1 Transforming Geometric Objects

Module Pacing: 39 Days

Topic 1: Rigid Motion Transformations

ELPS: 1.A, 1.C, 1.D, 1.E, 1.G, 2.C, 2.D, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.F, 4.A, 4.B, 4.C, 4.D, 4.G, 4.K, 5.E

Topic Pacing: 20 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**Patty Paper, Patty Paper** Introduction to Congruent Figures	Students use patty paper to indirectly measure segments and angles and use folds to make observations about a figure. They determine if figures are the same size and shape. The term *congruent figures* is defined. Students use patty paper to determine if figures are congruent. They then make conjectures about congruence, investigate their conjectures, and justify their conjectures using informal transformation language.	• Patty paper is a hands-on tool for investigating geometric ideas. • If two figures are *congruent figures*, all corresponding sides and all corresponding angles have the same measure. • *Corresponding sides* are sides that have the same relative position in geometric figures. • *Corresponding angles* are angles that have the same relative position in geometric figures. • A rigorous study of geometry requires making conjectures, investigating conjectures, and justifying true results.	8.10A	2
2	**Slides, Flips, and Spins** Introduction to Rigid Motions	Students develop a formal understanding of translations, rotations, and reflections in the plane. The terminology of transformations is introduced, including *pre-image, image, translation, reflection, line of reflection, rotation, center of rotation,* and *angle of rotation*. Students use patty paper to investigate each transformation, create images from pre-images, and determine the properties of each tranformation. They learn that each rigid motion transformation preserves the size and shape of the original figure, and that translations and rotations also preserve the orientation of the figure. At the end of the lesson, students state the formal name for transformations that carry figures onto congruent figures and reason that an image of a pre-image is congruent to the pre-image.	• *Transformations* are mappings of a plane and all the points of a figure in a plane according to a common action or operation. • *Rigid motions* are transformations that preserve segment length, angle measure, and parallelism of segments. • Translations, rotations, and reflections are rigid motions. • The *pre-image* of a figure is the original figure. The *image* is the result of a transformation. • *Translations* "slide" a figure in a given direction by a specific distance. • *Reflections* "flip" a figure across a line of reflection. • *Rotations* "spin" a figure given a center of rotation, by an angle of rotation, in a given direction.	8.10A 8.10B	3

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
3	**Lateral Moves** Translations of Figures on the Coordinate Plane	Students use patty paper to explore translations of various figures on a coordinate plane. They then generalize about the effects of translating a figure on its coordinates. Students verify that two figures are congruent by describing a sequence of translations that map one figure onto another.	• A translation is a transformation that moves each point of a figure the same distance and direction. • A point with the coordinates (x, y), when translated horizontally by c units, has new coordinates ($x + c$, y). • A point with the coordinates (x, y), when translated vertically by c units, has new coordinates (x, $y + c$).	8.10A **8.10C**	2
Mid-Topic Assessment					1
4	**Mirror, Mirror** Reflections of Figures on the Coordinate Plane	Students use patty paper to explore reflections of various figures on a coordinate plane. They then generalize about the effects reflecting a figure has on its coordinates. Students verify that two figures are congruent by describing a sequence of translations and reflections that map one figure onto another.	• A reflection is a transformation that "flips" a figure across a reflection line. • A reflection line is a line that acts as a mirror, or perpendicular bisector, so that corresponding points are the same distance from the mirror. • When a geometric figure is reflected across the y-axis to form its image, the x-values of the ordered pairs of the vertices of the pre-image become opposites and the y-values of the ordered pairs of the pre-image remain the same. • When a geometric figure is reflected across the x-axis to form its image, the y-values of the ordered pairs of the vertices of the pre-image become opposites and the x-values of the ordered pairs of the pre-image remain the same. • A point with the coordinates (x, y), when reflected across the x-axis, has new coordinates (x, $-y$). A point with the coordinates (x, y), when reflected across the y-axis, has new coordinates ($-x$, y).	8.10A **8.10C**	2
5	**Half Turns and Quarter Turns** Rotations of Figures on the Coordinate Plane	Students use patty paper to explore rotations of various figures on a coordinate plane. They then generalize about the effects of rotating a figure on its coordinates. Students verify that two figures are congruent by describing a sequence of rigid motions that map one figure onto another.	• A rotation is a transformation that turns a figure clockwise or counterclockwise about a fixed point for a given angle and a given direction. • An angle of rotation is the amount of clockwise or counterclockwise rotation about a fixed point. • The point of rotation can be a point on the figure, in the figure, or outside the figure.	8.10A **8.10C**	2

