workplace Documents and Public Documents**



Consumer materials:	Warranties, product information
Workplace documents:	Memoranda, instructions
Public documents:	Speeches, newspaper editorials



Reading Applications – Literary Text

What this means: *Organizing and interpreting results through collecting data to answer questions and solve problems, show relationships and make predictions about different types of literature (e.g., fables, tales, short stories).*

- Identify different kinds of characters such as flat, round, dynamic or static characters and determine how they affect the plot.

Check your understanding: **Flat, Round, Dynamic and Static Characters**



- Flat character:** A character with only one outstanding trait or feature.
- Round character:** A character that is complex and multi-dimensional.
- Dynamic character:** A character that undergoes a change during the story.
- Static character:** A character that does not change during the story.

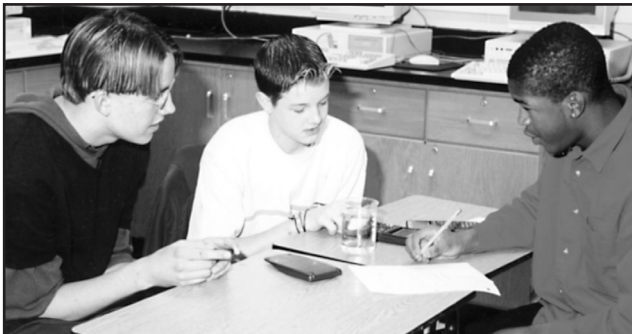
- Explain how the authors use subplots, parallel episodes and climax.
- Identify examples of foreshadowing and flashback in reading material.

Check your understanding: **Foreshadowing and Flashback**



- Foreshadowing:** Giving clues to what will happen next in reading material.
- Flashback:** Stopping the action in a story and going back to an earlier period to introduce more information.

- Examine symbols in literary works (A symbol is something concrete -- a person, place, or object -- that signifies something more than just itself; something abstract; e.g., a heart stands for love, the flag stands for freedom, a dove stands for peace).



- c) Different economies of the North and South;
- d) Extension of slavery into territories;
- e) The abolitionist movement;
- f) The addition of new states to the union;
- g) The emergence of Abraham Lincoln as a national figure.

- Explain the courses and consequences of the Civil War with a focus on Abraham Lincoln, Robert E. Lee, Ulysses S. Grant, the Emancipation Proclamation and the Battle of Gettysburg.
- Analyze the outcomes of Reconstruction with emphasis on President Lincoln's assassination; President Andrew Johnson's impeachment; attempts to improve opportunities for freedom; and the Ku Klux Klan and the enactment of black codes.



People in Societies

What this means: Identifying both similarities and differences in the traditions of various groups of people.

- Explore how religious freedom has evolved in the United States.
- Explain the effects of stereotyping and prejudice, racism and discrimination.
- Analyze how contact between white settlers and American Indians resulted in treaties, land acquisition and Indian removal.
- Analyze the factors that contributed to the enslavement of African-Americans in North America and the resistance to slavery.
- Describe the historical limitations of the participation of women in U.S. society and their efforts to gain equal rights.
- Explain how the diverse people of the United States developed a common national identity.



Geography

What this means: Identifying the location of places, understanding how places are connected and how human activity affects them.

- Compare places in the United States as they existed before 1877

- Explain the challenges in writing and ratifying the U.S. Constitution including:
 - a) Issues debated during the convention resulting in compromises;
 - b) The Federalist/Anti Federalist debate;
 - c) The debate over a Bill of Rights.
- Describe the actions taken to build one country from 13 states including:
 - a) The precedents established by George Washington including the cabinet and a two-term presidency;
 - b) Alexander Hamilton's actions to create a financially strong country including the creation of a national bank;
 - c) The establishment of an independent federal court system.

Check your understanding: **Building One Country from 13 States**

George Washington assembled a group of advisers called the Cabinet and he limited himself to two terms as president. This set an example that was followed by other presidents. Alexander Hamilton argued for the creation of a national bank.

- Describe the territorial expansion of the United States including:
 - a) The Northwest Ordinance;
 - b) The Louisiana Purchase and the Lewis and Clark expedition;
 - c) Westward movement including Manifest Destiny;
 - d) The Texas War for Independence and the Mexican-American War.

Check your understanding: **Territorial Expansion of the United States**

The United States began as a narrow strip of land along the East Coast of North America. Throughout its first 100 years it continued to add new territory until it stretched from coast to coast.

