# GRADE-LEVEL EXPECTATIONS (GLE) HANDBOOK

## FIFTH GRADE


**LOUISIANA DEPARTMENT OF EDUCATION**

**CECIL J. PICARD**
**STATE SUPERINTENDENT OF EDUCATION**

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## LOUISIANA
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# GRADE-LEVEL EXPECTATIONS HANDBOOK OVERVIEW

## INTRODUCTION

In 1997, rigorous K–12 content standards were approved for mathematics, English language arts, science, social studies, foreign languages, and the arts. In conjunction with the development of these content standards, the Louisiana Department of Education (LDE) developed standards-based tests in English language arts, mathematics, science and social studies for grades 4, 8, 10, and 11. These tests have served as the basis for Louisiana's School and District Accountability System for several years. The development of Grade-Level Expectations (GLEs) in 2003 in English language arts, mathematics, science and social studies was a continuation of Louisiana's effort to expand and extend the content standards. GLEs identify what all students should know or be able to do by the end of a given grade level from prekindergarten through grade 12 in these four content areas.

## PURPOSES OF THE GLE HANDBOOKS

The Louisiana Grade-Level Expectations handbooks include grade-specific information about the GLEs. Each handbook includes introductory information for each content area contained within the handbook, a glossary, and tables that map the relationship between the standards and/or strands, benchmarks, and GLEs. Each handbook also correlates with one of fourteen GLE posters.

## GRADE-LEVEL EXPECTATIONS DEVELOPMENT GUIDELINES

Each grade-level expectation is meant to further define a content standard and benchmark(s). There is a progression of specificity; the standards represent broad statements, benchmarks are more specific, and GLEs provide the most detail. Grade-level expectations have been developed from prekindergarten through grade 12.

GLEs do not represent the entire curriculum for a given grade or course. Rather, they represent the core content that should be mastered by the end of a given year by all students. For mastery to be achieved at a given level, it may be necessary for those skills to be introduced at an earlier grade. Similarly, skills will need to be maintained after mastery has occurred.

The GLEs were developed with the following goals in mind:

- to articulate learning from PreK–12
- to be appropriate for the developmental or grade level of students
- to move from the concrete to the abstract
- to attend to prerequisite skills and understandings
- to be specific, but not so specific as to be too small in "grain size" compared with other GLEs for a particular content area

The GLEs were developed with an effort to avoid including:

- statements of curricular activities or instructional strategies
- value-laden concepts and understandings

## SUMMARY OF GLE DEVELOPMENT PROCESS

In December 2002, the LDE selected Data Recognition Corporation (DRC) as the contractor for the Grade-Level Expectations Project. The steps in the process of developing the Grade-Level Expectations for English language arts, mathematics, science, and social studies are described below.

1. **Identifying National Consultants.** National consultants representing each content area were selected to provide a national perspective to the GLE project and to assist the LDE and DRC with various steps in the GLE development process.

2. **Conducting Teacher Committee Meetings.** In March and April of 2003, content-area development committees, comprised of approximately 120 Louisiana classroom teachers, administrators, special populations teachers, and resource teachers chosen for their knowledge of standards and curriculum, were convened to assist with the development of the GLEs for English language arts, mathematics, science, and social studies.

3. **Completing Initial drafts.** The draft GLEs for the four content areas were completed and prepared for further review.

4. **Convening Focus Groups.** Two eighty-member groups of educators, nominated by their districts, reviewed the draft GLEs for horizontal and vertical alignments with the standards for English language arts, mathematics, science, and social studies and provided additional input on these initial drafts to the LDE.

5. **Conducting an Online/Electronic Public Review.** An online/electronic public review and feedback system was developed for the GLEs and made available on the LDE Web site. The purpose of this review was to solicit a broad range of feedback on the GLEs from parents, teachers, and other stakeholders.

6. **Completing an External Review.** With assistance from the staff of the Council of Chief State School Officers (CCSSO), twelve content specialists (three per content area) from other states or from universities or educational organizations across the nation were invited to serve on the review committee. In addition, the LDE also invited the national consultants from each content area to participate in the review meeting to answer questions about the development of the GLEs. External review committee members reviewed the GLE documents prior to the meetings, met with national consultants and LDE staff, and provided specific feedback on the GLEs via a written report.

7. **Conducting Final Committee Meeting.** The public comments and suggestions from the online public review were tabulated, and the additional comments and feedback from the external review committee meeting were compiled for sharing with committee members during the third and final GLE development committee meeting. The outcome of the third meeting of content-area committees consisted of suggestions for final edits that would be incorporated into the documents for presentation to the Louisiana State Board of Elementary and Secondary Education.

8. **Obtaining SBESE Board Approval of the GLEs.** In October 2003, the LDE staff presented the GLEs to the Louisiana State Board of Elementary and Secondary Education for review and approval.

9. **Conducting Preworkshops and GLE Awareness Workshops.** Two preworkshops for district supervisors in early December 2003 and fifteen GLE awareness workshops for local school personnel in late January 2004 have been conducted to inform educators about the grade-level expectations and their future role as it relates to curriculum and assessment

## CONCLUSION

Louisiana's content standards and benchmarks have guided the Louisiana education reform program for several years. As an extension of the content standards and benchmarks, the GLEs provide a link among instruction, curriculum, and assessment. The primary goal is a common understanding among parents, students, teachers, and the general public about what is expected of Louisiana students as they progress from grade to grade.

# ENGLISH LANGUAGE ARTS INTRODUCTION

## INTRODUCTION

Louisiana's English language arts content standards encompass reading, writing, researching, and listening and speaking. Each benchmark within a standard delineates what students should know and be able to do by the end of a grade cluster. Grade-Level Expectations (GLEs) further define the knowledge and skills students are expected to master by the end of each grade or high school course. The GLEs for each grade are developmentally appropriate and increase in complexity to build the knowledge and skills students need. For example, the GLE in PreK, "participate in group-shared writing experiences that include rhyming and descriptive words," begins the development of the concept "recognizing and applying literary devices." In subsequent grades, GLEs build on this foundational literary concept.

## ELEMENTARY: PREKINDERGARTEN–GRADE 4

At the elementary level, prekindergarten through third-grade students focus on understanding and learning the basics of how to read. The building blocks of reading as presented in *The Reading First Initiative* and the *National Reading Panel Report (2000)* provide the foundation for the GLEs. These building blocks emphasize five areas of reading instruction: phonemic awareness, phonics, vocabulary, fluency, and text comprehension. The GLEs emphasize these building blocks.

To develop a basic understanding of a text, beginning readers in prekindergarten through third grade should be able to 1) use context and other word-identification strategies, 2) recognize what a text is mainly about, and 3) recognize some supporting information within a text. As students become more confident in their ability to decode (read) and encode (write) text, they make a process transition from learning to read to reading to learn. By fourth grade, students shift from using only basic skills and strategies as they learn to read to developing higher-level thinking skills as they gain an ability to understand the structures and concepts of more complex literary and informational texts.

At the elementary level, prekindergarten through third-grade students focus on understanding and learning the basics of how to write. Students learn to write for different purposes. At these grade levels, students learn the mechanics of how to write and how to use the basic writing formats. In the fourth grade, students develop writing skills that include using organizational strategies as well as applying writing processes.

Listening skills for PreK through fourth grade show progression from being able to follow simple directions to the ability to understand, respond to, compare, and critique messages heard from a variety of sources. At the earliest levels, speaking skills are demonstrated in the expression of feelings, needs, and ideas. As children mature, speaking skills progress through a continuum, culminating in the delivery of rehearsed oral presentations.

In the elementary grades, students begin the process of developing skills to acquire and communicate knowledge using a variety of sources, including technology. From identifying and describing simple schedules and charts to interpreting complex graphic organizers such as maps, diagrams, timelines, and tables, students learn to locate, select, and synthesize information from a variety of resources.

# ENGLISH LANGUAGE ARTS INTRODUCTION

## MIDDLE SCHOOL: GRADES 5–8

At the middle school level, the focus is on developing an understanding of literary and structural elements found in literature and informational texts. Students deepen understanding of texts by developing and applying critical thinking skills to become more independent learners. Learning to make connections among events, characters, and other story elements helps students relate what they have read to their own lives and experiences. To make rigorous academic progress, students at the middle school level should comprehend and process texts that are organized in a variety of ways to accomplish different purposes.

Fifth-grade through eighth-grade students develop competence in communicating thoughts and ideas through written expression. At this level, students write multiparagraph compositions for different purposes, within specific contexts, and for a variety of audiences. By implementing the practices of good writing, grammar, and usage, student writers develop skill in writing with increased clarity and complexity.

Speaking and listening skills at this grade cluster focus on effective oral communication and include students preparing and giving formal and informal presentations. Knowledge of the research process extends as students gain skill in accessing, evaluating, and documenting information using technology resources to produce research reports.

## HIGH SCHOOL: GRADES 9–12

At the high school level, students in grades nine through twelve focus on developing the ability to bring multiple levels of understanding to the texts that they read. Students employ critical thinking strategies such as asking questions as they read, making predictions, drawing conclusions, and creating meanings to match their initial assumptions about a text. Students at this level read between and beyond the lines of sophisticated, complex texts in order to shape their learning and to do more critical thinking at school and in real life.

Ninth-grade through twelfth-grade students develop competence in using writing processes to craft a wide variety of compositions for academic as well as real-life purposes. At this level, writers develop individual styles and increase proficiency in revising, editing, and proofreading their own work.

Speaking and listening skills are fine-tuned at this level and include learning both to follow and communicate complex directions and to prepare and deliver oral responses and complex presentations. Students gain skill in using all parts of the research process to produce thoughtful, well-organized research papers that have real-life and academic applications.

# ENGLISH LANGUAGE ARTS INTRODUCTION

## STANDARDS/BENCHMARKS/GLES

Codes at the end of each GLE are used to identify a developmental profile indicator from the *Louisiana Standards for Programs Serving Four-Year-Old Children* (Table 1) and/or benchmarks from the *Louisiana English Language Arts Content Standards* (Table 2). A GLE may apply to more than one benchmark; as a result, a GLE may have more than one code.

**Developmental Profile Indicator Codes:** The first term is always PK, which means prekindergarten. The second term indicates the domain and content area (i.e., Language and Literacy Development). The third term indicates the skill area (i.e., Listening, Speaking, Reading, Writing) and skill number (e.g., 1, 2).

**Table 1**. **Explanation of Developmental Profile Indicator Codes**

| Code(s) | Explanation |
|---|---|
| PK-LL-L3 | Prekindergarten, Language and Literacy Development, Listening, Skill 3 |
| PK-LL-R4 | Prekindergarten, Language and Literacy Development, Reading, Skill 4 |
| PK-LL-S2 | Prekindergarten, Language and Literacy Development, Speaking, Skill 2 |

**GLE Numbering and Benchmark Codes:**

Grade-Level Expectations are numbered consecutively in each grade level and grouped by standard in the following order:

- Standards 1, 6, and 7—Reading and responding
- Standards 2 and 3—Writing process and conventions of language
- Standard 4—Speaking and listening
- Standard 5—Using information resources

Benchmarks are coded by content area, standard number, and grade cluster. The first part is always ELA, which stands for English language arts. The second part, or term, indicates the standard number. The third term indicates the grade cluster and benchmark number.

**Table 2. Explanation of Benchmark Codes**

| Code(s) | Explanation |
|---|---|
| ELA-1-E2 | English Language Arts, Standard 1, Elementary, Benchmark 2 |
| ELA-4-M1 | English Language Arts, Standard 4, Middle School, Benchmark 1 |
| ELA-3-H4 | English Language Arts, Standard 3, High School, Benchmark 4 |

# FIFTH GRADE INTRODUCTION

**Fifth Grade**

Grade-Level Expectations (GLEs) for fifth grade reflect a shift in understanding and approach as students become submerged in the experience of reading to learn. Students become skilled at interpreting as they identify and explain story elements, literary devices, and the fine points of expository texts. The influence of cultural characteristics, the features of various genres, and an author's viewpoint and purpose for writing are extracted from the reading and writing experiences of fifth-grade students. By implementing the practices of good writing, grammar, and usage, students write compositions of increased clarity and complexity, using technology resources.

## SAMPLE PAGE AND KEY FOR ENGLISH LANGUAGE ARTS (ELA)

Standard

**Standard One: Students read, comprehend, and respond to a range of materials, using a variety of strategies for different purposes.**

| Benchmarks | Grade-Level Expectations |
|---|---|
| **ELA-1-E1:** gaining meaning from print and building vocabulary using a full range of strategies (e.g., self-monitoring and correcting, searching, cross-checking), evidenced by reading behaviors using phonemic awareness, phonics, sentence structure, and meaning | 1. Use understanding of base words, roots, prefixes, and suffixes to decode more complex words (ELA-1-E1)<br>2. Determine the meaning of unfamiliar words using knowledge of word origins and inflections (ELA-1-E1)<br>3. Determine word meanings, word choices, and pronunciations using a broad variety of reference aids such as dictionaries, thesauruses, synonym finders, and reference software (ELA-1-E1) |
| **ELA-1-E2:** using the conventions of print (e.g., left-to-right directionality, top-to-bottom, one-to-one matching, sentence framing) | |
| **ELA-1-E3:** adjusting speed of reading (e.g., appropriate pacing, intonation, expression) to suit the difficulty of materials and the purpose for reading (e.g., enjoying, learning, problem solving) | 4. Adjust speed of reading to accomplish purpose based on text complexity (ELA-1-E3) |
| **ELA-1-E4:** recognizing story elements (e.g., setting, plot, character, theme) and literary devices (e.g., simile, dialogue, personification) within a selection | 5. Identify a variety of story elements, including:<br>• the impact of setting on character<br>• multiple conflicts<br>• first- and third-person points of view<br>• development of theme (ELA-1-E4)<br>6. Identify literary devices, including metaphor and hyperbole (ELA-1-E4) |

Benchmarks

Grade-Level Expectations (GLEs)

# FIFTH GRADE

# ENGLISH LANGUAGE ARTS (ELA)

**Standard One: Students read, comprehend, and respond to a range of materials, using a variety of strategies for different purposes.**

| Benchmarks | Grade-Level Expectations |
|---|---|
| **ELA-1-M1:** using knowledge of word meaning and developing basic and technical vocabulary using various strategies (e.g., context clues, idioms, affixes, etymology, multiple-meaning words) | 1. Identify word meanings using a variety of strategies, including:<br>• using context clues (e.g., definition, restatement, example, contrast)<br>• using structural analysis (e.g., base words, roots, affixes)<br>• determining word origins (etymology)<br>• using electronic and print dictionaries, thesauruses, glossaries (ELA-1-M1)<br>2. Identify common abbreviations, symbols, acronyms, and multiple-meaning words (ELA-1-M1)<br>3. Identify the meanings of idioms and analogies (ELA-1-M1)<br>4. Develop specific vocabulary (e.g., for reading scientific, geographical, historical, and mathematical texts, as well as news and current events) for various purposes (ELA-1-M1) |

| | |
|---|---|
| **ELA-1-M2:** interpreting story elements (e.g., mood, tone, style) and literary devices (e.g., flashback, metaphor, foreshadowing, symbolism) within a selection | 5. Identify and explain story elements, including:<br>• theme development<br>• character development<br>• relationship of word choice and mood<br>• plot sequence (e.g., exposition, rising action, climax, falling action, resolution) (ELA-1-M2)<br>6. Identify and explain literary devices in grade-appropriate texts, including:<br>• how word choice and images appeal to the senses and suggest mood, tone, and style<br>• foreshadowing<br>• flashback (ELA-1-M2) |
| **ELA-1-M3:** reading, comprehending, and responding to written, spoken, and visual texts in extended passages (e.g., ranging from 500-1,000 words) | 7. Answer literal and inferential questions in oral and written responses about ideas and information in grade-appropriate texts, including:<br>• fiction<br>• nonfiction<br>• poetry<br>• songs (ELA-1-M3) |
| **ELA-1-M4:** interpreting (e.g., paraphrasing, comparing, contrasting) texts with supportive explanations to generate connections to real-life situations and other texts (e.g., business, technical, scientific) | 8. Identify the connections between ideas and information in a variety of texts (e.g., cartoons, poetry, fiction, instructional manuals) and real-life situations and other texts (ELA-1-M4) |
| **ELA-1-M5:** adjusting reading rate according to texts and purposes for reading (e.g., problem solving, evaluating, researching) | |

| **Standard Six: Students read, analyze, and respond to literature as a record of life experiences.** | |
|---|---|
| | |
| **Benchmarks** | **Grade-Level Expectations** |
| **ELA-6-M1:** Comparing/contrasting and responding to United States and world literature that represents the experiences and traditions of diverse ethnic groups | 9. Identify cultural characteristics, including customs, traditions, and viewpoints, found in national, world, and multicultural literature in oral and written responses (ELA-6-M1) |
| **ELA-6-M2:** Identifying, comparing and responding to a variety of classic and contemporary fiction and non-fiction literature from many genres (e.g., novels, drama) | 10. Compare and contrast elements (e.g., plot, setting, characters, theme) in a variety of genres in oral and written responses (ELA-6-M2) |
| **ELA-6-M3:** Classifying and interpreting various genres according to their unique characteristics | 11. Use knowledge of the distinctive characteristics to classify and interpret elements of various genres, including:<br>• fiction (e.g., folktales, fairy tales, fables, legends, short stories, novels)<br>• nonfiction (e.g., biography, autobiography, informational text)<br>• poetry (e.g., lyric, narrative)<br>• drama (e.g., one-act play or skits) (ELA-6-M3) |

| **Standard Seven: Students apply reasoning and problem-solving skills to reading, writing, speaking, listening, viewing, and visually representing.** | |
|---|---|
| | |
| **Benchmarks** | **Grade-Level Expectations** |
| **ELA-7-M1:** using comprehension strategies (e.g., summarizing, recognizing literary devices, paraphrasing) to analyze oral, written, and visual texts | 12. Demonstrate understanding of information in grade-appropriate texts using a variety of strategies, including:<br>• sequencing events and steps in a process<br>• summarizing and paraphrasing information<br>• identifying stated and implied main ideas and supporting details for each<br>• comparing and contrasting literary elements and ideas<br>• making simple inferences and drawing conclusions<br>• predicting the outcome of a story or situation with reasonable justification<br>• identifying literary devices (ELA-7-M1) |
| **ELA-7-M2:** using reasoning skills (e.g., categorizing, prioritizing), life experiences, accumulated knowledge, and relevant available information resources to solve problems in oral, written, and visual texts | 13. Examine and explain the relationship between life experiences and texts to generate solutions to problems (ELA-7-M2)<br>14. Use technical information and other available resources (e.g., software programs, manuals) to solve problems (ELA-7-M2) |
| **ELA-7-M3:** interpreting the effects of an author's purpose (reason for writing) and viewpoint (perspective) | 15. Explain an author's purpose for writing (e.g., to explain, to entertain, to persuade, to inform, to express personal attitudes or beliefs) (ELA-7-M3)<br>16. Explain how the author's viewpoint (perspective, bias) is reflected in the text (ELA-7-M3) |

| | |
|---|---|
| **ELA-7-M4:** using inductive and deductive reasoning skills across oral, written, and visual texts | 17. Analyze grade-appropriate print and nonprint texts using various reasoning skills, including:<br>• identifying cause-effect relationships<br>• raising questions<br>• thinking inductively and deductively<br>• generating a theory or hypothesis<br>• skimming/scanning<br>• distinguishing facts from opinions and probability (ELA-7-M4) |
| | |
| **Standard Two: Students write competently for a variety of purposes and audiences.** | |
| | |
| **Benchmarks** | **Grade-Level Expectations** |
| **ELA-2-M1:** writing multi-paragraph compositions (150-200 words) that clearly imply a central idea with supporting details in a logical, sequential order | 18. Write multiparagraph compositions on student- or teacher-selected topics organized with the following:<br>• an established central idea<br>• important ideas or events stated in sequential or chronological order<br>• elaboration (e.g., fact, examples, specific details)<br>• transitional words and phrases that unify points and ideas<br>• an overall structure including an introduction, a body/middle, and a concluding paragraph that summarizes important ideas (ELA-2-M1)<br>19. Organize individual paragraphs with topic sentences, relevant elaboration, and concluding sentences (ELA-2-M1) |

