STAAR

The State of Texas of Assessment of Academic Readiness (STAAR) is based on the Texas Essential Knowledge and Skills (TEKS). Most of the state standards, if they are eligible for assessment in a multiple choice/short answer format, will be assessed on STAAR.

STAAR is designed as a **vertical** system. Just as the TEKS are structured in a vertically aligned manner, so is STAAR. Learning from one grade level is aligned with learning at the next grade level. Some skills are developed over the course of a student’s educational career from kindergarten through high school, while other skills and learning may begin at a particular grade level and serve as the foundation for later learning. STAAR is an assessment of **academic** readiness.

STAAR is designed to ensure that teachers answer these questions:
- Did students learn what they were supposed to learn in the current year’s grade?
- Are students ready for the next grade?
- And are they also ready for the grade after that?

So what’s the big deal about that shift? Fundamentally, it requires that teachers relook at curriculum and instruction in a very different way than they have under previous assessment systems (TABS, TEAMS, TAAS, TAKS). Not only are teachers required to have a deep understanding of the content of the grade level they are teaching, but they must also be firmly grounded in how the content of that current grade level prepares students for subsequent grade levels. Overemphasis on grade level attainment **ONLY** may create a context where teachers in subsequent grade levels have to reteach foundational skills to accommodate for the gap created by the lack of appropriate emphasis earlier. It may require students to “unlearn” previous ways of conceptualizing content and essentially start all over.

**STAAR: focus, clarity, depth**

[The TEKS] are designed to prepare students to succeed in college, in careers and to compete globally. However, consistent with a growing national consensus regarding the need to provide a more clearly articulated K-16 education program that focuses on fewer skills and addresses those skills in a deeper manner, TEA has further refined the TEKS organization as follows.

STAAR is designed around three concepts: focus, clarity, and depth:

- **Focus**: STAAR will focus on grade level standards that are critical for that grade level and the ones to follow
- **Clarity**: STAAR will assess the eligible TEKS at a level of specificity that allow students to demonstrate mastery
- **Depth**: STAAR will assess the eligible TEKS at a higher cognitive level and in novel contexts
STAAR: the assessed curriculum – readiness, supporting, and process standards

A key concept that underpins the design of STAAR is that all standards (TEKS) do not play the same role in student learning. Simply stated, some standards (TEKS) have greater priority than others - they are so vital to the current grade level or content area that they must be learned to a level of mastery to ensure readiness (success) in the next grade levels. Other standards are important in helping to support learning, to maintain a previously learned standard, or to prepare students for a more complex standard taught at a later grade.

By assessing the TEKS that are most critical to the content area in more rigorous ways, STAAR will better measure the academic performance of students as they progress from elementary to middle to high school. Based on educator committee recommendations, for each grade level or course, TEA has identified a set of readiness standards - the TEKS which help students develop deep and enduring understanding of the concepts in each content area. The remaining knowledge and skills are considered supporting standards and will be assessed less frequently, but still play a very important role in learning.

Readiness standards have the following characteristics:

» They are essential for success in the current grade or course.
» They are important for preparedness for the next grade or course.
» They support college and career readiness.
» They necessitate in-depth instruction.
» They address broad and deep ideas.

Supporting standards have the following characteristics:

» Although introduced in the current grade or course, they may be emphasized in a subsequent year.
» Although reinforced in the current grade or course, they may be emphasized in a previous year.
» They play a role in preparing students for the next grade or course but not a central role.
» They address more narrowly defined ideas.

STAAR assesses the eligible TEKS at the level at which the TEKS were written.

STAAR is a more rigorous assessment than TAKS (and TAAS, TEAMS, TABS before that). The level of rigor is connected with the cognitive level identified in the TEKS themselves. Simply stated, STAAR will measure the eligible TEKS at the level at which they are written.

The rigor of items will be increased by

» assessing content and skills at a greater depth and higher level of cognitive complexity
» assessing more than one student expectation in a test item

The rigor of the tests will be increased by

» assessing fewer, yet more focused, student expectations and assessing them multiple times and in more complex ways
» including a greater number of rigorous items on the test, thereby increasing the overall test difficulty
About the STAAR Field Guide for Teachers

The STAAR Field Guide for Teachers is designed as a tool to help teachers prepare for instruction. The tools and resources in this guide are designed to supplement local curriculum documents by helping teachers understand how the design and components of STAAR are connected to the scope and sequence of instruction. In order to help students attain even higher levels of learning as assessed on STAAR, teachers need to plan for increasing levels of rigor. This guide contains the following components:

**STAAR Readiness and Supporting Standards Analysis Sheets** - overviews of the nature of each readiness and supporting standard assessed on STAAR, designed to be used in planning to build teacher content knowledge and ensure that current grade level instruction reinforces previous learning and prepares students for future grade levels.

**STAAR-Curriculum Planning Worksheet** - a tool to organize the pages in this guide to be used in planning and professional development.
Steps to Success

1. Download the TEA Documents to add to your STAAR Teacher Field Guide
   - STAAR Blueprint
   - Assessed Curriculum Documents
   - STAAR Test Design
   - STAAR Reference Materials

2. Visit lead4ward.com/resources to download lead4ward resource materials to add to your STAAR Field Guide
   - STAAR Snapshot
   - TEKS Scaffold Documents
   - IQ Released Tests
   - Student Recording Sheets

3. Review the STAAR Snapshot for your course/grade level and content area
   - Note the readiness standards
   - With your team, explore why those TEKS are classified as readiness standards - and which criteria they meet
   - Review the supporting standards and note any that may have played a larger role on TAKS

4. Review the components of the STAAR Readiness and Supporting Standards Analysis Sheets
   - Use the samples on pages 6 and 7 to explore the analysis sheets
   - Add additional information based on the discussion of the team

5. Create STAAR-Curriculum Planning Packets for each unit or grading period
   - Collect either the Scope and Sequence document (if it includes the TEKS standards for each unit of instruction) OR Unit Plan documents (where the TEKS standards are bundled together into units of instruction)
   - The STAAR Field Guide is arranged by standard type (readiness or supporting) in numeric order of the standards. You may need to photocopy certain pages/standards if they are repeated throughout multiple units
   - Use the scope and sequence or unit plan documents to identify the TEKS taught in each unit/grading period
   - Compile the STAAR Readiness and Supporting Standards Analysis Sheets that correspond to the TEKS in each unit/grading period
   - After the pages/standards are sorted into their appropriate unit, create a method of organizing the documents (binder, folder, file, etc.).

6. Plan for instruction
   - Collect the curriculum documents used for planning
   - Use the STAAR - Curriculum Planning Worksheet as you plan each unit. The worksheet provides guiding questions and reflection opportunities to aid you in maximizing the material in the STAAR Field Guide
   - Determine where the team needs additional learning
   - Evaluate instructional materials
   - Review the plan for appropriate levels of rigor
# How to read STAAR Readiness Standards Analysis Pages

## Standard and Indication of "Readiness" or "Supporting"

- **Content Builder**
  - The basics of the content within the standard are extracted in a bulleted list. Describes multiple measurable parts in a standard - used to select and vary instructional materials.

- **Instructional Implications**
  - Suggestions to modify instruction that support effectively teaching this standard.

## TEKS Scaffold

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
<th>3.3F Readiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3H</td>
<td>represent and solve addition and subtraction of fractions with unequal denominators referring to the same whole using objects and pictorial models and properties of operations (6)</td>
<td></td>
</tr>
<tr>
<td>4.3</td>
<td>The student applies mathematical process standards to represent and generate fractions to solve problems.</td>
<td></td>
</tr>
<tr>
<td>3.3 Number and Operations. The student applies mathematical process standards to represent and explain fractional units. The student is expected to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(f) represent equivalent fractions with denominators of 2, 3, 4, 6, and 8 using a variety of objects and pictorial models, including number lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3C</td>
<td>explain that two fractions are equivalent if and only if they are both represented by the same point on the number line or represent the same portion of a same whole for an area model (5)</td>
<td></td>
</tr>
<tr>
<td>3.3B</td>
<td>determine the corresponding fraction greater than zero and less than or equal to one with denominators of 2, 3, 4, 6, and 8 given a specified point on a number line (5)</td>
<td></td>
</tr>
<tr>
<td>3.3A</td>
<td>represents fractions greater than zero and less than or equal to one with denominators of 2, 3, 4, 6, and 8 using concrete objects and pictorial models, including strip diagrams and number lines (5)</td>
<td></td>
</tr>
<tr>
<td>3.3E</td>
<td>solve problems involving partitioning an object or a set of objects among two or more recipients using pictorial representations of fractions with denominators of 2, 3, 4, 6, and 8 (5)</td>
<td></td>
</tr>
<tr>
<td>2.3A</td>
<td>partition objects into equal parts and name the parts, including halves, fourths, and eighths, using words (5)</td>
<td></td>
</tr>
</tbody>
</table>

## Texas Essential Knowledge and Skills Statement

- **Instructional Implication**
  - Suggestions to modify instruction that support effectively teaching this standard.

## Student Expectation

- **Distractor Factor**
  - Alerts teachers to areas where students traditionally struggle, have misconceptions, or may need reinforcement. Common errors in learning.

## Content Builder - (See Appendix for Tree Diagram)

- Represents equivalent fractions with denominators of 2, 3, 4, 6, and 8 |
  - objects |
  - pictorial models |
  - number lines |

## Academic Vocabulary

- **Academic Vocabulary**
  - Vocabulary words extracted directly from the standard and/or associated with the instruction of the content within the standard.

- **Rigor Implications**
  - Uses the verb(s) from the Student Expectation to indicate the cognitive complexity of the standard.

## Rigor Implications

- **Academic Vocabulary**
  - Equal parts of a whole |
  - Number lines |
  - Numerator |
  - Whole |

- **Rigor Implications**
  - Apply |
  - Represent |
  - Explain
GRADE 8

How to read STAAR Supporting Standards Analysis Pages

Standard and Indication of “Readiness” or “Supporting”

GRADE 3  3.9E Supporting

Texas Essential Knowledge and Skills Statement

Student Expectation

3.9E Personal Financial Literacy. The student applies mathematical process standards to manage one’s financial resources effectively for lifetime financial security. The student is expected to:

(E) list reasons to save and explain the benefits of a savings plan, including for college

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
• 3.9 Personal Financial Literacy

How does it support the Readiness Standard(s)?
Listing reasons to save and explain the benefits will support one’s ability to manage their financial resources more effectively for a lifetime of financial security.

Instructional Implications
In adherence to the standard, students should identify several reasons why they should save (e.g., purchase a large item, in case of emergencies, college, etc.). In conjunction with 3.9E, students should recognize the benefits in saving.

Academic Vocabulary
• Benefits
• College
• Save (savings plan)

Rigor Implications
• Apply
• List
• Explain

Supporting the Readiness Standards - Most supporting standards support a readiness standard in the current grade level. This section discusses the relationships of the standards that are often taught together.

Instructional Implication
Suggestions to modify instruction that support effectively teaching this standard.

Academic Vocabulary
Vocabulary words extracted directly from the standard and/or associated with the instruction of the content within the standard.

Rigor Implications
Uses the verb(s) from the Student Expectation to indicate the cognitive complexity of the standard.
### Curriculum - STAAR Planning Worksheet

<table>
<thead>
<tr>
<th>Course/Grade Level</th>
<th>Readiness Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Content Area</th>
<th>Supporting Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grading Period/Unit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Action Steps

#### Read each analysis page.

**Guiding Questions & Notes**

- What stands out?
  - Do you have data on any of the standards that suggest whether the standard is a strength or a concern?
  - How many of the standards are at a high level of rigor?

#### Instructional Implications

**Guiding Questions & Notes**

- How will these implications inform your planning?
- How can you use this information to modify instruction?