- Explain causes of the Civil War including:
 - a) Slavery;
 - b) States' rights;



Writing Processes

What this means: *Using the steps of prewriting, drafting, revising and editing to publish different types of writing.*

- Develop writing ideas by talking with others and by reading printed materials. Keep a list of the ideas.
- Use background reading, interviews or surveys when needed.
- Establish a thesis (theme) statement for writing.
- Determine a purpose and audience.
- Use organizational strategies such as notes or outlines.
- Organize writing with an introduction, body and conclusion.
- Group related ideas into paragraphs and maintain a consistent focus across paragraphs.
- Add or delete information to better explain a main idea.
- Use resources and reference materials (e.g., dictionaries and thesauruses) to select more effective vocabulary.
- Rearrange words, sentences and paragraphs and add transitional words and phrases to make meaning clearer.
- Prepare publications for writing that follow a format appropriate to the purpose (e.g., for display or sharing with others). Use techniques such as electronic resources and graphics to enhance the final product (e.g., storyboards, collages, posters, photographs, illustrations, charts, graphs, diagrams).



Writing Applications

What this means: *Learning about, using and choosing appropriate words for different kinds of writing, from letters to scientific reports, and for different audiences.*

- Write stories that:
 - a) Keep the reader's interest by pacing action and developing an engaging plot;
 - b) Use literary devices to improve the style and tone of the story;
 - c) Create complex characters in a setting that is believable.

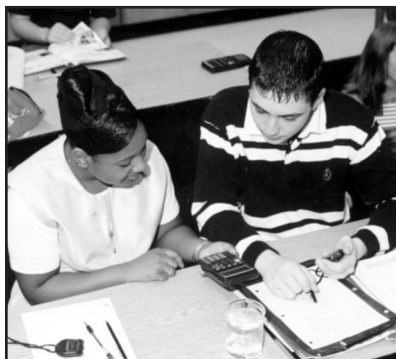
- Write business letters, letters to the editor and job applications that:
 - a) Address the needs of the audience and clearly state the purpose;
 - b) Follow the style appropriate to the text using proper technical terms;
 - c) Include appropriate facts and details;
 - d) Exclude unnecessary details;
 - e) Provide a sense of closure to the writing.
- Write informational essays or reports that:
 - a) Ask relevant questions that engage the reader;
 - b) Provide a clear point of view on the subject;
 - c) Create an organizing format;
 - d) Support the main idea with facts, details, examples and explanations;
 - e) Document sources and include bibliographies.
- Write a persuasive composition that:
 - a) Establishes a controlling idea;
 - b) Supports arguments with detailed evidence;
 - c) Excludes unnecessary information;
 - d) Cites sources of information.



Writing Conventions

What this means: *Understanding and applying punctuation, grammar and spelling rules.*

- Use correct spelling, punctuation and capitalization.
- Use all eight parts of speech.



Social Studies



Focus: U.S. Studies from 1607 to 1877: Colonization Through Reconstruction



History

What this means: *Understanding the pattern of events that have happened in the past.*

- Describe the political, religious and economic aspects of North American colonization including:
 - a) Reasons for colonization including religion, desire for land and economic opportunity;
 - b) Differences among the Spanish, French and British colonies;
 - c) Interactions between American Indians and European settlers;
 - d) Indentured servants and slavery;
 - e) Early governments and democratic practices that emerged;
 - f) Conflicts among colonial powers for control of North America.
- Explain what events led to the American Revolution such as the Proclamation of 1763, the Stamp Act, the Boston Tea Party and petitions and appeals to Parliament.
- Explain the results of developments of the American Revolution including:
 - a) A declaration of American independence;
 - b) Military struggle in the North in the early years of the war and the shift of the battle to the South after 1779;
 - c) Creation of state constitutions;
 - d) Impacts on women, African-Americans and American Indians.
- Explain the domestic problems faced by the leaders of the new republic under the Articles of Confederation including:
 - a) Maintaining national security;
 - b) Creating a stable economy;
 - c) Dealing with war debts;
 - d) Collecting revenue;
 - e) Defining the authority of the central government.



Scientific Ways of Knowing

What this means: Learning how to think scientifically and understand how people have shaped the study and practice of science.

- Know the difference between a description (e.g., observation, summary) and explanation (e.g., inference, prediction, importance).
- Explain why it is important to examine data objectively and not let bias affect observations.