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
6	**Every Which Way** Combining Rigid Motions	Students use coordinates to determine the rigid motion used to map one congruent figure onto another. They learn about and write congruence statements for congruent triangles. Using figures on a grid, students investigate and determine a sequence of transformations that can be used to verify that figures are congruent. They then generalize the effects of rigid motions on the coordinates of figures.	• Reflections change the orientation of the vertices of a figure. • Rigid motions produce congruent figures. • *Congruent line segments* are line segments that have the same length. • *Congruent angles* are angles that have equal measures. • Congruent figures can be mapped from one to another through a sequence of translations, reflections, and rotations. • There is often more than one sequence of transformations that can be used to map from one congruent figure onto another one. • The effects of rigid motion transformations on the coordinates of figures can be generalized.	8.10A **8.10C**	2
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					5

Topic 2: Similarity

ELPS: 1.A, 1.C, 1.E, 1.F, 1.G, 2.C, 2.E, 2.I, 3.D, 3.E, 4.B, 4.C, 5.B, 5.F, 5.G

Topic Pacing: 10 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**Pinch-Zoom Geometry** Dilations of Figures	Students explore dilations on the plane. The terms *dilation, center of dilation, scale factor* or *dilation factor, enlargement,* and *reduction* are defined. Students dilate a variety of objects and figures using scale factors greater than and less than 1. They use a model to determine side lengths and angle measures after enlargements and reductions in order to verify similarity. Students connect dilations to changing image sizes in word processing and graphics software.	• *Dilation* is a transformation that produces images that are the same shape as the pre-image, but not the same size. • When a figure is dilated with a *scale factor* greater than 1, the resulting figure is a similar figure that is an *enlargement* because each side length is multiplied by a scale factor that is larger than the identity factor of 1. • When a figure is dilated with a scale factor less than 1, the resulting figure is a similar figure that is a *reduction* because each side length is multiplied by a scale factor that is smaller than the identity factor of 1.	8.3A 8.10A	2

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
2	**Running, Rising, Stepping, Scaling** Dilating Figures on the Coordinate Plane	Students build dilations on the coordinate plane as repeated geometric translations using the origin as the center of dilation. Throughout, students create and modify conjectures about the effect of dilations with the origin as the center on the coordinates, perimeter, and area of a figure. They use dilations and transformations they learned previously to verify that two figures are similar.	• Dilation is a transformation that produces images that are the same shape as the pre-image, but not the same size. • When a figure is dilated on the coordinate plane, the resulting figure is similar to the original figure. • Each coordinate (x, y) point on a figure is multiplied by the scale factor when the figure is dilated using the origin as the center of dilation. • When a figure is dilated using the origin as the center of dilation, the perimeter of the new figure is the scale factor multiplied by the perimeter of the original figure. The area of the new figure is the square of the scale factor multiplied by the area of the original figure.	8.3B **8.3C** 8.10B 8.10D	2
3	**From Here to There** Mapping Similar Figures Using Transformations	Students determine if figures are similar through transformations. They explore what is meant by "same shape" when referring to similar figures. Students determine similarity using a single dilation and verify similarity of a variety of figures through a sequence of transformations. They then explore the relationship between images of a common pre-image under different conditions and the relationship between figures that are similar. Finally, students summarize the relationships between transformations and congruent and similar figures.	• If two figures are similar, one can be mapped onto the other through a sequence of transformations. • Images created from the same pre-image are similar.	**8.3C** 8.10A 8.10B **8.10C**	2
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					3

