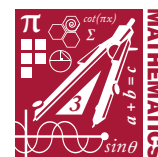


# TREND-SPOTTING



This guide links the *Trend-spotting* unit to the Texas Essential Knowledge and Skills (TEKS) for kindergarteners. *Trend-spotting* is a mathematics unit that allows students to observe trends in their everyday environments. *Trend-spotting* also has interdisciplinary connections to English Language Arts, Social Studies, and Fine Arts disciplines. For example, students will compose original texts, as outlined in the English Language Arts and Reading TEKS, and understand physical and human characteristics of the environment, as described in the Social Studies TEKS. Also, students will sharpen their perceptual and creative expression skills as indicated by the Fine Arts TEKS. The following document includes the applicable TEKS and the details of the *Trend-spotting* 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 task, students will use the basic mathematical skills of counting, grouping, and comparing to observe patterns and spot trends in their everyday environments. Students observe how quantities of items counted vary over time and how they might make predictions based on increasing or decreasing numbers. Students keep a trend-spotting journal, counting a self-selected item either in the classroom or at home for a period of two weeks. Then, students illustrate their findings by creating a series of posters for data analysis. Each poster indicates the quantity of the item counted on a certain day, a visual representation of that number, and a graphical image depicting the object being studied. Teachers guide the students in sequencing the posters chronologically in preparation for analysis. Finally, students adopt the role of a product designer and apply their learning to the creation of an original design for the item being studied. In the final presentation, they pitch their design idea to the class alongside their data. Will they follow the observed trends or deviate from them in their own designs? How will they explain their creative decisions?

### *Trend-spotting* (Kindergarten)

## Goals

Students will meet these goals in their explorations:

- Become familiar with using mathematics as a way to observe patterns in everyday life
- Collect and analyze data, make predictions and inferences, and draw conclusions using quantitative data
- Create and use representations to organize, record, and communicate mathematical ideas
- Ask questions and explore theories
- Have opportunities to design original works informed by previous learning
- Develop the essential skills of communicating, creative problem solving, and logical thinking

Teacher Directions	Additional Teacher Preparation & Notes
<p><b>Elicit</b></p> <p>Show students the flag of the state of Texas and the flag of the United States of America. Both flags have similar characteristics and colors. What are some differences students notice between the stars and stripes of each flag? Ask the students to count the numbers of red and white stripes and the numbers of stars. Show students earlier versions of the United States flag. How do the stars differ in these earlier flags?</p> <ul style="list-style-type: none"> <li>• What would happen to the current flag of the United States if, instead of alternating between red and white stripes, the red stripes were bunched together?</li> <li>• How have the addition of stars changed the design of the flag?</li> </ul> <p>You may wish to graph the number of stars over time to show students how they have increased and discuss the meaning behind that trend (e.g., the United States was growing).</p> <p>Introduce students to the concept of a pattern and how mathematics can be used to observe patterns in the environment.</p>	<p>Use the concrete visual comparison of the two flags of the United States of America and the State of Texas to assess student's basic understanding of patterns.</p> <p>You may wish to print out examples such as those found at <a href="http://en.wikipedia.org/wiki/History_of_the_flags_of_the_United_States">http://en.wikipedia.org/wiki/History_of_the_flags_of_the_United_States</a>. If time permits, you might have students color or construct their own versions of the flag with various patterns of red, white and blue.</p>
<p><b>Engage</b></p> <p>Ask students to name their current favorite flavor of ice cream. Group students according to flavors and ask each group to count the number of members. Write down the flavor names along with the counts on the board.</p> <ul style="list-style-type: none"> <li>• What are some similarities and differences that students notice?</li> </ul>	<p>Gather counts for students' favorite flavors of ice cream. You will want to ask for the current flavor, as well as their flavor preferences last year and the year before.</p>

