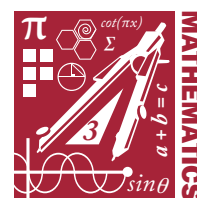
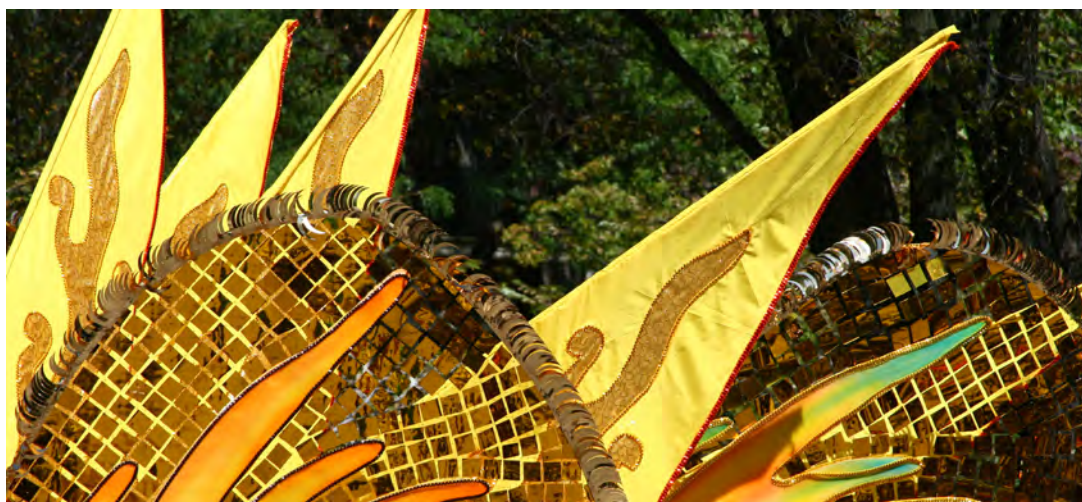


TAKING SHAPE



GRADE 1

This guide links the *Taking Shape* unit to the Texas Essential Knowledge and Skills (TEKS) for first graders. *Taking Shape* is an interdisciplinary mathematics unit that allows students to study geometric shapes and apply mathematical skills through the creation of an original play. *Taking Shape* also has interdisciplinary connections to Fine Arts and English Language Arts and Reading. For example, students will identify elements of a story including setting, character, and key events, as outlined in the English Language Arts and Reading TEKS, and assume roles through imitation, as described in the Fine Arts TEKS. The following document includes the applicable TEKS and the details of the *Taking Shape* unit. The final section of this document presents the applicable Texas College and Career Readiness Standards adopted by the Texas Higher Education Coordinating Board (THECB) on January 24, 2008.

Description of Unit

In this interdisciplinary task, combining mathematics and theatre, students study geometric shapes in their environment through the lens of a fictional story such as *The Greedy Triangle* by Marilyn Burns. Students reinterpret the text, rewrite scenes, and adapt them into a short performance. Furthermore, students apply mathematical vocabulary and skills such as counting, sequencing and measuring through the design and construction of original costumes for the play.

Goals

Students will meet these goals in their explorations:

- Gain awareness of how the number of sides (and angles) vary in simple polygons
- Observe and measure geometric shapes in the classroom and environment
- Study a fictional text, reinterpret, rewrite, and adapt it as an original play using correct mathematical terms and vocabulary
- Have opportunities to apply mathematical skills in the design and construction of costumes
- Develop the essential skills of communicating, creative problem solving, and logical thinking

Taking Shape (Grade 1)