#### TEKS Scaffolding

**Guiding Questions & Notes**

- What concepts did students learn in the previous grade to prepare them?
  - Do you have students who may struggle with those concepts?
  - Look at how the students will use that concept in subsequent grades - will the way you teach it still apply in those grades?
## Action Steps

<table>
<thead>
<tr>
<th>Content Builder (Readiness Standards only)</th>
<th>Guiding Questions &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How many parts does this standard have?</td>
</tr>
<tr>
<td></td>
<td>Which of the parts are new to your team or to the students?</td>
</tr>
<tr>
<td></td>
<td>This content is important for students’ future learning. How will you assess retention?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supporting the Readiness Standards (Supporting Standards only)</th>
<th>Guiding Questions &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How can you use this information as you plan lessons?</td>
</tr>
<tr>
<td></td>
<td>Do the supporting standards match with the readiness standards in your unit bundle? If not, arrange them according to your curriculum. Address the questions again: “Which Readiness Standards does it support? How does it support the Readiness Standard(s)?”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>Guiding Questions &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>What strategies will you use to ensure mastery of the vocabulary for each standard in this unit?</td>
</tr>
<tr>
<td></td>
<td>What is your plan if students do not master the vocabulary?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use the Distractor Factor</th>
<th>Guiding Questions &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How can you address the information in the Distractor Factor section?</td>
</tr>
<tr>
<td></td>
<td>From your teaching experience, is there anything you would add to this? Write it on your analysis pages!</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reflection</th>
<th>Guiding Questions &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How have you taught this content in the past?</td>
</tr>
<tr>
<td></td>
<td>How will you teach it differently this year?</td>
</tr>
<tr>
<td></td>
<td>How will you utilize the readiness and supporting standards for formative and summative assessment?</td>
</tr>
</tbody>
</table>
# GRADE 8 8.2D Readiness

8.2 Number and Operations. The student applies mathematical process standards to represent and use real numbers in a variety of forms. The student is expected to:

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.2B</td>
<td>approximate the value of an irrational number, including π and square roots of numbers less than 225, and locate that rational number approximation on a number line (S)</td>
</tr>
</tbody>
</table>

- **8.2D**: order a set of real numbers arising from mathematical and real-world contexts

## Instructional Implications

In conjunction with 8.2B, students will use number lines to order a set of real numbers arising from mathematical (i.e. π, Pythagorean theorem, square roots) and real-world contexts (i.e. newspaper advertisements, stock market values, temperatures). Instruction should have students comparing/ordering a mixture of real number representations (i.e. order the following real numbers from least to greatest: 5 1/2, 21/4, √2, 5.25, 5%, π).

## Distractor Factor

- Students may disregard the sign of negative integers when ordering non-positive numbers.
- Students may compare the number of digits instead of applying their understanding of place value to determine the value of decimals (i.e. 0.45 is greater than 0.98 because it has more digits).
- Students may not understand that 0.7 is equivalent to 0.70.
- Students may not understand 0.7575... represents a repeating decimal where 0.757777775... represents a non-repeating decimal.
- Students may think the square root of a number means dividing the number by 2.
- Students may view 5 and √5 as equivalent values.
- Students need to understand the context of problems to order real numbers correctly (i.e. when ordering time from fastest to slowest, students may want to order from greatest to least).

## Academic Vocabulary

- equal to (=)
- greater than (>)
- greatest to least
- irrational numbers
- least to greatest
- less than (<)
- negative
- non-negative
- non-positive
- positive
- rational numbers
- real numbers

## Rigor Implications

- Apply
- Represent
- Use
- Order
8.3 Proportionality. The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to:

(C) use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation

In adherence with the standards, students will use an algebraic representation to explain the effect of a scale factor (i.e. If the scale factor is between 0 and 1 the figure shrinks, scale factor > 1 the figure is enlarged, scale factor = 1 the figure remains the same size) on a two-dimensional figure on a coordinate plane with the origin as the center of dilation (i.e. triangle ABC with vertices A(2, 4), B(6, 2), C(4, 6) is dilated by a scale factor of 1/2 with the origin as the center of dilation; the coordinates of the dilated image are A'(1, 2), B'(3, 1), C'(2, 3) and each corresponding vertex of the dilated image is half the distance from the origin as each vertex of the original triangle) as shown in the diagram below.

The algebraic representation for the coordinates of the dilation with a scale factor of 1/2 in the diagram above would be (0.5x, 0.5y), where (x, y) are the coordinates of the original shape. Instruction should include a variety of dilation problems involving shapes that are proportionally decreased or increased in size and in different quadrants on the coordinate plane where the scale factor is a positive rational number.

Distractor Factor

- Students may use the center of dilation rather than the origin.
- Students may not enlarge or reduce a shape proportionally.

Academic Vocabulary

- algebraic representation
- center of dilation
- coordinate plane
- dilation
- origin
- positive rational
- scale factor

Rigor Implications

- Apply
- Use
8.4B Readiness

**TEKS Scaffold**

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.3B</td>
<td>calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems (R)</td>
</tr>
<tr>
<td>A.3C</td>
<td>graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems (R)</td>
</tr>
<tr>
<td>8.4A</td>
<td>use similar right triangles to develop an understanding that slope, m, given as the rate comparing the change in y-values to the change in x-values, ( \frac{y_2 - y_1}{x_2 - x_1} ), is the same for any two points ((x_1, y_1)) and ((x_2, y_2)) on the same line (S)</td>
</tr>
<tr>
<td>8.5A</td>
<td>represent linear proportional situations with tables, graphs, and equations in the form of ( y = kx ) (S)</td>
</tr>
<tr>
<td>8.5F</td>
<td>distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form ( y = kx ) or ( y = mx + b ), where ( b \neq 0 ) (S)</td>
</tr>
<tr>
<td>8.5H</td>
<td>identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems (S)</td>
</tr>
<tr>
<td>8.5G</td>
<td>identify functions using sets of ordered pairs, tables, mappings, and graphs (R)</td>
</tr>
</tbody>
</table>

**8.4 Proportionality**. The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. The student is expected to:

- (B) graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship

**Instructional Implications**

In accordance with this standard, instruction should include a variety of problems where students graph proportional relationships and interpret the unit rate \( (\text{rate}) \), \( \frac{y}{x} \) simplified to \( x = 1 \) as the slope of the line modeling a relationship \( i.e. \) the scale on a map shows 5 centimeters represents the actual distance of 9 miles; the rate \( \frac{9\text{miles}}{5\text{centimeters}} \) is equivalent to the unit rate, \( \frac{1.8}{1} \); the unit rate is the slope, 1.8, for the line, \( y = 1.8x \), where the slope is interpreted as an increase of 1 centimeter on the map, is an increase of 1.8 miles in the actual distance) as shown in the diagram below.

**Academic Vocabulary**

- line
- proportional relationship
- slope
- unit rate

**Rigor Implications**

- Apply
- Explain
- Graph
- Interpret

**Distractor Factor**

- The student may graph a non-proportional relationship and interpret the slope as the unit rate.
- The students may not understand a linear proportional relationship goes through the origin.
GRADE 8  8.4C Readiness

TEKS Scaffold

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.3B</td>
<td>calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems (R)</td>
</tr>
<tr>
<td>A.3C</td>
<td>graph linear functions on the coordinate plane and identify key features, including x-intercept, y-intercept, zeros, and slope, in mathematical and real-world problems (R)</td>
</tr>
<tr>
<td>8.5B</td>
<td>represent linear non-proportional situations with tables, graphs, and equations in the form of ( y = mx + b ), where ( b \neq 0 ) (S)</td>
</tr>
<tr>
<td>8.5I</td>
<td>write an equation in the form ( y = mx + b ) to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations (R)</td>
</tr>
<tr>
<td>8.5H</td>
<td>identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems (S)</td>
</tr>
<tr>
<td>8.5G</td>
<td>identify functions using sets of ordered pairs, tables, mappings, and graphs (R)</td>
</tr>
</tbody>
</table>

8.4 Proportionality. The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. The student is expected to:

[C] use data from a table or graph to determine the rate of change or slope and y-intercept in mathematical and real-world problems

<table>
<thead>
<tr>
<th>Number of miles walked (( x ))</th>
<th>Process Column</th>
<th>Amount of Donation (( y ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>( 0 \cdot 2 + 6 )</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>( 1 \cdot 2 + 6 )</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>( 2 \cdot 2 + 6 )</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>( 3 \cdot 2 + 6 )</td>
<td>12</td>
</tr>
<tr>
<td>( x )</td>
<td>( x \cdot 2 + 6 )</td>
<td>( y )</td>
</tr>
</tbody>
</table>

Data from Table

\[
\text{Slope: } \frac{8 - 6}{1 - 0} = \frac{2}{1} \\
\text{y-intercept: } 6 \text{ since } y = 6 \text{ when } x = 0
\]

Data from Graph

\[
\text{Slope: } \frac{\text{rise}}{\text{run}} \\
\text{y-intercept: } (0, 6)
\]

Instructional Implications

In accordance with the standard, students will understand that the rate of change is the same thing as slope. Data from a table or a graph will be used to determine the rate of change or slope and the y-intercept (i.e. use data in the table: difference between y-values/ difference between x-values = slope and the y-value when \( x = 0 \) is the y-intercept; or from a graph: \( \frac{\text{rise}}{\text{run}} \) = slope and \( (0, y) \) is the y-intercept). Instruction should include mathematical and real-world problems.
GRADE 8  8.5D Readiness

TEKS Scaffold

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.5C</td>
<td>contrast bivariate sets of data that suggest a linear relationship with bivariate sets of data that do not suggest a linear relationship from a graphical representation (S)</td>
</tr>
<tr>
<td>8.5G</td>
<td>identify functions using sets of ordered pairs, tables, mappings, and graphs (R)</td>
</tr>
<tr>
<td>8.5H</td>
<td>identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems (S)</td>
</tr>
<tr>
<td>8.5I</td>
<td>write an equation in the form ( y = mx + b ) to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations (R)</td>
</tr>
</tbody>
</table>

8.5D 8.5 Proportionality. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

(D) use a trend line that approximates the linear relationship between bivariate sets of data to make predictions

Instructional Implications

In accordance with the standard, students will use a trend line (i.e. a line on a graph showing the general direction that a set of data seem to be heading) that approximates the linear relationship between bivariate sets of data to make predictions. Using the trend line, predictions may be made concerning the data in the table (i.e. according to the trend line, someone who is approximately 55 inches tall would weigh approximately 110 pounds). Instruction should include experiences where the trend line may or may not go through the origin (0,0).

Graph

<table>
<thead>
<tr>
<th>Height in Inches</th>
<th>Weight in Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>60</td>
<td>125</td>
</tr>
<tr>
<td>70</td>
<td>150</td>
</tr>
<tr>
<td>80</td>
<td>175</td>
</tr>
</tbody>
</table>

Academic Vocabulary

- bivariate
- linear relationship
- sets of data
- trend line

Rigor Implications

- Apply
- Use
- Develop
- Approximate
- Make (predict)

Distractor Factor

- Students may think a trend line must connect all the points in the data set.
- Students may not set up the intervals on the axes correctly (i.e. the student may begin with 50 on the vertical axis and each interval after 50 will be in increments of 25).
8.5G Readiness

**TEKS Scaffold**

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.2A</td>
<td>determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities (R)</td>
</tr>
<tr>
<td>7.4A</td>
<td>represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including ( d = rt ) (R)</td>
</tr>
<tr>
<td>6.6B</td>
<td>write an equation that represents the relationship between independent and dependent quantities from a table (S)</td>
</tr>
<tr>
<td>6.6C</td>
<td>represent a given situation using verbal descriptions, tables, graphs, and equations in the form ( y = kx ) or ( y = x + b ) (R)</td>
</tr>
</tbody>
</table>

**8.5 Proportionality**

The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

- (G) identify functions using sets of ordered pairs, tables, mappings, and graphs

**Instructional Implications**

In accordance with the standard, students will identify functions using sets of ordered pairs (i.e., identify the set that represents a function: \( \{(0, 1), (2, 3), (4, 5)\} \) or \( \{(0, 1), (2, 3), (2, 5)\} \), tables, mappings, and graphs. Instruction should include a variety of situations for students to relate to functions (i.e., is it possible for an individual to have more than one birthdate; is it possible for more than one individual to share the same birthday?). The vertical line test may also be used to determine if a graph represents a function (i.e., if a vertical line passes through two or more points on a graph, the graph does not represent a function; refer to the model of the graph below that does not represent a function).