<ul style="list-style-type: none"> <li>• Think back to when you were 3 years old. What was your favorite ice cream flavor then? What was your favorite ice cream flavor when you were 4 years old?</li> <li>• How may students' flavor preferences changed over time? For example, ask students who once liked vanilla, but now prefer chocolate, how their current choices impact the numbers the class recorded.</li> </ul> <p>You may wish to show the class a book such as <i>More, Fewer, Less</i> by Tana Hoban or send home an activity such as <a href="#">Counting Around the House</a>.</p>	<p>Ask students to think back and vote on their favorite flavors at each point in their life. Group and count the results and keep track of the numbers on the board.</p> <p>Create a bar graph on chart paper to show the class how the trends have changed.</p>
<h2>Explain</h2> <p>Introduce the <a href="#">definition of trend(s)</a> to the students. Complete a graphic organizer with the students with the definitions and examples of trends.</p> <ul style="list-style-type: none"> <li>• <a href="http://www.merriam-webster.com/dictionary/trend">http://www.merriam-webster.com/dictionary/trend</a></li> <li>• <a href="http://dictionary.reference.com/browse/Trends">http://dictionary.reference.com/browse/Trends</a></li> <li>• <a href="http://www.visuwords.com/fullscreen/">http://www.visuwords.com/fullscreen/</a></li> </ul>	<p>Lead the class in a discussion connecting the concept of a trend with changes to patterns over time using the ice cream activity from Engage (e.g., what changes might have caused the number of votes for vanilla to go down? In what ways were these related to increases in the number of votes for chocolate?)</p> <p>Some guiding questions might include:</p> <ul style="list-style-type: none"> <li>• In what ways are patterns and trends related?</li> <li>• How might we use mathematics to track a trend?</li> <li>• How might the changes in the choices of ice cream flavor (from the Engage activity) cause changes in the trend for favorite flavors (e.g., increasing or decreasing values)?</li> </ul>

### Trend-spotting (Kindergarten)

## Explore

Introduce the concept of a measurable trend as something that can be observed by counting and observing whether the quantity either increases, decreases, or stays the same over time. As in the book, *More, Fewer, Less*, observing and counting objects in real life is like a photographic snapshot—things may be different before we “take the picture” —before we count and after. Ask students to divide up by the color of shirts they are wearing (or other appropriate option). Write the answers on the board and explain to students that we will count the colors of shirts tomorrow.

Ask the class how many students they think will wear the same color shirt tomorrow? Introduce this concept as the students’ prediction and write the number down on the board.

Have students keep a trend-spotting journal in which students record observations about patterns, consult with others about what has been observed, and theorize about how those patterns might change over time. Ask students to identify at least one object or event in their environment to count over the course of two weeks. Students may consider the following questions to guide their selections:

- What are some of the most popular colors of cars in my area?
- How many students prefer lighter colored (white, pastels, neutrals) clothing to darker colors (navy, black, brown)?
- How often are the same lunch meals served in the cafeteria?

Students will depict their data in a poster presented to the class. (See the lessons below on graphing.)

<http://illuminations.nctm.org/lessons/GridPaper-Large.pdf>

Guide students’ practice in identifying objects to count, collecting data, and observing trends.

## Explain

Students will present their posters from the previous Explore activity to the class. Presentations might address the following questions:

- Why the student chose the particular object to study and where the object can be found within the student’s environment?
- How common or rare the object seems to the student (e.g., is it an object that he/she observes often, or is it uncommon)?
- How many times was the student able to count the object over the course of the week?
- What are the student’s predictions for how the count might increase, decrease, or stay the same should he/she count the object next week?

Students’ posters should demonstrate their use of data analysis skills as described in the TEKS:

- (A) collect, sort, and organize data into two or three categories;
- (B) use data to create real-object and picture graphs; and
- (C) draw conclusions from real-object and picture graphs.

## Elaborate (Phase II)

### Research process

1. **Selecting a topic.** Introduce students to the idea of tracking trends as a way to improve product designs. For instance, trends are useful to de For example, if a student was trying to design a new tennis shoe, he/she might begin by collecting numeric data on usage of the most popular shoes. If the target audience for the student's shoe includes kids aged 5-8, he/she might survey individuals in that age group to count the types of shoes most frequently worn. The student might also count preferences such as colors, sole patterns, or lace designs.

Form small groups to brainstorm items to count. Students should consider items where change occurs with at least daily frequency such as clothing, observed automobiles during commutes, preferences for television programming, video game usage, or app usage. For example, students would not likely want to count the number of people or pets in their household as these numbers should remain stable during the two-week period. Students might count events or activities, but again these should change. For example, if the student plays video games everyday, he/she may not want to count the game, if it is the same game, but rather the number of hours he/she plays with the game, which may vary. Each student in the group should count the same types of items/activities so that the group can collect a larger set of data.