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| **ELA-2-M2:** using language, concepts, and ideas that show an awareness of the intended audience and/or purpose (e.g., classroom, real-life, workplace) in developing complex compositions | 20. Develop grade-appropriate compositions on student- or teacher-selected topics that include the following:<br>• word choices (diction) appropriate to the identified audience and/or purpose<br>• vocabulary selected to clarify meaning, create images, and set a tone<br>• information/ideas selected to engage the interest of the reader<br>• clear voice (individual personality)<br>• variety in sentence structure (ELA-2-M2) |
| **ELA-2-M3:** identifying and applying the steps of the writing process | 21. Develop grade-appropriate compositions applying writing processes such as the following:<br>• selecting topic and form<br>• prewriting (e.g., brainstorming, researching, raising questions, completing graphic organizers)<br>• drafting<br>• conferencing (e.g., peer and teacher)<br>• revising based on feedback and use of various tools (e.g., LEAP21 Writer's Checklist, rubrics)<br>• proofreading/editing<br>• publishing using technology (ELA-2-M3) |
| **ELA-2-M4:** using narration, description, exposition, and persuasion to develop various modes of writing (e.g., notes, essays) | 22. Develop grade-appropriate paragraphs and multiparagraph compositions using the various modes (i.e., description, narration, exposition, and persuasion), emphasizing narration and exposition (ELA-2-M4)<br>23. Use the various modes to write compositions, including:<br>• how-to essays<br>• stories that incorporate dialogue, characters, plot, setting, and sensory details (ELA-2-M4) |
| **ELA-2-M5:** identifying and applying literary devices (e.g., symbolism, dialogue) | 24. Develop writing/compositions using a variety of literary and sound devices, including similes, metaphors, and onomatopoeia (ELA-2-M5) |

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| **ELA-2-M6:** writing as a response to texts and life experiences (e.g., personal and business letters) | 25. Write for various purposes, including:<br>• formal and informal letters that state a purpose, make requests, or give compliments<br>• evaluations of media, such as films, performances, or field trips<br>• explanations of stories and poems using retellings, examples, and text-based evidence (ELA-2-M6) |
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| **Standard Three: Students communicate using standard English grammar, usage, sentence structure, punctuation, capitalization, spelling, and handwriting.** | |
| | |
| **Benchmarks** | **Grade-Level Expectations** |
| **ELA-3-M1:** writing fluidly and legibly in cursive or printed form | |
| **ELA-3-M2:** demonstrating use of punctuation (e.g., colon, semicolon, quotation marks, dashes, parentheses), capitalization, and abbreviations | 26. Use standard English punctuation, including:<br>• parentheses and commas in direct quotations<br>• commas to set off appositives and introductory phrases<br>• use quotation marks around dialogue (ELA-3-M2)<br>27. Capitalize the first and other important words in titles and proper nouns (ELA-3-M2) |
| **ELA-3-M3:** demonstrating standard English structure and usage by using correct and varied sentence types (e.g., compound and compound-complex) and effective personal styles | 28. Write paragraphs and compositions following standard English structure and usage, including:<br>• varied sentence structures (e.g., simple, compound) and types (i.e., declarative, interrogative, imperative, exclamatory)<br>• agreement of subjects and verbs in complex sentences<br>• sentences without double negatives<br>• correct sentence fragments and run-on sentences (ELA-3-M3) |

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| **ELA-3-M4:** demonstrating understanding of the parts of speech to make choices for writing | 29. Apply knowledge of parts of speech in writing, including:<br>• using same verb tense throughout when appropriate<br>• selecting and using specific nouns, pronouns, and verbs for clarity (ELA-3-M4) |
| **ELA-3-M5:** spelling accurately using strategies and resources (e.g., glossary, dictionary, thesaurus, spell check) when necessary | 30. Spell high-frequency, commonly confused, frequently misspelled words correctly (ELA-3-M5)<br>31. Incorporate accurate spelling and use a variety of resources (e.g., glossaries, dictionaries, thesauruses, spell check) to find correct spellings (ELA-3-M5) |
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| **Standard Four: Students demonstrate competence in speaking and listening as tools for learning and communicating.** | |
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| **Benchmarks** | **Grade-Level Expectations** |
| **ELA-4-M1:** speaking intelligibly, using standard English pronunciation and diction | 32. Adjust diction and enunciation to suit the purpose for speaking (ELA-4-M1)<br>33. Use complete sentences and standard English grammar, diction, syntax, and pronunciation when speaking (ELA-4-M1) |
| **ELA-4-M2:** giving and following directions/procedures | 34. Follow procedures (e.g., read, question, write a response, form groups) from detailed oral instructions (ELA-4-M2)<br>35. Restate or describe oral directions/procedures for tasks (ELA-4-M2) |
| **ELA-4-M3:** using the features of speaking (e.g., audience analysis, message construction, delivery, interpretation of feedback) when giving rehearsed and unrehearsed presentations | 36. Adjust volume and inflection to suit the audience and purpose of presentations (ELA-4-M3)<br>37. Organize oral presentations with a thesis, an introduction, a body developed with relevant details, and a conclusion (ELA-4-M3) |

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| **ELA-4-M4:** speaking and listening for a variety of audiences (e.g., classroom, real-life, workplace) and purposes (e.g., awareness, concentration, enjoyment, information, problem solving) | 38. Demonstrate active listening strategies (e.g., asking focused questions, responding to questions, making visual contact) (ELA-4-M4)<br>39. Deliver formal and informal presentations for a variety of purposes, including:<br>• book reports<br>• personal experiences<br>• explanations of projects (ELA-4-M4) |
| **ELA-4-M5:** listening and responding to a wide variety of media | 40. Evaluate media for various purposes, including:<br>• effectiveness of organization and presentation<br>• usefulness and relevance of information (ELA-4-M5) |
| **ELA-4-M6:** participating in a variety of roles in group discussions (e.g., facilitator, recorder) | 41. Participate in group and panel discussions, including:<br>• explaining the effectiveness and dynamics of group process<br>• applying agreed-upon rules for formal and informal discussions<br>• assuming a variety of roles (e.g., facilitator, recorder, leader, listener) (ELA-4-M6) |
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| **Standard Five: Students locate, select, and synthesize information from a variety of texts, media, references, and technological sources to acquire and communicate knowledge.** | |
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| **Benchmarks** | **Grade-Level Expectations** |
| **ELA-5-M1:** identifying and using organizational features of printed text, other media, and electronic information (e.g., microprint, CD-ROM, e-mail) | 42. Locate and select information using a variety of organizational features in grade-appropriate resources, including:<br>• complex reference sources (e.g., almanacs, atlases, newspapers, magazines, brochures, map legends, prefaces, appendices)<br>• electronic storage devices (e.g., CD-ROMs, diskettes, software, drives)<br>• frequently accessed and bookmarked Web addresses (ELA-5-M1) |

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| **ELA-5-M2:** integrating information sources | 43. Locate and integrate information from grade-appropriate resources, including:<br>• multiple printed texts (e.g., encyclopedias, atlases, library catalogs, specialized dictionaries, almanacs, technical encyclopedias)<br>• electronic sources (e.g., Web sites, databases, audio and video tapes, films, documentaries) for use in researching a topic (ELA-5-M2) |
| **ELA-5-M3:** locating, gathering, and selecting information using formal outlining, paraphrasing, interviewing, and surveying to produce documented texts and graphics | 44. Locate, gather, and select information using data-gathering strategies, including:<br>• surveying<br>• interviewing<br>• paraphrasing (ELA-5-M3)<br>45. Generate grade-appropriate research reports that include information presented in a variety of forms, including:<br>• visual representations of data/information<br>• graphic organizers (e.g., outlines, timelines, charts, webs)<br>• bibliographies (ELA-5-M3) |
| **ELA-5-M4:** using available technology to produce, revise, and publish a variety of works (e.g., documented research reports, investigative reports, annotated bibliographies) | 46. Use word processing and/or other technology to draft, revise, and publish a variety of works, including compositions and reports (ELA-5-M4) |
| **ELA-5-M5:** citing references using various formats (e.g., endnotes, annotated bibliographies) | 47. Give credit for borrowed information following acceptable use policy, including:<br>• integrating quotations and citations<br>• using endnotes<br>• creating bibliographies and/or works cited lists (ELA-5-M5) |
| **ELA-5-M6:** identifying and interpreting graphic organizers (e.g., flowcharts, timelines, tree diagrams) | 48. Interpret information from a variety of grade-appropriate sources, including timelines, charts, schedules, tables, diagrams, and maps (ELA-5-M6) |

# MATHEMATICS INTRODUCTION

## INTRODUCTION

Grade-Level Expectations (GLEs) are explicit recommendations for what students should know and be able to do as a result of each level of schooling from prekindergarten through grade 12. This degree of specificity is made with the expectation that all students in Louisiana have access to a high-quality instructional program in mathematics. Instructional programs must provide all students with a solid foundation in mathematics, regardless of race or ethnic origin, geographical location, or socioeconomic status. The design, delivery, and assessment of such programs require careful planning, articulation, and coordination.

The GLEs provide a basis for all of these goals. Further, they clearly define what schools and teachers need to focus on in each year of instruction. This focus provides teachers with a quick listing of the main ideas that frame the year's study and, at the same time, helps students see the connections in the mathematics they are studying.

The following list of GLEs provides a comprehensive look at the expectations for all Louisiana mathematics students for each grade level. They define the targets for instruction, assessment, and emphasis during each year of public schooling. Further, they outline the promises that each teacher is striving to make to successive teachers about what their students know and can do. Such attempts at articulation serve to tighten the curriculum; help avoid programs that have great breadth, but no depth; and assist in helping teachers link the mathematics they are teaching to what students have already studied and to what they will be using in other areas of the curriculum.

## ORGANIZATIONAL PRINCIPLES

All GLEs in mathematics are organized by grade levels and address one or more benchmarks in the six mathematics strands: Number and Number Relations; Algebra; Geometry; Measurement; Data Analysis, Probability, and Discrete Math; and Patterns, Relations, and Functions.

With the single exception of prekindergarten, there are GLEs representing each of the six strands for each grade level. In addition, the number of GLEs in each strand either increases or decreases depending on the experience of the learner. For example, most of the GLEs in prekindergarten and kindergarten are based on Number and Number Relations, and few are based on the Data Analysis, Probability, and Discrete Math, or Patterns, Relations and Functions strands. By grade 9, the trend reverses as students have completed most of their study of Number.

Not all high school students take the same courses, nor do they take them in the same order. As a result**, the Grade-Level Expectations for grades 9 and 10 represent the content that all students should master before graduation.** When mastery occurs will depend on the order in which courses are taken. The expectations are written with a view toward a greater integration of mathematics learning across these two grades than traditionally has been the case. For schools teaching separate courses in Algebra I and Geometry, the total of the Grade-Level Expectations for grades 9 and 10 should be considered as what students should be able to do by the end of grade 10, rather than thinking of these as separate outcomes for grade 9 and grade 10.

# MATHEMATICS INTRODUCTION

**The GLEs for grades 11/12 represent the core content for students who enroll in Algebra II and higher courses in preparation for post-secondary education**. They reflect the content of collegiate entrance examinations and mathematics found in common applications in such programs of study.

## BENCHMARK CODES

Codes at the end of each GLE are used to identify a developmental profile indicator from the *Louisiana Standards for Programs Serving Four-Year-Old Children* (Table 1) and/or benchmarks from the *Louisiana Mathematics Framework* (Table 2). A GLE may apply to more than one benchmark and, as a result, a GLE may have more than one code.

**Developmental Profile Indicator Codes:** The first part is always PK, which means prekindergarten. The second part indicates the domain and content area (i.e., Cognitive Mathematics). The third part indicates the skill area (i.e., Number, Measurement, Geometry, Data, Patterns) and skill number (e.g., 1, 2).

**Table 1. Explanation of Developmental Profile Indicator Codes**

| Code(s) | Explanation |
|---|---|
| PK-CM-N1 | Prekindergarten, Cognitive Mathematics, Number, Skill 1 |
| PK-CM-M3 | Prekindergarten, Cognitive Mathematics, Measurement, Skill 3 |
| PK-CM- G2 | Prekindergarten, Cognitive Mathematics, Geometry, Skill 2 |

**Benchmark Codes:** Benchmark codes have 3 parts. The first part in the benchmark code refers to the strand (e.g., Number and Number Relations). The second part refers to the benchmark number. The third part refers to the grade cluster (i.e., E, M, H).

**Table 2. Explanation of Benchmark Codes**

| Code | Explanation |
|---|---|
| N-1-E | Number and Number Relations, Benchmark 1, Elementary |
| G-5-M | Geometry, Benchmark 5, Middle School |
| A-3-H | Algebra, Benchmark 3, High School |

# MATHEMATICS INTRODUCTION

Each of the following GLE grade listings opens with a concise note about the focal emphases of that grade. These emphases serve to shape and mold the program for that individual grade level. Such focal points at each level and the careful articulation of these ideas lead to significant growth in students' abilities to learn and profitably apply mathematics in their professional, vocational, and personal lives.

# FIFTH GRADE INTRODUCTION

**Fifth Grade**

Number and Number Relations work at grade 5 shifts from the focus on whole numbers to an emphasis on fractions and decimals. Students work to compare and represent positive fractions on a number line and to add and subtract fractions with common denominators. Students continue to work with whole numbers to demonstrate computational fluency by year's end and further develop estimation strategies and their ability to test the reasonableness of an answer to a given computation. Work with rates, ratios, and equivalent ratios emerge, but formal development waits for later grades.

By grade 5, students can select appropriate units and tools for measurement situations and perform operations on the resulting measures. In particular, they become proficient in the use of rulers, yard- and meter-sticks, as well as protractors. They can handle elapsed time problems that involve the noon and midnight breaks and solve real-life problems involving time. Students extend their understanding of polygons to the properties of regular polygons and learn about rotational symmetry and basic transformations.

In Data, grade 5 students extend their capabilities to using divided bar and line graphs. Special emphasis is given to the impact of different scales and labels for bar and line graphs. In Probability, grade 5 students start to represent probabilities as common fractions. The grade 5 study of Algebra involves students in an extension of ways of solving sentences involving unknowns. Students are introduced to solving number sentences by mental math, inverse processes (i.e., unwrapping operations), and manipulatives. They also begin to study representations of simple inequalities in one variable on number lines. Students learn to extend patterns consisting of multiples, as well as patterns involving positions of geometric figures.

## SAMPLE PAGE AND KEY FOR MATHEMATICS

Strand/ Standard →

**Number and Number Relations: In problem-solving investigations, students demonstrate an understanding of the real number system and communicate the relationships within that system using a variety of techniques and tools.**

| Benchmarks | Grade-Level Expectations |
|---|---|
| **N-1-E:** constructing number meaning and demonstrating that a number can be expressed in many different forms (e.g., standard notation, number words, number lines, geometrical representation, fractions, and decimals) | 1. Read and write place value in word, standard, and expanded form through 1,000,000 (N-1-E)<br>2. Read, write, compare, and order whole numbers using place value concepts, standard notation, and models through 1,000,000 (N-1-E) (N-3-E) (A-1-E)<br>3. Illustrate with manipulatives when a number is divisible by 2, 3, 5, or 10 (N-1-E)<br>4. Know all basic facts for multiplication and division through 12 x 12 and 144 ÷ 12, and recognize factors of composite numbers less than 50 (N-1-E) (N-6-E) (N-7-E)<br>5. Read, write, and relate decimals through hundredths and connect them with corresponding decimal fractions (N-1-E)<br>6. Model, read, write, compare, order, and represent fractions with denominators through twelfths using region and set models (N-1-E) (A-1-E)<br>Also see GLE #7. |
| **N-2-E:** demonstrating number sense and estimation skills, giving particular attention to common equivalent reference points (i.e., 1/4 = 25% = .25; ½ = 50% = .5; $1 = 100%, etc.) | 7. Give decimal equivalents of halves, fourths, and tenths (N-2-E) (N-1-E)<br>8. Use common equivalent reference points for percents (i.e., ¼, ½, ¾, and 1 whole) (N-2-E)<br>9. Estimate fractional amounts through twelfths, using pictures, models, and diagrams (N-2-E)<br>Also see GLE #27. |

Benchmarks →

← Grade-Level Expectations (GLEs)

# FIFTH GRADE

# MATHEMATICS

**Number and Number Relations: In problem-solving investigations, students demonstrate an understanding of the real number system and communicate the relationships within that system using a variety of techniques and tools.**

| Benchmarks | Grade-Level Expectations |
|---|---|
| **N-1-M:** demonstrating that a rational number can be expressed in many forms, and selecting an appropriate form for a given situation (e.g., fractions, decimals, and percents) | 1. Differentiate between the terms *factor* and *multiple*, and *prime* and *composite* (N-1-M)<br>2. Recognize, explain, and compute equivalent fractions for common fractions (N-1-M) (N-3-M) |
| **N-2-M:** demonstrating number sense and estimation skills to describe, order, and compare rational numbers (e.g., magnitude, integers, fractions, decimals, and percents) | 3. Add and subtract fractions with common denominators and use mental math to determine whether the answer is reasonable (N-2-M)<br>4. Compare positive fractions using number sense, symbols (i.e., <, =, >), and number lines (N-2-M)<br>Also see GLE #9. |
| **N-3-M:** reading, writing, representing, and using rational numbers in a variety of forms (e.g., integers, mixed numbers, and improper fractions) | 5. Read, explain, and write a numerical representation for positive improper fractions, mixed numbers, and decimals from a pictorial representation and vice versa (N-3-M)<br>Also see GLE #2. |
| **N-4-M:** demonstrating a conceptual understanding of the meaning of the basic arithmetic operations (add, subtract, multiply and divide) and their relationships to each other | 6. Select and discuss the correct operation for a given problem involving positive fractions using appropriate language such as *sum*, *difference*, *numerator*, and *denominator* (N-4-M) (N-5-M)<br>Also see GLE #7. |