Topic 3: Line and Angle Relationships

ELPS: 1.A, 1.C, 1.E, 1.F, 1.G, 2.C, 2.E, 2.I, 3.D, 3.E, 4.B, 4.C, 5.B, 5.F, 5.G

Topic Pacing: 9 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**Pulling a One-Eighty!** Triangle Sum and Exterior Angle Theorems	Students explore and justify the relationships between angles and sides in a triangle. They establish the Triangle Sum Theorem and use the theorem as they explore the relationship between interior angle measures and the side lengths of triangles. Students identify exterior angles and remote interior angles of triangles and explore the relationship between these angles to establish the Exterior Angle Theorem. They then practice applying both theorems to demonstrate their knowledge of triangle relationships.	• The *Triangle Sum Theorem* states that the sum of the measures of the interior angles of a triangle is 180°. • The longest side of a triangle lies opposite the largest interior angle. • The shortest side of a triangle lies opposite the smallest interior angle. • The *remote interior angles of a triangle* are the two angles non-adjacent to the exterior angle. • The *Exterior Angle Theorem* states that the measure of the exterior angle of a triangle is equal to the sum of the measures of the two remote interior angles of the triangle.	8.8D	2
2	**Crisscross Applesauce** Angle Relationships Formed by Lines Intersected by a Transversal	Students explore the angles formed when two lines are intersected by a transversal. They use the Parallel Postulate and transformations to begin exploring and identifying the angles. The terms *transversal, alternate interior angles, alternate exterior angles, same-side interior angles,* and *same-side exterior angles* are introduced. Students are given a street map and asked to identify transversals and special pairs of angles. After measuring several angles, they conclude that when two parallel lines are intersected by a transversal, the alternate interior, alternate exterior, and corresponding angles are congruent. Students also conclude that same-side interior and same-side exterior angles are supplementary. When the lines are not parallel, these relationships do not hold true. Finally, students solve problems using the parallel line and angle relationships.	• A *transversal* is a line that intersects two or more lines. • When two parallel lines are intersected by a transversal, corresponding angles are congruent. • When two parallel lines are intersected by a transversal, *alternate interior angles* are congruent. • When two parallel lines are intersected by a transversal, *alternate exterior angles* are congruent. • When two parallel lines are intersected by a transversal, *same-side interior angles* are supplementary. • When two parallel lines are intersected by a transversal, *same-side exterior angles* are supplementary. • Parallel line and angle relationships can be proven using transformations.	8.8D	3
3	**The Vanishing Point** The Angle-Angle Similarity Theorem	The Angle-Angle Similarity Theorem can be used to show that two triangles are similar. From previous lessons, students should already recognize that two similar triangles have congruent corresponding angles and proportional corresponding sides. The Angle-Angle Similarity Theorem allows students to show that two triangles are similar without comparing the measures of the six parts of each triangle.	• The *Angle-Angle Similarity Theorem (AA)* states that if two angles of one triangle are congruent to the corresponding angles of another triangle, then the triangles are similar. • The Angle-Angle Similarity Theorem can be applied to identify similar triangles in problem situations.	8.8D	1
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					2

2 Developing Function Foundations

Module Pacing: 43 Days

Topic 1: From Proportions to Linear Relationships

ELPS: 1.A, 1.C, 1.D, 1.E, 1.H, 2.C, 2.D, 2.E, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.F, 3.G, 3.H, 4.A, 4.B, 4.C, 4.D, 4.F, 4.G, 4.K, 5.E

Topic Pacing: 17 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**Post-Secondary Proportions** Representations of Proportional Relationships	Students examine a context which presents a proportional relationship with a ratio and use this ratio to write equivalent ratios. They further analyze this context by creating a table of values and matching equations to situations. Students then generalize this representation to an equation in the form $y = kx$, identifying k as the constant of proportionality. Next, students analyze scenarios involving proportional relationships, also known as direct variation, represented in different forms. They end the lesson by analyzing and describing the general characteristics of proportional relationships as represented in graphs, tables, and equations. Later in the topic, students will use these general characteristics to contrast proportional linear relationships with non-proportional linear relationships.	• A *proportional relationship* is one in which the ratio of two quantities is constant. • A proportional relationship is represented as a linear graph passing through the origin. • A proportional relationship is represented as a table with the values that increase or decrease at a constant rate, beginning or ending with (0, 0). • The equation for a proportional relationship is written in the form $y = kx$, where k is the *constant of proportionality*. • A proportional relationship can also be referred to as a direct variation. The y-value varies directly with the x-value, therefore the ratio of y to x is constant for every point. If two quantities vary directly, the points on a graph form a straight line, and the line passes through the origin.	**8.4B** **8.4C** 8.5A 8.5E 8.5H	3
2	**Jack and Jill Went Up the Hill** Using Similar Triangles to Describe Steepness of a Line	Students connect the previously learned concepts of unit rate, constant of proportionality, and scale factor with the concept of slope, which is introduced here as the rate of change of the dependent quantity compared to the independent quantity. In this lesson, *slope* is defined as the steepness and direction of a line. The formula to calculate slope is introduced in the next topic. Students derive the equation for a proportional relationship, $y = mx$. By translating the line b units, they derive the equation for a non-proportional linear relationship, $y = mx + b$. They practice writing equations from graphs. Students begin with incomplete tables and graphs to create their own proportional and non-proportional linear relationships. They also investigate the slope of a horizontal line.	• A *rate of change* is used to describe the rate of increase or decrease of one quantity relative to another quantity. • A unit rate is a comparison of two measurements in which the denominator has a value of one unit. • The rate of change is the same for any two points on a line. • The *slope* of a line describes its steepness and direction. • An increasing line has a positive slope; a decreasing line has a negative slope.	8.4A **8.4B** **8.4C** 8.5F 8.5H	3
	Mid-Topic Assessment				1