**Distractor Factor**

- The student may think two x-values mapped to the same y-value is not a function.
- The student may think only linear data can represent a function.

**Academic Vocabulary**

- function
- graph
- table
- mapping
- ordered pair

**Rigor Implications**

- Apply
- Use
- Develop
- Identify
8.5I Readiness

**TEKS Scaffold**

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.3B</td>
<td>calculate the rate of change of a linear function represented tabularly, graphically, or algebraically in context of mathematical and real-world problems (R)</td>
</tr>
<tr>
<td>A.2C</td>
<td>write linear equations in two variables given a table of values, a graph, and a verbal description (R)</td>
</tr>
<tr>
<td>A.2I</td>
<td>write systems of two linear equations given a table of values, a graph, and a verbal description (R)</td>
</tr>
</tbody>
</table>

**8.5 Proportionality.** The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

(I) write an equation in the form $y = mx + b$ to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations

**Instructional Implications**

In accordance with the standard, students will write equations of the form $y = mx + b$ to model linear relationships between two quantities using verbal, numerical, tabular, and graphical representation. Instruction should include meaningful situations to represent the linear relationship (i.e. there is a constant rate of change between two quantities). It is important students develop an understanding that each representation is a different way to communicate the relationship between the two quantities. Through verbal representations, students will articulate the relationship between the two quantities as it relates to the given situation (i.e. in a walk-a-thon, a sponsor will donate $56 and an additional $2 per mile the participant walks). A tabular representation organizes data and provides a means for students to look for patterns and write an equation in the form, $y = mx + b$. The use of a process column may be used to model the relationship between the two quantities using numerical representation which can be written in the form $y = mx + b$ (i.e. $y = 2x + 6$).

**Academic Vocabulary**

- constant rate of change
- equation
- linear relationship
- slope
- y-intercept
- apply
- develop
- model
- use
- write

**Distractor Factor**

- The student may confuse the x-intercept with the y-intercept.
- The student may not relate the data from the table (i.e. $\frac{\text{change in } y}{\text{change in } x}$) to the rate of change or slope.
- The student may think the slope is always equal to $\frac{y}{x}$.
- The student may do $\frac{\text{run}}{\text{rise}}$ as the slope when using data from the graph.

**Table**

<table>
<thead>
<tr>
<th>Number of miles walked (x)</th>
<th>Process Column</th>
<th>Amount of Donation (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 • 2 + 6</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>1 • 2 + 6</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>2 • 2 + 6</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>3 • 2 + 6</td>
<td>12</td>
</tr>
<tr>
<td>x</td>
<td>x • 2 + 6</td>
<td>y</td>
</tr>
</tbody>
</table>

Through the use of graphs, students are able to visualize the relationship between the two quantities. These graphical representations will allow students to observe that graphs of linear relationships have a constant rate of change (i.e. m in the equation $y = mx + b$) and a y-intercept (i.e. the point (0, b) where the y-coordinate is the b). When students recognize and understand the role of $m$ and b in the equation $y = mx + b$, they will begin to develop an understanding of linear relationships.
## Academic Vocabulary
- area of the base
- circumference
- cone
- cylinder
- diameter
- height
- length
- pi ($\pi$)
- radius
- slant height
- sphere
- volume

## Rigor Implications
- Apply
- Use
- Solve

## Instructional Implications
In conjunction with 8.6A/8.6B, students will determine the solution for problems involving the volume of cylinders, cones, and spheres. Problems should include positive rational numbers (decimals and fractions). Instruction should vary the context of the problems (i.e. given the lengths of radius/diameter/height, determine the volume; given the volume and one of the dimensions of the radius/diameter and/or height, determine the missing radius/diameter and/or height, given the area of the base, determine the missing height). It is important that students understand why length is represented in units, area is represented in square units and volume is presented in cubic units.

## Distractor Factor
- The students may confuse the slant height of a cone with the height of the cone.
- The students may not understand the "B" in the formula represents the area of the base of the shape.
- The students may use the formula for the circumference of a circle instead of the formula for the area of a circle when calculating the area of the base of a cylinder or cone.
TEKS Scaffold

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.9D</td>
<td>solve problems involving the lateral and total surface area of a</td>
</tr>
<tr>
<td></td>
<td>rectangular prism, rectangular pyramid, triangular prism, and</td>
</tr>
<tr>
<td></td>
<td>triangular pyramid by determining the area of the shape’s net (S)</td>
</tr>
</tbody>
</table>

8.7 Expressions, Equations, and Relationships. The student applies mathematical process standards to use geometry to solve problems. The student is expected to:

(B) use previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders

| 6.8D   | determine solutions for problems involving the area of rectangles, |
|        | parallelograms, trapezoids, and triangles and volume of right     |
|        | rectangular prisms where dimensions are positive rational numbers |
|        | (R)                                                                |
| 6.8C   | write equations that represent problems related to the area of    |
|        | rectangles, parallelograms, trapezoids, and triangles and volume |
|        | of right rectangular prisms where dimensions are positive rational|
|        | numbers (S)                                                        |

Instructional Implications

In conjunction with 7.9D, students will make connections to the formulas for lateral and total surface area (i.e. lateral area = perimeter of base • height, A = Ph and total surface area = 2 • area of base • perimeter of base • height, A = 2B + Ph) and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders. Instruction should include a variety of problem situations that include positive rational numbers (i.e. decimals and fractions). Instruction should also vary the context of the problems (i.e. given the dimensions, determine the lateral area and/or total surface area; given the lateral area and one of the dimensions of the sides/edges/radius/diameter and/or height, determine the missing side/edge/radius/diameter and/or height). It is important that students understand why the dimensions are represented in units and area is represented in square units. Instruction should include examples of when lateral versus total surface area would be applied (i.e. a canned good label would represent the lateral area and the metal part of the can would represent the total surface area).

Distractor Factor

- The students may not understand the “B” in the formula represents the area of the base of the shape.
- The students may not understand the “P” in the formula represents the perimeter/circumference of the base of the shape.
- The students may use the formula for the circumference of a circle instead of the formula for the area of a circle when calculating the area of the base of a cylinder.

Academic Vocabulary

- area
- area of the base
- circumference
- cylinder
- diameter
- height
- lateral area
- length
- pi (π)
- radius
- rectangular prism
- total surface area
- triangular prism

Rigor Implications

- Apply
- Use
- Make (connect)
- Determine
8.7C Readiness

**TEKS Scaffold**

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.7D</td>
<td>determine the distance between two points on a coordinate plane using the Pythagorean theorem (S)</td>
</tr>
</tbody>
</table>

**8.7 Expressions, Equations, and Relationships.** The student applies mathematical process standards to use geometry to solve problems. The student is expected to:

(C) use the Pythagorean Theorem and its converse to solve problems

---

**Content Builder - (See Appendix for Tree Diagram)**

- use the Pythagorean Theorem and its converse to solve problems

**Instructional Implications**

In conjunction with 8.6C, students will use the Pythagorean Theorem (i.e. $a^2 + b^2 = c^2$) and its converse (i.e. if $a^2 + b^2 = c^2$, then the triangle with legs $a$ and $b$ and hypotenuse $c$ is a right triangle) to solve problems. Instruction should vary the context of the problems (i.e. given the hypotenuse and one of the legs, determine the missing leg; given the lengths of two sides, determine the hypotenuse). In adherence to the standard, students should be able to apply the converse to determine if a shape yields a right triangle (i.e. given the length of three sides of a triangle, determine if the triangle is a right triangle). Instruction should also include a variety of problems where the length of the legs or hypotenuse of the right triangle represent irrational numbers (i.e. $a = \sqrt{10}$, $b = \sqrt{17}$, $c = \sqrt{27}$). It is important instruction includes a variety of real-world problems.

**Distractor Factor**

- Students may have difficulty identifying the hypotenuse vs. the legs of rotated right triangles.
- The students may confuse the hypotenuse as the length of one of the legs.
- The students may not understand $\sqrt{27}$ and 27 are two different numerical values.
- The students may think the square root of a number equals the number divided by 2.

**Academic Vocabulary**

- converse of Pythagorean Theorem
- hypotenuse
- leg
- Pythagorean Theorem ($a^2 + b^2 = c^2$)
- right angle
- right triangle
- square root

**Rigor Implications**

- Apply
- Use
- Solve
GRADE 8  8.8C Readiness

## TEKS Scaffold

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.5A</td>
<td>solve linear equations in one variable, including those for which the</td>
</tr>
<tr>
<td></td>
<td>application of the distributive property is necessary and for which</td>
</tr>
<tr>
<td></td>
<td>variables are included on both sides (R)</td>
</tr>
<tr>
<td>A.5C</td>
<td>solve systems of two linear equations with two variables for</td>
</tr>
<tr>
<td></td>
<td>mathematical and real-world problems (R)</td>
</tr>
<tr>
<td>8.8B</td>
<td>write a corresponding real-world problem when given a one-variable</td>
</tr>
<tr>
<td></td>
<td>equation or inequality with variables on both sides of the equal sign</td>
</tr>
<tr>
<td></td>
<td>using rational number coefficients and constants (S)</td>
</tr>
<tr>
<td>8.8A</td>
<td>write one-variable equations or inequalities with variables on both</td>
</tr>
<tr>
<td></td>
<td>sides that represent problems using rational number coefficients and</td>
</tr>
<tr>
<td></td>
<td>constants (S)</td>
</tr>
</tbody>
</table>

### 8.8 Expressions, Equations, and Relationships

The student applies mathematical process standards to use one-variable equations or inequalities in problem situations. The student is expected to:

(C) model and solve one-variable equations with variables on both sides of the equal sign representing mathematical and real-world problems using rational number coefficients and constants.

## Instructional Implications

In accordance with the standard, students model and solve one-variable equations with variables on both sides of the equal sign (i.e., \( \frac{1}{2}x + 3.1 = 5 - 0.6x \)) using rational number coefficients and constants. To model one-variable equations with variables on both sides of the equal sign using rational number coefficients and constants, instruction should begin with the use of concrete objects (i.e., algebra tiles) using whole number coefficients and constants (i.e., \( 2x + 3 = 3x + 5 \)).

As students begin to associate the representation and manipulation of the concrete objects to the symbolic solving of the equation, then the abstract solving of equations with rational number coefficients and constants can be introduced.

\[
\frac{1}{2}x + 3.1 - 5 - 0.6x \\
\frac{1}{2}x + 3.1 + 0.6x = 5 - 0.6x + 0.6x \\
1.1x + 3.1 = 5 \\
1.1x + 3.1 - 3.1 = 5 - 3.1 \\
1.1x = 1.9 \\
\frac{1.1x}{1.1} = \frac{1.9}{1.1} \\
x = 1.9 \\
\]

## Distractor Factor

- The student may not understand that an action is replicated on both sides of the equal sign to maintain equality when solving an equation. The value of the expression does not change throughout the solving of equation process.
- Students may treat unlike terms as if the terms are like terms (i.e., \( 2x + 3 \) may be misrepresented as \( 5x \)).
- Students may confuse the inverse operation for addition/subtraction and the inverse operation of multiplication/division yielding the incorrect usage of signs (i.e., \( -3x = 6 \); \( -3x/3 = 6/3; x = 2 \)).