2. **Asking guiding questions.** Each group selects an item to count over the two-week period. Students will collect the data individually in their journals. Teachers can use this opportunity to show how each student may arrive at different results depending upon whether he/she does the counting in a different or similar environment to the other students (i.e., the home versus the classroom). Guiding questions for students to ask include:
  - At what time of day will I count these items?
  - How might the time of day that I count influence my results?
  - What items can I count every day without forgetting?
  - How might I predict these items changing each day?
  - Will the item I select to count keep my interest

During the *Elaborate* section of this task, guide students through the research process for a student-selected topic that tracks trends in the environment.

Students will be counting and tracking the trends as a way to inform a redesign of the object, activity, or application.

The final product will consist of one poster depicting the trend data and one poster consisting of the student's original design of the object being studied.

<p>over the research period?</p> <ul style="list-style-type: none"> <li>• How will I ensure that I count and record my data each day?</li> </ul> <p><b>3. Creating a research proposal.</b> Guide students in completing a topic selection and/or research plan proposal such as those in the <a href="#">Sample Forms</a> section of this website. If the observation and data collection (counting) will occur outside of school hours, be sure to send the forms home to parents so they are aware of the project and can provide guidance to the student as he/she conducts the research.</p> <p><b>4. Conducting the research.</b> Count the item each day, preferably at the same time. Record the quantity counted in your journal. What changes are you observing as you turn the pages backwards and forwards? How are the numbers from the days before more or less than the numbers from the current counting? Explain how you know. What are some possible reasons for the changes?</p>	
<p><b>Explain</b></p> <p>Each student takes on the role of a product designer and creates a new version of the item being counted. Students turn their journal into a sequence of posters to help their classmates observe the trends and then create a final poster that serves as an advertisement for the student’s original design.</p> <p><b>The product</b></p> <p>Each student should create two 8.5 x 11 inch posters. The first poster illustrates the data they captured in their journal. For example, students who are collecting information on T-shirt colors may choose to collage images of T-shirts from magazines on each poster, and write in numbers, as well as depict with colored shapes, the quantities counted each day.</p> <p>Once the posters depicting the trend are complete, students assume the role of a product designer or marketer and create a second poster for their own version of the object. This final poster might resemble an advertisement, with features and benefits of the new design captured. The student will pitch his/her ideas for the new product during the poster presentation and will discuss how the trend-spotting activity informed his/her choices.</p>	<p>Students will create a pair of posters. The first poster illustrates the student’s research findings. The second poster applies the student’s understanding of the trend through the development of a creative redesign of the item being studied.</p>

<p><b>Communication</b></p> <p>Help students hang their posters in chronological order along a wall for discussion and analysis. Students will present posters to the class and the group will identify any increasing or decreasing trends by viewing the posters in sequence on the wall. Additionally, students will present the redesigned product and explain the rationale behind their creative decisions.</p>	
<p><b>Evaluate</b></p> <p>Use the TPSP Primary Rubric to assess each student’s learning. Additionally, you may wish to develop self- or peer-assessments based on the rubric that students could use to evaluate their products.</p> <p><b>A completed project consists of:</b></p> <ol style="list-style-type: none"> <li>1. Trend-spotting journal</li> <li>2. Poster series depicting observed patterns</li> <li>3. Product design poster</li> <li>4. Videotape or audiotape of the poster presentation, including the Q&amp;A session</li> </ol> <p>In what ways did the student:</p> <ul style="list-style-type: none"> <li>• Develop sophisticated, open-ended questions about the self-selected topic;</li> <li>• Use a variety of sources that access advanced content and include multiple perspectives;</li> <li>• Collect data using the tools of the discipline;</li> <li>• Analyze and interpret the data;</li> <li>• Capture and apply their analysis through an original product; and</li> <li>• Communicate his/her research findings, learning, and ideas to an audience using the language of the discipline.</li> </ul>	<p>The TPSP Primary Rubric can be downloaded at <a href="http://www.texaspsp.org/primary/primary-assessment.php">http://www.texaspsp.org/primary/primary-assessment.php</a>.</p>
<p><b>Extend</b></p> <p>Tracking trends and patterns using mathematics is a vital skill that can be applied to study in a variety of disciplines. The following guiding questions provide interdisciplinary research extensions to the Trend-spotting task.</p> <p><b>Science</b></p> <p>What was the hottest month you experienced this summer? How has</p>	