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
3	**Slippery Slopes** Exploring Slopes Using Similar Triangles	Students use similar triangles to explain why the slope is the same between any two distinct points on a non-vertical line. They develop this understanding by taking two points on a line and drawing a segment horizontally from one point and a segment vertically from the other point until the two segments intersect to form a right triangle. The right triangles formed are verified to be similar using transformations, patty paper, and properties of angles formed by parallel lines. Using the relationship between the ratios associated with the corresponding sides of similar triangles, students demonstrate that the slope of any two points on the non-vertical line is the same. They explore this concept first using a line in the form $y = mx$ and then with lines in the form $y = mx + b$ with positive and negative slopes.	• The properties of similar triangles constructed on a line can explain why the slope is the same for any two points on a line. • All right triangles formed on a given line are similar. • The horizontal and vertical side lengths of right triangles formed on a given line can be substituted in the ratio $\frac{\text{change in vertical distance}}{\text{change in horizontal distance}}$ to calculate the slope of the line.	8.4A	2
4	**Up, Down, and All Around** Transformations of Lines	Students apply geometric transformations to the basic function, $y = x$, first reviewing the effects of transformations on geometric figures in the coordinate plane. They use patty paper to investigate the relationship between translations of $y = x$, noting that the images have the same slope as the pre-image and different y-intercepts. Students then investigate graphs with the same y-intercept but different slopes and recognize $y = mx$ as a dilation of $y = x$ by a factor of m. Students graph several equations with the same slope and conclude that the lines have a parallel relationship. They investigate the relationship between the images of parallel lines and segments after undergoing reflections and rotations.	• When a line is dilated by a non-zero factor other than 1, the slope of the line changes by the factor. • When a line is translated horizontally or vertically, the slope remains the same but the intercepts change. • Linear relationships can be graphed using transformations. • When lines are parallel to each other, the slope values in their equations are equal. • Translating a line results in a line parallel to the original line. • Rotating parallel lines results in parallel lines. • Reflecting parallel lines results in parallel lines.	**8.3C** **8.4B** **8.4C** 8.5F **8.10C** 8.10D	3
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					4

Topic 2: Linear Relationships

ELPS: 1.A, 1.C, 1.D, 1.E, 1.F, 2.C, 2.D, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.E, 4.A, 4.B, 4.C, 4.D, 4.K, 5.B, 5.C, 5.E

Topic Pacing: 14 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**U.S. Shirts** Using Tables, Graphs, and Equations	Tables, graphs, and equations can provide different representations of the same problem situation. Students create equations, tables, and graphs to analyze linear relationships. Students compare and analyze the U.S. Shirts and Hot Shirts problem situations algebraically and graphically. They then write a response that compares the pricing plans for the two companies and predict how the pricing by Hot Shirts will affect the business of U.S. Shirts.	• Two linear relationships can be compared algebraically. • Two linear relationships can be compared graphically.	8.5B **8.5I**	2
2	**At the Arcade** Linear Relationships in Tables	Students analyze a table of values within a context and determine the rate of change by using its formal definition. Students use the formula $\frac{y_2 - y_1}{x_2 - x_1}$ to determine the rate of change for a table of values (or two points). Students combine their knowledge of linear relationships and their skill of determining rate of change from a table of values in order to determine whether a given table of values represents a linear relationship. This process includes the special case of examining first differences.	• The formula $\frac{y_2 - y_1}{x_2 - x_1}$, where the first point is (x_1, y_1) and the second point is (x_2, y_2) can be used to calculate the rate of change of a linear relationship from a table of values or two coordinate pairs. • If the rate of change between consecutive ordered pairs in a table is the same value every time, the table of values represents a linear relation. • *First differences* are the values determined by subtracting consecutive y-values in a table when the x-values are consecutive integers. If the first differences are the same every time, the table of values represents a linear relationship.	8.4A **8.4C** 8.5F	3
		Mid-Topic Assessment			1
3	**Dining, Dancing, Driving** Linear Relationships in Context	Students analyze a context that represents linear relationships among distance, cost, and gallons of gas. They represent the same context using different independent and dependent quantities, each time calculating the rate in order to connect processes and representations. Students then determine the unit rate from a variety of contexts. Some contexts provide rates that must be interpreted and restated using the given units and labels, while others provide two data points, giving students the opportunity to use the formula $\frac{y_2 - y_1}{x_2 - x_1}$.	• A context representing a linear function often provides enough information to determine the rate of change of the function. • There are similarities in the processes of determining the rate of change from a context, graph, and table. • In order to calculate a unit rate from a context representing a linear function, a rate, or two data points, must be provided.	**8.4C**	2