## Academic Vocabulary

- coefficient
- constant
- equation
- rational number
- solution
- variable
- model
- solve
- apply
- use
8.10C Readiness

TEKS Scaffold

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.10B</td>
<td>differentiate between transformations that preserve congruence and those that do not (S)</td>
</tr>
<tr>
<td>8.10A</td>
<td>generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane (S)</td>
</tr>
</tbody>
</table>

8.10C

Two-dimensional shapes. The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:

(C) explain the effect of translations, reflections over the x- or y-axis, and rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation

Instructional Implications

In accordance with the standard, students explain the effect of transformations (i.e. translations, reflections, and rotations) using algebraic representation (i.e. translations: translation of (x, y) four units left and three units up is [x - 4, y + 3]; reflections: reflection of (x, y) over the x-axis is (x, -y) and reflection of (x, y) over the y-axis is (-x, y); rotations counter-clockwise about the origin: rotation of (x, y) 90° is (-y, x) and rotation of (x, y) 180° is (-x, -y) and rotation of 270° of (x, y) is (y, -x) and rotation of 360° of (x, y) is (x, y)]. Instruction should provide opportunities for students to graph a two-dimensional shape on a coordinate plane, perform one of the required transformations, and then explain the effect using algebraic representation as shown in the example below for a reflection over the y-axis.

<table>
<thead>
<tr>
<th>Original Shape</th>
<th>Reflection</th>
<th>Algebraic Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A(1, 4)</td>
<td>A'(-1, 4)</td>
<td>(x, y) → (-x, y)</td>
</tr>
<tr>
<td>B(4, 3)</td>
<td>B'(-4, 3)</td>
<td>(x, y) → (-x, y)</td>
</tr>
<tr>
<td>C(2, 1)</td>
<td>C'(-2, 1)</td>
<td>(x, y) → (-x, y)</td>
</tr>
</tbody>
</table>

Instruction should be extended to include translations, reflections, and rotations (i.e. designate the point of rotation and the direction of the rotation, clockwise or counter-clockwise). It is important to note that if no direction is given for the rotation, the rotation is assumed to be counter-clockwise.

Distractor Factor

- The student may not graph an ordered pair correctly (i.e. graph the y-coordinate using the x-axis and the x-coordinate using the y-axis).
- The student may reflect the original shape across the wrong axis (i.e. reflect a shape over the x-axis when asked to reflect over the y-axis).
- The student may confuse what components of the coordinates and/or algebraic representation are impacted by the transformation of an object up and down versus right and left.
- The student may confuse the different transformations.

Academic Vocabulary

- algebraic representation
- clockwise rotation
- coordinate plane
- counter-clockwise rotation
- ordered pair (x, y)
- reflection
- rotation (90°, 180°, 270°, 360°)
- transformation
- translation
- two-dimensional shape
- x-axis
- y-axis

Rigor Implications

- Apply
- Develop
- Explain
- Use
GRADE 8  8.12D Readiness

**TEKS Scaffold**

<table>
<thead>
<tr>
<th>TEKS</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.12C</td>
<td>explain how small amounts of money invested regularly, including money saved for college and retirement, grow over time (S)</td>
</tr>
</tbody>
</table>

8.12 Personal Financial Literacy. The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one’s life as a knowledgeable consumer and investor. The student is expected to:

(D) calculate and compare simple interest and compound interest earnings

<table>
<thead>
<tr>
<th>7.13E</th>
<th>calculate and compare simple interest and compound interest earnings (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.3B</td>
<td>apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers (R)</td>
</tr>
<tr>
<td>6.3E</td>
<td>multiply and divide positive rational numbers fluently (R)</td>
</tr>
</tbody>
</table>

**Instructional Implications**

In adherence with the standard, students will apply their understanding of operations of rational numbers and solve problems involving percents as they calculate simple interest (i.e. formula: \( I = Prt \), where \( I \) = interest, \( P \) = principal times interest rate times length of time) and compound interest (i.e. formula: \( M = P(1 + i)^n \), where final amount including the principal = principal times \((1 + \text{rate of interest per year})^{\text{number of years invested}}\)). In order to compare simple interest and compound interest, it is important students understand the difference between simple interest (i.e. interest that is calculated once per period on the principal and not on any interest) and compound interest (i.e. interest that is paid on both the principal and also on any interest from past months or years). Students will need to understand the initial money invested is called principal, the additional money earned from the principal is called interest, and the total amount which is earned at the end of a specified time is known as the amount.

**Distractor Factor**

- Students may not understand that principal represents the initial money invested, not the additional money earned or the total amount.
- Students may not represent the length of time correctly (i.e. 0.5 would be used to represent 6 months, not 6).
- Students may not represent the rate of interest correctly (i.e. 6% is 0.06, not 0.6).

**Academic Vocabulary**

- compound interest
- earnings
- interest
- interest rate
- principal
- simple interest
- time

**Rigor Implications**

- Apply
- Develop
- Calculate
- Compare
STAAR
SUPPORTING
STANDARDS
8.2A Supporting

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.2D order a set of real numbers arising from mathematical and real-world context

How does it support the Readiness Standard(s)?

Describing the relationship between a set of real numbers will allow students to have a better understanding of the various representations in order to compare the values in mathematical and real-world context.

Instructional Implications

In accordance with the standard, students will use a visual representation (i.e. Venn Diagram) to describe relationships between sets of real numbers. Instruction should be an extension of the student’s previous knowledge of sets and subsets (i.e. natural numbers are a subset of whole numbers and integers, natural numbers, whole numbers; integers are subsets of rational numbers, etc.).

The use of a number line may support students with this understanding (i.e. begin with a number line marked ..., -2, -1, 0, 1, 2, 3 ... to reflect integers; discuss fractional and decimal values in between integers -2.5, -0.05, 0, 1/2, √2 to reflect rational numbers). After students place several rational numbers (i.e. every number that can be expressed as a/b, where a is an integer and b is an integer with the condition b ≠ 0) on the number line, they need to develop an understanding that between any two rational numbers there are infinitely more rational numbers (i.e. if the number line is magnified, there would be a “hole” between numbers on the number line). The students will then place examples of irrational numbers on the number line which should include a variety of examples (i.e. π, √10, 3.142142214222... etc.) and asked to represent these values as an approximated rational number. Instruction should include the understanding that there are also an infinite number of irrational numbers on a number line. The set of rational numbers and the set of irrational numbers form the set of real numbers.

Academic Vocabulary

- π (pi)
- integers
- irrational numbers
- natural numbers
- negative
- nonnegative
- non-positive
- non-terminating decimal
- positive
- rational numbers
- real numbers
- repeating decimal
- sets
- square roots
- subsets
- terminating decimal
- Venn diagram
- whole numbers

Rigor Implications

- Apply
- Represent
- Use
- Extend
- Describe
8.2 Number and Operations. The student applies mathematical process standards to represent and use real numbers in a variety of forms. The student is expected to:
(B) approximate the value of an irrational number, including \( \pi \) and square roots of numbers less than 225, and locate that rational number approximation on a number line

**What Readiness Standard(s) or concepts from the Readiness Standards does it support?**
- 8.2D order a set of real numbers arising from mathematical and real-world contexts

**How does it support the Readiness Standard(s)?**
This standard describes the mathematical relationship found in irrational numbers. This relationship will support students in approximating the value of an irrational number in order to effectively order a set of real numbers.

**Instructional Implications**
In adherence to the TEKS and in conjunction with 8.2A, students should be fluid in recognizing and representing rational numbers in a variety of forms (i.e. \( \frac{7}{10}, 0.7, 0.1717..., 70\%, -1.3, \) etc.). This standard will apply that knowledge in approximating the value of and locating a rational number approximation of irrational numbers. Instruction should have students approximate the value of several irrational numbers (i.e. \( \pi, \sqrt{2}, \sqrt{50}, -1.232232223, \) etc.). As students approximate the value of irrational numbers, they should locate these approximated values on a number line. A calculator should be used to determine the approximate value of square roots that represent irrational numbers.

**Academic Vocabulary**
- \( \pi \) (pi)
- decimal
- irrational number
- negative
- nonnegative
- non-positive
- non-terminating decimal
- number line
- positive
- rational number
- repeating decimal
- sets of numbers
- square root

**Rigor Implications**
- Apply
- Represent
- Use
- Approximate
- Locate
8.2C Number and Operations. The student applies mathematical process standards to represent and use real numbers in a variety of forms. The student is expected to:
(C) convert between standard decimal notation and scientific notation

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.2D order a set of real numbers arising from mathematical and real-world contexts

How does it support the Readiness Standard(s)?

Converting between standard decimal notation and scientific notation will build on fluidity in the representation and use of real numbers in a variety of forms. This understanding can then be applied to ordering a set of real numbers which may include a real number represented in scientific notation.

Instructional Implications

In adherence to the TEKS, students will convert between standard decimal notation (i.e. standard notation where numbers are written without exponents using the base ten system; 34.01) and scientific notation (i.e. a mathematical process used to represent very large or very small numbers where the number is written as a decimal greater than or equal to 1 and less than 10 raised to a positive or negative power of 10; for example, 3.01 x 10^6). Students need a variety of problems where they convert from standard decimal notation to scientific notation and vice versa. Instruction should include real-world situations where scientific notation is used (i.e. approximate population of the world is 7 billion or 7 x 10^9).

It is important students understand the two forms represent equivalent values. In conjunction with 8.2D, instruction should include the ordering of real numbers represented in scientific notation (i.e. order the following distances from Earth from least to greatest

<table>
<thead>
<tr>
<th>Location from Earth</th>
<th>Approximate Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moon</td>
<td>250 thousand miles</td>
</tr>
<tr>
<td>Sun</td>
<td>93,000,000</td>
</tr>
<tr>
<td>Mercury</td>
<td>5.7 x 10^7</td>
</tr>
<tr>
<td>Neptune</td>
<td>2.68 x 10^9</td>
</tr>
</tbody>
</table>

Academic Vocabulary

- standard decimal notation
- scientific notation

Rigor Implications

- Apply
- Represent
- Use
- Convert
GRADE 8 8.3A Supporting

8.3 Proportionality. The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to:

(A) generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
- 8.3C use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of the dilation

How does it support the Readiness Standard(s)?
Generalizing the ratio of corresponding sides of similar shapes will be the foundation for students to be able to use an algebraic representation to explain the effects of a scale factor applied to two-dimensional figures on a coordinate plane.

Instructional Implications
In adherence to the TEKS, students should generalize the ratio of corresponding sides of similar shapes are proportional. For rectangles A, B, and C, the ratios of corresponding sides are equal; therefore, these corresponding sides of the similar shapes are proportional.

<table>
<thead>
<tr>
<th>Ratio Between Corresponding Sides of Figures A and B</th>
<th>Ratio Between Corresponding Sides of Figures A and C</th>
<th>Ratio Between Corresponding Sides of Figures B and C</th>
</tr>
</thead>
<tbody>
<tr>
<td>widthA/lengthA</td>
<td>widthA/lengthA</td>
<td>widthB/lengthB</td>
</tr>
<tr>
<td>widthB/lengthB</td>
<td>widthC/lengthC</td>
<td>widthC/lengthC</td>
</tr>
<tr>
<td>2/3 = 4/6</td>
<td>2/4 = 4/8</td>
<td>3/4 = 6/8</td>
</tr>
</tbody>
</table>

Instruction should also include a shape and its dilation (i.e. a similarity transformation in which a figure is enlarged, scale factor > 1, or reduced, 0 < scale factor < 1, or congruent, scale factor = 1) as shown in the diagram below where an original triangle was proportionally reduced using a scale factor = 3/4 (i.e. the length of each side of triangle ABC was multiplied by a scale factor of 3/4 to create a dilation such that the ratio between the corresponding sides of the two triangles are proportional).

Academic Vocabulary
- corresponding sides
- dilation
- proportional
- ratio
- similar shapes

Rigor Implications
- Apply
- Describe
- Use
- Generalize
8.3 Proportionality. The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to:

(B) compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

• 8.3C use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of the dilation.

How does it support the Readiness Standard(s)?

The ability to compare and contrast the attributes of a shape and its dilation on a coordinate plane will be the foundation for students to use an algebraic representation to explain the effects of a scale factor applied to two-dimensional figures on a coordinate plane.