Phase I. Learning Experiences

1. Review with students the geometric figures. Students will create a Venn diagram to identify the differences between two and three dimensional figures. Students will categorize geometric figures into two and three dimensional figures.
2. Introduce the idea of using shapes as characters in a dramatization. One possible suggestion is to read the book, *The Greedy Triangle* by Marilyn Burns. In this story, a triangle becomes dissatisfied with his current lot in life and visits his local shape shifter to turn into other types of shapes. For instance, he becomes a quadrilateral, a pentagon, and a hexagon. Eventually, he becomes greedy and keeps adding angles (and sides) until he becomes very distorted. In the end, he realizes that he was happiest being a triangle. The book contains references to the triangle shape's appearance in many real-world contexts, such as in the orchestra as a musical instrument, in the negative space when people put their hands on their hips, and in bridges and the roofs of houses.
3. Identify triangle shapes in objects within the classroom. Generate a list of other places students might see triangles. What other shapes do students see in the room? Ask students to create a catalog of the shapes they see. Students might want to select 2-3 shapes to draw for their catalog. Count the sides of the "collected" shapes, measure them (if possible), note the location of the shapes in the environment, and include this information in the catalog. The catalog will serve as a reference for student puppets and props later in this phase of the task.
4. Go on a scavenger hunt for shapes outside of the classroom. Ask students to document in a journal where they see triangles and other shapes in their environments. Encourage them to count the sides and take measurements, if possible. If the shapes are not in places students can measure, ask students to estimate how long they think the sides are. Students might want to keep a running tally or poll of where they see particular shapes. What locations do students notice have the most instances of one type of shape? What are the most commonly observed shapes students see? What shape is the most rarely observed?
5. Help students connect the shapes they see to the story. Ask students, "What might be some of the reasons that the author of *The Greedy Triangle* chose the real-world examples that she did? What are some other examples you might suggest that she include?" Brainstorm a list of suggestions.
6. Introduce students to the concepts of role-playing and acting in character and how to demonstrate safe use of voice and movement. Break students into small groups and ask them to refer to their shape catalogs from earlier in this task. Which of the objects can they move easily? Which of the objects might serve as a background or setting? Ask each small group to create a brief puppet show that re-enacts a scene from *The Greedy Triangle* using the shapes they found in the room as characters and props.

Phase II. Independent Research

A. Research process

1. Selecting a topic. Guide students as a group to reimagine and rewrite *The Greedy Triangle* as if it were their own play. You may wish to use the [SCAMPER technique](#) as you go through the story as a whole group, and ask students where they would:
 - **S**ubstitute one of the characters in the story with something else,
 - **C**ombine two of the actions in the story into one,
 - **A**dapt part of the story to reach a different ending,
 - **M**odify the plot of the story so that a different shape stars in the lead role,
 - **P**ut the story to another use, for example as in the design of a board game for kindergarteners,
 - **E**liminate one of the major characters or actions in the story, or
 - **R**everse the plot of the story so that the action flows backwards (e.g., the triangle starts out as a hexagon and loses sides).

As a large group, spend some time playing with the text and altering it to create something new from it. Facilitate a large class discussion where students identify the key changes they will make to adapt the story for dramatic play.

2. Asking guiding questions. Collaborate with the fine arts teacher/specialist and/or the English Language Arts and Reading teacher to help students navigate through the decisions they will need to make to construct their own narrative. For example, some possible questions might include:
 - What shape will play the main character?
 - Why might you choose this shape to be the lead?
 - What will cause this main character to decide he wants to change?
 - How will the shape change?
 - Who will he encounter as he undergoes these changes?
 - What will happen to him as a result of the changes?

Guide students in composing a short, original play based on the ideas the class generated through the SCAMPER technique. You may wish to break students into small groups and isolate certain parts of the story into short scenes. For example, maybe the storyline remains the same, but the key character is a Circle who is sad that he is so round.

- What happens to the Circle when he meets the shape-shifter but finds he does not have enough money to pay for his services?
- How does the Circle earn money?
- What happens to the Circle when, instead of meeting the shape-shifter (who helps him add angles or sides to his body), he instead runs into the dreaded shape-splitter (who divides him into many smaller selves)?
- How does he become whole again if he becomes split during his encounter with the shape-splitter?
- What other shapes does he meet along his journey?