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
4	**Derby Day** Slope-Intercept Form of a Line	Students formalize the initial value of a linear relationship, or the point where the line crosses the *y*-axis, as the *y*-intercept of the graph. They learn the notation for *y*-intercept and determine *y*-intercept informally from graphs. Students then use the slope formula to determine the value of the *y*-intercept and to derive the slope-intercept form of a linear equation. They practice writing equations in slope-intercept form given different information in different forms and analyze linear relationships.	• The *y-intercept* is the *y*-coordinate of the point where a graph crosses the *y*-axis. • The *y*-intercept is written as the coordinate pair (0, *y*). • The *y*-intercept can be determined from any representation (context, table, graph, or equation) of a linear relationship. • In cases where the *y*-intercept of a linear equation is not obvious, it is helpful to use the slope and algebra to calculate its value. • The *slope-intercept form* of a linear equation is $y = mx + b$, where m is the slope of the line and (0, *b*) is the *y*-intercept of the line.	**8.4C** **8.5I**	2
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					3

Topic 3: Introduction to Functions

ELPS: 1A, 1.D, 1.E, 2.C, 2.D, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.G, 3.H, 4.A, 4.B, 4.C, 4.D, 4.F, 4.K, 5.E

Topic Pacing: 12 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**Patterns, Sequences, Rules ...** Analyzing Sequences as Rules	*Sequences* and *terms* in a sequence are introduced. Sequences that involve numbers and figures are provided, and students determine the next term in each sequence. Different contexts and diagrams are provided for students to develop an understanding of sequences. It is important that all students discuss all problems, as each problem demonstrates a different type of pattern. In the last problem, students summarize the sequences generated in this lesson, first by documenting whether each sequence was increasing or decreasing, and then by defining the growth pattern of each sequence.	• A *sequence* is a pattern involving an ordered arrangement of numbers, geometric figures, letters, or other objects. A *term* in a sequence is an individual number, figure, or letter in the sequence. • There are many different patterns that can generate a sequence of numbers. Some possible patterns are: – Adding or subtracting by the same number each time. – Multiplying or dividing by the same number each time. – Adding by a different number each time, with the numbers being part of a pattern. – Alternating between adding and subtracting.	**8.5G**	**0**

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
2	**Once Upon a Graph** Analyzing the Characteristics of Graphs of Relationships	Through a sorting activity, students characterize graphs as (1) discrete or continuous, (2) increasing, decreasing, neither increasing nor decreasing, or both increasing and decreasing, and (3) linear or non-linear. The activity guides students to the realization that the graphs of all of the sequences are discrete graphs. Next, students interpret two piecewise graphs within a context by calculating rates from the line segments in the graph. Lastly, students create stories to describe information from numberless graphs.	• Graphs can be described by characteristics such as discrete or continuous; linear or non-linear; and increasing, decreasing, neither increasing nor decreasing, or both increasing and decreasing. • A *discrete* graph is a graph of isolated points. A *continuous* graph is a graph with no breaks in it. • A linear graph is a graph that is a line or series of *collinear* points. A *non-linear* graph is a graph that is not a line and therefore not a series of collinear points. • The graphs of all sequences are discrete graphs.	**8.5G**	**1**
3	**One or More Xs to One Y** Defining Functional Relationships	The terms *relation* and *function* are defined. Relations are represented as mappings, sets of ordered pairs, tables, sequences, contexts, graphs, and equations. Students begin by analyzing mappings, sets of ordered pairs, tables, and sequences and determine whether these relations are functions according to the definition. They then determine whether different real-world contexts represent functions. Next, students analyze graphs and use the vertical line test to determine whether the various graphs represent functions. Students determine whether equations are functions by substituting values for x into the equation, and then determining if any x-values can be mapped to more than one y-value. Students solidify their understanding of functions by completing a graphic organizer with the definition of *function*, a problem situation, a table, and a sketch of a graph of a function.	• A *relation* is any set of ordered pairs or the *mapping* between a set of inputs and a set of outputs. The first coordinate in an ordered pair in a relation is the *input*, and the second coordinate is the *output*. • A *function* is a relation which maps each input to one and only one output. Relations that are not functions will have more than one output for each input. • A *scatterplot* is a graph of a collection of ordered pairs that allows an exploration of the relationship between the points. • The *vertical line test* is a visual method of determining whether a relation represented as a graph is a function.	**8.5G**	**2**
OMIT	Mid-Topic Assessment				**0**