Instructional Implications

In conjunction with 8.3A, instruction should include problems where students compare and contrast the attributes of a shape and its dilation on a coordinate plane. Consider the diagram below where triangle ABC with vertices A(2, 4), B(6, 2), C(4, 6) is dilated by a scale factor of 1/2 and the coordinates of the dilated triangle A'B'C' are A'(1, 2), B'(3, 1), C'(2, 3).

The table below shows a sample of a compare and contrast of the attributes of the two triangles.

<table>
<thead>
<tr>
<th>Compare</th>
<th>Contrast</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Corresponding angles are congruent</td>
<td>• Sides are different lengths</td>
<td></td>
</tr>
<tr>
<td>• Same shape</td>
<td>• Different sizes</td>
<td></td>
</tr>
<tr>
<td>• Polygons with three vertices, three sides</td>
<td>• Corresponding vertices of the dilated image are half the distance from the origin as the vertices of the original shape</td>
<td></td>
</tr>
</tbody>
</table>

academic Vocabulary

• attribute
• coordinate plane
• dilation
• shape

Rigor Implications

• Apply
• Use
• Describe
• Compare
• Contrast
8.4 Proportionality. The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. The student is expected to:

(A) use similar right triangles to develop an understanding that slope, \( m \), given as the rate comparing the change in y-values to the change in x-values, \( \frac{y_2 - y_1}{x_2 - x_1} \), is the same for any two points \( (x_1, y_1) \) and \( (x_2, y_2) \) on the same line.

**What Readiness Standard(s) or concepts from the Readiness Standards does it support?**

- 8.4B graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship

**How does it support the Readiness Standard(s)?**

Using similar right triangles to develop an understanding for the slope of a line will be the foundation for students to graph proportional relationships and interpret the unit rate as the slope of the line.

**Instructional Implications**

In adherence with the standards, instruction should include problems where students use similar right triangles and the coordinates of the similar right triangles to develop an understanding that slope, \( m \), given as the rate comparing change in y-values to change in x-values (i.e. \( \frac{y_2 - y_1}{x_2 - x_1} \)) is the same for any two points on that line. Consider the diagram below where the two right triangles are similar since corresponding sides are proportional and corresponding angles are congruent. The two triangles model the slope, \( m \), of the line as the rate comparing the change of the y-values to the change of the x-values (i.e. \( \frac{-3 - (-2)}{-4 - (-2)} = \frac{1}{2} \), which is equivalent to \( \frac{4 - 1}{6 - 2} = \frac{1}{2} \)).

**Academic Vocabulary**

- line
- points \( (x_1, y_1) \) and \( (x_2, y_2) \)
- rate (comparing change in y-values to change in x-values)
- similar right triangles
- slope, \( m \)

**Rigor Implications**

- Apply
- Explain
- Use
- Develop
- Compare
8.5 Proportionality. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

(A) represent linear proportional situations with tables, graphs, and equations in the form of $y = kx$

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.4B graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship

How does it support the Readiness Standard(s)?

Representing linear proportional situations with tables, graphs, and equations will be the foundation for students to graph proportional relationships and interpret the unit rate as the slope of the line.

Instructional Implications

In accordance with the standard, students will represent linear proportional situations with tables, graphs, and equations (i.e. $y = kx$). Instruction should include meaningful problems to represent linear proportional situations (i.e. in a walk-a-thon, a sponsor will donate $2 per mile the participant walks). It is important students develop an understanding that each representation is a different way to communicate the relationship between the quantities, $x$ and $y$. The use of tables organizes data and provides a means for students to look for patterns and develop a rule that describes the way the quantities are related (i.e. the unit rate, where $k = y/x$ and $x = 1$, will remain the same). The use of a process column identifying the rule can support students in representing the data using symbolic notation for equations of the form $y = kx$ (i.e. $y = 2x$).

<table>
<thead>
<tr>
<th>Number of miles walked</th>
<th>Process Column</th>
<th>Amount of Donation ($y$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 $\times 2$</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1 $\times 2$</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>2 $\times 2$</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>3 $\times 2$</td>
<td>6</td>
</tr>
<tr>
<td>$x$</td>
<td>$x \times 2$</td>
<td>$y$</td>
</tr>
</tbody>
</table>

Through the use of graphs, students are able to visualize the linear proportional situation. These graphical representations will allow students to observe the unit rate (i.e. $k = y/x$ when $x = 1$) represents the slope of the line, $y = kx$, and the line contains the origin, (0, 0). Students should be able to move fluidly from one representation (i.e. table, graph, and equation) to the next. Exploring these different representations will assist students as they develop a fuller understanding of linear proportional situations.

Academic Vocabulary

- linear proportional situation
- table
- graph
- equation ($y = kx$)

Rigor Implications

- Apply
- Use
- Develop
- Represent
8.5B Supporting

8.5 Proportionality. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

(B) represent linear non-proportional situations with tables, graphs, and equations in the form of \( y = mx + b \), where \( b \neq 0 \)

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.4C use data from a table or graph to determine the rate of change or slope and y-intercept in mathematical and real-world problems

How does it support the Readiness Standard(s)?

Representing linear non-proportional situations with tables, graphs, and equations will be the foundation for students to use data from a table or graph to determine the slope and y-intercept of linear relationships in mathematical and real-world problems.

Instructional Implications

In accordance with the standard, students will represent linear non-proportional situations with tables, graphs, and equations (i.e. \( y = mx + b \)). Instruction should include meaningful problems to represent linear non-proportional situations (i.e. in a walk-a-thon, a sponsor will donate $6 and an additional $2 per mile the participant walks). It is important students develop an understanding that each representation is a different way to communicate the relationship between the quantities, \( x \) and \( y \). The use of tables organizes data and provides a means for students to look for patterns and develop a rule that describes the way the quantities are related (i.e. the slope, \( m \), is the rate comparing the change in \( y \)-values to the change in \( x \)-values, \( \frac{y_2 - y_1}{x_2 - x_1} \), and the y-intercept, \( b \), is represented by the \( y \)-value in the ordered pair \( (0, y) \), where \( b \neq 0 \)). The use of a process column identifying the rule can support students in representing the data using symbolic notation for equations of the form \( y = mx + b \), \( b \neq 0 \) (i.e. \( y = 2x + 6 \)).

<table>
<thead>
<tr>
<th>Number of miles walked</th>
<th>Process Column</th>
<th>Amount of Donation (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 \cdot 2 + 6</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>1 \cdot 2 + 6</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>2 \cdot 2 + 6</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>3 \cdot 2 + 6</td>
<td>12</td>
</tr>
<tr>
<td>( x )</td>
<td>( x \cdot 2 + 6 )</td>
<td>( y )</td>
</tr>
</tbody>
</table>

Through the use of graphs, students are able to visualize the linear non-proportional situation. These graphical representations will allow students to observe the constant rate of change, \( m = \frac{\text{rise}}{\text{run}} \), represents the slope of the line, \( y = mx + b \), and the y-intercept of the line contains the point with the coordinates, \( (0, b) \), where \( b \neq 0 \). Students should be able to relate the understanding of slope and the y-intercept to the real-world situation (i.e. the slope of 2 represents the $2 donation for each mile walked and the y-intercept of (0,6) represents the $6 donation regardless of how many miles are walked). Students should be able to move fluidly from one representation (i.e. table, graph, and equation) to the next. Exploring these different representations will assist students as they develop a fuller understanding of linear non-proportional situations.

Academic Vocabulary

- linear non-proportional situation
- table
- graph
- equation \( (y=mx+b) \)

Rigor Implications

- Apply
- Use
- Develop
- Represent
GRADE 8  8.5C Supporting

8.5C 8.5 Proportionality. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

(C) contrast bivariate sets of data that suggest a linear relationship with bivariate sets of data that do not suggest a linear relationship from a graphical representation

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

• 8.5D use a trend line that approximates the linear relationship between bivariate sets of data to make predictions

How does it support the Readiness Standard(s)?

The ability to contrast bivariate sets of data that suggest a linear relationship with bivariate sets of data that do not suggest a linear relationship using a graphical representation will be the foundation for students to use a trend line to approximate the linear relationship between bivariate sets of data in order to make predictions.

Instructional Implications

In accordance with the standard, instruction should include graphical representations of bivariate sets of data (i.e. data with two variables involved where each axis on a coordinate grid represents one of the two variables) in order to contrast between bivariate sets of data that suggest a linear relationship and bivariate sets of data that do not suggest a linear relationship.

Through the use of graphs, students are able to visualize the bivariate sets of data that suggest a linear relationship (i.e. Graph A: horizontal axis represents height in inches and vertical axis represents weight in pounds) and those that do not (i.e. Graph B: horizontal axis represents number of letters in last name and vertical axis represents weight in pounds). Instruction should include discussions that have students write statements contrasting the differences between the graphical representations.

Academic Vocabulary

• bivariate
• graphical representation
• linear relationship
• sets of data

Rigor Implications

• Apply
• Use
• Develop
• Contrast
8.5E Proportionality. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

(E) solve problems involving direct variation

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
- 8.4B graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship

How does it support the Readiness Standard(s)?
Being able to solve problems involving direct variation (i.e. \( y = kx \)) will provide a link for students as they graph proportional relationships and interpret the unit rate (i.e. \( k \)) as the slope of the line.

Instructional Implications
In accordance with the standard, students will solve problems involving direct variation (i.e. the number of gallons of gas a car uses varies directly with the number of miles driven, where \( y \) represents the number of gallons of gas, \( x \) represents the number of miles driven, and \( k \) is the unit rate of number of gallons of gas to drive 1 mile) and is written as the equation, \( y = kx \). Instruction should include a variety of direct variation problems for students to solve. Consider the example:
The number of miles represented on a map varies directly as the number of centimeters you measure on that map, where the scale is shown as 2 cm = 25 miles. If it is 3.8 cm between two cities on the map, how many miles apart are the two cities? (i.e. the y-values represent the number of miles, the x-values represent the number of centimeters, and the unit rate, \( k = \frac{\text{number of miles}}{\text{number of centimeters}} \), when \( x = 1 \) centimeter for the equation \( y = kx \)).

Academic Vocabulary
- direct variation
- equation \((y = kx)\)

Rigor Implications
- Apply
- Use
- Develop
- Solve
GRADE 8  8.5F Supporting

8.5 Proportionality. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

(F) distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form \( y = kx \) or \( y = mx + b \), where \( b \neq 0 \)

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

• 8.4B graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship

How does it support the Readiness Standard(s)?

Being able to distinguish between proportional and non-proportional situations will be the foundation for students to graph proportional relationships and interpret the unit rate as the slope of the line.

Instructional Implications

In accordance with the standard, students will distinguish between proportional and non-proportional situations with tables, graphs, and equations (i.e. \( y = kx \) or \( y = mx + b \)). Instruction should include meaningful problems to represent both proportional and non-proportional situations (i.e. proportional: in a walk-a-thon, a sponsor will donate $2 per mile the participant walks versus non-proportional: in a walk-a-thon, a sponsor will donate $6 and an additional $2 per mile the participant walks) through the use of tables, graphs, and equations (i.e. \( y = 2x \) or \( y = 2x + 6 \)). Side by side comparisons of the two situations will provide a means for students to distinguish between proportional and non-proportional linear situations (i.e. the proportional situation is a line that contains the origin and the slope is the unit rate, \( k = \frac{y}{x} \); the non-proportional situation is a line that has a y-intercept of (0, b), where \( b \neq 0 \) and the slope is the rate, \( \frac{\text{change in } y}{\text{change in } x} \)).

Academic Vocabulary

• equation \( y = kx \) or \( y = mx + b, \ b \neq 0 \)
• graph
• linear non-proportional situation
• linear proportional situation
• table

Rigor Implications

• Apply
• Use
• Develop
• Distinguish

It is important instruction includes the difference between the slope of a linear proportional situation and the slope of a linear non-proportional situation are determined.