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| **N-5-M:** applying an understanding of rational numbers and arithmetic operations to real-life situations | 7. Select, sequence, and use appropriate operations to solve multi-step word problems with whole numbers (N-5-M) (N-4-M)<br>8. Use the whole number system (e.g., computational fluency, place value, etc.) to solve problems in real-life and other content areas (N-5-M)<br>Also see GLEs #6, #10, and #11. |
| **N-6-M:** constructing, using, and explaining procedures to compute and estimate with rational numbers employing mental math strategies | 9. Use mental math and estimation strategies to predict the results of computations (i.e., whole numbers, addition and subtraction of fractions) and to test the reasonableness of solutions (N-6-M) (N-2-M)<br>10. Determine when an estimate is sufficient and when an exact answer is needed in real-life problems using whole numbers (N-6-M) (N-5-M) |
| **N-7-M:** selecting and using appropriate computational methods and tools for given situations involving rational numbers (e.g., estimation, or exact computation using mental arithmetic, calculator, computer, or paper and pencil) | |
| **N-8-M:** demonstrating a conceptual understanding and applications of proportional reasoning (e.g., determining equivalent ratios, finding a missing term of a given proportion) | 11. Explain concepts of ratios and equivalent ratios using models and pictures in real-life problems (e.g., understand that 2/3 means 2 divided by 3) (N-8-M) (N-5-M) |
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| **Algebra: In problem-solving investigations, students demonstrate an understanding of concepts and processes that allow them to analyze, represent, and describe relationships among variable quantities and to apply algebraic methods to real-world situations.** | |
| | |
| **Benchmarks** | **Grade-Level Expectations** |
| **A-1-M:** demonstrating a conceptual understanding of variables, expressions, equations, and inequalities (e.g., symbolically represent real-world problems as linear terms, equations, or inequalities) | See GLE #13. |

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| **A-2-M:** modeling and developing methods for solving equations and inequalities (e.g., using charts, graphs, manipulatives, and/or standard algebraic procedures) | 12. Find unknown quantities in number sentences by using mental math, backward reasoning, inverse operations (i.e., unwrapping), and manipulatives (e.g., tiles, balance scales) (A-2-M) (A-3-M)<br>13. Write a number sentence from a given physical model of an equation (e.g., balance scale) (A-2-M) (A-1-M)<br>14. Find solutions to one-step inequalities and identify positive solutions on a number line (A-2-M) (A-3-M) |
| **A-3-M:** representing situations and number patterns with tables, graphs, and verbal and written statements, while exploring the relationships among these representations (e.g., multiple representations for the same situation) | See GLEs #12 and #14. |
| **A-4-M:** analyzing tables and graphs to identify relationships exhibited by the data and making generalizations based upon these relationships | See GLE #28. |
| **A-5-M:** demonstrating the connection of algebra to the other strands and to real-life situations | |

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| **Measurement: In problem-solving investigations, students demonstrate an understanding of the concepts, processes, and real-life applications of measurement.** |

| **Benchmarks** | **Grade-Level Expectations** |
|---|---|
| **M-1-M:** applying the concepts of length, area, surface area, volume, capacity, weight, mass, money, time, temperature, and rate to real-world experiences | 15. Model, measure, and use the names of all common units in the U.S. and metric systems (M-1-M)<br>16. Apply the concepts of elapsed time in real-life situations and calculate equivalent times across time zones in real-life problems (M-1-M) (M-6-M) |

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| **M-2-M** demonstrating an intuitive sense of measurement (e.g., estimating and determining reasonableness of measures) | 17. Distinguish among the processes of counting, calculating, and measuring and determine which is the most appropriate strategy for a given situation (M-2-M)<br>18. Estimate time, temperature, weight/mass, and length in familiar situations and explain the reasonableness of answers (M-2-M)<br>19. Compare the relative sizes of common units for time, temperature, weight, mass, and length in real-life situations (M-2-M) (M-4-M) |
| **M-3-M:** selecting appropriate units and tools for tasks by considering the purpose for the measurement and the precision required for the task (e.g., length of a room in feet rather than inches) | 20. Identify appropriate tools and units with which to measure time, mass, weight, temperature, and length (M-3-M)<br>21. Measure angles to the nearest degree (M-3-M) |
| **M-4-M:** using intuition and estimation skills to describe, order, and compare formal and informal measures (e.g., ordering cup, pint, quart, gallon; comparing a meter to a yard) | 22. Compare and estimate measurements between the U.S. and metric systems in terms of common reference points (e.g., l vs. qt., m vs. yd.) (M-4-M)<br>Also see GLE #19. |
| **M-5-M:** converting from one unit of measurement to another within the same system (Comparisons between systems, customary and metric, should be based on intuitive reference points, not formal computation.) | 23. Convert between units of measurement for length, weight, and time, in U.S. and metric, within the same system (M-5-M) |
| **M-6-M:** demonstrating the connection of measurement to the other strands and to real-life situations | See GLE #16. |

| **Geometry: In problem-solving investigations, students demonstrate an understanding of geometric concepts and applications involving one-, two-, and three-dimensional geometry, and justify their findings.** | |
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| **Benchmarks** | **Grade-Level Expectations** |
| **G-1-M:** using estimation skills to describe, order, and compare geometric measures | |
| **G-2-M:** identifying, describing, comparing, constructing, and classifying geometric figures and concepts | 24. Use mathematical terms to classify and describe the properties of 2-dimensional shapes, including circles, triangles, and polygons (G-2-M) |
| **G-3-M:** making predictions regarding transformations of geometric figures (e.g., make predictions regarding translations, reflections, and rotations of common figures) | 25. Identify and use appropriate terminology for transformations (e.g., *translation* as *slide*, *reflection* as *flip*, and *rotation* as *turn*) (G-3-M)<br>26. Identify shapes that have rotational symmetry (G-3-M) |
| **G-4-M:** constructing two- and three-dimensional models | |
| **G-5-M:** making and testing conjectures about geometric shapes and their properties | |
| **G-6-M:** demonstrating an understanding of the coordinate system (e.g., locate points, identify coordinates, and graph points in a coordinate plane to represent real-world situations) | 27. Identify and plot points on a coordinate grid in the first quadrant (G-6-M) |
| **G-7-M:** demonstrating the connection of geometry to the other strands and to real-life situations (e.g., applications of the Pythagorean Theorem) | |

| **Data Analysis, Probability, and Discrete Math: In problem-solving investigations, students discover trends, formulate conjectures regarding cause-and-effect relationships, and demonstrate critical thinking skills in order to make informed decisions.** | |
|---|---|
| | |
| **Benchmarks** | **Grade-Level Expectations** |
| **D-1-M:** systematically collecting, organizing, describing, and displaying data in charts, tables, plots, graphs, and/or spreadsheets | 28. Use various types of charts and graphs, including double bar graphs, to organize, display, and interpret data and discuss patterns verbally and in writing (D-1-M) (D-2-M) (P-3-M) (A-4-M)<br>29. Compare and contrast different scales and labels for bar and line graphs (D-1-M)<br>30. Organize and display data using spreadsheets, with technology (D-1-M) |
| **D-2-M:** analyzing, interpreting, evaluating, drawing inferences, and making estimations, predictions, decisions, and convincing arguments based on organized data (e.g., analyze data using concepts of mean, median, mode, range, random samples, sample size, bias, and data extremes) | 31. Compare and contrast survey data from two groups relative to the same question (D-2-M)<br>Also see GLE #28. |
| **D-3-M:** describing informal thinking procedures (e.g., solving elementary logic problems using Venn diagrams, tables, charts, and/or elementary logic operatives to solve logic problems in real-life situations; reach valid conclusions in elementary logic problems involving "and, or, not, if/then") | |
| **D-4-M:** analyzing various counting and enumeration procedures with and without replacement (e.g., find the total number of possible outcomes or possible choices in a given situation) | |

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| **D-5-M:** comparing experimental probability results with theoretical probability (e.g., representing probabilities of concrete situations as common fractions, investigating single-event and multiple-event probability, using sample spaces, geometric figures, tables, and/or graphs) | 32. Represent probabilities as common fractions and recognize that probabilities fall between 0 and 1, inclusive (D-5-M) |
| **D-6-M:** demonstrating the connection of data analysis, probability, and discrete math to other strands and to real-life situations | |
| | |
| **Patterns, Relations, and Functions: In problem-solving investigations, students demonstrate an understanding of patterns, relations, and functions that represent and explain real-world situations.** | |
| | |
| **Benchmarks** | **Grade-Level Expectations** |
| **P-1-M:** describing, extending, analyzing, and creating a wide variety of numerical, geometrical, and statistical patterns (e.g., skip counting of rational numbers and simple exponential number patterns) | 33. Fill in missing elements in sequences of designs, number patterns, positioned figures, and quantities of objects (P-1-M) |
| **P-2-M:** describing and representing relationships using tables, rules, simple equations, and graphs | |
| **P-3-M:** analyzing relationships to explain how a change in one quantity results in a change in another (e.g., change in the dimensions of a rectangular solid affects the volume) | See GLE #28. |
| **P-4-M:** demonstrating the pervasive use of patterns, relations, and functions in other strands and in real-life situations | |

# SCIENCE INTRODUCTION

## GENERAL DEVELOPMENT PRINCIPLES

The content described by the Grade-Level Expectations (GLEs) does not represent the entire science curriculum for a grade or course. The GLEs indicate core content to be mastered by the end of a given grade. Science content can be added and enriched as appropriate for a district program, school, or student. For mastery to be attained, most content must be introduced earlier than the grade identified for mastery. Once a particular skill has been identified as a GLE, the skill should be reinforced in subsequent years, but it is not repeated in the list of expectations for subsequent years.

## ELEMENTARY: PREKINDERGARTEN–GRADE 4

Students at the prekindergarten (PreK) through grade 4 levels are learning to observe by using their senses, describing properties of substances using appropriate terminology, and comparing, sorting, classifying, and reading about the natural world. Science activities and investigations can be used to engage students in reading, expository writing, measuring, calculating, graphing, and communicating.

## MIDDLE SCHOOL: GRADES 5–8

To develop a deeper understanding of concepts, science content focus areas have been identified for grades 5–8. They are listed in Table 1.

**Table 1. Middle School Science Focus Areas**

| Grade | Focus Area |
|---|---|
| 5 | Integrated Science |
| 6 | Physical Science |
| 7 | Life Science |
| 8 | Earth and Space Science |

In addition to the designated focus areas, the Science as Inquiry (SI) and Science and the Environment (SE) strands are integrated into each of the middle school grades. Other content may be integrated locally within school districts. Additionally, districts not teaching middle school science in the same order as the focus areas may need to realign their curriculum to meet *i*LEAP assessment requirements.

## HIGH SCHOOL: GRADES 9–12

In high school, GLEs were developed for six science courses, one each at ninth- and tenth-grade levels and four for the eleventh- and twelfth-grade levels, with the following recommendations in mind (Table 2):

**Table 2. High School Courses**

| Strand | Course(s) | Recommended Grades |
|---|---|---|
| Physical Science | Physical Science | 9 |
| | Chemistry I | 11–12 |
| | Physics I | 11–12 |
| Life Science | Biology I | 10 |
| Earth and Space Science | Earth Science | 11–12 |
| Science and the Environment | Environmental Science | 11–12 |

Students may meet the state's high school graduation requirements in science in a variety of ways. Both personal preference and district course offerings affect which courses are taken and may determine the order in which courses are taken.

Chemistry and Physics are advanced Physical Science courses. GLEs for these courses are based on the Physical Science benchmarks but require higher-level skills and understandings. Prerequisite GLEs for Chemistry and Physics can be found in the Physical Science course recommended for grade 9.

## STANDARDS/BENCHMARKS/GLES

The organization of the science GLEs aligns with the *Louisiana Science Framework* (1997). The science GLEs address benchmarks from all five content strands outlined in the framework document.

Additional resources used to facilitate the development of the science GLEs include the *National Science Education Standards* (NSES, 1996), the National Assessment of Educational Progress *Science Framework* (NAEP, 1999), and the various Project 2061 publications of the American Association for the Advancement of Science. These national standards are reflected in the *Louisiana Science Framework* and the GLEs.

The five Louisiana science content standards are broad goals for what all students in Louisiana should know and be able to do in science. In the *Louisiana Science Framework*, strands are based on the five science standards. That is, each strand represents one of the five standards. The strands and their respective abbreviated codes are Science as Inquiry (SI), Physical Science (PS), Life Science (LS), Earth and Space Science (ESS), and Science and the Environment (SE). There is one process strand, Science as Inquiry, and four content strands. This organization into strands does not imply that science must be taught in separate isolated units. In fact, teachers are encouraged to teach integrated, interdisciplinary units of study.

# SCIENCE INTRODUCTION

Codes at the end of each GLE are used to identify a developmental profile indicator from the *Louisiana Standards for Programs Serving Four-Year-Old Children* (Table 3) and/or benchmarks from the *Louisiana Science Framework* (Table 4). A GLE may apply to more than one benchmark and, as a result, a GLE may have more than one code.

**Developmental Profile Indicator Code:** The first part of the code is always PK, which means prekindergarten. The second part, or term, indicates the domain and content area (i.e., Cognitive Science). The third term indicates the skill area, or strand, (i.e., PS, LS, ES) and skill number (e.g., 1, 2).

**Table 3. Explanation of Developmental Profile Indicator Codes**

| Code(s) | Explanation |
|---|---|
| PK-CS-L4 | Prekindergarten, Cognitive Science, Life Science, Skill 4 |
| PK-CS-P3 | Prekindergarten, Cognitive Science, Physical Science, Skill 3 |
| PK-CS-ES1 | Prekindergarten, Cognitive Science, Earth and Space Science, Skill 1 |

**Benchmark Codes:** The first term in the benchmark code refers to the strand (i.e., SI, PS, LS, ESS, SE). The second term refers to the grade cluster (i.e., E for elementary, M for middle school, and H for high school). The third term refers to the substrand and benchmark number (e.g., A1, B2, C3).

For most grade clusters, strands are divided into substrands or major topical areas. (The SE strand has no substrands at the PreK–4 and 5–8 grade levels.) Science GLEs have been developed and are organized based on this secondary breakdown. Substrands are indicated by the letters in the benchmark code designations.

**Table 4. Explanation of Benchmark Codes**

| Code(s) | Explanation |
|---|---|
| SI-E-A5 | SI strand, Elementary level, substrand A, benchmark 5 |
| PS-M-B4 | PS strand, Middle School level, substrand B, benchmark 4 |
| SE-H-A6<br>LS-H-D1 | SE strand, High School level, substrand A, benchmark 6 *and* LS strand, High School level, substrand D, benchmark 1 |

# SCIENCE INTRODUCTION

The SI standard states: *The students will **do** science by engaging in partial and full inquiries that are within their developmental capabilities*. The GLEs for the SI strand of the science framework are to be embedded in all science courses at every grade level and cannot be considered in isolation from the other strands. The processes and skills in the SI strand are to be integrated with the science content of the other four strands.

Each of the following GLE listings by grade opens with a summary describing the focal emphases of that grade. These emphases serve to shape and mold the program for that individual grade level. Careful articulation of these GLEs in a program will assure Louisiana a future marked by significant growth in students' abilities to learn, apply, and appreciate science concepts in all aspects of their lives.

# FIFTH GRADE INTRODUCTION

**Fifth Grade**

The focus of fifth-grade science is to further develop understanding of fundamental concepts from each of the science strands. The emphasis is on developing inquiry skills and acquiring more depth in content knowledge. For example, in the Physical Science (PS) strand, students compare physical and chemical properties of materials. In the Earth and Space Science (ESS) strand, they demonstrate the results of constructive and destructive forces using models or illustrations.

## SAMPLE PAGE AND KEY FOR SCIENCE

Strand/ Standard →

**Science As Inquiry: The students will <u>do</u> science by engaging in partial and full inquiries that are within their developmental capabilities.**

Substrand →

***A. The Abilities Necessary to do Scientific Inquiry***

| Benchmarks | Grade-Level Expectations |
|---|---|
| **SI-E-A1:** asking appropriate questions about organisms and events in the environment | 1. Ask questions about objects and events in the environment (e.g., plants, rocks, storms) (SI-E-A1)<br>2. Pose questions that can be answered by using students' own observations, scientific knowledge, and testable scientific investigations (SI-E-A1) |
| **SI-E-A2:** planning and/or designing and conducting a scientific investigation | 3. Use observations to design and conduct simple investigations or experiments to answer testable questions (SI-E-A2)<br>4. Predict and anticipate possible outcomes (SI-E-A2)<br>5. Identify variables to ensure that only one experimental variable is tested at a time (SI-E-A2)<br>6. Use a variety of methods and materials and multiple trials to investigate ideas (observe, measure, accurately record data) (SI-E-A2) |
| **SI-E-A3:** communicating that observations are made with one's senses | 7. Use the five senses to describe observations (SI-E-A3) |
| **SI-E-A4:** employing equipment and tools to gather data and extend the sensory observations | 8. Measure and record length, temperature, mass, volume, and area in both metric system and U.S. system units (SI-E-A4)<br>9. Select and use developmentally appropriate equipment and tools (e.g., magnifying lenses, microscopes, graduated cylinders) and units of measurement to observe and collect data (SI-E-A4) |

Benchmarks →

← Grade-Level Expectations (GLEs)

# FIFTH GRADE

## SCIENCE

**Science As Inquiry: The students will do science by engaging in partial and full inquiries that are within their developmental capabilities.**

*A. The Abilities Necessary to do Scientific Inquiry*

| Benchmarks | Grade-Level Expectations |
|---|---|
| **SI-M-A1:** identifying questions that can be used to design a scientific investigation | 1. Generate testable questions about objects, organisms, and events that can be answered through scientific investigation (SI-M-A1)<br>2. Identify problems, factors, and questions that must be considered in a scientific investigation (SI-M-A1)<br>3. Use a variety of sources to answer questions (SI-M-A1) |
| **SI-M-A2:** designing and conducting a scientific investigation | 4. Design, predict outcomes, and conduct experiments to answer guiding questions (SI-M-A2)<br>5. Identify independent variables, dependent variables, and variables that should be controlled in designing an experiment (SI-M-A2) |
| **SI-M-A3:** using mathematics and appropriate tools and techniques to gather, analyze, and interpret data | 6. Select and use appropriate equipment, technology, tools, and metric system units of measurement to make observations (SI-M-A3)<br>7. Record observations using methods that complement investigations (e.g., journals, tables, charts) (SI-M-A3)<br>8. Use consistency and precision in data collection, analysis, and reporting (SI-M-A3)<br>9. Use computers and/or calculators to analyze and interpret quantitative data (SI-M-A3) |

| | |
|---|---|
| **SI-M-A4:** developing descriptions, explanations, and graphs using data | 10. Identify the difference between description and explanation (SI-M-A4)<br>11. Construct, use, and interpret appropriate graphical representations to collect, record, and report data (e.g., tables, charts, circle graphs, bar and line graphs, diagrams, scatter plots, symbols) (SI-M-A4)<br>12. Use data and information gathered to develop an explanation of experimental results (SI-M-A4)<br>13. Identify patterns in data to explain natural events (SI-M-A4) |
| **SI-M-A5:** developing models and predictions using the relationships between data and explanations | 14. Develop models to illustrate or explain conclusions reached through investigation (SI-M-A5)<br>15. Identify and explain the limitations of models used to represent the natural world (SI-M-A5)<br>16. Use evidence to make inferences and predict trends (SI-M-A5) |
| **SI-M-A6:** comparing alternative explanations and predictions | 17. Recognize that there may be more than one way to interpret a given set of data, which can result in alternative scientific explanations and predictions (SI-M-A6)<br>18. Identify faulty reasoning and statements that misinterpret or are not supported by the evidence (SI-M-A6) |
| **SI-M-A7:** communicating scientific procedures, information, and explanations | 19. Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)<br>20. Write clear, step-by-step instructions that others can follow to carry out procedures or conduct investigations (SI-M-A7)<br>21. Distinguish between *observations* and *inferences* (SI-M-A7)<br>22. Use evidence and observations to explain and communicate the results of investigations (SI-M-A7) |
| **SI-M-A8:** utilizing safety procedures during scientific investigations | 23. Use relevant safety procedures and equipment to conduct scientific investigations (SI-M-A8)<br>24. Provide appropriate care and utilize safe practices and ethical treatment when animals are involved in scientific field and laboratory research (SI-M-A8) |

| *B. Understanding Scientific Inquiry* | |
|---|---|
| **SI-M-B1:** recognizing that different kinds of questions guide different kinds of scientific investigations | 25. Compare and critique scientific investigations (SI-M-B1)<br>26. Use and describe alternate methods for investigating different types of testable questions (SI-M-B1)<br>27. Recognize that science uses processes that involve a logical and empirical, but flexible, approach to problem solving (SI-M-B1) |
| **SI-M-B2:** communicating that current scientific knowledge guides scientific investigations | 28. Recognize that investigations generally begin with a review of the work of others (SI-M-B2) |
| **SI-M-B3:** understanding that mathematics, technology, and scientific techniques used in an experiment can limit or enhance the accuracy of scientific knowledge | 29. Explain how technology can expand the senses and contribute to the increase and/or modification of scientific knowledge (SI-M-B3)<br>30. Describe why all questions cannot be answered with present technologies (SI-M-B3)<br>31. Recognize that there is an acceptable range of variation in collected data (SI-M-B3)<br>32. Explain the use of statistical methods to confirm the significance of data (e.g., mean, median, mode, range) (SI-M-B3) |
| **SI-M-B4:** using data and logical arguments to propose, modify, or elaborate on principles and models | 33. Evaluate models, identify problems in design, and make recommendations for improvement (SI-M-B4) |
| **SI-M-B5:** understanding that scientific knowledge is enhanced through peer review, alternative explanations, and constructive criticism | 34. Recognize the importance of communication among scientists about investigations in progress and the work of others (SI-M-B5)<br>35. Explain how skepticism about accepted scientific explanations (i.e., hypotheses and theories) leads to new understanding (SI-M-B5)<br>36. Explain why an experiment must be verified through multiple investigations and yield consistent results before the findings are accepted (SI-M-B5)<br>37. Critique and analyze their own inquiries and the inquiries of others (SI-M-B5) |
| **SI-M-B6:** communicating that scientific investigations can result in new ideas, new methods or procedures, and new technologies | 38. Explain that, through the use of scientific processes and knowledge, people can solve problems, make decisions, and form new ideas (SI-M-B6) |