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
4	**Over the River and Through the Woods** Describing Functions	Students analyze the graphical behavior of linear and non-linear functions. They determine which of a set of distance-time graphs could represent a journey and which are functions. They then analyze a familiar linear situation, write an equation, and graph the situation, concluding that this and other similar situations that represent linear relationships are linear functions. Next, students analyze a context that includes increasing, decreasing, and constant intervals. They write equations for each portion of the graph and conclude that this non-linear graph is also a function. Finally, students explore non-linear functions as represented by equations, tables and graphs. In each case, students create a graph and determine that it is a function, but not a linear function. They determine the intervals of increase and decrease for each function.	• A *linear function* is a function whose graph is a straight line. • In an *increasing function*, both values of the function increase. • In a *constant function*, the *y*-value does not change or remains constant. • In a *decreasing function*, the value of the dependent variable decreases as the independent variable increases. • A function has an *interval of increase* when it is increasing for some values of the independent variable. • A function has an *interval of decrease* when it is decreasing for some values of the independent variable. • A function has a *constant interval* when it is constant for some values of the independent variable. • Non-linear functions can be represented with equations, tables, and graphs.	**8.4C** 8.5B 8.5F **8.5G** **8.5I**	2
5	**Comparing Apples to Oranges** Comparing Functions Using Different Representations	Students compare the rate of change associated with functions represented by equations, tables of values, graphs, and verbal descriptions. Situations involve analyzing student solution paths, a peer analysis scenario, and rates of change described in real-world situations. Students also order rates of change associated with various representations.	• Functions may be represented and compared using graphs, equations, verbal descriptions, and a table of values. • The properties of functions can be compared even when the functions are represented in different ways. • An increasing line has a positive rate of change; a decreasing line has a negative rate of change; a horizontal line has a rate of change equal to zero; and a vertical line has a rate of change that is undefined. • When comparing lines on the same graph, as the absolute value of the slope increases, the line becomes steeper, or closer to a vertical line. As the absolute value of the slope decreases, the line becomes closer to a horizontal line. • When comparing rates of change, calculate $\|m\|$; the steeper the line, regardless if it is increasing or decreasing, the larger the rate of change.	**8.4C** 8.5B	2
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					4

3 Data Data Everywhere

Module Pacing: 19 Days

Topic 1: Patterns in Bivariate Data

ELPS: 1.A, 1.D, 1.E, 2.C, 2.D, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 4.A, 4.B, 4.C, 4.K, 5.E

Topic Pacing: 8 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**Pass the Squeeze** Analyzing Patterns in Scatterplots	Students construct and analyze scatterplots of bivariate data to explore patterns in the data. They perform an experiment, collect data, use the data to create a table of values, use the table of values to create a scatterplot, and use the scatterplot to answer questions related to the problem situation. Students analyze scatterplots as they learn the terms *bivariate data, explanatory variable, response variable, linear association, positive association, negative association, cluster,* and *outlier*. Students identify explanatory and response variables and look for and describe the patterns of association in a wide variety of contexts.	• *Bivariate data* is used when collecting information regarding two characteristics for the same person, thing, or event. • A scatterplot is a graph of a set of ordered pairs. The points in a scatterplot are not connected. • Scatterplots allow us to investigate patterns in bivariate data. • In a scatterplot, if the *response variable* increases as the *explanatory variable* increases, then the two variables are said to have a *positive association*. If the response variable decreases as the explanatory variable increases, then the two variables are said to have a *negative association*. • Common patterns in bivariate data are clustering, positive or negative associations, linear and non-linear associations, and outliers. • *Outliers* are points that deviate from the overall pattern of the data.	8.5C 8.11A	2
2	**Where Do You Buy Your Books?** Drawing Lines of Best Fit	Students analyze two scatterplots to show percent of book sales from bookstores and the internet from 2004 to 2010. They write an equation of the line of best fit for each scatterplot and draw it on their plot. Using their line of best fit, students predict the percent of book sales. The terms *line of best fit, trend line, interpolating,* and *extrapolating* are defined in this lesson.	• A *line of best fit* is a straight line that is as close to as many points as possible, but does not have to go through any of the points on the scatterplot. • Equations can be written for a line of best fit. • A line of best fit can be used to make predictions about bivariate data. • A line of best fit and its equation are often referred to as a model of the data.	8.5C **8.5D**	1
	Mid-Topic Assessment				**0**