Proportional Table

<table>
<thead>
<tr>
<th>Number of miles walked (x)</th>
<th>Process Column</th>
<th>Amount of Donation (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 · 2</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1 · 2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>2 · 2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>3 · 2</td>
<td>6</td>
</tr>
<tr>
<td>x</td>
<td>x · 2</td>
<td>y</td>
</tr>
</tbody>
</table>

Non-Proportional Table

<table>
<thead>
<tr>
<th>Number of miles walked (x)</th>
<th>Process Column</th>
<th>Amount of Donation (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 · 2 + 6</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>1 · 2 + 6</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>2 · 2 + 6</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>3 · 2 + 6</td>
<td>12</td>
</tr>
<tr>
<td>x</td>
<td>x · 2 + 6</td>
<td>y</td>
</tr>
</tbody>
</table>

Proportional Graph

Non-Proportional Graph
8.5 Proportionality. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

(H) identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.4B graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship

How does it support the Readiness Standard(s)?

Being able to identify examples of proportional and non-proportional functions from mathematical and real-world problems will be the foundation for students to graph proportional relationships and interpret the unit rate as the slope of the line.

Instructional Implications

In accordance with the standard, students will identify proportional and non-proportional functions from mathematical and real-world problems. Instruction should include a variety of problems involving proportional situations (i.e. an insurance agent earns a commission of 21% of the value of the insurance policies she sells) and non-proportional situations (i.e. an insurance agent earns $1500 a month base pay and in addition earns a commission of 9% of the value of the insurance policies she sells) for students to identify. Students can use various methods (such as graphs and equations) to determine whether mathematical and/or real-world problems are proportional. Graphically, proportional relationships are straight lines through the origin. Algebraically, proportional relationships can simplify to the form y=kx.

Academic Vocabulary

- function
- non-proportional
- proportional

Rigor Implications

- Apply
- Use
- Develop
- Identify
8.6 Expression, Equations, and Relationships. The student applies mathematical process standards to develop mathematical relationships and make connections to geometric formulas. The student is expected to:

(A) describe the volume formula \( V = Bh \) of a cylinder in terms of its base area and its height

**What Readiness Standard(s) or concepts from the Readiness Standards does it support?**

- 8.7A solve problems involving the volume of cylinders, cones, and spheres

**How does it support the Readiness Standard(s)?**

Being able to describe the volume formula of a cylinder in terms of its base area and its height will provide the foundation students need to solve problems involving the volume of a cylinder.

**Instructional Implications**

In conjunction with 7.8C, students will build on their prior experience of the formula for the area of a circle to describe the volume formula of a cylinder (i.e. \( V = Bh \)) in terms of its base area, \( B \), (i.e. area of a circle where \( A = \pi r^2 \)) and its height, \( h \). Instruction should include experiences where students verbally describe this relationship (i.e. the formula for the volume of a cylinder is the area of a circle, since the base of a cylinder is in the shape of a circle, times the height of the cylinder since a cylinder is like layers of congruent circles). This process should be repeated for several different cylinders.

**Academic Vocabulary**

- area
- base
- cylinder
- formula \( (V = Bh) \)
- height
- volume

**Rigor Implications**

- Apply
- Develop
- Make (connect)
- Describe
8.6B Supporting

8.6 Expression, Equations, and Relationships. The student applies mathematical process standards to develop mathematical relationships and make connections to geometric formulas. The student is expected to:

(B) model the relationship between the volume of a cylinder and a cone having congruent bases and heights and connect that relationship to the formulas

**What Readiness Standard(s) or concepts from the Readiness Standards does it support?**

- 8.7A solve problems involving the volume of cylinders, cones, and spheres

**How does it support the Readiness Standard(s)?**

Being able to model the relationship between the volume of a cylinder and a cone having congruent bases and heights will provide the foundation students need to solve problems involving the volume of cylinders and cones.

**Instructional Implications**

In adherence with the standard, students will model the relationship of the volume of a cylinder and a cone with a base and height congruent to the base and height of the cylinder and connect this relationship to formulas (i.e. \( V = Bh \) the volume formula for a cylinder where \( B \) represents the area of the base which is the formula for the area of a circle, \( \pi r^2 \), so \( V = Bh \) is equivalent to the formula, \( V = \pi r^2 h \), and \( V = 1/3 Bh \) the volume formula for a cone where \( B \) represents the area of the base which is the formula for the area of a circle, \( \pi r^2 \), so \( V = 1/3 Bh \) is equivalent to the formula \( V = 1/3 \pi r^2 h \). Instruction should include experiences where students use nets of these shapes and assemble the nets to form a cylinder whose volume formula can be related to the volume formula of a cone with a base and height congruent to the cone (i.e. the volume of a cylinder is three times the volume of a cone with a base and height congruent to the cylinder or the volume of the cone is one-third the volume of a cylinder). Once the volume formula of a cylinder is verified, the students may use rice to fill the assembled net of the cone and pour into the cylinder until it is filled (i.e. it will take 3 of the cones to fill the cylinder).

This process should be repeated for several different cylinders and cones.

**Academic Vocabulary**

- area
- base
- cone
- cylinder
- formula cylinder volume \( V = 1/3 Bh \) or \( V = \pi r^2 h \)
- formula cone volume \( V = 1/3 Bh \) or \( V = 1/3 \pi r^2 h \)
- height
- volume

**Rigor Implications**

- Apply
- Develop
- Make (connect)
- Model
8.6 Expression, Equations, and Relationships. The student applies mathematical process standards to develop mathematical relationships and make connections to geometric formulas. The student is expected to:

(C) use models and diagrams to explain the Pythagorean theorem

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.7C use the Pythagorean Theorem and its converse to solve problems

How does it support the Readiness Standard(s)?

Being able to use models and diagrams to explain the Pythagorean theorem will provide the foundation students need to solve problems using the Pythagorean theorem.

Instructional Implications

In adherence with the standard, students will use models and diagrams to explain the Pythagorean theorem (i.e. \(a^2 + b^2 = c^2\), where \(a\) and \(b\) represent the legs of a right triangle and \(c\) represents the hypotenuse). Instruction should include the use of square grid paper where students cut out squares with side lengths equal to the legs and hypotenuse of a right triangle. The students will assemble the squares to outline the right triangle and then compare the area of the two squares for the legs to the area of the square for the hypotenuse. The students will draw diagrams to match the models in order to explain the Pythagorean theorem.

Instruction should include the use of a variety of models and diagrams.

Academic Vocabulary

- hypotenuse
- leg
- Pythagorean theorem \(a^2 + b^2 = c^2\)
- right angle
- right triangle

Rigor Implications

- Apply
- Develop
- Make (connect)
- Use
- Explain
8.7D Supporting

8.7D 8.7 Expression, Equations, and Relationships. The student applies mathematical process standards to use geometry to solve problems. The student is expected to:

(D) determine the distance between two points on a coordinate plane using the Pythagorean Theorem

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.7C use the Pythagorean Theorem and its converse to solve problems

How does it support the Readiness Standard(s)?

Being able to determine the distance between two points on a coordinate plane will reinforce an understanding of the Pythagorean Theorem so it can be used efficiently to solve problems.

Instructional Implications

In conjunction with 8.6C/8.7C, students will determine the distance between two points on a coordinate plane (i.e. \((x_1, y_1)\) and \((x_2, y_2)\)) using the Pythagorean theorem (i.e. \(a^2 + b^2 = c^2\), where \(a\) and \(b\) represent the lengths of the legs of a right triangle and \(c\) represents the length of the hypotenuse). Instruction should include the use of different rational numbers as the coordinates for the points. One leg of the right triangle will represent the vertical distance between the two points on the coordinate plane (i.e. \(a = y_2 - y_1\)) and the other leg will represent the horizontal distance between two points on the coordinate plane (i.e. \(b = x_2 - x_1\)) and the length of the hypotenuse of the right triangle will represent the distance between two points on the coordinate plane (i.e. \(c = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}\)).

The distance between point A and point B can be calculated using the Pythagorean Theorem as shown below.

Let \(a\) = vertical distance between A and B: 4 - 1 = 3
Let \(b\) = horizontal distance between A and B: 6 - 2 = 4
Use \(a^2 + b^2 = c^2\), where \(a = 3\) and \(b = 4\), to calculate \(c\)

\[
(3)^2 + (4)^2 = c^2 \\
9 + 16 = c^2 \\
25 = c^2 \\
\sqrt{25} = \sqrt{c^2} \\
5 = c,
\]

which represents the distance between A and B on the coordinate plane above.

Academic Vocabulary

- coordinate plane
- coordinates \((x, y)\)
- distance
- hypotenuse
- leg
- points
- Pythagorean theorem \((a^2 + b^2 = c^2)\)
- right angle
- right triangle

Rigor Implications

- Apply
- Use
- Solve
- Determine
GRADE 8  8.8A Supporting

8.8 Expression, Equations, and Relationships. The student applies mathematical process standards to use one-variable equations or inequalities in problem situations. The student is expected to:

(A) write one-variable equations or inequalities with variables on both sides that represent problems using rational number coefficients and constants

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.8C model and solve one-variable equations with variables on both sides of the equal sign that represent mathematical and real-world problems using rational number coefficients and constants

How does it support the Readiness Standard(s)?

Being able to write one-variable equations or inequalities with variables on both sides that represent problems will reinforce an understanding of the process for modeling and solving one-variable equations that represent mathematical and real-world problems.

Instructional Implications

In accordance with the standard, students are expected to write one-variable equations with variables on both sides of the equal sign (i.e. $\frac{1}{3}x + 5.2 = 6x - \frac{3}{5}$) and one-variable inequalities with variables on both sides of the inequality (i.e. $\frac{1}{3}x + 5.2 < 6x - \frac{3}{5}$) using rational number coefficients and constants. Instruction will model examples of equations identifying conditions (i.e. You have $100 and plan to spend $4.75 a day on snacks; your sister has $20 but is adding $5.25 per day; by what day will you both have the same amount of money?; $100 - 4.75x = 20 + 5.25x$) and inequalities representing constraints (i.e. Sam weighs 187 pounds, but is on a diet where he loses 1.7 pounds a week; Joe weighs 93 pounds, but is on a diet where he gains 0.9 pounds a week; how many weeks will Sam weigh more than Joe?; $187 - 1.7x > 93 + 0.9x$). Emphasis needs to be placed on real-world examples of applying greater than/less than (i.e. the temperature must be warmer than 75° for the air conditioner to turn on; $x > 75$) vs. greater than or equal to/less than or equal to (i.e. maximum capacity of a ballroom is 300 people; $x \leq 300$). Instruction should address how equations yield one solution (i.e. $\frac{2}{3}x + 5.5 = 11$ - $\frac{2}{3}x$, $x = 5.5$); whereas, inequalities yield several possible solutions (i.e. $\frac{2}{3}x + 5.5 < 11$ - $\frac{2}{3}x$, $x < 5.5$).

Academic Vocabulary

- coefficient
- constant
- equal
- equation
- inequality
- rational number
- variable

Rigor Implications

- Apply
- Use
- Write
GRADE 8 8.8B Supporting

8.8 Expression, Equations, and Relationships. The student applies mathematical process standards to use one-variable equations or inequalities in problem situations. The student is expected to:

(B) write a corresponding real-world problem when given a one-variable equation or inequality with variables on both sides of the equal sign using rational number coefficients and constants

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.8C model and solve one-variable equations with variables on both sides of the equal sign that represent mathematical and real-world problems using rational number coefficients and constants

How does it support the Readiness Standard(s)?

Being able to write a corresponding real-world problem when given a one-variable equation or inequality with variables on both sides will reinforce an understanding of the process for modeling and solving one-variable equations that represent mathematical and real-world problems.