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|---|---|
| **SI-M-B7:** understanding that scientific development/technology is driven by societal needs and funding | 39. Identify areas in which technology has changed human lives (e.g., transportation, communication, geographic information systems, DNA fingerprinting) (SI-M-B7)<br>40. Evaluate the impact of research on scientific thought, society, and the environment (SI-M-B7) |
| | |
| **Physical Science: Students will develop an understanding of the characteristics and interrelationships of matter and energy in the physical world.** | |
| ***A. Properties And Changes Of Properties In Matter*** | |
| **Benchmarks** | **Grade-Level Expectations** |
| **PS-M-A1:** investigating, measuring, and communicating the properties of different substances which are independent of the amount of the substance | 1. Measure a variety of objects in metric system units (PS-M-A1)<br>2. Compare the physical properties of large and small quantities of the same type of matter (PS-M-A1) |
| **PS-M-A2:** understanding that all matter is made up of particles called atoms and that atoms of different elements are different | 3. Describe the structure of atoms and the electrical charge of protons, neutrons, and electrons (PS-M-A2) |
| **PS-M-A3:** grouping substances according to similar properties and/or behaviors | 4. Identify the physical and chemical properties of various substances and group substances according to their observable and measurable properties (e.g., conduction, magnetism, light transmission) (PS-M-A3) |
| **PS-M-A4:** understanding that atoms and molecules are perpetually in motion | |
| **PS-M-A5:** investigating the relationships among temperature, molecular motion, phase changes, and physical properties of matter | 5. Describe the properties and behavior of water in its solid, liquid, and gaseous phases (states) (PS-M-A5) |
| **PS-M-A6:** investigating chemical reactions between different substances to discover that new substances formed may have new physical properties and do have new chemical properties | 6. Describe new substances formed from common chemical reactions (e.g., burning paper produces ash) (PS-M-A6) |

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|---|---|
| **PS-M-A7:** understanding that during a chemical reaction in a closed system, the mass of the products is equal to that of the reactants | |
| **PS-M-A8:** discovering and recording how factors such as temperature influence chemical reactions | |
| **PS-M-A9:** identifying elements and compounds found in common foods, clothing, household materials, and automobiles | |
| ***B. Motions and Forces*** | |
| **PS-M-B1:** describing and graphing the motions of objects | 7. Compare, calculate, and graph the average speeds of objects in motion using both metric system and U.S. system units (PS-M-B1) |
| **PS-M-B2:** recognizing different forces and describing their effects (gravity, electrical, magnetic) | |
| **PS-M-B3:** understanding that, when an object is not being subjected to a force, it will continue to move at a constant speed and in a straight line | 8. Explain that gravity accelerates all falling objects at the same rate in the absence of air resistance (PS-M-B3) |
| **PS-M-B4:** describing how forces acting on an object will reinforce or cancel one another, depending upon their direction and magnitude | |
| **PS-M-B5:** understanding that unbalanced forces will cause changes in the speed or direction of an object's motion | 9. Demonstrate a change in speed or direction of an object's motion with the use of unbalanced forces (PS-M-B5) |
| ***C. Transformations of Energy*** | |
| **PS-M-C1:** identifying and comparing the characteristics of different types of energy | 10. Compare potential and kinetic energy and give examples of each (PS-M-C1)<br>11. Classify energy resources as *renewable*, *non-renewable*, or *inexhaustible* (PS-M-C1) |
| **PS-M-C2:** understanding the different kinds of energy transformations and the fact that energy can be neither destroyed nor created | |

| | |
|---|---|
| **PS-M-C3:** understanding that the sun is a major source of energy and that energy arrives at the Earth's surface as light with a range of wavelengths | 12. Identify the Sun as Earth's primary energy source and give examples (e.g., photosynthesis, water cycle) to support that conclusion (PS-M-C3) |
| **PS-M-C4:** observing and describing the interactions of light and matter (reflection, refraction, absorption, transmission, scattering) | 13. Investigate how changes in the position of a light source and an object alter the size and shape of the shadow (PS-M-C4) |
| **PS-M-C5:** investigating and describing the movement of heat and the effects of heat in objects and systems | |
| **PS-M-C6:** describing the types of energy that can be involved, converted, or released in electrical circuits | 14. Identify other types of energy produced through the use of electricity (e.g., heat, light, mechanical) (PS-M-C6) |
| **PS-M-C7:** understanding that energy is involved in chemical reactions | |
| **PS-M-C8:** comparing the uses of different energy resources and their effects upon the environment | |
| | |
| **Life Science: The students will become aware of the characteristics and life cycles of organisms and understand their relationships to each other and to their environment.** | |
| ***A. Structure and Function in Living Systems*** | |
| **Benchmarks** | **Grade-Level Expectations** |
| **LS-M-A1:** describing the observable components and functions of a cell, such as the cell membrane, nucleus, and movement of molecules into and out of cells | 15. Identify the cell as the basic unit of living things (LS-M-A1)<br>16. Observe, identify, and describe the basic components of cells and their functions (e.g., cell wall, cell membrane, cytoplasm, nucleus) (LS-M-A1) |
| **LS-M-A2:** comparing and contrasting the basic structures and functions of different plant and animal cells | 17. Compare plant and animal cells and label cell components (LS-M-A2) |

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|---|---|
| **LS-M-A3:** observing and analyzing the growth and development of selected organisms, including a seed plant, an insect with complete metamorphosis, and an amphibian | 18. Describe the metamorphosis of an amphibian (e.g., frog) (LS-M-A3) |
| **LS-M-A4:** describing the basic processes of photosynthesis and respiration and their importance to life | 19. Describe the processes of photosynthesis and respiration in green plants (LS-M-A4) |
| **LS-M-A5:** investigating human body systems and their functions (including circulatory, digestive, skeletal, respiratory) | 20. Describe the levels of structural organization in living things (e.g., cells, tissues, organs, organ systems) (LS-M-A5) |
| **LS-M-A6:** describing how the human body changes with age and listing factors that affect the length and quality of life | |
| **LS-M-A7:** describing communicable and noncommunicable diseases | 21. Identify diseases caused by germs and how they can be transmitted from person to person (LS-M-A7) |
| ***B. Reproduction and Heredity*** | |
| ***There are no Grade-Level Expectations for Benchmarks in Grade 5 for this substrand.*** | |
| ***C. Populations and Ecosystems*** | |
| **LS-M-C1:** constructing and using classification systems based on the structure of organisms | 22. Develop and use a simple dichotomous key to classify common plants and animals (LS-M-C1) |
| **LS-M-C2:** modeling and interpreting food chains and food webs | 23. Construct food chains that could be found in ponds, marshes, oceans, forests, or meadows (LS-M-C2)<br>24. Describe the roles of producers, consumers, and decomposers in a food chain (LS-M-C2)<br>25. Compare food chains and food webs (LS-M-C2) |
| **LS-M-C3:** investigating major ecosystems and recognizing physical properties and organisms within each | 26. Identify and describe ecosystems of local importance (LS-M-C3)<br>27. Compare common traits of organisms within major ecosystems (LS-M-C3) |
| **LS-M-C4:** explaining the interaction and interdependence of nonliving and living components within ecosystems | 28. Explain and give examples of predator/prey relationships (LS-M-C4) |

| *D. Adaptations of Organisms* | |
|---|---|
| **LS-M-D1:** describing the importance of plant and animal adaptation, including local examples | 29. Describe adaptations of plants and animals that enable them to thrive in local and other natural environments (LS-M-D1) |
| **LS-M-D2:** explaining how some members of a species survive under changed environmental conditions | |
| | |
| **Earth and Space Science: The students will develop an understanding of the properties of earth materials, the structure of the Earth system, the Earth's history, and the Earth's place in the universe.** | |
| *A. Structure of the Earth* | |
| **Benchmarks** | **Grade-Level Expectations** |
| **ESS-M-A1:** understanding that the Earth is layered by density with an inner and outer core, a mantle, and a thin outer crust | |
| **ESS-M-A2:** understanding that the Earth's crust and solid upper mantle are dividing plates that move in response to convection currents (energy transfers) in the mantle | |
| **ESS-M-A3:** investigating the characteristics of earthquakes and volcanos and identifying zones where they may occur | |
| **ESS-M-A4:** investigating how soils are formed from weathered rock and decomposed organic material | 30. Identify organic and inorganic matter in soil samples with the aid of a hand lens or microscope (ESS-M-A4) |
| **ESS-M-A5:** identifying the characteristics and uses of minerals and rocks and recognizing that rocks are mixtures of minerals | 31. Identify common rocks and minerals and explain their uses and economic significance (ESS-M-A5) |
| **ESS-M-A6:** explaining the processes involved in the rock cycle | |

| | |
|---|---|
| **ESS-M-A7:** modeling how landforms result from the interaction of constructive and destructive forces | 32. Demonstrate the results of constructive and destructive forces using models or illustrations (ESS-M-A7)<br>33. Identify the processes that prevent or cause erosion (ESS-M-A7) |
| **ESS-M-A8:** identifying the man-made and natural causes of coastal erosion and the steps taken to combat it | |
| **ESS-M-A9:** compare and contrast topographic features of the ocean floor to those formed above sea level | |
| **ESS-M-A10:** explaining (illustrating) how water circulates—on and through the crust, in the oceans, and in the atmosphere—in the water cycle | See GLE #46. |
| **ESS-M-A11:** understanding that the atmosphere interacts with the hydrosphere to affect weather and climate conditions | 34. Identify the components of the hydrosphere (ESS-M-A11)<br>35. Identify the atmosphere as a mixture of gases, water vapor, and particulate matter (ESS-M-A11)<br>36. 36. Identify, describe, and compare climate zones (e.g., polar, temperate, tropical) (ESS-M-A11) |
| **ESS-M-A12:** predicting weather patterns through use of a weather map | 37. Identify typical weather map symbols and the type of weather they represent (ESS-M-A12) |
| ***B. Earth History*** | |
| **ESS-M-B1:** investigating how fossils show the development of life over time | |
| **ESS-M-B2:** devising a model that demonstrates supporting evidence that the Earth has existed for a vast period of time | |
| **ESS-M-B3:** understanding that earth processes such as erosion and weathering affect the Earth today and are similar to those which occurred in the past | 38. Estimate the range of time over which natural events occur (e.g., lightning in seconds, mountain formation over millions of years) (ESS-M-B3) |

| *C. Earth In The Solar System* | |
|---|---|
| **ESS-M-C1:** identifying the characteristics of the sun and other stars | 39. Identify the physical characteristics of the Sun (ESS-M-C1)<br>40. Describe the significance of Polaris as the North Star (ESS-M-C1)<br>41. Explain why the Moon, Sun, and stars appear to move from east to west across the sky (ESS-M-C1) |
| **ESS-M-C2:** comparing and contrasting the celestial bodies in our solar system | 42. Differentiate among moons, asteroids, comets, meteoroids, meteors, and meteorites (ESS-M-C2)<br>43. Describe the characteristics of the inner and outer planets (ESS-M-C2) |
| **ESS-M-C3:** investigating the force of gravity and the ways gravity governs motion in the solar system and objects on Earth | |
| **ESS-M-C4:** modeling the motions of the Earth-moon-sun system to explain day and night, a year, eclipses, moon phases, and tides | 44. Explain rotation and revolution by using models or illustrations (ESS-M-C4) |
| **ESS-M-C5:** modeling the position of the Earth in relationship to other objects in the solar system | 45. Identify Earth's position in the solar system (ESS-M-C5) |
| **ESS-M-C6:** modeling and describing how radiant energy from the sun affects phenomena on the Earth's surface, such as winds, ocean currents, and the water cycle | 46. Identify and explain the interaction of the processes of the water cycle (ESS-M-C6) (ESS-M-A10) |
| **ESS-M-C7:** modeling and explaining how seasons result from variations in amount of the sun's energy hitting the surface due to the tilt of Earth's rotation on its axis and the length of the day | |
| **ESS-M-C8:** understanding that space exploration is an active area of scientific and technological research and development | 47. Identify and explain advances in technology that have enabled the exploration of space (ESS-M-C8) |

**Science and the Environment: In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.**

| Benchmarks | Grade-Level Expectations |
|---|---|
| **SE-M-A1:** demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems | |
| **SE-M-A2:** demonstrating an understanding of how carrying capacity and limiting factors affect plant and animal populations | 48. Determine the ability of an ecosystem to support a population (carrying capacity) by identifying the resources needed by that population (SE-M-A2) |
| **SE-M-A3:** defining the concept of pollutant and describing the effects of various pollutants on ecosystems | 49. Identify and give examples of pollutants found in water, air, and soil (SE-M-A3) |
| **SE-M-A4:** understanding that human actions can create risks and consequences in the environment | 50. Describe the consequences of several types of human activities on local ecosystems (e.g., polluting streams, regulating hunting, introducing nonnative species) (SE-M-A4) |
| **SE-M-A5:** tracing the flow of energy through an ecosystem and demonstrating a knowledge of the roles of producers, consumers, and decomposers in the ecosystem | |
| **SE-E-A6:** distinguishing between renewable and nonrenewable resources and understanding that nonrenewable natural resources are not replenished through the natural cycles and thus are strictly limited in quantity | |
| **SE-M-A7:** demonstrating knowledge of the natural cycles, such as the carbon cycle, nitrogen cycle, water cycle, and oxygen cycle | 51. Describe naturally occurring cycles and identify where they are found (e.g., carbon, nitrogen, water, oxygen) (SE-M-A7) |

| | |
|---|---|
| **SE-M-A8:** investigating and analyzing how technology affects the physical, chemical, and biological factors in an ecosystem | |
| **SE-M-A9:** demonstrating relationships of characteristics of soil types to agricultural practices and productivity | |
| **SE-M-A10:** identifying types of soil erosion and preventive measures | |

# SOCIAL STUDIES INTRODUCTION

## INTRODUCTION

Grade-Level Expectations (GLEs) for social studies further define the knowledge and skills students are expected to master by the end of each grade level or high school course. The GLEs for each grade are developmentally appropriate, with foundational concepts being introduced in prekindergarten and expanded as students move from one grade to the next.

Social studies concepts are arranged to build the knowledge and skills students will need to meet the benchmarks. For example, the foundation needed to achieve the K-4 benchmark, "demonstrating how economic wants affect decisions about using goods and services," is laid beginning in PreK with the GLE, "demonstrate an awareness of the uses of money in play activities." In each subsequent elementary grade, there are GLEs that build on this foundational economic concept. Knowledge and skills related to economic decisions continue to build in middle school; in high school, students then are expected to "identify factors that drive economic decisions (e.g., incentives, benefits, costs, trade-offs, consequences)."

In addition to the goal of building knowledge and skills across the grades, the GLEs are organized so that each elementary and middle school grade has a particular focus. High school GLEs are organized around core content courses.

## ELEMENTARY: PREKINDERGARTEN–GRADE 4

Prekindergarten and kindergarten students focus on identifying and understanding their roles as members of their families, class, school, community, nation, and the world. The first grade focus is on the study of the school community, family, and the local community. Second grade focuses on the local community. Third grade GLEs focus on the state of Louisiana, and fourth grade on the United States. The GLEs for Geography, Civics, Economics, and History are generally linked to the overall focus for each grade, although some social studies concepts of culture, geographic location, and trade are addressed from a global perspective. The changing focus from grade to grade reflects and reinforces students' broadening perspective of the world around them as they move through elementary school.

## MIDDLE SCHOOL: GRADES 5–8

In middle school, the GLEs reflect a shift from the elementary school concentration on the foundations of social studies to a more in-depth study of different social studies strands, historical eras, and geographical areas. Each grade has a primary historical/geographic focus. The fifth grade focus is on the early history of America from the historical beginnings to approximately 1763. In the sixth grade, the primary focus is on World History, from the earliest human activity to 1500. The seventh grade GLEs focus on U.S. History from the American Revolution through Reconstruction, while eighth grade focuses on Louisiana History through the present.

Each middle school grade also has a secondary focus. In fifth and sixth grades, the secondary focus is Geography. At these grades, students continue to broaden their perspective of the world through the study of Geography and to develop the geographic concepts that will be applied in the study of History at succeeding grades. In seventh grade, the secondary focus is Civics, as early U.S. History provides a rich context for the study of government. The secondary focus for eighth grade is Economics, in part because many of the economic concepts in the benchmarks are more developmentally appropriate for eighth graders than for younger students. Additionally, the primary eighth grade focus on Louisiana provides students a familiar context for applying and understanding economic concepts.

It is important to note that while each grade has a primary and a secondary focus, students are expected to apply their knowledge and skills from other strands in their study of History. For example, previously mastered economic concepts, such as scarcity and interdependence, are embedded in seventh grade U.S. History GLEs that address the issues of mercantilism, tariffs, and sectionalism. Similarly, Geography skills mastered at fifth and sixth grades are reinforced and applied at all succeeding grades.