Tips and Activities

- ✓ Schedule an evening gathering of students and parents to observe the night sky. Acquire the use of a telescope through a friend, school or local college. Communicate with the teacher to access books and charts to guide this activity.
- ✓ Identify the landforms in your community through observations and library research.
- ✓ Create a family tree and identify common physical characteristics of family members. Identify occupations of family members that involved any aspect of science.
- ✓ Learn about an individual in your community or state who is known for their skills in science and technology.

Check your understanding: **Using the Eight Parts of Speech** ✓

Nouns:	Ruby and Sarah swam across the lake .
Pronouns:	Robbie played basketball until he grew tired.
Verbs:	Kendall played video games and watched television while he was sick.
Adverbs:	He finished the test quickly .
Adjectives:	The large , brown dog caught the red frisbee.
Conjunctions:	I can't decide if I want a brownie or a cookie.
Prepositions:	He jumped over the tire and underneath the slide.
Interjections:	Stop!

- Use proper placement of modifiers.

Check your understanding: **Modifiers** ✓

A **modifier** is a word or a phrase that describes something else. You should place it as close as possible to what it describes. If you don't, your intended meaning may not be clear. Consider the unintentional meanings in the following:

The dog was chasing the boy with the spiked collar.

You can see what's wrong. The boy doesn't have a spiked collar. Because the modifier is misplaced it makes the reader unsure of the intended meaning. The correct version should read:

The dog with the spiked collar was chasing the boy.

- Use appropriate verb tenses (e.g., past, present, future).



Research

What this means: *Knowing how to gather information in all subjects using different kinds of tools (e.g., books, computers, magazines) and communicate what is found.*

- Develop open-ended questions (questions that require more than just a “yes” or “no” answer) for research and change questions when needed while investigating the research.
- Locate sources and collect information from several sources such as school library catalogs, online databases and electronic resources.
- Select an appropriate structure for organizing information such as notes, outlines, charts or tables.
- Use quotations and citations in written material to maintain a flow of ideas.
- Use style guides to produce oral and written reports that give proper credit for sources.
- Use various communications techniques including oral (spoken), visual or written reports to present information that has a clear position and maintains a balance between researched information and original ideas.



Communication: Oral and Visual

What this means: *Delivering presentations on different topics for different types of audiences.*

- Show active listening strategies (e.g., listen to message for clarity, organize important information, listen for changes in pace).
- Determine if the speaker is credible (e.g., hidden agendas, biased material), and recognize if the speaker is using misleading reasoning in his or her message.
- Recognize the speaker’s choice of language and delivery styles (e.g., repetition, appeal to emotion, eye contact) and how they contribute to the meaning of the message.



Science and Technology

What this means: *Understanding the relationship between science and technology to design and construct devices to solve problems.*

- Examine how science and technology have advanced through the contributions of many different people, cultures and times in history.
- Examine how choices about the uses of technology are influenced by limits caused by different factors that can’t be avoided (e.g., location, limited resources and social, political and economic considerations).
- Design and build a product or create a solution to a problem that has more than two constraints (e.g., limits of cost and time, supply of materials, environmental effects).



Scientific Inquiry

What this means: *Using scientific processes to ask questions, conduct investigations, gather, analyze and communicate information.*

- Choose the appropriate tools and use relevant safety procedures to complete science experiments.
- Read, construct and interpret data in different forms (e.g., tables, graphs, charts, maps, diagrams).
- Use appropriate math skills to interpret quantitative data (e.g., mean, median, mode).



- Describe how landforms are created through destructive and constructive processes.

Check your understanding: **Destructive and Constructive Processes**



Examples of destructive processes: Weathering, erosion

Examples of constructive processes: Volcanic eruptions and deposition of sediments



Life Sciences

What this means: Understanding the structure and function of living systems and how they interact with the environment.

- Understand that in sexual reproduction new combinations of traits are produced, which may increase or decrease an organism's chance for survival.
- Explain that diversity of species is developed through gradual processes over many generations (e.g., fossil record).
- Explore how an organism that has adapted to a certain environment may become extinct if the environment changes.



Physical Sciences

What this means: Understanding physical systems, concepts and properties of matter, energy, forces and motion.

- Explain that motion describes the change in the position of an object as time changes.
- Explain that an unbalanced force acting on an object changes that object's speed or direction.
- Show that vibrations in materials may produce waves that spread away from the source in all directions (e.g., earthquake waves and sound waves).