the temperature of your city during this month changed over the past ten years? With the help of your teacher and/or the librarian, gather weather data for your city during this hot month. Pick a single day within the month (e.g., July 5<sup>th</sup>) and make a chart of the high temperatures from each of the years' data sets that you gathered. In what year was the warmest day? What might be your prediction for the temperatures for the next five summers in your city?

**Social Studies**

How have the numbers and types of buildings in your neighborhood changed over time? Count the number of houses, apartments, and office buildings in your neighborhood now and compare your counts with historical data from the library or local historical society (e.g., ask your teacher or librarian to help you find sources for past building types and counts such as historical photographs of your neighborhood). What do you notice when you review the numbers for each type of building? What are your thoughts as to why these changes might be happening in your neighborhood? How do you feel about the changes? What changes do you predict might occur in the future?

**Fine Arts**

What types of music do people in your life prefer? How have their taste preferences changed over time? Interview family members, neighbors, and friends and ask each group to name at least three different types of music they have enjoyed during different times in their lives. How old were they during each phase? Where were they living and what was their life like? How do they feel about that type of music now?

**English Language Arts**

Survey family members and friends in your area to determine how they most prefer to communicate when they are not able to speak to a person face-to-face, on the phone, or through a video chat program. Count the number of responses for short written communications such as texts, emails, tweets, Facebook posts, or hand-written letters or notes. Ask each person who completes your survey to provide his/her age. Group your results by age to see if any patterns emerge. What do you notice? Do your data indicate differences in preferences for one form over another—for example, hand-written notes over texts— between people of various ages?



## Resources

*More, Fewer, Less* by Tana Hoban

*Anno's Math Games* by Mitsumasa Anno

*Anno's Hat Tricks* by Mitsumasa Anno

*12 Ways to Get to 11* by Eve Merriam

*Patterns Around Us – Recognizing Patterns* by Tony Hyland

<http://pbskids.org/lab/activity/countingaroundthehouse/>

<http://pbskids.org/lab/games/>

<http://illuminations.nctm.org/LessonDetail.aspx?id=U64>

<http://illuminations.nctm.org/LessonDetail.aspx?id=L42>

<http://illuminations.nctm.org/LessonDetail.aspx?id=L79>

## Texas Essential Knowledge and Skills

The unit may address the following TEKS:

### English Language Arts and Reading:

- K.4 Comprehends a variety of texts drawing on useful strategies as needed
- K.5 Understands new vocabulary and uses it correctly when reading and writing
- K.10 Analyzes, makes inferences and draws conclusions about expository text, and provides evidence from text to support their understanding
- K.11 Understands how to glean and use information in procedural texts and documents
- K.13 Uses elements of the writing process (planning, drafting, revising, editing, and publishing) to compose text
- K.14 Writes literary texts to express their ideas and feelings about real or imagined people, events, and ideas
- K.15 Writes expository and procedural or work-related texts to communicate ideas and information to specific audiences for specific purposes
- K.16 Understands the function of and uses the conventions of academic language when speaking and writing and continue to apply earlier standards with greater complexity
- K.17 Writes legibly and uses appropriate capitalization and punctuation conventions in their compositions
- K.18 Spells correctly
- K.19 Asks open-ended research questions and develops a plan for answering them
- K.20 Determines, locates, and explores the full range of relevant sources addressing a research question and systematically records the information they gather
- K.21 Uses comprehension skills to listen attentively to others in formal and informal settings
- K.22 Speaks clearly and to the point, using the conventions of language
- K.23 Works productively with others in teams