## HIGH SCHOOL: GRADES 9–12

The GLEs for high school were developed around five core courses in high school social studies to provide students more in-depth study of each social studies strand: Geography (Core Course: World Geography), Civics (Core Course: Civics), Economics (Core Course: Free Enterprise); and History (Core Courses: World History—since 1500 and U.S. History—since 1877). Students are expected to build on the knowledge and skills mastered at earlier grades in order to meet the high school GLEs and benchmarks. For example, in U.S. History—since 1877, students use what they learned in seventh grade U.S. History as a basis for their understanding and analysis of later history. Additionally, students' foundational knowledge and skills in Geography, Civics, and Economics are applied in the U.S. History GLEs.

## HISTORICAL THINKING SKILLS

There is a set of unifying GLEs related to historical thinking skills (substrand A of the History strand) present in every grade from prekindergarten through eighth grade, and in the two high school History courses. These historical thinking skills build throughout the grades, asking students to progress from concrete skills (e.g., understanding relative chronology) to complex analytical skills (e.g., analyzing historical periods, change and continuity). These skills are embedded and applied meaningfully throughout the study of social studies and are not mastered in isolation.

# SOCIAL STUDIES INTRODUCTION

## STANDARDS/BENCHMARKS/GLES

Codes at the end of each GLE are used to identify a developmental profile indicator from the *Louisiana Standards for Programs Serving Four-Year-Old Children* (Table 1) and/or benchmarks from the *Louisiana Social Studies Content Standards* (Table 2). A GLE may apply to more than one benchmark, and as a result, a GLE may have more than one code.

**Developmental Profile Indicator Codes:** The first part is always PK, which means prekindergarten. The second part indicates the domain and content area (i.e., Cognitive Social Studies). The third part indicates the skill area (i.e., Geography, Civics, Economics, History) and skill number (e.g., 1, 2).

**Table 1. Explanation of Developmental Profile Indicator Codes**

| Code(s) | Explanation |
|---|---|
| PK-CSS-G3 | Prekindergarten, Cognitive Social Studies, Geography, Skill 3 |
| PK-CSS-C1 | Prekindergarten, Cognitive Social Studies, Civics, Skill 1 |
| PK-CSS-E1 | Prekindergarten, Cognitive Social Studies, Economics, Skill 1 |
| PK-CSS-H1 | Prekindergarten, Cognitive Social Studies, History, Skill 1 |

**Benchmark Codes:** Benchmarks codes have 3 parts. The first part identifies the strand (i.e., Geography, Civics, Economics, History). The second part gives the standard number and substrand. The third part indicates the grade cluster and benchmark number.

**Table 2. Explanation of Benchmark Codes**

| Code(s) | Explanation |
|---|---|
| G-1A-E1 | Geography, Standard 1, Substrand A, Elementary, Benchmark 1 |
| C-1B-E2 | Civics, Standard 1, Substrand B, Elementary, Benchmark 2 |
| E-1C-M2 | Economics, Standard 1, Substrand C, Middle School, Benchmark 2 |
| H-1C-H3 | History, Standard 1, Substrand C, High School, Benchmark 3 |

# FIFTH GRADE INTRODUCTION

**Fifth Grade**

The Grade-Level Expectations (GLEs) for grade 5 reflect the shift from the elementary school focus on the foundations of social studies to a more in-depth focus on various social studies strands and historical eras at each grade in middle school. In Grade 5, the GLEs center on early American history, from the historical beginnings of peoples in the Americas to the rising tensions between American colonists and the British up to 1763. Students learn about peoples and cultures in the Americas prior to European exploration, as well as the causes and course of European exploration and settlement of the New World, with particular focus on the thirteen American colonies. Students continue to build on the historical thinking skills acquired in earlier grades by applying such concepts as cause and effect and point of view when learning about early American history.

Geography is the secondary focus of grade 5. More advanced map skills are expected, and students are expected to acquire and use geographic information and concepts in their study of early America and how the United States developed. While Economics and Civics concepts are imbedded in the GLEs, these two social studies strands receive greater attention in grades 7 and 8.

## SAMPLE PAGE AND KEY FOR SOCIAL STUDIES

Strand/ Standard

Substrand

Benchmarks

Grade-Level Expectations (GLEs)

| | |
|---|---|
| **Geography—Physical and Cultural Systems: Students develop a spatial understanding of Earth's surface and the processes that shape it, the connections between people and places, and the relationship between man and his environment.** | |
| ***A. The World in Spatial Terms*** | |
| **Benchmarks** | **Grade-Level Expectations** |
| **G-1A-E1:** identifying and describing the characteristics and uses of geographic representations, such as various types of maps, globes, graphs, diagrams, photographs, and satellite-produced images | 1. Interpret different kinds of maps using a map key/legend, compass rose, cardinal and intermediate directions, and distance scale (G-1A-E1)<br>2. Use a variety of images or other spatial graphics (e.g., aerial photographs, satellite images) to locate major physical and human characteristics (G-1A-E1) |
| **G-1A-E2:** locating and interpreting geographic features and places on maps and globes | 3. Locate and label places on a map or globe: the seven continents, the United States and its major land forms, major bodies of water and waterways, referring to the poles, the equator, latitude, longitude and meridians (G-1A-E2)<br>4. Identify all U.S. states by shapes and position on map (G-1A-E2) |
| **G-1A-E3:** constructing maps, graphs, charts, and diagrams to describe geographical information and to solve problems | 5. Draw, complete, and add features to a map (including such map elements as a title, compass rose, legend, and scale), based on given information (G-1A-E3) |
| ***B. Places and Regions*** | |
| **G-1B-E1:** describing and comparing the physical characteristics of places, including land forms, bodies of water, soils, vegetation, and climate | 6. Describe and compare the distinguishing characteristics of various land forms, bodies of water, climates, and forms of vegetation in the United States (G-1B-E1)<br>7. Identify the best place for human settlement based on a map showing physical characteristics of an area (G-1B-E1) |
| **G-1B-E2:** identifying and describing the human characteristics of places, including population distributions and culture | |

# FIFTH GRADE

## SOCIAL STUDIES

**Geography—Physical and Cultural Systems: Students develop a spatial understanding of Earth's surface and the processes that shape it, the connections between people and places, and the relationship between man and his environment.**

| *A. The World in Spatial Terms* | |
|---|---|
| **Benchmarks** | **Grade-Level Expectations** |
| **G-1A-M1:** identifying and describing the characteristics, functions, and applications of various types of maps and other geographic representations, tools, and technologies | 1. Describe the characteristics, functions, and applications of various types of maps (G-1A-M1)<br>2. Compare the uses of different types of maps, including two different types of maps of the same area (G-1A-M1) |
| **G-1A-M2:** interpreting and developing maps, globes, graphs, charts, models, and databases to analyze spatial distributions and patterns | 3. Interpret a map, using a map key/legend and symbols, distance scale, compass rose, cardinal or intermediate directions, and latitude and longitude (G-1A-M2)<br>4. Locate major landforms and geographic features, places, and bodies of water/waterways on a map of the United States (G-1A-M2) |
| **G-1A-M3:** organizing and displaying information about the location of geographic features and places by using mental mapping skills | 5. Translate a mental map into sketch form to illustrate relative location, size, and distances between places (G-1A-M3) |
| ***B. Places and Regions*** | |
| **G-1B-M1:** explaining and analyzing both the physical and human phenomena associated with specific places, including precipitation and settlement patterns | 6. Describe types of settlements and patterns of land use in Colonial America and suggest reasons for locations of cities and settlements (G-1B-M1) |
| **G-1B-M2:** identifying and describing significant physical features that have influenced historical events | 7. Identify ways in which location and physical features influence the development or life in a region of the United States (e.g., effects of natural barriers) (G-1B-M2) |

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| **G-1B-M3:** identifying criteria used to define regions and explaining how and why regions change | 8. Identify physical or other criteria used to define regions and apply criteria to distinguish one region from another in the United States (G-1B-M3) |
| **G-1B-M4:** describing and explaining how personal interests, culture, and technology affect people's perceptions and uses of places and regions | 9. Explain ways in which goals, cultures, interests, inventions, and technological advances affected perceptions and uses of places or regions in Colonial America (G-1B-M4) |
| ***C. Physical and Human Systems*** | |
| **G-1C-M1:** predicting and explaining how physical features help to shape patterns and arrangements in the physical environment | |
| **G-1C-M2:** identifying key demographic concepts and using these concepts to analyze the population characteristics of a country or region | |
| **G-1C-M3:** describing the characteristics and patterns of human settlement in different regions of the world and analyzing the impact of urbanization | 10. Describe the influence of location and physical setting on the founding of the original thirteen colonies (G-1C-M3) |
| **G-1C-M4:** analyzing types, patterns, and effects of human migration over time | 11. Explain the reasons why Europeans chose to explore and colonize the world (G-1C-M4) |
| **G-1C-M5:** tracing local and worldwide patterns of cultural diffusion and analyzing their causes and effects | |
| **G-1C-M6:** comparing historical and contemporary patterns of economic interdependence | 12. Describe the economic interdependence among the thirteen American colonies (G-1C-M6) |
| **G-1C-M7:** explaining how cooperation and conflict among people contribute to the political divisions on Earth's surface | 13. Explain how geographic differences and similarities among the thirteen American colonies contributed to political cooperation and conflict (G-1C-M7) |
| ***D. Environment and Society*** | |
| **G-1D-M1:** analyzing and evaluating the effects of human actions upon the physical environment | 14. Describe the impact of human action on the physical environment of early America (G-1D-M1) |

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| **G-1D-M2:** explaining and giving examples of how characteristics of different physical environments affect human activities | 15. Explain and give examples of how Native Americans and Europeans adapted to living in a particular North American physical environment (G-1D-M2) |
| **G-1D-M3:** analyzing the worldwide distribution and utilization of natural resources | 16. Identify the natural resources used by people in the United States (G-1D-M3) |
| **G-1D-M4:** identifying problems that relate to contemporary geographic issues and researching possible solutions | |
| | |
| **Civics—Citizenship and Government: Students develop an understanding of the structure and purposes of government, the foundations of the American democratic system, and the role of the United States in the world, while learning about the rights and responsibilities of citizenship.** | |
| ***A. Structure and Purposes of Government*** | |
| **Benchmarks** | **Grade-Level Expectations** |
| **C-1A-M1:** explaining major ideas about why governments are necessary and evaluating competing positions on the purposes government should serve | |
| **C-1A-M2:** describing the essential characteristics of various systems of government | |
| **C-1A-M3:** explaining how the powers of the government are distributed, shared, and limited by the United States and Louisiana constitutions | |
| **C-1A-M4:** explaining the purposes of state constitutions and describing the relationship of state constitutions to the federal constitution | |
| **C-1A-M5:** describing the organization and major responsibilities of local, state, and national governments | 17. Compare aspects of American colonial government (e.g., local, colonial governors, role of the British parliament and Crown) to present-day U.S. local, state, and national government (C-1A-M5) |

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| **C-1A-M6:** identifying government leaders and representatives at the local, state, and national levels and explaining their powers and the limits on their powers | |
| **C-1A-M7:** explaining the importance of law in the American constitutional system and applying criteria to evaluate rules and laws | |
| **C-1A-M8:** explaining how public policy is formed, debated, and carried out at local, state, and national levels | |
| **C-1A-M9:** explaining the necessity of taxes and describing the purposes for which tax revenues are used | |
| **C-1A-M10:** identifying and evaluating different types of taxes | |
| ***B. Foundations of the American Political System*** | |
| ***There are no Grade-Level Expectations for Benchmarks in Grade 5 for this substrand.*** | |
| ***C. International Relationships*** | |
| ***There are no Grade-Level Expectations for Benchmarks in Grade 5 for this substrand.*** | |
| ***D. Roles of the Citizen*** | |
| ***There are no Grade-Level Expectations for Benchmarks in Grade 5 for this substrand.*** | |

| **Economics—Interdependence and Decision Making: Students develop an understanding of fundamental economic concepts as they apply to the interdependence and decision making of individuals, households, businesses, and governments in the United States and the world.** | |
|---|---|
| ***A. Fundamental Economic Concepts*** | |
| **Benchmarks** | **Grade-Level Expectations** |
| **E-1A-M1:** describing how the scarcity of resources necessitates decision making at both personal and societal levels | |
| **E-1A-M2:** analyzing consequences of economic decisions in terms of additional benefits and additional costs | |
| **E-1A-M3:** analyzing the consequences and opportunity cost of economic decisions | |
| **E-1A-M4:** analyzing the role of specialization in the economic process | |
| **E-1A-M5:** giving examples of how skills and knowledge increase productivity and career opportunities | |
| **E-1A-M6:** describing the essential differences in the production and allocation of goods and services in traditional, command, and market systems | |
| **E-1A-M7:** describing the various institutions, such as business firms and government agencies, that make up economic systems | |
| **E-1A-M8:** differentiating among various forms of exchange and money | |

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| **E-1A-M9:** using economic concepts to help explain historic and contemporary events and developments | 18. Describe economic activities within and among American Indian cultures prior to contact with Europeans (E-1A-M9)<br>19. Use economic concepts (e.g., supply and demand, scarcity, interdependence) to identify the economic motivations for European exploration and settlement in the Americas (E-1A-M9) |
| ***B. Individuals, Households, Businesses, and Governments*** | |
| ***There are no Grade-Level Expectations for Benchmarks in Grade 5 for this substrand.*** | |
| ***C. The Economy as a Whole*** | |
| ***There are no Grade-Level Expectations for Benchmarks in Grade 5 for this substrand.*** | |
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| **History—Time, Continuity, and Change: Students develop a sense of historical time and historical perspective as they study the history of their community, state, nation, and world.** | |
| ***A. Historical Thinking Skills*** | |
| **Benchmarks** | **Grade-Level Expectations** |
| **H-1A-M1:** describing chronological relationships and patterns | 20. Construct a timeline of key events in American history (beginnings to 1763) (H-1A-M1)<br>21. Demonstrate an understanding of relative and absolute chronology by interpreting data presented in a timeline (H-1A-M1) |
| **H-1A-M2:** demonstrating historical perspective through the political, social, and economic context in which an event or idea occurred | 22. Identify different points of view about key events in early American history (H-1A-M2) |
| **H-1A-M3:** analyzing the impact that specific individuals, ideas, events, and decisions had on the course of history | 23. Identify the causes, effects, or impact of a given event in early American history (H-1A-M3) |
| **H-1A-M4:** analyzing historical data using primary and secondary sources | 24. Use both a primary and secondary source to describe key events or issues in early American history (H-1A-M4) |

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| **H-1A-M5:** identifying issues and problems from the past and evaluating alternative courses of action | 25. Identify historical issues or problems in early America and explain how they were addressed (H-1A-M5) |
| **H-1A-M6:** conducting research in efforts to answer historical questions | 26. Conduct historical research using a variety of resources to answer historical questions related to early American history (H-1A-M6) |
| ***B. United States History*** | |
| **H-1B-M1:** identifying and describing characteristics of societies in the Americas, Western Europe, and Western Africa that increasingly interacted after 1450 | 27. Identify and describe indigenous cultures and groups that existed in the Americas at the beginning of European exploration (H-1B-M1)<br>28. Describe the trade that connected the Americas, Western Europe, and Western Africa prior to 1620, including the origins of the West Africa-European trade connection (H-1B-M1)<br>29. Compare and contrast Africans, Europeans, and Native Americans converging in the Western Hemisphere after 1492 (H-1B-M1) |
| **H-1B-M2:** explaining the cultural, ecological, and economic results of early European exploration and colonization | 30. Explain that cultures change through cultural diffusion, invention, and innovation (H-1B-M2)<br>31. Describe major early explorations and explorers and their reasons for exploration (H-1B-M2)<br>32. Describe the Spanish conquests in the Americas including the impact on the Aztecs, Incas, and other indigenous peoples (H-1B-M2)<br>33. Explain the course and consequences of the Columbian Exchange, including its cultural, ecological, and economic impact on Europe, the Americas, and West Africa (H-1B-M2) |
| **H-1B-M3:** describing the interactions among Native Americans, early Europeans, and Africans in the Americas | 34. Describe the arrival of Africans in the European colonies in the seventeenth century and the increase in the importation of slaves in the eighteenth century (H-1B-M3)<br>35. Explain the societal impact of the immersion of Africans in the Americas (H-1B-M3)<br>36. Identify instances of both cooperation and conflict between Indians and European settlers (H-1B-M3) |
| **H-1B-M4:** tracing the emergence of religious freedom and changing political institutions in the English colonies | 37. Describe and compare the various religious groups in colonial America and the role of religion in colonial communities (H-1B-M4) |

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| **H-1B-M5:** analyzing the impact of European cultural, political, and economic ideas and institutions on life in the Americas | 38. Describe the political, social, and economic organization and structure of the thirteen British colonies that became the United States (H-1B-M5)<br>39. Describe reflections of European culture, politics, and institutions in American life (H-1B-M5)<br>40. Explain why some colonists felt loyal to England due to their cultural, political, and economic ties to their homeland (H-1B-M5) |
| **H-1B-M6:** explaining the causes and course of the American Revolution and the reasons for the American victory | |
| **H-1B-M7:** explaining the impact of the American Revolution on the politics, society, and economy of the new nation | |
| **H-1B-M8:** relating the institutions and practices of government established during and after the American Revolution to the foundation of the American political system | |
| **H-1B-M9:** describing the territorial expansion of the United States and analyzing the effects on relations with Native Americans and external powers | |
| **H-1B-M10:** analyzing the changes and regional tensions created by Jacksonian democracy, the industrial revolution, increasing immigration, the rapid expansion of slavery, and the westward movement | |
| **H-1B-M11:** explaining and giving examples of the reform movements that occurred during the antebellum period and evaluating their impact on American society | |
| **H-1B-M12:** describing the causes and course of the Civil War and examining the impact of the war on the American people | |
| **H-1B-M13:** comparing and evaluating various reconstruction plans of the post-Civil War era | |
| **H-1B-M14:** describing the impact of industrialization in the United States | |

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| **H-1B-M15:** describing the significant economic, political, social, and cultural changes that have occurred in the United States during the 20th century | |
| **H-1B-M16:** identifying the causes and consequences of major world conflicts involving the United States | |
| **H-1B-M17:** describing the impact of the Great Depression and World War II on American society | |
| **H-1B-M18:** discussing significant developments and issues in contemporary United States history | |
| ***C. World History*** | |
| **H-1C-M1:** describing the earliest human communities | |
| **H-1C-M2:** explaining the emergence of agricultural societies around the world | |
| **H-1C-M3:** identifying the major characteristics of early civilizations in Mesopotamia, Egypt, and the Indus valley | |
| **H-1C-M4:** tracing the development and expansion of agricultural societies and the emergence of new states | |
| **H-1C-M5:** analyzing the political, social, and cultural consequences of population movements and militarization in Europe and Asia | |
| **H-1C-M6:** discussing and giving examples of technological and cultural innovation and change | |
| **H-1C-M7:** describing the classical civilizations and examining their interactions and influences | |
| **H-1C-M8:** describing and comparing the emergence of major religions and large-scale empires in the Mediterranean basin, China, and India | |

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| **H-1C-M9:** tracing the expansion of major religions and cultural traditions and examining the impact on civilizations in Europe, Asia, and Africa | |
| **H-1C-M10:** analyzing the political, social, and cultural developments and changes that resulted from the rise and fall of empires and kingdoms in Europe, Asia, Africa, and the Americas | |
| **H-1C-M11:** analyzing the cultural and economic impact of the interregional system of communication and trade that developed among the peoples of Europe, Asia, and Africa | |
| **H-1C-M12:** explaining the developments and events that led to the political, social, cultural, and economic transformation of Europe | |
| **H-1C-M13:** describing the development and expansion of complex societies and empires in the Americas | 41. Describe the origins, characteristics, and expansion of ancient American empires (e.g., Inca, Maya) and complex societies in the Americas (e.g., Aztec) (H-1C-M13) |
| **H-1C-M14:** explaining the political, cultural, and economic developments and trends of major world regions that resulted in the transformation of societies in the 15th through the mid-18th centuries | |
| **H-1C-M15:** determining and discussing the impact of the political, agricultural, and industrial revolutions on societies around the world | |
| **H-1C-M16:** describing the transformation of world societies that occurred during an era of global trade and Western domination | |
| **H-1C-M17:** identifying the causes and worldwide consequences of major 20th century conflicts | |
| **H-1C-M18:** identifying and discussing significant political, economic, social, cultural, and technological trends that have had an impact on the modern world | |

| *D. Louisiana History* |
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| ***There are no Grade-Level Expectations for Benchmarks in Grade 5 for this substrand.*** |

# GLOSSARY

## ENGLISH LANGUAGE ARTS GLOSSARY

**Acronym** — A word created from the first letters of each (or most) word in a phrase, such as SCUBA, *self-contained underwater breathing apparatus*.