- How do these shapes behave?
 - What do they look like and sound like?
 - Which of these shape-characters help him, and which stand in his way?
3. Creating a research proposal. Capture the students' decisions into an outline that covers the main plot points of the story. Check the document with the class for discussion and agreement. Help students incorporate as many mathematics concepts as they can into the storyline, such as skip-counting groups of shapes that the character meets, telling time at some point during the story, and partitioning one or more of the shapes into two or four parts (e.g., How might students demonstrate partitioning into four parts with their movements or gestures? One possibility is for four students to come together to create one large shape that is then split into smaller units through some action in the story.)
 3. Conducting the research. Collaborate with visual arts and theatre specialists to construct costumes for each character in the play. Students will need to identify each shape/character in the play, measure the dimensions for each costume, sketch original designs, and execute their plans to create safe and wearable costumes for the performance. Students should communicate the specific design requirements for each costume using measurement skills and mathematical vocabulary terms.
 5. Sharing findings. Each student should execute the design to create a wearable shape costume. Additionally, the student will develop the shape's character, incorporating expressive uses of voice and gesture, and perform in the play with peers. If the class is large, you may wish to have groups of students act in a chorus of shapes, possibly summarizing the action for the audience, heightening the suspense through gestures and sound effects, or narrating certain scenes.

Each student develops his or her portrayal of the shape/character that they will depict in the play based on the agreed-upon action (scenes), any dialogue the class developed, and the student's own creative interpretation. For example, if the play features a character such as a large blue square that impedes the main character's progress—is the large blue square in the way because he is grumpy and difficult to get along with (frowning, crossing arms, and furrowing his brow) or is he simply sleepy and is in the way because he keeps nodding off and dreaming?

B. The product

Each student develops his own costume and portrayal of the character he/she will act out in the play. With guidance from the teacher, as well as in collaboration with fine arts specialists on campus, the class as a whole works collaboratively to stage their play in front of an audience such as other first grade classes.

C. Communication

Each class stages the production of an original play derived from their modifications to the storyline and characters of *The Greedy Triangle* by Marilyn Burns. The audience for the play may consist of other first grade classes, kindergarten classes, or parents. The teacher should guide students to capture video documentation, both of the play as well as “behind the scenes” clips and interviews with each actor/actress. Note: Other classes can be camera operators when they are not performing.

D. A completed project consists of:

1. A copy of the script created by the whole group
2. Sketches for the costume
3. The costume and any notes the student keeps related to how the character will act
4. Video or audio of the play, including any “behind the scenes” or actor/actress “interview footage” that might include an audience Q&A session.

Resources

The Greedy Triangle by Marilyn Burns

<http://www.youtube.com/watch?v=kPul4XyyZUE>

Shapes, Shapes, Shapes by Tana Hoban

Internet resource for the SCAMPER tool: http://www.mindtools.com/pages/article/newCT_02.htm

http://www.mathsolutions.com/documents/Greedy_Triangle_Play.pdf (Reader Theater version)

Texas Essential Knowledge and Skills

The unit may address the following TEKS:

English Language Arts and Reading:

- | | |
|------|--|
| 1.4 | Comprehends a variety of texts drawing on useful strategies as needed |
| 1.5 | Reads grade-level text with fluency and comprehension |
| 1.6 | Understands new vocabulary and uses it when reading and writing |
| 1.7 | Analyzes, makes inferences and draws conclusions about theme and genre in different cultural, historical, and contemporary contexts and provides evidence from the text to support their understanding |
| 1.9 | Understands, makes inferences and draws conclusions about the structure and elements of fiction and provides evidence from text to support their understanding |
| 1.16 | Uses comprehension skills to analyze how words, images, graphics, and sounds work together in various forms to impact meaning |

- 1.17 Uses elements of the writing process (planning, drafting, revising, editing, and publishing) to compose text
- 1.18 Writes literary texts to express their ideas and feelings about real or imagined people, events, and ideas
- 1.19 Writes expository and procedural or work-related texts to communicate ideas and information to specific audiences for specific purposes
- 1.20 Understands the function of and uses the conventions of academic language when speaking and writing
- 1.24 Determines, locates, and explores the full range of relevant sources addressing a research question and systematically records the information they gather
- 1.26 Organizes and presents their ideas and information according to the purpose of the research and their audience
- 1.27 Uses comprehension skills to listen attentively to others in formal and informal settings
- 1.28 Speaks clearly and to the point, using the conventions of language
- 1.29 Works productively with others in teams