### *Trend-spotting (Kindergarten)*

**Mathematics:**

- K.1 Uses mathematical processes to acquire and demonstrate mathematical understanding
- K.2 Applies mathematical process standards to understand how to represent and compare whole numbers, the relative position and magnitude of whole numbers, and relationships within the numeration system
- K.6 Applies mathematical process standards to analyze attributes of two-dimensional shapes and three-dimensional solids to develop generalizations about their properties
- K.7 Applies mathematical process standards to directly compare measurable attributes
- K.8 Applies mathematical process standards to collect and organize data to make it useful for interpreting information

**Science:**

- K.2 Develops abilities to ask questions and seek answers in classroom and outdoor investigations
- K.3 Knows that information and critical thinking are used in scientific problem solving
- K.4 Uses age-appropriate tools and models to investigate the natural world
- K.5 Knows that objects have properties and patterns
- K.8 Knows that there are recognizable patterns in the natural world and among objects in the sky

**Social Studies:**

- K.3 Understands the concept of chronology
- K.14 Applies critical-thinking skills to organize and use information acquired from a variety of valid sources, including electronic technology
- K.15 Communicates in oral and visual forms
- K.16 Uses problem-solving and decision-making skills, working independently and with others, in a variety of settings

**Fine Arts:****Art**

- K.1 Develop and organize ideas from the environment
- K.2 Express ideas through original artworks, using a variety of media with appropriate skill
- K.3 Demonstrate an understanding of art history and culture as records of human achievement
- K.4 Make informed judgments about personal artworks and the artworks of others

## Texas College and Career Readiness Standards

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

**English Language Arts:**

- I.A.1 Determines effective approaches, forms, and rhetorical techniques that demonstrate

- understanding of the writer’s purpose and audience
- I.A.2 Generates ideas and gathers information relevant to the topic and purpose, keeping careful records of outside sources
- I.A.3 Evaluates relevance, quality, sufficiency, and depth of preliminary ideas and information, organizes material generated, and formulates thesis
- 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
- 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.B.1 Listens critically and respond 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.A.3 Refines research topic and devise a timeline for completing work
- V.B.1 Gathers relevant sources
- V.B.2 Evaluates the validity and reliability of sources
- V.B.3 Synthesizes and organize information effectively
- V.C.1 Designs and presents an effective product
- V.C.2 Uses source material ethically

### Mathematics:

- II.C.2 Explains the difference between the solution set of an equation and the solution set of an inequality
- II.D.1 Interprets multiple representations of equations and relationships
- II.D.2 Translates among multiple representations of equations and relationships
- III.A.2 Makes, tests, and uses conjectures about one-, two-, and three-dimensional figures and their properties
- III.A.3 Recognizes and applies right triangle relationships including basic trigonometry
- 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.1 Makes connections between geometry and algebra
- III.C.2 Makes connections between geometry, statistics, and probability
- VI.B.1 Determines types of data
- VI.B.2 Selects and applies appropriate visual representations of data

VI.B.3	Computes and describes summary statistics of data
VI.B.4	Describes patterns and departure from patterns in a set of data
VI.C.1	Makes predictions and draws inferences using summary statistics
VI.C.2	Analyzes data sets using graphs and summary statistics
VIII.B.2	Uses various types of reasoning
VIII.C.1	Formulates a solution to a real world situation based on the solution to a mathematic problem
VIII.C.2	Uses a function to model a real-world situation
VIII.C.3	Evaluates the problem solving process
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
X.A.2	Connects mathematics to the study of other disciplines
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.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.C.1	Prepares and represents scientific/technical information in appropriate formats for various audiences
III.D.1	Uses search engines, databases, and other digital electronic tools effectively to locate information
III.D.2	Evaluates quality, accuracy, completeness, reliability, and currency of information from any source
V.C.1	Recognizes patterns of change

### Social Studies:

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.A.1 Engages in scholarly inquiry and dialogue
- 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 relates 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
- II.A.3 Identifies the intended purpose and audience of the text
- II.A.4 Identifies the key information and supporting details
- II.C.1 Understands which topics or questions are to be investigated
- II.C.2 Explores a research topic
- II.C.3 Refines research topic based on preliminary research and devises a timeline for completing work
- II.C.6 Designs and present an effective product
- II.C.7 Integrates source material
- II.C.8 Presents final product
- II.D.3 Presents analyzed data and communicate findings in a variety of formats
- II.E.1 Uses technology to gather information