**Affix** — A letter or group of letters attached to the beginning and/or end of a root word that changes its meaning or function, such as the prefix *un-* and the suffix *-able* in *undeniable*.

**Allegory** — A narrative in which the characters, events, action, and setting are contrived not only to make sense in themselves but also to signify a second, correlated order of persons, things, concepts, or events.

**Alliteration** — The repetition of the beginning sounds of two or more neighboring words, such as "*Peter Piper picked a peck of pickled peppers*."

**Argumentative** — A type of writing that develops or debates a topic in a logical or persuasive way.

**Assonance** — The repetition of a vowel sound in words, such as the long *e* sound in *she feeds the seals*.

**Climax** — In a story or play, the turning point or highest point of interest in the action of the plot. See also **plot sequence**.

**Cognate** — Two or more words from different languages that are related to one another because their historical base is the same or similar.

**Conceit** — A metaphor or simile that is constructed using elaboration or exaggeration to establish a striking parallel between two apparently dissimilar things or situations.

**Connotative** — The emotional, implied, or suggested meaning attached to a word that goes beyond its literal meaning.

**Consonance** — The repetition of final consonant sounds, such as *bake*, *stick*, *clock*.

# GLOSSARY

**Consonant Blends** — Two or more consonants that are blended together rapidly without loss of identity of the sounds, such as the *bl* sound in *black* or the *str* sound in *struggle*.

**Conventions of Print** — Fundamental knowledge of how a person interacts with printed material based on the culture of the person. This knowledge forms the basis upon which a person learns to read. Examples include directionality (left to right, top to bottom), differences between letters and words, uppercase and lowercase letters, punctuation, understanding that books have front and back covers, title page, author, etc.

**Conventions of Writing** — Fundamental knowledge of how a person uses his or her own understanding of the written language when writing. This knowledge includes grammar, usage, mechanics (including capitalization and punctuation), structure (topic sentence, paragraph, etc.), and spelling.

**Declarative Sentence** — A sentence that states an idea, a fact, or an argument—often punctuated by a period—such as *The rabbit hopped*.

**Deductive Reasoning** — The process of logical reasoning that proceeds from the more general to the more specific; reasoning from whole to parts.

**Denotative** — The literal meaning or dictionary definition of a word.

**Derivative** — A word formed by adding an affix (prefix and/or suffix) to a root or stem, such as *dogs*, *highly*, *running*, *bicycle*, *replant*.

**Developmental Spelling** — The transitional stages students progress through as they move toward spelling standard English words.

**Digraph** — Two or more letters that make up a single sound, such as the *ph* sound in *phone* or the *oo* sound in *foot*.

**Dialect** — The social or regional variation of a language as it differs from the standard language.

**Diphthong** — A single vowel sound made when the tongue glides from one vowel sound to another in the same syllable, such as the *ow* sound in *owl* or the *ai* sound in *main*.

# GLOSSARY

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|---|---|
| **Dramatic Monologue** | A type of poem or speech uttered by an assumed character, or persona, in a specific situation at a critical moment, that reveals the character's innermost thoughts and feelings to the audience. See also **soliloquy**. |
| **Epic** | A long narrative poem about a subject, and told in an elevated style, centering on the adventures of a larger-than-life hero or heroine, and reflecting the ideals of a nation or culture. |
| **Etymology** | The study of words—their origins, history, and meanings. |
| **Euphemism** | A word or expression used to replace unacceptable or taboo language. |
| **Exclamatory Sentence** | A sentence that expresses a strong opinion or emotion, often punctuated by an exclamation point or marked by intonation, such as *What a fantastic play!* |
| **Expository** | A mode of writing that is informational in nature. It is used to explain, describe, or tell about something. |
| **Falling Action** | The part of the plot generally following the climax, in which the author reveals the result of the conflict. |
| **Fiction** | Literary writing whose content comes from the imagination and is not necessarily based on fact but is designed to entertain; specifically, a type of literature, especially prose (novels, short stories, and forms of folklore). |
| **Figurative Language** | Language enriched by word images and figures of speech; not literal in its intent, but designed to make the reader take an imaginative leap to understand the author's point. Often includes the use of similes, metaphors, personification, etc. |
| **Flashback** | A literary device in which an earlier event is inserted into a narrative to show events that happened at an earlier time. |
| **Fluency** | The ability to orally read words or express ideas with clarity and ease. |
| **Foreshadowing** | The technique of arranging events and information in a narrative so that later events are set up beforehand. |
| **Genre** | A French term for a kind, a literary type or class. |

# GLOSSARY

**Graphic Organizer** — A representation of information in forms such as maps, charts, graphs (including pie charts and bar graphs), or tables, which visually organize information to identify patterns and relationships.

**Homograph** — One of two or more words that have the same spelling but differ in origin, meaning, and sometimes pronunciation, such as *bear* (large animal) and *bear* (support; carry) or *bow* (weapon for shooting arrows) and *bow* (forward part of a ship) and *bow* (bend in greeting or respect).

**Homonym** — One of two or more words that have the same sound and often the same spelling but that differ in meaning, such as bay (a body of water) and bay (part of a window).

**Hyperbole** — A figure of speech in which subject exaggeration is used for emphasis or effect, such as *That tree must be a mile tall!*

**Idiom** — A verbal expression that does not mean what it literally says and which may not be understood without local knowledge of the given language. For example, *You're barking up the wrong tree* is the equivalent to arriving at the wrong conclusion.

**Imperative Sentence** — A verb, a phrase, or a sentence whose construction or spoken tone issues a command and is punctuated with an exclamation point, for example, *Watch out!*

**Inductive Reasoning** — The process of logical reasoning that proceeds from the more specific to the more general; reasoning from parts to a whole.

**Inflection** — A change in the form of a word by the addition of an affix or by changing the base of the word to indicate grammatical features, such as number, person, tense, or mood, for example, *run* to *runs* or *run* to *ran*.

**Inflectional Forms** — The changing grammatical forms, functions, and meanings of a base or root word as different affixes are added to it. For example, the root word is bake; some inflectional forms of *bake* are *bake<u>s</u>*, *bake<u>d</u>*, *bak<u>ing</u>*, *<u>pre</u>bake*.

**Interrogative Sentence** — A sentence or expression that asks a question and is punctuated with a question mark, such as *Where are you going?*

# GLOSSARY

**Intonation** — The rise and fall in pitch of the spoken voice, helping to convey the meaning of a phrase or sentence, for example, the difference between a command and a question as in "*Stop!*" or "*Stop?*"

**Irony** — A literary technique for implying, through words, plot or character development, that the actual comments or situation is quite different from what is asserted. The author's use of tone, exaggeration, or understatement often suggests the opposite of the literal meaning of the words used.

**Literal** — The simplest, nonfigurative, or most obvious meaning of a word or words; without exaggeration or embellishment. The words stated mean exactly what they say.

**Literary Devices** — Rhetorical elements (such as metaphor, foreshadowing, flashback, allusion, symbolism, irony, hyperbole, etc.) used to create a desired mood or tone in a piece of writing.

**Metaphor** — A figure of speech that makes an implied comparison between two things, such as *Habits are first cobwebs and then cables*.

**Mood** — The emotional state expressed in a literary work.

**Motif** — Intentional repetition of a word, phrase, event, or idea used as a unifying element in a piece of writing.

**Multicultural Literature** — Writing that reflects the customs, beliefs, and experiences of people of differing nationalities, ethnicities, cultures, and races.

**Narrative** — 1. A written (or orally presented) story that consists mainly of a sequence of events, which may be fictional or nonfictional. Narratives generally give an account of something presented as if it really happened.

2. A mode of writing that includes telling a story.

**Nonfiction** — A genre of writing designed to explain, argue, or describe a real event rather than to tell an invented story. A type of prose other than fiction but including biography and autobiography.

**Nonphonetic Word** — Any word whose pronunciation cannot be accurately predicted from its spelling.

# GLOSSARY

**Onomatopoeia** — The formation and use of words to imitate sounds, such as *buzz*, *bang*, *crunch*, etc. A figure of speech in which the sound reflects the sense.

**Onset** — The part of a syllable that precedes the syllable peak when spoken aloud. Typically, the consonants preceding the syllable's vowel sound, such as the *gr* in *grape*.

**Paradox** — An apparently contradictory or illogical statement that goes against common sense but suggests a truth, such as *Less is more.*

**Personification** — A metaphorical figure of speech in which nonhumans (animals, objects, or concepts) are given human qualities.

**Persuasive** — A mode of writing or a spoken text, the purpose of which is to prove something to be true, credible, or worthy. Arguments may be explicit or implicit, but the purpose of a persuasive argument is to convince an audience to adopt a belief or perform a desired action.

**Phoneme** — The smallest sound unit of speech that conveys a difference in the meaning of a word, for example, /*b*/ in *book* and /*t*/ in *took*.

**Phonemic Awareness** — An understanding of the sounds (phonemes) that make up syllables and spoken words.

**Phonics** — The application of sound-symbol relationships to read and write words.

**Phonological Awareness** — A broad term that includes identifying and making oral rhymes, working with syllables, onsets and rimes.

**Plot Sequence** — The structure of the actions of a narrative or drama. The classic plot sequence is as follows: 1) exposition, 2) rising action, 3) climax, and 4) falling action leading to 5) resolution.

**Point of View**

In fiction, the narrative perspective used by an author to tell a story:

- Third-person points of view:
  - omniscient – gives the reader an all-knowing position from which to see actions and the characters' thoughts
  - limited— point of view that presents the story from outside any single character's perception, but the reader has no special insight into the characters' minds or motivations
- First person points of view—events are related as they are perceived by one character.
  - self-conscious narrator—aware that he or she is composing a work of art and takes the reader into his or her confidence about problems involved either seriously or for comic purposes
  - fallible or unreliable narrator—his or her interpretation of matters does not coincide with the implicit beliefs and norms of value held by the author, whose beliefs and norms the author expects the reader to share.

In nonfiction, used to discuss the author's beliefs and objectivity or subjectivity toward his or her subject.

**Prefix**

An affix (a letter or group of letters) that comes before a base or root word, such as *pro* at the start of *proclaim*.

**Primary Source**

A research resource that a writer studies first hand and that contains original opinions or information. A writer may use primary sources as research for an essay or presentation, such as interviews, journals/diaries, letters, autobiographies, etc. See also **secondary source**.

**R-controlled Vowel**

The modified sound of a vowel immediately preceding /r/ in the same syllable, as in *care*, *never*, *sir*, *or*, *curse*, etc.

**Resolution**

The part of a story following the climax in which the conflict is resolved.

**Rhetorical**

Using the principles of rhetoric (the art of finding the available means of persuasion for a given situation) to compose effective and purposeful texts or speeches.

**Rime**

One or more vowels following the consonant sound of a syllable, such as /*ŏŏk*/ in *c<u>oo</u>k* or *br<u>oo</u>k*, or /*ā*/ in *st<u>ay</u>*.

# GLOSSARY

**Rising Action** — The part of a story in which the plot becomes increasingly complicated and introduces the conflict. Rising action generally leads to the climax of the story.

**Satire** — A literary technique or work that uses ridicule, humor, and wit to expose vices and fallacies. It may provoke change in the targeted beliefs, attitudes, or institutions.

**Secondary Source** — A research resource that contains the work and ideas of other authors or researchers. A writer may use secondary sources as research for an essay or presentation, such as reference books, articles by other authors, biographies, etc. See also **primary source**.

**Simile** — A comparison of two things that are apparently dissimilar, usually using the words *like* or *as*, for example, *coffee as cold as ice*.

**Soliloquy** — A speech, usually dramatic, performed by a character while or as if alone on stage. The soliloquy generally is used to develop the speaker's character and typically is a projection of the speaker's innermost thoughts. See also **dramatic monologue**.

**Sound Devices** — Literary terms that emphasize the sound(s) of the word (e.g., alliteration, assonance, consonance, onomatopoeia).

**Standard English** — The style of spoken and written English used in most schools, businesses, and government organizations in the United States. Standard English varies geographically and culturally, but maintains a fairly uniform grammatical structure.

**Story Elements** — Typical components that make up a story's structure and can be discussed individually, such as plot, characters, setting, theme, conflict, and outcome.

**Stream of Consciousness** — In literature, a technique used to present a character's thoughts and feelings as they develop; generally a random but continual flow of these thoughts and feelings.

# GLOSSARY

**Style** — An author's distinctive manner of using language that suits his or her ideas and purpose in writing. An author's style often reflects his or her personality and beliefs and appears through each writer's characteristic ways of arranging ideas and use of diction, sentence structures, rhythm, figures of speech, and other elements of composition.

**Suffix** — An affix (a letter or group of letters) that comes at the end of a base or root word that changes the meaning or grammatical function of the word, such as *-ing* at the end of *fishing*.

**Symbol and Symbolism** — Symbol: a word or a set of words that signifies an object or event which itself signifies something else. Scales, for example, symbolize justice; a dove, peace; the lion, strength and courage.

Symbolism: the use of a concrete image to express an emotion or an abstract idea, such as the white whale representing the concept of evil in *Moby Dick*.

**Syntax** — The pattern or structure of word order in sentences, phrases, and clauses. The rules of grammar that dictate proper sentence construction.

**Technical Writing** — Writing for the purpose of communicating scientific or technical information or instructions to a specific audience.

**Theme** — A main idea or central idea that may be stated directly or indirectly. A theme may be profound, difficult to understand, or even moralistic. Generally a theme can be extracted as the reader explores a text.

**Thesis Statement** — The main point or argument of which an author or speaker tries to convince an audience through writing or speech.

**Tone** — The reflections of an author's attitude toward the topic and the audience as suggested by his or her word choices and stylistic efforts, for example, using a *formal* or *informal* tone. The tone of a text may also indicate the message or reaction that an author hopes for from the audience. See also **voice**.

**Visual Texts** — Information conveyed with images, or with meaningful patterns or sequences. Visual texts range from diagrams to documentaries. Other examples include tables, flowcharts, storyboards, picture glossaries, maps, and movies.

# GLOSSARY

**Voice** — The expression of an author's self or identity as reflected in sentence construction and word choices, for example, using an active or passive voice. Less formally, the total effect of the elements of style that make a particular author's voice distinctive. See also **tone**.

**Webbing** — Any method of using diagrams, mapping, or other graphic-based tools that illustrate the relationships among the ideas and topics to be included in a piece of writing. May be used as a tool for teaching prewriting, outlining, comprehension, and note-taking.

# GLOSSARY

## MATHEMATICS GLOSSARY

**Absolute Error** — The difference between a measured value and the actual value. For example, when the thermometer reads 75º, the actual temperature might be 73º. The absolute error is 2 degrees.

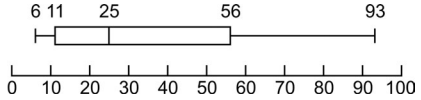
**Accuracy** — The extent to which a measurement/value/quantity conforms to an actual fact. For example, "The accuracy of this estimate will ensure there is enough water in the container without it overflowing."

**Associative Property** — A property, applicable to addition and multiplication, which states that it does not matter how numbers are grouped if they are all being added or all being multiplied (e.g., 2 + (4 + 9) = (2 + 4) + 9).

**Asymptote** — A line or curve that is approached (but never actually reached) by a function (e.g., the *x*-axis is an asymptote of the function $f(x) = \frac{1}{x}$).

**Backward Reasoning** — The reasoning involved when one assumes a conclusion is true and then works (or reasons) backwards to the evidence that the conclusion is true.

**Box and Whiskers Plot** — A graph in which five elements in a set of data are specifically marked: minimum value, first quartile, median value, third quartile and maximum value. This plot indicates a minimum of 6, first quartile of 11, median of 25, third quartile of 56 and maximum value of 93.




**Combinations** — Sets containing a certain number of objects selected from another set. The combinations of three items from the set $\{a,b,c,d\}$ are: $\{a,b,c\},\{a,b,d\},\{a,c,d\},\{b,c,d\}$. The sets *{a, b, c}* and *{b, a, c}* are considered to be the same sets.

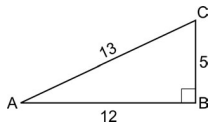
# GLOSSARY

| | |
|---|---|
| **Common Equivalent Reference Points** | Common fractions with decimal equivalents that can be used to approximate other nearby values. For example, ¼ = 0.25, ½ = 0.5, and ¾ =0 .75. Since 4/10 is slightly less than ½, its decimal equivalent will be slightly less than 0.5. |
| **Commutative Property** | A property, applicable to addition and multiplication; this property states that it does not matter in which order numbers are added or multiplied. (e.g., 5 + 6 = 6 + 5 and 8 x 9 = 9 x 8). |
| **Complementary Events** | Events that, when combined, constitute all possibilities. In the study of mathematics, the set of all complementary events constitutes the universal set. For example, writing an even integer or writing an odd integer are complementary events, since every possible integer is either even or odd. |
| **Computational Fluency** | A level of skill reached when a person is able to execute an algorithm or procedure efficiently and correctly without assistance. |
| **Congruent** | Figures that have the same size and shape. |
| **Conic Sections** | Figures that result from the intersection of a plane and a double-napped cone. The conic sections are a circle, an ellipse, a parabola, and a hyperbola. |
| **Contrapositive** | Given a statement of the form, "If P, then Q," the contrapositive is the statement, "If not Q, then not P." The contrapositive is logically equivalent to the original statement. Given the statement, "If it rained, then Bob went inside," the contrapositive is, "If Bob did not go inside, then it did not rain." |
| **Converse** | Given a statement of the form, "If P, then Q," the converse is the statement, "If Q, then P." The converse is not necessarily logically equivalent to the original statement. For example, given the statement, "If it rained, then Bob went inside," the converse is, "If Bob went inside, then it rained." |
| **Coordinate Systems** | Systems used to locate points using lines or points. |

# GLOSSARY

**Cosine Ratio**

The cosine of an angle in a right triangle is the ratio of the length of the adjacent side to the length of the hypotenuse. For example, in triangle ABC shown below, the cosine of angle A $\left[\cos(A)\right]$ is the ratio $\frac{12}{13}$.