Mathematics:

- 1.1 Uses mathematical processes to acquire and demonstrate mathematical understanding
- 1.2 Applies mathematical process standards to represent and compare whole numbers, the relative position and magnitude of whole numbers, and relationships within the numeration system related to place value
- 1.3 Applies mathematical process standards to develop and use strategies for whole number addition and subtraction computations in order to solve problems
- 1.4 Applies mathematical process standards to identify coins, their values, and the relationships among them in order to recognize the need for monetary transactions
- 1.5 Applies mathematical process standards to identify and apply number patterns within properties of numbers and operations in order to describe relationships
- 1.6 Applies mathematical process standards to analyze attributes of two-dimensional shapes and three-dimensional solids to develop generalizations about their properties
- 1.7 Applies mathematical process standards to select and use units to describe length and time
- 1.9 Applies mathematical process standards to manage one's financial resources effectively for lifetime financial security

Social Studies:

- 1.3 Understands the concepts of time and chronology
- 1.6 Understands various physical and human characteristics
- 1.16 Understands how technology affects daily life, past and present
- 1.17 Applies critical-thinking skills to organize and use information acquired from a variety of valid sources, including electronic technology
- 1.18 Communicates in oral, visual, and written forms
- 1.19 Uses problem-solving and decision-making skills, working independently and with others, in a variety of settings

Fine Arts:**Theatre**

- 1.1 Develops concepts about self, human relationships, and the environment, using elements of drama and conventions of theatre
- 1.2 Interprets characters, using the voice and body expressively, and creates dramatizations
- 1.3 Applies design, directing, and theatre production concepts and skills
- 1.5 Responds to and evaluates theatre and theatrical performances

Texas College and Career Readiness Standards

This unit may address the following Texas College and Career Readiness Standards:

English Language Arts:

- I.A.4 Recognizes the importance of revision as the key to effective writing
- I.A.5 Edits writing for proper voice, tense, and syntax, assuring that it conforms to standard English, when appropriate
- II.A.1 Uses effective reading strategies to determine a written work's purpose and intended audience
- II.A.2 Uses text features and graphics to form an overview of informational texts and to determine where to locate information
- II.A.3 Identifies explicit and implicit textual information including main ideas and author's purpose
- II.A.10 Identifies and analyzes how an author's use of language appeals to the senses, creates imagery, and suggests mood
- III.A.1 Understands how style and content of spoken language varies in different contexts and influences the listener's understanding
- III.A.2 Adjusts presentation (delivery, vocabulary, length) to particular audiences and purposes
- III.B.1 Participates actively and effectively in one-on-one oral communication situations
- III.B.2 Participates actively and effectively in group discussions
- IV.A.1 Analyzes and evaluates the effectiveness of a public presentation
- IV.A.2 Interprets a speaker's message; identifies the position taken and the evidence in support of that position
- IV.B.1 Listens critically and responds appropriately to presentations
- IV.B.2 Listens actively and effectively in one-on-one communication situations
- IV.B.3 Listens actively and effectively in group discussions
- V.A.1 Formulates research questions
- V.A.2 Explores a research topic
- V.B.3 Synthesizes and organizes information effectively
- V.C.1 Designs and presents an effective product

Mathematics:

- I.A.1 Compares real numbers
- I.A.2 Defines and gives examples of complex numbers
- I.B.1 Performs computations with real and complex numbers
- III.A.1 Identifies and represents the features of plane and space figure
- III.A.2 Makes, tests, and uses conjectures about one-, two-, and three-dimensional figures and their properties
- III.B.1 Identifies and applies transformations to figure
- III.B.2 Identifies the symmetries of a plane figure
- III.B.3 Uses congruence transformations and dilations to investigate congruence, similarity, and symmetries of plane figure
- III.C.3 Makes connections between geometry and measurement
- IV.A.1 Selects or uses the appropriate type of unit for the attribute being measured
- IV.B.1 Converts from one measurement system to another
- IV.C.3 Determines indirect measurements of figures using scale drawings, similar figure, the Pythagorean Theorem, and basic trigonometry
- VI.B.2 Selects and applies appropriate visual representations of data
- VI.B.4 Describes patterns and departure from patterns in a set of data
- IX.A.1 Uses mathematical symbols, terminology, and notation to represent given and unknown information in a problem
- IX.A.2 Uses mathematical language to represent and communicate the mathematical concepts in a problem
- IX.A.3 Uses mathematics as a language for reasoning, problem solving, making connections, and generalizing
- IX.B.1 Models and interprets mathematical ideas and concepts using multiple representations
- IX.B.2 Summarizes and interprets mathematical information provided orally, visually, or in written form within the given context
- IX.C.1 Communicates mathematical ideas, reasoning, and their implications using symbols, diagrams, graphs, and words
- IX.C.2 Creates and uses representations to organize, record, and communicate mathematical ideas
- IX.C.3 Explains, displays, or justifies mathematical ideas and arguments using precise mathematical language in written or oral communications
- X.B.1 Uses multiple representations to demonstrate links between mathematical and real-world situations
- X.B.2 Understands and uses appropriate mathematical models in the natural, physical, and social sciences

Science:

- I.C.1 Collaborates on joint projects
- I.D.1 Demonstrates literacy in computer use

- I.D.2 Uses computer models, applications, and simulations
- I.E.1 Uses several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic
- I.E.2 Uses essential vocabulary of the discipline being studied
- III.B.4 Lists, uses and gives examples of specific strategies before, during, and after reading to improve comprehension
- III.C.1 Prepares and represents scientific/technical information in appropriate formats for various audiences

Social Studies:

- IV.A.5 Reads narrative texts critically
- IV.A.6 Reads research data critically
- IV.B.1 Uses established research methodologies
- IV.B.3 Gathers, organizes, and displays the results of data and research
- IV.B.4 Identifies and collects sources
- IV.C.1 Understands/interprets presentations critically
- V.A.1 Uses appropriate oral communication techniques depending on the context or nature of the interaction
- V.A.2 Uses conventions of standard written English
- V.B.1 Attributes ideas and information to source materials and authors

Cross-Disciplinary Standards:

- I.C.1 Analyzes a situation to identify a problem to be solved
- I.C.2 Develops and applies multiple strategies to solving a problem
- I.C.3 Collects evidence and data systematically and directly related to solving a problem
- I.D.1 Self-monitors learning needs and seeks assistance when needed
- I.D.2 Uses study habits necessary to manage academic pursuits and requirements
- I.D.3 Strives for accuracy and precision
- I.D.4 Perseveres to complete and master tasks
- I.E.1 Works independently
- I.E.2 Works collaboratively
- I.F.1 Attributes ideas and information to source materials and people
- I.F.2 Evaluates sources for quality of content, validity, credibility, and relevance
- II.A.3 Identifies the intended purpose and audience of the text
- II.A.4 Identifies the key information and supporting details
- II.A.5 Analyzes textual information critically
- II.A.6 Annotates, summarizes, paraphrases, and outlines texts when appropriate
- II.A.7 Adapts reading strategies according to structure of texts
- II.A.8 Connects reading to historical and current events and personal interest

- II.B.1 Writes clearly and coherently using standard writing conventions
- II.B.2 Writes in a variety of forms for various audiences and purposes
- II.C.5 Synthesizes and organizes information effectively
- II.C.6 Designs and presents an effective product
- II.C.7 Integrates source material
- II.C.8 Presents final product
- II.D.1 Identifies patterns or departures from patterns among data
- II.D.2 Uses statistical and probabilistic skills necessary for planning an investigation, and collecting, analyzing, and interpreting data
- II.E.1 Uses technology to gather information
- II.E.4 Uses technology appropriately