Instructional Implications

In accordance with the standard, students are expected to write a corresponding real-world problem when given a one-variable equation with variables on both sides of the equal sign (i.e. given the equation, \(50.2 - \frac{1}{6} x = \frac{1}{2} x - \frac{3}{5}\), the problem situation to match the equation could be: the temperature of a glass of water A is 50.2°F and is dropping \(\frac{1}{6}\)°F each hour and the temperature of a glass of water B is 3/5°F below zero and is rising \(\frac{1}{2}\)°F each hour, when will the two glasses of water be the same temperature? let \(x\) equal number of hours) or a one-variable inequality with variables on both sides of the inequality (i.e. given the inequality, \(0.6x - 110.25 < 0.4x + 110.25\), the problem situation to match the inequality could be: the 8th grade class is selling magazine subscriptions and receives 40% of the money from subscriptions sold plus a $110.25 bonus from the publisher and the publisher receives 60% of the money from subscriptions sold, how much money will the class raise and make more money than the publisher? let \(x\) equal amount of money from subscriptions sold) using rational number coefficients and constants.

Academic Vocabulary

- coefficient
- constant
- equal
- equation
- inequality
- rational number
- variable

Rigor Implications

- Apply
- Use
- Write
GRADE 8 8.8D Supporting

8.8 Expression, Equations, and Relationships. The student applies mathematical process standards to use one-variable equations or inequalities in problem situations. The student is expected to:

(D) use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

• G.5A: Investigate patterns to make conjectures about geometric relationships, including angles formed by parallel lines cut by a transversal, criteria required for triangle congruence, special segments of triangles, diagonals of quadrilaterals, interior and exterior angles of polygons, and special segments and angles of circles choosing from a variety of tools.
• G.6A: Verify theorems about angles formed by the intersection of lines and line segments, including vertical angles, and angles formed by parallel lines cut by a transversal and prove equidistance between the endpoints of a segment and points on its perpendicular bisector and apply these relationships to solve problems.
• G.7B: Apply the Angle-Angle criterion to verify similar triangles and apply the proportionality of the corresponding sides to solve problems.

How does it support the Readiness Standard(s)?

Being able to use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles will reinforce an understanding of the process for making conjectures and verifying theorems about geometric relationships concerning angles of a triangle, angles formed by parallel lines cut by a triangle, and angles of similar triangles.

Instructional Implications

In accordance with the standard, students are expected to use informal arguments to establish facts about the angle sum and exterior angle of triangles, angles created when parallel lines are cut by a transversal, and angle-angle criterion of similar triangles (i.e. refer to the diagrams below).

According to the diagram the following facts are established:

1) sum of the interior angles in the green triangle is: \( m \angle A + m \angle B + m \angle C = 180^\circ \)
2) blue \( \angle B \) and the red \( \angle A \) form an exterior angle for the green triangle so: \( m \angle A + m \angle B = \) the measure of the exterior angle

3) the type of angles created when parallel lines are cut by a transversal are:

4) the angle-angle criterion of similar triangles is:

Consider triangles \( \triangle ABC \) and \( \triangle EDC \), where \( \angle BAC \cong \angle DEC \) and \( \angle ACB \cong \angle ECD \) because it is the same angle.

Since two corresponding angles of the two triangles are congruent, the triangles are similar. This is supported by the ratios of the corresponding sides which are proportional \( \frac{3}{6} = \frac{2}{4} \).

Academic Vocabulary

• angle
• parallel lines
• transversal
• angle-angle criterion (similar triangles)
• similarity
• triangle
• sum of angles in triangle

Rigor Implications

• Apply
• Use
• Establish
GRADE 8  •  8.9A Supporting

8.9A  Expression, Equations, and Relationships. The student applies mathematical process standards to use multiple representations to develop foundational concepts of simultaneous linear equations. The student is expected to:

(A) identify and verify the values of x and y that simultaneously satisfy two linear equations in the form y = mx + b from the intersections of the graphed equations

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

• A.2I write systems of two linear equations given a table of values, a graph, and a verbal description
• A.5C solve system of two linear equations with two variables for mathematical and real-world problems

How does it support the Readiness Standard(s)?

Being able to identify and verify the values of x and y where two lines intersect will provide the foundational understanding for systems of linear equations.

Instructional Implications

In accordance with the standard, students identify and verify if the coordinates of the intersection of graphed linear equations simultaneously satisfy both equations (i.e. graph the two equations: y = 3x - 2 and y = -1/3 x - 2 and (0, -2) are the coordinates of the ordered pair where the two lines intersect). To verify the x- and y-values satisfy the two equations (i.e. y = 3x - 2 and y = -1/3x - 2), the values are substituted in each equation to determine if the simplified equation results in two true statements (i.e. (0, -2) is the point of intersection because 0 - 2 = 3(-2) -2 and -2 = 1/3 (0) - 2 are both true statements).

It is important instruction includes equations where the lines intersect at exactly one point (i.e. (0, 3) for y = 2x + 3 and y = 0.4x + 3), no point (i.e. lines are parallel for y = 2x + 3 and y = 6/3 x -5), and an infinite number of points (i.e. the same line for y = 2x + 3 and y = 2(x + 1.5]).

Academic Vocabulary

• graph
• intersection
• linear equation (y = mx + b)
• simultaneously
• x-value
• y-value

Rigor Implications

• Apply
• Use
• Develop
• Identify
• Verify
8.10 Two-dimensional Shapes. The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:
(A) generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
- 8.10C explain the effect of translations, reflections over the x- or y-axis, rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation

How does it support the Readiness Standard(s)?
Being able to generalize the properties of orientation and congruence of rotations of two-dimensional shapes on a coordinate plane provides the foundational understanding to explain the effect of translations, reflections, or rotations as applied to two-dimensional shapes.

Instructional Implications
In adherence with the standards, students will generalize the properties of orientation and congruence of rotations, reflections, translations and dilations of two-dimensional shapes on a coordinate plane (i.e. triangle ABC with vertices A(1, 4), B(4, 3), C(2, 1) is reflected across the y-axis image such that a generalization about the vertices of the reflected image, A'(-1, 2), B'(-4, 3), C'(-2, 1), can be stated as the “x-coordinates of each reflected vertex is the opposite value of the x-coordinate for each corresponding vertex of the original image” and the two shapes are congruent).

Instruction should be extended to include rotations (i.e. state center of rotation and clockwise or counterclockwise), translations, and dilations. It is important to note that if no direction is given for the rotation, the rotation is assumed to be counter-clockwise.

Academic Vocabulary
- congruence
- coordinate plane
- dilation
- orientation
- reflection
- rotation
- translation
- two-dimensional shape

Rigor Implications
- Apply
- Develop
- Generalize
**GRADE 8  8.10B Supporting**

8.10 Two-dimensional shapes. The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:

(B) differentiate between transformations that preserve congruence and those that do not

---

**What Readiness Standard(s) or concepts from the Readiness Standards does it support?**

- 8.10C explain the effect of translations, reflections over the x- or y-axis, rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation

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**How does it support the Readiness Standard(s)?**

Being able to differentiate between transformations that preserve congruence and those that do not provides the foundational understanding to explain the effect of translations, reflections, or rotations as applied to two-dimensional shapes.

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**Instructional Implications**

In conjunction with 8.10A, students will differentiate between transformations (i.e. rotations, reflections, translations and dilations) that preserve congruence and those that do not. Instruction should include observations made as students perform transformations on a coordinate plane and represent the results concerning congruence in a table similar to the one shown below:

<table>
<thead>
<tr>
<th>Rotation</th>
<th>Reflection</th>
<th>Translation</th>
<th>Dilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>congruence preserved</td>
<td>congruence preserved</td>
<td>congruence preserved</td>
<td>Congruence not preserved 0 &lt; scale factor &lt; 1: shrink</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Scale factor = 1: congruent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 &lt; scale factor: enlarged</td>
</tr>
</tbody>
</table>

---

**Academic Vocabulary**

- congruence
- differentiate
- dilations
- reflections
- rotations
- transformations
- translations

---

**Rigor Implications**

- Apply
- Develop
- Differentiate
8.10 Two-dimensional Shapes. The student applies mathematical process standards to develop transformational geometry concepts. The student is expected to:

(D) model the effect on linear and area measurements of dilated two-dimensional shapes

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.3C use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation

How does it support the Readiness Standard(s)?

Being able to model the effect on linear and area measurements of dilated two-dimensional shapes will provide a foundation for students to use an algebraic representation to explain the effect of a given scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation.

Instructional Implications

In adherence with the standard, students will model the effect on linear and area measurements of dilated two-dimensional shapes [i.e. linear measurements of dilated shape = original linear measurements • scale factor and area measurements of dilated shape = original area measurement • (scale factor)^2].

Academic Vocabulary

- area measurement
- dilated two-dimensional shapes
- linear measurement
- scale factor

Rigor Implications

- Apply
- Develop
- Model

Scale Factor = 2

Original Shape
Perimeter: 2(2) + 2(3) = 10 units
Area: 2(3) = 6 square units

New Dilated Shape
Perimeter: 2(2 • 2) + 2(2 • 3) = 20 units
Area: (2 • 2)(2 • 3) = 24 square units
8.11 Measurement and Data. The student applies mathematical process standards to use statistical procedures to describe data. The student is expected to:
(A) construct a scatterplot and describe the observed data to address questions of association such as linear, non-linear, and no association between bivariate data

**What Readiness Standard(s) or concepts from the Readiness Standards does it support?**

- 8.5D use a trend line that approximates the linear relationship between bivariate sets of data to make predictions

**How does it support the Readiness Standard(s)?**

The ability to construct a scatterplot and describe the observed data as linear, non-linear, or no association between bivariate data will be the foundation for students to use a trend line to approximate the linear relationship between bivariate sets of data in order to make predictions.

**Instructional Implications**

In accordance with the standard, students will construct scatterplots and describe association such as linear, non-linear, or no association between bivariate data (i.e. data with two variables involved where each axis on a coordinate grid represents one of the two variables).

Instruction should include students describing the association between the bivariate data for a scatterplot in order to answer questions concerning association such as linear, non-linear, or no association between bivariate data.

**Academic Vocabulary**

- bivariate data
- data
- linear
- no association
- non-linear
- scatterplot

**Rigor Implications**

- Apply
- Use
- Construct
- Describe
- Address (question)
8.11 Measurement and Data. The student applies mathematical process standards to use statistical procedures to describe data. The student is expected to:
(B) determine the mean absolute deviation and use this quantity as a measure of the average distance data are from the mean using a data set of no more than 10 data points

**What Readiness Standard(s) or concepts from the Readiness Standards does it support?**
- 8.11 The student applies mathematical process standards to use statistical procedures to describe data.

**How does it support the Readiness Standard(s)?**
Determining the mean absolute deviation supports a student’s ability to use statistical procedures to describe data.

**Instructional Implications**
In accordance with the standard, students will determine the mean absolute deviation (i.e. a measure of the mean average distance data are from the mean) using a data set. Instruction should include a data set (i.e. no more than 10 data points) where students calculate the mean average, the absolute value of the difference between each data value and the mean average (i.e. absolute deviation from the mean), and then the mean average of these absolute value differences (i.e. refer to the table below that represents a set of ten math grades for a student).

<table>
<thead>
<tr>
<th>Data Value</th>
<th>Absolute Deviation from the Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td></td>
</tr>
<tr>
<td>92</td>
<td></td>
</tr>
<tr>
<td>83</td>
<td></td>
</tr>
<tr>
<td>81</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
</tr>
<tr>
<td>94</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Sum = 837</td>
<td>Sum = 83</td>
</tr>
</tbody>
</table>

Mean Score = 837 ÷ 10 = 83.7
Mean Absolute Deviation = 83 ÷ 10 = 8.3

**Academic Vocabulary**
- absolute value
- data
- mean
- mean absolute deviation

**Rigor Implications**
- Apply
- Use
- Describe
- Determine
8.11C Supporting

8.11 Measurement and Data. The student applies mathematical process standards to use statistical procedures to describe data. The student is expected to:

(C) simulate generating random samples of the same size from a population with known characteristics to develop the notion of a random sample being representative of the population from which it was selected

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
- 8.11 The student applies mathematical process standards to use statistical procedures to describe data.