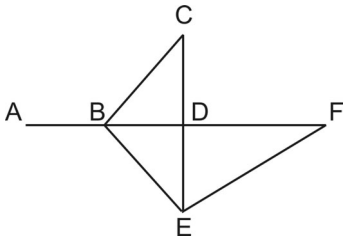



**Degenerate Conics**

Figures that result from the intersection of a plane and a double-napped cone, but are not "true" conic sections. The degenerate conics are a point, a line, and two intersecting lines.

**Euler Path**

A path that connects two vertices of a graph and travels each path in the graph exactly once. For example, the path A-B-C-D-B-E-D-F-E is an Euler path.




**Dependent Events**

Events that influence each other. If a bag contains three red marbles and two green marbles, randomly picking a red marble from the bag and then randomly picking a green marble from the bag (without replacing the red marble) are dependent events.

**Dilation**

A transformation that maps lines onto parallel lines. A dilation may be a translation (no size change) or an enlargement. The image on a movie screen represents a dilation of the image on the film.

# GLOSSARY

**Discrete Mathematics**

The branch of mathematics dealing with situations in which there are a finite or countable number of values or objects (i.e., not continuous). For example, since no fractional values are applicable, determining the combination of colors that can be used in a drawing requires application of discrete mathematics. Three colors, a discrete number, is reasonable. $3\frac{1}{2}$ and other fractional numbers of colors do not make sense and are not reasonable solutions.

**Distributive Property of Multiplication Over Addition**

Property that states that for numbers *a, b,* and *c*, $a(b+c) = ab + ac$.

**Expanded Form**

The form of a number written as a sum to show place value. For example, the expanded form of 367 is 300 + 60 + 7.

**Frequency Table**

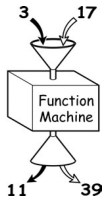
A table that lists how often different outcomes occur. Below is a frequency table representing the results of a poll about students' favorite fruits.

| FAVORITE FRUITS | |
|---|---|
| **Fruit** | **Frequency** |
| apple | 5 |
| banana | 9 |
| orange | 5 |
| strawberry | 7 |

# GLOSSARY

**Function Machine**

A simple way to think of a function. You provide one input value and the machine (function) produces one output value. The diagram below shows a function machine which doubles and adds five to each number placed into the machine.

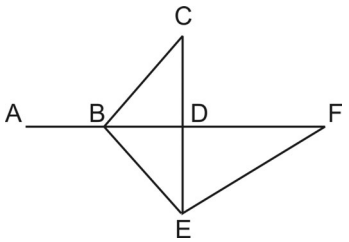



**Fundamental Counting Principle**

The principle that states that, "If there are **r** ways to do one thing and **s** ways to do another, and **t** ways to do a third thing, and so on, then the number of ways of doing all those things at once is **r** x **s** x **t** x …". Suppose a license plate lists a sequence of three letters followed by three digits. There are a total of $26 \bullet 26 \bullet 26 \bullet 10 \bullet 10 \bullet 10 = 17,576,000$ possible, different license plates.

**Hamiltonian Path**

A path that connects two vertices of a graph and visits each vertex in the graph exactly once. The path A-B-C-D-E-F is a Hamiltonian path.




**Independent Events**

Events that have no influence on each other. For example, flipping "tails" with a coin and rolling a four with a die are independent events.

# GLOSSARY

**Inverse** — Given a statement of the form, "If P, then Q," the inverse of the statement is, "If not P, then not Q." The inverse is not necessarily logically equivalent to the original statement. Given the statement, "If it rained, then Bob went inside," the inverse is, "If it didn't rain, then Bob didn't go inside."

**Inverse Operations** — Operations that "undo" or are opposites of one another are inverse operations (e.g., addition and subtraction, multiplication and division).

**Line of Symmetry** — A line that divides a geometric object into two congruent halves.

**Manipulatives** — Concrete, physical objects used to help illustrate mathematical concepts.

**Matrix (*pl.* Matrices)** — A set of values arranged in a rectangular array. For example, the coefficients of the expressions $3x^2 + 7x + 9$, $11x^2 + (-8x) + 52$, and $-4x^2 + 21x + (-7)$ are represented in the matrix $\begin{bmatrix} 3 & 7 & 9 \\ 11 & -8 & 52 \\ -4 & 21 & -7 \end{bmatrix}$.

**Mental Math** — Computations and estimations performed without the aid of paper and pencil.

**Mutually Exclusive Events** — Two or more events, each of which precludes all the others. For example, the people voting in a presidential election and the people who are celebrating their $15^{th}$ birthday on that election day are mutually exclusive events.

**Ordinal Number** — A number that denotes position in a sequence. In the sentence, "Susan was the $6^{th}$ person in line," $6^{th}$ is an ordinal.

**Outcomes** — Results that are possible from an experiment or simulation. For example, the possible outcomes of rolling a six-sided number cube are rolls of 1, 2, 3, 4, 5, and 6.

**Perfect Square** — A number that can be written as the square of one of its factors. For example, the number 36 is a perfect square since it is the product of 6 and 6 (i.e., $6 \bullet 6 = 36$). The number 36 is said to be the square of 6.

# GLOSSARY

**Permutations** — The ordered arrangements of the elements of a set. For example, the permutations of the list $\{A, B, C\}$ are (1) $\{A, B, C\}$ (2) $\{A, C, B\}$ (3) $\{B, A, C\}$ (4) $\{B, C, A\}$ (5) $\{C, A, B\}$ and (6) $\{C, B, A\}$

**Pictographs** — A visual representation of statistical data that uses pictures to indicate value or quantity.

**Picture Graphs** — See **pictograph**.

**Polyhedron (*pl.* Polyhedra)** — A three dimensional object with faces that are plane polygons. Cubes are polyhedra in which each face is a square.

**Polynomial Expression** — A mathematical expression that is the sum of terms, each of which is the product of a constant and a non-negative power of a variable or variables. For example, the expression $5x^7 + 11x^2 + 7x + (-3)$ is a polynomial expression.

**Precision** — The degree of specificity to which a measurement/value/quantity is determined. For example, "The measurement is precise to the nearest millimeter."

**Probability** — A number between 0 and 1, inclusive, which indicates the likelihood of an event occurring. For example, the probability of rolling a 1 on a fair, six-sided number cube is 1/6.

**Pythagorean Theorem** — The theorem that states a triangle is a right triangle if, and only if, the sum of the squares of the two sides is equal to the square of the hypotenuse. For example, the measures of the sides and hypotenuse of a triangle are 6 in., 8 in., and 10 in. Therefore, the triangle is a right triangle since $6^2 + 8^2 = 10^2$.

**Quartiles** — The three values that divide a set of data into four intervals with an equal number of elements in each interval. In the set of values $\{1,2,3,4,5,6,7\}$, the quartiles are 2 ($1^{st}$), 4 (median) and 6 ($3^{rd}$).

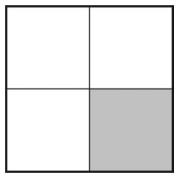
**Range** — The absolute difference between the greatest and least value in a set of data. For example, the range of the data set $\{7,8,12,17,23\}$ is $16\,(23 - 7)$.

# GLOSSARY

**Rational Number** — Any number that can be written as a fraction in which both the numerator is an integer and the denominator is a natural number. For example, 3/7 is a rational number since it can be written as a fraction.

**Rectangular Array** — An arrangement of objects to aid in understanding multiplication. For example, four rows with three pieces of candy in each row can be used to illustrate 3 x 4 = 12 and 4 x 3 = 12.

**Region Model** — A geometric figure divided into equally-sized parts to illustrate fractional concepts. For example, the model below could be used to illustrate ¼ (the shaded region) or ¾ (the unshaded region).



**Related Turn-around Pairs** — Addition and multiplication facts that are the same except for the order in which the numbers are added or multiplied. For example, 2 + 3 = 5 and 3 + 2 = 5 is a related turn-around pair.

**Rotational Symmetry** — The property of an object such that after the object is rotated a number of degrees (less than 360°), the object is identical to the original object. For example, a square has rotational symmetry because it can be rotated 90 degrees and then appears identical to the original square.

**Scatter Plot** — A two-dimensional graph of a collection of points.

**Sequences of Arithmetic Growth** — A sequence of numbers in which the difference between successive terms is constant and the value of successive terms is increasing. For example, the pattern 4, 7, 10, 13, 16, 19, … is an arithmetic sequence with a constant difference of 3.

**Sequence of Geometric Growth** — A sequence of numbers in which the ratio of successive elements is constant and the value of successive elements is increasing. For example, the pattern 3, 6, 12, 24, 48, 96, 192, … is a geometric sequence with a constant ratio of 2.

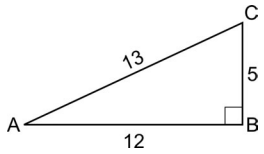
# GLOSSARY

**Set Model** — A model for fractions in which the fraction is shown by a subset of highlighted objects out of the total set of objects. For example, one-third might be represented as • o o.

**Similarity** — The quality of having the same shape and proportional corresponding linear measurements. For example, the triangles are the same shape, but each side of the one triangle is six times as long as the corresponding side of the other triangle. Also, a marble and a bowling ball are not the same size, but they are similar.

**Simulation** — A representation (physical, written, verbal, graphic, procedural, experimental, etc.) of a situation or event(s). For example, the results of turning a spinner that is divided into ten equivalent parts marked zero (0) through nine (9) can be used to simulate the sequence of numbers on a license plate.

**Sine Ratio** — The sine of an angle in a right triangle is the ratio of the length of the opposite side to the length of the hypotenuse. For example, in triangle ABC shown below, the sine of angle A $\left[\sin(A)\right]$ in triangle ABC is the ratio $\frac{5}{13}$.




**Skip-counting** — Counting forward or backwards by a number other than 1. For example, starting at 2 and skip-counting forward by 2s would result in the sequence: 2, 4, 6, 8, …

**Standard Form** — The form in which numbers are traditionally written. For example, 367 is in standard form.

# GLOSSARY

**Stem and Leaf Plot**

A data display consisting of "stems," which are the data with the last digit removed, and "leaves," which are the last digits of the data.

| Stem | Leaves |
|---|---|
| 3 | 4 4 6 8 |
| 4 | 0 3 6 6 7 |
| 5 | 1 1 3 4 |

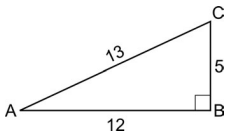
Key: 4 | 3 = 43

**Symbolic Representation**

A representation that uses symbols to model a situation or event. For example, the circumference of a circle is found by multiplying the diameter by pi. The symbolic representation that models this calculation is $C = \pi d$ .

**Tangent Ratio**

The tangent of an angle in a right triangle is the ratio of the length of the opposite side to the length of the adjacent side. For example, in triangle ABC shown below, the tangent of angle A $\left[\tan(A)\right]$ in triangle ABC is the ratio $\frac{5}{12}$.




**Tessellations**

A covering of the plane using the same, non-overlapping shapes.

**Trend Line (line of best fit)**

The line, or equation of a line, that best represents the trend formed by the points in a scatter plot.

**Unwrapping**

The act of solving an equation by using inverse operations and knowing which operation to use first. This concept is sometimes associated with the concept of wrapping and unwrapping a present. When you unwrap, the first step is to "undo" the last step used when the gift was wrapped. For example, to solve the equation $4x + 2 = 6$, you would subtract 2 from both sides of the equation to "unwrap" the $x$.

# GLOSSARY

## SCIENCE GLOSSARY

**Acceleration** — The change in velocity per unit time; it is a vector quantity, as are velocity and position. The metric units of acceleration are meters per second squared or $m/s^2$.

**Aerobic Respiration** — Process of respiration that involves the release of energy from glucose or another organic compound in the presence of oxygen. The basic word equation that summarizes aerobic respiration is (glucose + oxygen $\rightarrow$ carbon dioxide + water + energy). The balanced chemical equation is $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O +$ energy. The energy produced is captured in adenosine triphosphate (ATP) molecules.

**Anaerobic Respiration** — Process of cellular respiration in which a cell obtains energy from inorganic molecules in the absence of oxygen.

**Biome** — A biome is a group of ecosystems that covers a large geographic area, related by having a similar type of vegetation, and governed by a similar climate. Examples of biomes are arctic tundra, coniferous forest, temperate forest, grassland, desert, tropical rain forest, and ocean.

**Biosphere** — Thin layer of Earth's surface where life exists; it includes all living organisms and all organic matter.

**Bohr Model** — Simplified, schematic model of the atom proposed by Niels Bohr in 1915 and more familiarly known as the planetary model. In the Bohr model, neutrons and protons occupy a dense central nucleus and the electrons orbit the nucleus.

**Cardinal Directions** — The four basic points (top or north, bottom or south, left side or west, and right side or east) on a compass.

**Carrying Capacity** — The maximum number of individuals of a species or population that an ecosystem can support without being degraded or destroyed over time.

**Celestial** — Of or related to the sky or universe, as the planets and stars.

**Centripetal Force** — Force acting on a body in curvilinear motion that pulls the object toward the center of curvature or axis of rotation.

# GLOSSARY

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| **Circuit** | Closed path followed by an electrical current. |
| **Closed System** | A complex unity of diverse parts that is isolated so that it experiences no interactions to the outside environment; a closed-loop system. |
| **Communicable Disease** | Disease that is transmittable between persons or species; contagious disease. |
| **Compression Waves** | Waves which travel back and forth in the same direction as the waves wave motion; an example of compression waves is sound waves; also known as longitudinal waves. |
| **Conductor** | Substance or medium that transmits heat, light, sound, or especially, an electrical charge. |
| **Consistency** | Repeatability or reproducibility of measurements. |
| **Continental Drift** | The movement of continents as described by the German geologist and meteorologist Alfred Wegener in 1915. A theory that proposed the continents had once been joined together and have slowly drifted apart by an unknown mechanism. Essentially this theory has been replaced by advances in plate tectonics, which built on the original theory of continental drift. |
| **Constants/Controls** | Those factors (variables) that are kept unchanged or are restricted during a controlled experiment. |
| **Control/Control Group** | A group of subjects or objects in a scientific experiment or group investigation that does not receive the treatment being tested. |
| **Controlled Experiment** | An experiment in which all but one of the variable factors are experiment kept the same in order to observe the results of changing one factor, the independent variable. |
| **Coulomb's Law** | Principle stating that electrostatic force is proportional to the product of the charges and inversely proportional to the square of the distance between them. Charles A. Coulomb, a French scientist, was the first to quantitatively measure the electrical attraction and repulsion between charged objects. |

# GLOSSARY

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| **Covalent Compound** | A compound in which bonded atoms share electrons; it is formed compound when two nonmetals bond to each other. |
| **Data** | Numerical or descriptive, factual information, especially that which is derived from scientific observations or experiments, organized for analysis. |
| **Dependent Variable** | A variable whose value is determined by the changes made in the variable independent variable. Those factors observed for changes in value as a result of adjustments made in the independent variable. |
| **Dichotomous Key** | Tool that can be used to correctly identify organisms or objects in the natural world (e.g., trees, flowers, rocks, minerals) through a series of divergent choices between two descriptions. |
| **Dimensional Analysis** | Problem-solving method based on the fact that any number or analysis mathematical expression can be multiplied by one without changing its value; also called factor-label method or unit factor method. |
| **Doppler Effect** | Apparent change in the wavelength of radiation caused by the relative motion of a source and the observer. As the source and/or the observer draw closer together, the observed frequency is higher than the emitted frequency and decrease as they move apart. |
| **Electromagnetic Waves** | Waves that involve varying electrical and magnetic fields at right angles to each other and the direction of wave propagation (direction of travel of the waves). Examples of these waves that together comprise the electromagnetic spectrum are light (visible, infrared, and ultraviolet) waves, microwaves, x-rays, gamma rays, and radio waves. |
| **Electrostatic Forces** | Forces between electrically-charged objects at rest, as measured and expressed by Coulomb's law. |
| **Empirical** | Based entirely on experimental evidence and observation rather than theory. |
| **Endothermic Chemical Reactions** | Chemical reactions such as photosynthesis that absorb energy in chemical order to proceed and cannot occur spontaneously; these types of reactions reactions are characterized by positive heat flow (i.e., into the reaction) and an increase in enthalpy. |

# GLOSSARY

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| **Eukaryotic Cells** | Cells that contain membrane-bound nuclei and organelles. |
| **Exothermic Chemical Reactions** | Chemical reactions that release energy in the form of heat, light, or chemical sound. In the laboratory, these reactions produce heat and may reactions be flammable or explosive. |
| **Genotype** | Combination of two alleles that an organism inherits for a certain trait; genetic makeup of an organism. |
| **Guiding Questions** | Questions that begin a process of thinking and questioning leading to discovery through exploration and manipulation of data. |
| **Habitat** | Specific environment or part of an ecosystem where an organism lives (e.g., woods, desert). |
| **Hertzsprung-Russell (HR) Diagram** | A two-dimensional plot of the observed stars used to group them by spectral class, relative luminosity (compared to Sun = 1), diagram absolute magnitude or degree of brightness on a logarithmic scale, and effective temperature (Kelvin). |
| **Homeostasis** | The maintenance of the internal environment in a system within tolerable limits; the resistance to change and the maintenance of equilibrium, or constant conditions, in a system. |
| **Hybridization** | 1. Cross-mating between two closely related species.<br><br>2. Concept dictating the nature of bonding and resulting molecular shapes of carbon compounds. |
| **Hypothesis** | Rational explanation of a single event or phenomenon based upon what has been observed but not proven. A tentative explanation for the cause of an observed phenomenon. |
| **Independent Variable** | Manipulated variable in a scientific experiment or investigation that determines the changes in the dependent variables. |
| **Inertia** | The tendency of a body at rest to remain at rest, or if moving in a straight line, to continue moving in a straight line, unless acted on by an outside force. |

# GLOSSARY

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| **Inexhaustible Resources** | Apparently endless resources such as the Sun, wind, or internal resources heat of Earth. |
| **Inference** | Process of drawing a conclusion or making a logical judgment based on prior conclusions or evidence but without direct observation. |
| **Inorganic Matter** | Matter not involving or relating to living organisms or the products of organic life. |
| **Inquiry** | Systematic process of using knowledge and skills to acquire and/or apply new knowledge and skills. |
| **Ion** | An atom or group of atoms that has acquired a net positive or negative electrical charge by gaining or losing one or more electrons. |
| **Ionic Compound** | A compound in which bonded atoms transfer electrons from one to the other; it is usually formed when metals bond to nonmetals. |
| **Kinetic Energy** | The energy of motion of an object, as expressed in the equation, $KE = ½ * m * v^2$, where m equals the mass of the object and v equals the speed of the object. |
| **Lewis Dot Structures** | Symbolic representations in atoms and simple ions showing structures valence electrons as dots placed around the symbol of the element, *and* structures illustrating covalent compounds or polyatomic ions showing valence electrons arranged among the atoms symbols in the molecule to illustrate the bonding of the atoms. |
| **Lithospheric Plate** | One of the movable sections of Earth's crust and upper mantle. |
| **Medium** | Substance, for example water or glass, through which something else, such as sound or light, is transmitted or carried. |
| **Metamorphosis** | Process of change of organisms through various stages in their life cycles. May be complete, involving the four stages of egg, larva, pupa, and adult, as in butterflies and moths, or incomplete, as in the gradual development of many insects and crustaceans. |