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
3	**Mia Is Growing Like a Weed** Analyzing Lines of Best Fit	Students create a scatterplot for age and height and a scatterplot for age and weight. They draw the line of best fit and determine the equation of the line of best fit for each scatterplot. Students then make predictions for height and for weight based on age using the equation of each line of best fit.	• A *line of best fit* is a straight line that is as close to as many points as possible, but does not have to go through any of the points on the scatterplot. • Equations can be written for a line of best fit. • A line of best fit can be used to make predictions about bivariate data. • A line of best fit and its equation are often referred to as a model of the data. • The closer the data points are to a line, the better the fit of the line to the data. • You can interpret the slope and *y*-intercept of a line of best fit by looking at the problem situation and the independent and dependent quantities.	**8.5D** **8.5I**	2
4	**The Stroop Test** Comparing Slopes and Intercepts of Data from Experiments	The Stroop Test studies a person's perception of words and colors by using lists of color words (red, green, black, and blue) that are written in one of the four colors. Students conduct the Stroop Test experiment to gather data. They calculate the mean time for various matching and non-matching lists of words and create scatterplots of the list length versus the amount of time. Students draw the line of best fit for each scatterplot, and then make predictions for the amount of time based on the list length using the equations of the lines of best fit.	• Equations can be written for a line of best fit. • A line of best fit can be used to make predictions about data.	**8.5D** **8.5I**	**0**
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					2

Topic 2: Variability and Sampling

ELPS: 1.A, 1.C. 1.D, 1.E, 1.G, 2.C, 2.D, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.F, 4.A, 4.B, 4.C, 4.G, 4.K, 5.E

Topic Pacing: 11 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**March MADness** Mean Absolute Deviation	Students analyze two data sets displayed on a dot plot that have the same mean, but with different amounts of spread. The concept of deviation is introduced, and students calculate the deviations of each data point from the mean. The *mean absolute deviation* is introduced, and students calculate the mean absolute deviation for each data set. Then, they calculate and interpret the mean absolute deviation for two additional data sets. Finally, students convert non-numerical data from two data sets into numerical data to analyze and interpret it using measures of center and variation.	• Measures of variability in a data set describe how spread out the data is. • The *mean absolute deviation* is a measure of variation describing how the data is spread out around the mean of the data set.	8.11B	2

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
2	**Let's Hear From You!** Collecting Random Samples	Students review the statistical process and deepen their understanding of the second component of the process: data collection. They are introduced to new terms related to data collection. Students then read various problem situations and differentiate between census and sample, and parameter and statistic. Students learn that a sample is smaller than the population, and it represents characteristics of the population. They encounter methods for selecting samples from a population and determine if methods inadvertently misrepresent the population. Students use two tools to generate random numbers: pulling numbers and random number tables. Random number tables are provided.	• A *survey* is a method of collecting information from a population or sample of a population. • A *population* is the entire set of items from which data can be selected. • A *census* is the collection of data from every member of a population. • The characteristic used to describe the population is called a *parameter*. • A *statistic* describes the sample from a population and can be used to make a prediction about a parameter. • A *random sample* is a sample that is selected from the population in such a way that every member of the population has the same chance of being selected. • A sample generated randomly is more likely to be representative of the population than one that is not generated randomly. • Random number tables are used to generate a random sample when the population size is large.	8.11C	3
3	**Tiles, Gumballs, and Pumpkins** Using Random Samples to Draw Inferences	Students use statistical information gathered from a sample to determine a parameter for a population. They complete this process two times with one scenario. The first time students may select the sample using various methods; however, the second time they follow a specific strategy to select a random sample. In each case, students use proportional reasoning to estimate the parameter. They compute percent error and conclude that statistics obtained from samples are more likely to represent the parameter of the population if the sample is randomly chosen. They then analyze data from 100 samples and predict the parameter from the data. Finally, students are provided with a scenario and must design and carry out a sampling plan to estimate the parameter.	• Statistics obtained from samples are more likely to represent the parameter of the population if the sample is randomly chosen. • Statistics are used to estimate parameters. • Proportional reasoning can be used with statistics to estimate parameters. • Percent error can be used as a measure of the variation between a statistic and a parameter.	8.11C	2
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					3