How does it support the Readiness Standard(s)?
Simulating random samples supports a student’s ability to use statistical procedures to describe data.

Instructional Implications
In adherence to the TEKS, students will simulate generating random samples (i.e. use a random number generator because random numbers form a basic tool for any simulation study) of the same size from a population with known characteristics. It is important students understand that it is sometimes impossible to gather data from an entire population so the purpose of gathering and using data from random samples of the population is to make inferences and predictions that apply beyond the available set of data. One generally needs to investigate variables of interest based on a smaller sample which is randomly selected from the original population. When gathering data for a sample it is imperative to incorporate randomness into the sample selection process in order to produce samples that are representative of the population. Instruction may use a spreadsheet with a random number generator to perform many simulations using a selected sample size with given conditions (i.e. Estimate the likelihood that a player will hit 2 home runs in a single game if on the average the baseball player hits a home run once in every 10 times at bat (i.e. 10%) and he gets exactly two at bats in every game. A simulation is useful only if it mirrors real-world outcomes, so the possible outcomes for this simulation are only two possible outcomes: he hits a home run or he does not. Since the player hits a home run 10% of his at bats, 10% of the random numbers should represent a home run and the random numbers generated should be two-digit numbers since we want to simulate two at bats in a single game; the digit “4” will represent a home run and any other digit represents a different outcome since the digit 4 is 1 out of the ten digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9; this means the number “44” would represent two home runs in a single game and any other 2-digit number represents a failure to hit consecutive home runs in the game). The random number generator would run a selected number of times to generate a sample size of two-digit numbers and this simulation would be repeated numerous times. The results of the random numbers generated would then be analyzed (i.e. suppose the number “44” occurred six times out of 500 numbers, then it would be predicted the baseball player had a 1.2% likelihood of hitting two home runs in a single game). It is important to remember that when using a random number generator, the students will need to “reseed” the random number generator.

Academic Vocabulary
- population
- random samples
- simulation

Rigor Implications
- Apply
- Use
- Simulate
- Develop
8.12 Personal Financial Literacy. The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one’s life as a knowledgeable consumer and investor. The student is expected to:

(A) solve real-world problems comparing how interest rate and loan length affect the cost of credit

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.12 Personal Financial Literacy

How does it support the Readiness Standard(s)?

Solving real-world problems that compare how interest rate and loan length affect the cost of credit will support one’s ability to manage his or her financial resources more effectively for a lifetime of financial security.

Instructional Implications

In adherence with the standard, the student will solve real-world problems that involve credit. The students will compare how the interest rate and the loan length affect the cost of credit. Instruction should include information on credit cards (i.e. brochures, guest speakers, internet, etc.) offered by different local financial institutions. Since features, fees, and interest rates for credit cards vary from financial institution to financial institution, it is important instruction includes information from several financial institutions. Instruction should require students solve different credit problems with different interest rates (i.e. 12.99%, 15%, etc.) and loan lengths (i.e. one month, two months, one year, etc.) so the students can make a comparison between the different interest rates and loan lengths and how these affect the credit cost. There is online credit card calculators available for students to calculate interest paid on different lengths of loans. It is important students understand that interest is added to the unpaid balance on a credit card and the total amount paid over a period of time will exceed the original amount borrowed.

Academic Vocabulary

- compounded interest
- cost of credit
- credit
- interest rate
- loan length

Rigor Implications

- Apply
- Develop
- Solve
8.12 Personal Financial Literacy. The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one’s life as a knowledgeable consumer and investor. The student is expected to:

(B) calculate the total cost of repaying a loan, including credit cards and easy access loans, under various rates of interest and over different periods using an online calculator

**What Readiness Standard(s) or concepts from the Readiness Standards does it support?**

- 8.12 Personal Financial Literacy

**How does it support the Readiness Standard(s)?**

Calculating the total cost of repaying a loan under different conditions will support one’s ability to manage his or her financial resources more effectively for a lifetime of financial security.

**Instructional Implications**

In adherence with the standard, the student will calculate the total cost of repaying a loan (i.e. include credit cards and easy access loans) under various rates of interest and over different periods of time using an online calculator. Instruction should include information on credit cards (i.e. brochures, guest speakers, internet, etc.) offered by different local financial institutions. Since features, fees, and interest rates for credit cards vary from financial institution to financial institution, it is important instruction includes information from several financial institutions. It is important students understand that interest is added to the unpaid balance on a credit card and the total cost of repaying a loan over a period of time will exceed the original amount borrowed.

**Academic Vocabulary**

- credit card
- easy access loans
- loan
- payment periods
- rate of interest

**Rigor Implications**

- Apply
- Develop
- Calculate
- Use
8.12C 8.12 Personal Financial Literacy. The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one’s life as a knowledgeable consumer and investor. The student is expected to:
(C) explain how small amounts of money invested regularly, including money saved for college and retirement, grow over time

What Readiness Standard(s) or concepts from the Readiness Standards does it support?
• 8.12 Personal Financial Literacy

How does it support the Readiness Standard(s)?
Explaining how small amounts of money invested regularly grow over time will support one’s ability to manage his or her financial resources more effectively for a lifetime of financial security.

Instructional Implications
In adherence with the standard, the student will explain how small amounts of money invested regularly will grow over time. Instruction should include opportunities for students to gather different means for investing money on a regular basis from financial institutions or internet resources and then explain the impact small regular investments have over a period of time. Consider the example where an initial amount of $500 is invested and simple interest (i.e. $I = prt$) is calculated once a year and a regular amount of $50 per month is added to the account. The students could use a spreadsheet to show the growth of the investment over a 10 year period.

Academic Vocabulary
• interest
• invest
• principle

Rigor Implications
• Apply
• Develop
• Explain
8.12E Supporting

8.12E Personal Financial Literacy. The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one’s life as a knowledgeable consumer and investor. The student is expected to:

(E) identify and explain the advantages and disadvantages of different payment methods

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

• 8.12 Personal Financial Literacy

How does it support the Readiness Standard(s)?

Identifying and explaining advantages and disadvantages of different payment methods will support one’s ability to manage his or her financial resources more effectively for a lifetime of financial security.

Instructional Implications

In adherence with the standard, the student will identify and explain the advantages and disadvantages of different payment methods. Instruction should include information on different payment methods available to consumers. Since features and fees vary for different payment methods, it is important instruction includes information from several financial institutions. Some payment methods in use around the world may include the following:
cash, money orders, checks, debit cards, credit cards, wire transfers, lines of credit, and electronic payment (i.e. three main types: a one-time customer-to-vendor payment commonly used when you shop online at an-e-commerce site, a recurring customer-to-vendor payment when you pay a bill through a regularly scheduled direct debit from your checking account and automatic charge to your credit card, or use an automatic bank-to-vendor payment where your bank offers an online bill pay service and you log onto your bank’s website and authorize your bank to electronically transfer money from your account to pay bills). Instruction should also include opportunities for students to explain the advantages and disadvantages of different payment methods similar to some of the examples shown below:

<table>
<thead>
<tr>
<th>Payment Method</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>cash</td>
<td>• Convenient • Easy to use</td>
<td>• Theft • Carry large amounts • Easy to misplace • Counterfeiting</td>
</tr>
<tr>
<td>check</td>
<td>• Do not have to carry • Easy to use</td>
<td>• Some businesses do not accept out of town, only local • Charged insufficient funds</td>
</tr>
<tr>
<td>credit card</td>
<td>• Convenient • Do not have to carry cash or checks • Pay off all at once</td>
<td>• Charged interest on unpaid balance • Annual fee • Fraud • Inconvenient if card lost</td>
</tr>
<tr>
<td>online credit</td>
<td>• Easier to purchase a product • Do not have to have a credit</td>
<td>• Charged a fee for the transaction • Internet hackers</td>
</tr>
</tbody>
</table>

Academic Vocabulary

• automatic charge
• bill
• checking account
• consumer
• credit
• credit card
• debit
• e-commerce site
• electronic payment
• online bill pay service
• payment method
• vendor

Rigor Implications

• Apply
• Develop
• Identify
• Explain
8.12F Supporting

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.12 Personal Financial Literacy

How does it support the Readiness Standard(s)?

Analyzing situations to determine if situations represent financial responsibility will support one’s ability to manage his or her financial resources more effectively for a lifetime of financial security.

Instructional Implications

In adherence with the standard, students will analyze situations to determine if the situations represent financially responsible (i.e. process of managing money and other assets in a manner that is considered productive and in the best interests of the individual) decisions. Being proficient at the task of finance and money management involves cultivating a mindset that makes it possible to look beyond the wants of today in order to provide for the needs of tomorrow. In order to achieve a high level of financial responsibility, it is necessary to understand the difference between needs and wants, establish a budget and stick to it, pay off credit card balance monthly or within three pay periods, and set aside a monthly amount for savings. Instruction should have students identify the benefits of financial responsibility (i.e. financial security) and the costs of financial irresponsibility (i.e. long term debt, no savings for emergencies, no money for college fund, etc.).

Academic Vocabulary

- benefits
- costs
- financial irresponsibility
- financial responsibility

Rigor Implications

- Apply
- Develop
- Analyze
- Determine
- Identify
8.12 Personal Financial Literacy. The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one's life as a knowledgeable consumer and investor. The student is expected to:

(G) estimate the cost of a two-year and four-year college education, including family contribution, and devise a periodic savings plan for accumulating the money needed to contribute to the total cost of attendance for at least the first year of college

What Readiness Standard(s) or concepts from the Readiness Standards does it support?

- 8.12 Personal Financial Literacy

How does it support the Readiness Standard(s)?

Estimating the cost and devising a periodic savings plan for accumulating the money needed to attend college will support one’s ability to manage his or her financial resources more effectively for a lifetime of financial security.

Instructional Implications

In adherence with the standard, the student will estimate the cost of a two-year and four-year college education. Costs need to include tuition, books, transportation, room, and board, etc. Instruction should have students devise a periodic savings plan (i.e. family contribution, savings, grants, scholarships, student loans, and work-study) for accumulating the money needed to contribute to the total cost of attending at least the first year of college. Instruction may include having students use the internet to investigate different periodic savings plans and the cost for various colleges and then devise a plan that may work best for the student’s degree plan.

Academic Vocabulary

- estimated cost
- family contribution
- periodic savings plan

Rigor Implications

- Apply
- Develop
- Estimate
- Devise
APPENDIX
TREE DIAGRAM
Grade 8 Math TEKS Tree - Readiness Standards

8.2D Order Set of rational numbers Mathematical probs. Real-world situations
     Use Representations Algebraic
     Figures 2-dimensional Real-world situations
     Explain Effect Coordinate plane

8.3C Graph Relationships Proportional
     Interpret Unit rate Slope
     Use Data Table

8.4B Determine Rate of change (slope) Mathematical probs. Real-world situations
     y-intercept Mathematical probs. Real-world situations
     Use Trend line Linear relationships
     Make Predictions

8.4C Graph Interpret Unit rate Slope
     Use Data Table

8.5D Use Trend line Linear relationships
     Make Predictions

8.5G Identify Functions
     Use Representations Algebraic
     Write Equations Form: $y = mx + b$
     Model Linear relationships

8.6A Solve Volume problems Cylinders
     Use Knowledge of surface area Cones
     Make Connections Spheres
     Determine Solutions Formulas for:
     (to L.A./S.A. problems) Lateral surface area
     Pythagorean Theorem Total surface area
     Converse Rectangular prisms

8.7C Use Pythagorean Theorem Converse
     Solve Problems

8.8C Model Equations 1-variable
     Solve Equations Variable on both sides
     Representations Rational coefficients
     Use Algebraic

8.10C Explain Effect Translations
     Calculate Interest Reflections Over x-axis
     Simple Compound Over y-axis
     Rotate 90° + 180° + 360°

8.12D Compare Earnings Simple interest
     Compound interest
     Calculate Interest Simple interest
     Compare Earnings Compound interest