# GLOSSARY

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| **Metric System Units of Measurement** | Decimal system of weights and measurements that includes units of Standard International or SI units measurement. |
| **Meiosis** | Process of cellular division in which the number of chromosomes in each daughter cell is reduced by half the number in the parent cell. This cellular division process produces gametes. |
| **Mitosis** | Process of cellular division in which a cell's chromosomes are divided into two identical sets prior to cytoplasmic division. This process produces two identical daughter cells. |
| **Model** | Simulation of a real object that has explanatory power but that typically differs in size, scale, and/or detail; examples include plan, scheme, structure, or mathematical equation. |
| **Molality** | Number of moles of solute dissolved in one kilogram of solvent. |
| **Molarity** | Number of moles of solute dissolved in a liter of solution. |
| **Nebular Hypothesis** | Hypothesis for the origin of the solar system that proposes that hypothesis that the Sun and planets formed from the same cloud of gas and dust in interstellar space. |
| **Niche** | The role an organism carries out in its habitat. |
| **Noncommunicable Disease** | Disease that is not transmittable between persons or species; disease non-contagious disease. |
| **Nonpoint-source** | Sources of pollution that do not result from a single point or pollution source, for example, erosion of soil materials from multiple farms and construction sites that are carried and deposited in an adjacent stream as opposed to specific points of discharge. |
| **Nonstandard Tools** | Objects or instruments such as pieces of string, rows of blocks, tools fingers, hands, or pencils used for measurement; examples do not include standard and systematic means of measurement such as scales, rulers, clocks, and thermometers. |

# GLOSSARY

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| **Normality** | Concentration of a solution expressed in gram equivalent weights of solute per liter; it is particularly useful in titration calculations. |
| **Null Hypothesis** | Statistical hypothesis, often the reverse of what the experimenter actually believes, that is used to determine if the results obtained can be rejected merely on the basis of chance factors. |
| **Organic Matter** | Matter that is of, related to, or derived from living organisms. |
| **Phenotype** | The expression of an organism's traits as a result of its genetic makeup; outward appearance of an organism. |
| **Pitch** | Relative quality of highness or lowness of sound that is primarily dependent on the frequency of the waves produced by its source. |
| **Plate Tectonics** | Theory that Earth's outer shell consists of individual plates which interact in various ways and produce earthquakes, volcanoes, and mountain building. |
| **Point-source Pollution** | Pollution originating from a single source such as a discharge pipe from a sewage plant or chemical factory. |
| **Potable Water** | Water fit for human consumption. |
| **Potential Energy** | Energy that is stored in an object as a result of its vertical position. |
| **Precision** | The relative degree of exactness and reproducibility between measurements or estimates. |
| **Prokaryotic Cells** | Cells that lack an organized, membrane bound nucleus. |
| **Punnett Square** | Chart or grid system used to compute and visualize all possible genotypes of a genetic cross. |
| **Refract** | To deflect or bend from a straight path, as when a light wave changes direction as it passes from one medium into another of different density. |

# GLOSSARY

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| **Revolution** | The motion of a body or object around another body or object, for example, the revolution of Earth around the Sun. |
| **Rotation** | The spinning of a planet such as Earth or other object on its axis. |
| **Rules of Evidence** | Criteria used to examine and evaluate experimental results; examples include testability, reliability, application of standards and controls, error rate, subjection to peer review, and acceptance in the scientific community. |
| **Scalar Quantity** | A quantity that is completely specified by its magnitude and has no direction in space; examples are mass, length, volume, temperature, and speed. |
| **Scientific Evidence** | Evidence in which theories are validated against physical observations and not judged simply on the basis of their logical compatibility with available data; includes criteria such as testability, reliability, application of standards and controls, error rate, subjection to peer review, and acceptance in the scientific community. |
| **Sea-floor Spreading** | It is the process of producing new sea floor crust on the ocean floor between two diverging tectonic plates. |
| **Standard International (SI) Units of Measurement** | More complete, coherent version of the metric system of International measurement; basic units of the SI system include the centimeter (SI) units of or meter, gram or kilogram, and second. measurement |
| **Standard Tools** | Instruments such as meter sticks, pan balances, graduated cylinders, or thermometers used for systematic measurement. |
| **Statistical Significance** | A test performed to determine if the null hypothesis can be significance rejected, and if so, then the effect in the sample is found to be statistically significant. |
| **Stoichiometry** | Quantitative relationship between chemical substances in a reaction. |
| **Superposition** | Principle in geology which states that in any undisturbed sequence of sedimentary rocks each bed is older than the layers above and younger than the layers found below. |

# GLOSSARY

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| **Sustainability** | Capacity of continuing and maintaining a population and growth with minimal long-term effects on natural resources and the environment. *Sustainable* means that a process can be continued indefinitely without depleting the energy and resources upon which it depends. |
| **Sustainable Development** | Development that provides benefits now without sacrificing or development depleting resources or causing environmental impacts that will affect future generations. |
| **Symbolic Representation** | Ways in which science ideas such as chemical elements, formulas, representation ions, and equations are expressed; other examples include numbers in scientific notation illustrations, fractions, graphs, or spreadsheets. |
| **Terrestrial** | Relating to Earth or earthlike, its environments, or its inhabitants. |
| **Testable Question/ a Hypothesis/Investigation** | A query that can be answered through experimentation or research; hypothesis that makes predictions about the compatibility or investigation noncompatibility of observable evidence; an investigation or experiment to answer a testable question or hypothesis. |
| **Scientific Theory** | Explanation of a set of related observations or events based upon theory hypotheses that have verified through multiple investigations. Scientific theories differs from the general use of the word theory because this term applies to well tested and widely accepted ideas that explain certain observable facts. |
| **Translucent** | Transmitting light with sufficient diffusion so as to prevent distinct perception of images. |
| **Transverse Waves** | Waves in which the motion is up and down or at right angles to the direction of propagation or the direction in which the waves are traveling. Examples include radio waves, light waves, heat waves, and water waves. |
| **U.S. System Units of Measurement** | Principal and customary system of weights and measurements of measurement used in the U.S.A.; although the names of the units are the same as in the British system, the sizes of some units differ. |
| **Valence Electron** | Orbital electrons in the outermost shell of an atom that largely determine its properties and that are capable of forming chemical bonds with other atoms. |

# GLOSSARY

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| **Validity** | Degree to which an experimenter is measuring what s/he thinks; more generally refers to the strength of conclusions, inferences, propositions. |
| **Vector Quantity** | Quantity that is not complete unless both a magnitude and a direction are specified; an example is velocity. |
| **Velocity** | Vector quantity specifying both the speed and direction of a body or an object in motion. |
| **Zygote** | Fertilized egg resulting from the joining of two haploid gametes. |

# GLOSSARY

## SOCIAL STUDIES GLOSSARY

**Absolute Chronology** — Chronology is the sequencing of events by time, from earliest to most recent. Absolute chronology is the sequencing of events according to the exact date (day, month, and/or year) that an event occurred.

**Atmosphere** — The several layers of gases that surround Earth and separate our planet from space.

**Biosphere** — The part of Earth and its atmosphere in which plant or animal life exists or is possible.

**Capital Resources** — One of three types of resources, natural, human, and capital, used in the production of goods and services. Capital resources are human-made products, such as tools, equipment, buildings, and machines that are used to produce other goods and services.

**Cardinal Directions** — The four primary points on the compass: north, south, east, and west.

**Choice/Trade-off** — An economic choice requires choosing among alternatives. The result of making a choice is that something is given up to get something else. The result of a choice is a trade-off.

**Command Economy** — An economic system in which the government regulates the economy and answers the four basic economic questions (i.e., "what to produce," "how to produce," "how much to produce," and "for whom to produce"). In a command economy, the central government or authority determines both supply and price.

**Complements** — Goods or services that are usually consumed or used together (e.g., hot dogs/hot dog buns). A change in demand for one complement causes a similar change in demand for the other complement. Also known as complementary goods.

**Concurrent Powers** — Powers that may be exercised by both the national (federal) government and state governments (e.g., the power to tax).

**Consumer** — A person who satisfies a want or need by buying or using a good or service.

# GLOSSARY

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| **Cost/Benefit** | All predicted costs weighed against the predicted benefits of an economic choice. The process and outcome of weighing costs and benefits is known as cost/benefit analysis. |
| **Culture, Elements of** | Cultural elements include the customary beliefs, social forms, and material traits of a racial, religious, or social group. These elements may be spread from group to group through direct and indirect contact. See also **cultural diffusion**. |
| **Cultural Diffusion** | The process of spreading cultural elements (e.g., music, religious beliefs/practices, clothing) from society to society through indirect or direct contact among groups. |
| **Cultural Diversity** | The variety of human cultures represented in a specific group, institution, or region. |
| **Delegated Powers** | Powers granted to the national (federal) government under the U.S. Constitution, including expressed and implied powers, as enumerated in Articles I, II and III (e.g., declaring war). |
| **Demographic Variables** | The statistical data variables of a population (e.g., age, gender, income, location, employment, education). |
| **Demographics** | The characteristics or statistical data of a population as classified by age, gender, income, location, employment, or education. |
| **Division of Labor** | The division of an entire production process into a number of simpler tasks, each one of which is undertaken by a different individual who typically specializes in one task. See also **specialization**. |
| **Economic Institution** | Any institution that has evolved in a market economy to help individuals and/or groups accomplish their goals. Banks, labor unions, corporations, legal systems, and not-for-profit organizations are examples of economic institutions that are essential to a market economy. |
| **Equilibrium Point** | The price when the supply of goods matches demand. Also known as equilibrium price. |

# GLOSSARY

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| **European Union (EU)** | An economic and political association of European countries founded by the Treaty of Rome in 1957 as a common market for six nations. It was known as the European Community until January 1, 1994, and is currently comprised of 15 European countries—Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and Sweden. The EU's goals are a single market for goods and services without any economic barriers, and a common currency—the euro—with one monetary authority. |
| **Federalism** | A form of political organization in which governmental power is divided among a central government and territorial subdivisions (e.g., states, or provinces). |
| **Five Themes of Geography, The** | *Location* (position on Earth's surface), *region* (the basic unit of geographic study), *place* (the human and physical characteristics that give meaning and character to a place and distinguish it from other places), *movement* (humans interacting on Earth), and *human/environment interaction* (the positive and negative effects of people interacting with their surroundings). |
| **G8** | The G8 (Group of Eight) is comprised of the heads of state/government of the major industrialized democracies who meet annually to deal with international trade and other economic and political issues facing their nations or the international community as a whole. The meetings began in 1975 with a Group of Six (France, Germany, Great Britain, Italy, Japan, and the United States). Canada joined in 1976; Russia became a full participant in 1998. |
| **Goods and Services** | A good is an object, such as a toy, a box of cereal, or a computer, that can be used to satisfy a person's want or need. A service, such as waiting on a table or providing dental care, is an action that can be used to satisfy a person's want or need. |
| **Human Characteristics** | In geography, features or patterns of features on Earth's surface created by humans. |
| **Human Resources** | One of three types of resources, natural, human, and capital, used in the production of goods and services. Human resources are people, such as teachers, truck drivers, and factory workers, who work to produce goods or provide services. |

# GLOSSARY

**Human Systems** — The processes, patterns, and functions of human settlement, structures, and competition for control of Earth's surface.

**Hydrosphere** — The water realm of Earth, which includes water contained in the oceans, lakes, rivers, ground, snowfields, glaciers, and water vapor in the atmosphere.

**Implied Powers** — Powers that are not specifically enumerated for the national (federal) government, but are "implied" in Article I, Section 8, Clause 18 of the U.S. Constitution. This clause, also known as the elastic clause, or the necessary and proper clause, gives Congress the authority to "make all laws which shall be necessary and proper for carrying into execution the foregoing powers and all other powers vested by the Constitution in the government of the United States, or in any department or officer thereof." An early example of Congress exercising its implied powers was the establishment of a national bank in 1791.

**Inflation** — An increase in the general level of prices consumers pay for goods and services. This is equivalent to a fall in the value or purchasing power of money. The Consumer Price Index is a common measure of inflation.

**Interdependence** — The situation which occurs when individuals and businesses rely on each other for production of goods or providing services to satisfy wants and needs due to specialization or division of labor. See also **division of labor**, **specialization**.

**Intermediate Directions** — The points on the compass that fall between the four primary points (north, south, east, and west). The intermediate directions are northeast, northwest, southeast, and southwest.

**International Monetary Fund** — An international financial organization that was established in 1946 to stabilize the international monetary system. It manages the global financial system and provides loans to its member states to help alleviate balance of payments problems. Part of its mission is to help countries that experience serious economic difficulties. In return, the countries who are helped are obliged to enact certain reforms, such as privitization.

**Laws** — Regulations that are issued and enforced by a government or other authority and that bind every member of society.

# GLOSSARY

**Limited Government** — A government in which a constitution, statement of rights, or other laws define the limits of those in power. Everyone, including all authority figures, must obey the laws. The United States has a limited government with powers delegated to different branches of government by the U.S. Constitution and its amendments.

**Lithosphere** — The uppermost portion of the solid Earth, including the soil, land, and geologic formations.

**Market Economy** — An economic system in which individuals answer the four basic economic questions (i.e., "what to produce," "how to produce," "how much to produce," and "for whom to produce") based on supply, demand, and prices. This economic system is also known as free enterprise, and has the following characteristics: private ownership of goods and the factors of production, freedom of individuals to make economic choices, the use of prices to allocate resources, and a limited economic role for government.

**Mental Map** — A map that represents the mental image a person has of an area. A mental map includes geographic features and spatial relationships, as well as a person's perceptions and attitudes regarding the place. Also known as a cognitive map.

**Mercantilism** — An economic doctrine/system prevalent in Europe from the 16$^{th}$ century to the mid-18$^{th}$ century. This doctrine held that the economic interests of a nation could be strengthened by tariffs, increased foreign trade, monopolies, and a balance of exports over imports. This economic doctrine influenced the British attitude and policies towards its American colonies (i.e., the colonies were held for the economic benefit of the mother country).

**Migration** — The process of people moving to a new place with the intent of staying at the destination permanently or for a relatively long period of time.

**Militarization** — Act of assembling and putting into readiness for war or other emergency.

**NAFTA** — The North American Free Trade Agreement which was signed by the United States, Canada, and Mexico in 1992 and became effective on January 1, 1994. It created a free trade zone among the three countries and immediately removed trade barriers and tariffs on most goods. Certain tariffs on such goods as textiles and automobiles were planned to be gradually eliminated over a 15-year timetable.

# GLOSSARY

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| **Nation** | A nation is a group of people sharing aspects of their language, culture, religion, and/or ethnicity (e.g., Cherokee Nation). A nation may exist within more than one state (i.e., across political boundaries). The term nation is sometimes applied to a group of people organized under a single government, country, or to the government of a sovereign state. See also **nation-state**. |
| **Nation-State** | Often refers to a political unit of people living in a defined territory, with government authority in their economy, political organization, and external security. Thus, the term nation-state is often used interchangeably with the term state. However, nation-state more properly refers to a state in which a single nation (i.e., group of people sharing aspects of their language, culture, religion, and/or ethnicity) is dominant. See also **nation**. |
| **Natural Disasters** | Calamitous events resulting in great material damage, loss, and distress. They are the result of natural phenomena such as floods, hurricanes, tornadoes, earthquakes, etc. |
| **Natural Resources** | One of three types of resources, natural, human, and capital, used in the production of goods and services. Natural resources are not made by humans. They are found in and on Earth, such as water, oil, and trees. |
| **Opportunity Cost** | The value of the next best (second best) alternative that must be given up when a choice is made. |
| **Patterns of Land Use** | The societal patterns of exploiting the land for agricultural, industrial, residential, or other purposes. |
| **Physical Characteristics** | In geography, traits that are used to describe the natural environment of a place. Physical characteristics may be related to climate, vegetation, soil, landform, or body of water. |
| **Physical Systems** | Physical processes that shape Earth's surface and interact with plant and animal life to create, sustain, and modify ecosystems. |
| **Primary Sources** | Documents produced by a person who participated in or observed an event, or artifacts, such as photographs produced by a person who lived during the time period being studied. |
| **Producer** | A person or business that uses resources to make goods or provide services. |

# GLOSSARY

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| **Productivity** | The relationship between input (workers, machines, materials, and capital) and output (goods and services), e.g., the number of loaves of bread a particular bakery can make in a single day. |
| **Profit** | The amount of money left over after all of the costs of production have been paid (revenues minus costs). |
| **Region** | An area of Earth that has physical or human characteristics that make it distinctive from other areas. |
| **Relative Chronology** | Chronology is the sequencing of events by time, that is from earliest to most recent. Relative chronology is the sequencing of events, individuals, or time periods in relation to each other (e.g., which came first). Relative chronology does not rely on knowing the exact date (day, month, and/or year) that an event occurred. |
| **Relative Location** | A position that is described solely in relation to another position(s); where a place is in relation to other places. |
| **Reserved Powers** | The powers not delegated to the national (federal) government by the U.S. Constitution, nor prohibited to the states. These powers are reserved to the states (e.g., creating a school system) or the people. |
| **Risk** | In economics, risk is the potential loss when a choice is made. For example, in choosing to finance the production of a good, there is the risk that product sales will not generate sufficient revenues to cover production expenses. |
| **Rural Areas** | Areas that are sparsely settled and are distinct from more densely populated urban and suburban areas. Rural areas are also distinct from unsettled, or wilderness, areas. |
| **Scarcity** | The condition that occurs when there are not enough resources (goods and services) to satisfy wants and needs. |
| **Secondary Sources** | Summaries or interpretations of historical events produced by people who did not observe or participate in the events. |

# GLOSSARY

**Specialization** — At a broad level, specialization means the production of a limited variety of goods or services by a business, region, or nation. At an individual level, specialization usually refers to a worker who produces only one part of a final product, rather than producing the entire product (e.g., an autoworker who only installs engines in automobiles). There may also be specialization within providing services (e.g., one person may sort the mail and another may deliver it). See also **division of labor**.

**Substitutes** — Goods or services that can be used or consumed interchangeably (i.e., they satisfy the same want). Also known as substitute goods.

**Suburban Area** — A residential, or largely residential, area located on the outskirts of a city.

**Supply and Demand** — Supply is the quantity of a good or service that producers are willing and able to offer for sale at various prices at any given time. Demand is the quantity of a good or service that consumers are willing and able to buy at various prices at any given time. These two forces combined result in the law of supply and demand: more will be bought at lower prices and less at higher prices, and more will be produced at higher prices than will be produced at lower prices.

**Technology** — A broad and encompassing term that includes any tool, instrument, machine, system, or process that humans develop to solve human problems and/or assist in living in or managing the physical environment.

**Topography** — The shape or configuration of Earth's surface, including relief and position of natural and human-made features.

**Trade-off** — See **choice/trade-off.**

**Traditional Economy** — An economic system in which customs, habits, and religious beliefs determine how the four basic economic questions (i.e., "what to produce," "how to produce," "how much to produce," and "for whom to produce") are answered. In a traditional economy most goods and services are produced by and for a family, with little surplus for sale or barter.

**Unemployment** — In economic terms, the measure of the number of workers that want to work but do not have jobs.

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| **Unlimited Government** | A government in which control is held solely by the ruler and his or her appointees, and there are no limits imposed on the ruler's authority. |
| **Urban Area** | A geographical area constituting a city or town. |
| **World in Spatial Terms, The** | Refers to understanding and interpreting the world in terms of geographic representations. |