- Give informational presentations that:
 - a) Show an understanding of the topic and present events in the order in which they take place;
 - b) Support the main idea with appropriate facts, details, examples, quotations or statistics;
 - c) Include an introduction and conclusion and use common organizational structures (e.g., compare-contrast, cause-effect);
 - d) Use visual materials (e.g., diagrams, charts, pictures) and available technology;
 - e) Draw from many sources and identify sources used.

Tips and Activities



- ✓ Make sure your child can explain the cause-and-effect relationship of important events. It is important that he or she can recite back to you in his or her own words what he or she has read.
- ✓ Encourage your child to review material a little bit each day for several days before a test or quiz rather than cramming the night before.
- ✓ Have the newspaper available to your children at home. Discuss the day's headlines.
- ✓ Playing crossword and scrabble games helps your child with spelling.
- ✓ Attend PTA meetings at your child's school. If you don't speak or understand English, request a translator for the meeting.
- ✓ While driving or fixing dinner, ask your child to read his or her textbook to you. This is a good way to monitor his or her oral reading and identify any reading problems. Discuss any questions the book may present. This will allow you to check your child's comprehension of what was just read.

Mathematics



Numbers, Number Sense and Operations

What this means: Using number sense and number skills, from basic counting to paper and pencil calculations, to age-appropriate use of calculators and computers.

- Use scientific notation to express large and small numbers between 1 and 0.

Check your understanding: **Place Value and Scientific Notation**



The national debt of the United States is approximately \$575,000,000,000,000. This translates into 5.7×10^{14} .

- Apply order of operations to simplify expressions and perform computations involving exponents and radicals.
- Estimate, compute and solve problems involving radical numbers including ratio proportion and percent, and judge the reasonableness of solutions.
- Find the square root of perfect squares (e.g., 4 is the square root of 16; $4 \times 4 = 16$) and estimate the square root of non-perfect squares (e.g., the square root of 130 is between 11 and 12).
- Add, subtract, multiply, divide and compare numbers written in scientific notation.

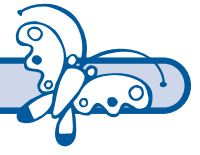


Measurement

What this means: Making accurate measurements using the appropriate tools, terms and technology.

- Compare and put in order the relative size of common U.S. customary units and metric units (e.g., mile and kilometer, gallon and liter, pound and kilogram).
- Be able to convert units from one measurement system to another (e.g., degrees Fahrenheit to degrees Celsius).

Science



Earth and Space Sciences

What this means: Understanding the interconnected cycles and systems of the universe, solar system and Earth.

- Explain how the regular motion of objects in the solar system explain such things as days, years, seasons, eclipses, tides and moon cycles.
- Describe the effect asteroids or meteoroids have when moving through space and sometimes entering planetary atmospheres.

Check your understanding: **Asteroids and Meteoroids**



Asteroids: A small rocky body orbiting the sun.

Meteoroids: One of a large number of celestial bodies that appear as meteors (e.g., “shooting stars”) when they enter the Earth’s atmosphere.

- Explain that the universe consists of billions of galaxies that are classified by shape.
- Explain that interstellar distances are measured in light years (e.g., the nearest star beyond the sun is 4.3 light years away).
- Name tools used to study the universe.

Check your understanding: **Tools Used to Study the Universe**



Examples of tools that are used to study the universe include **telescopes, probes, satellites** and **spacecraft**.

- Explain that most major geological events (e.g., earthquakes, volcanic eruptions, hot spots, mountain building) result from plate motion.
- Use models to analyze the size and shape of the Earth, its surface and its interior (e.g., globes, maps, satellite images).



Mathematical Processes

What this means: Applying problem-solving and reasoning skills and communicating mathematical ideas.

- Use a variety of mathematical representations appropriately, then write clearly and coherently about the mathematical thinking and ideas.
- Apply mathematical knowledge and skills routinely in practical situations and other content areas.
- Use connections between equivalent representations and related procedures for mathematics.
- Apply reasoning processes and skills to make logical conclusions and defend the validity of the solutions.

Tips and Activities

- ✓ Have your child analyze past population trends for your city, predict what the population will be in 10 years and write convincing arguments based on the data.
- ✓ Have your child design a garden with various geometric shapes to fit in a given space, then build the garden.
- ✓ Calculate the amount of discount and sale price for items using advertisements, coupons and other special offers. For example, find the final cost or total amount of savings when buying a jacket on sale for 40% off the regular price of \$45. What would be the cost and savings using a coupon for an additional 20% off the sale price?
- ✓ Discuss the meaning of data and information presented in the media. For example, discuss the meaning of "median income." Identify different ways for selecting a sample for a survey and how each might influence the results (e.g., a survey about a favorite sport might be different for persons leaving a baseball game than for persons selected at random).

- Determine surface area for pyramids by analyzing their parts.
- Find the sum of the interior and exterior angles of regular convex polygons with and without measuring angles with a protractor (e.g., the sum of the interior angle of a pentagon is 540°).
- Apply reasoning to solve problems that involve indirect measurements.

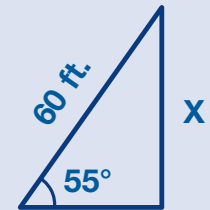
Check your understanding: **Indirect Measurements**



A 60-foot cable connects a point on the ground to the top of a pole. The cable makes a 55° angle with the ground. Find the height of the pole to the nearest foot.

$$\begin{aligned}\sin 55^\circ &= \frac{x}{60} \\ .819 &\approx \frac{x}{60} \\ .819 \times 60 &\approx x \\ 49.15 &\approx x\end{aligned}$$

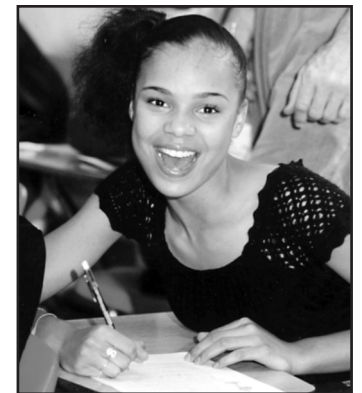
The height of the pole is about 49 feet.



Geometry and Spatial Sense

What this means: Identifying, classifying and analyzing one-, two- and three-dimensional objects, understanding their properties and using that knowledge to solve problems.

- Use proportions in several forms to solve problems involving similar figures (part-to-part, whole-to-whole).
- Represent shapes using coordinate geometry (e.g., given three vertices and the type of quadrilateral, find the coordinates of the fourth vertex).
- Draw the results of translations, reflections, rotations and dilations of objects.



Check your understanding: **Translations, Reflections, Rotations and Dilations**



- Translations:** A transformation where an image is formed by moving every point on a figure the same distance in the same direction.
- Reflections:** A transformation that results in a mirror image of the original shape.
- Rotations:** Turning a figure about a point which serves as the center of rotation of a given number of degrees.
- Dilations:** A transformation that keeps the shape of the figure, but allows the size to change.



Patterns, Functions and Algebra

What this means: Representing patterns and relationships using tables, graphs and symbols, and using them to solve problems.

- Generalize patterns and sequences by describing how to find the Nth term.

Check your understanding: **Nth Term**



In the pattern 6, 12, 18, 24....., the Nth term is $6n$.

- Explain when patterns are linear (e.g., 1, 3, 5, 7...) or nonlinear (e.g., 1, 3, 4, 16...).
- Use symbolic algebra (equations and inequalities), graphs and tables to solve problems.
- Solve simple quadratic equations graphically.
- Use graphing calculators or computers to analyze change over time.
- Describe the relationship between the graph of a line and its equation, including being able to explain the meaning of slope as a constant rate of change and using y-intercept in real-world problems.

- Compute and interpret slope, midpoint and distance given a set of ordered pairs.
- Solve 2 by 2 systems of linear equations (graphically and by simple substitution) and interpret the meaning of the solution.



Data Analysis and Probability

What this means: Organizing and interpreting results through data collection to answer questions, solve problems, show relationships and make predictions.

- Evaluate different graphical representations of the same data to determine which one should be used (e.g., use a line graph for change over time or a circle graph for part-to-whole comparisons).
- Tell the difference between discrete and continuous data.

Check your understanding: **Discrete and Continuous Data**



- Discrete data:** Data that can be counted (e.g., the number of people in a town).
- Continuous data:** Data that can be assigned an infinite number of values between whole numbers (e.g., the size of the apples on an apple tree is continuous data).

- Identify different ways of selecting samples such as survey response, random sample, representative sample and convenience sample.
- Develop convincing arguments based on analysis of data and graphs.
- Calculate the number of possible outcomes for a situation, recognizing when items may occur more than once or when order is important.