4 Modeling Linear Equations

Module Pacing: 18 Days

Topic 1: Solving Linear Equations

ELPS: 1.A, 1.D, 1.E, 1.G, 2.C, 2.D, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.F, 4.A, 4.B, 4.C, 4.G, 4.K, 5.E

Topic Pacing: 8 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**Solving Strategically** Equations with Variables on Both Sides	Students solve equations with the same variable on both sides of the equals sign. They use the Properties of Equality, the additive inverse, and the Distributive Property to solve equations. In addition, students consider different strategies to solve the same equation based on its given structure. They divide out a number from both sides of an equation, multiply both sides of an equation by the least common denominator of fractional terms to rewrite fractions as integers, and multiply both sides of an equation by a power of 10 to rewrite decimals as integers. These strategies help simplify equations for students to make calculations easier as students solve for an unknown. The lesson begins and ends with students building their own equations.	• Solving equations with variables on both sides requires the use of the same properties as solving two-step equations. • Dividing out a number from both sides of an equation, multiplying both sides of an equation by the least common denominator of fractional terms to rewrite fractions as integers, and multiplying both sides of an equation by a power of 10 to rewrite decimals as integers are useful strategies to consider prior to solving for an unknown.	**8.8C**	2
2	**DVDs and MP3s** Analyzing and Solving Linear Equations	Students write algebraic expressions within the context of different situations. They then use the expressions to write equations and solve the equations for unknown values. Students interpret solutions and determine if equations have one solution, no solutions, or infinite solutions. They model given situations with inequalities, and write possible scenarios that could be represented by a given inequality.	• Situations can be represented and solved using linear equations. • The value of unknown quantities can be determined using information you have for another quantity. • Some situations can be represented using inequalities in one variable.	8.8A 8.8B **8.8C**	3
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					2

Topic 2: Systems of Linear Equations

ELPS: 1.A, 1.C, 1.D, 1.E, 1.G, 2.C, 2.D, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.F, 4.A, 4.B, 4.C, 4.D, 4.G, 4.K, 5.E

Topic Pacing: 10 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**Crossing Paths** Point of Intersection of Linear Graphs	The terms *point of intersection* and *break-even point* are introduced. Students compare and analyze cost and income equations graphically and algebraically. They then graph cost and income equations on the same graph to determine a point of intersection. Students interpret the point of intersection as the solution to the two equations, and they explore the meaning of the break-even point in different real-world problems. Finally, students compare the process of determining a point of intersection using a table alone to doing so using a graph and equations.	• The *point of intersection* is the point at which two lines cross on a coordinate plane. • When one line represents the cost of an item and the other line represents the income from selling the item, the point of intersection is called the *break-even point*. • The point of intersection of two linear graphs is the ordered pair that represents a solution to both equations of the graphs.	8.9A	2
2	**The Road Less Traveled** Systems of Linear Equations	Students write and analyze a linear system of equations with different slopes and y-intercepts. They informally calculate the solution to a system of linear equations and then graph the system of equations. Students then write and analyze a system of linear equations with the same slope. They conclude that because the lines will never intersect, there is no solution to the system. Students then write a system of linear equations to represent the graph of two lines.	• A *system of linear equations* is formed when two or more linear equations define a relationship between quantities. • The *solution of a linear system* is an ordered pair that is a solution to both equations in the system. • Systems that have one or many solutions are called *consistent systems*. Systems with no solution are called *inconsistent systems*. • The slopes of parallel lines are equal.	8.5B 8.9A	2
3	**Roller Rink Rockin'** Solving Linear Systems	Students compare the cost of holding a middle school skating event at three different locations. The first location charges a \$200 fee plus a \$3 per skater fee, the second location charges only a \$5 per skater fee, and the third location charges a \$1000 flat rate for an unlimited number of skaters. Students write equations for each location. They then compare the cost for different numbers of skaters by solving systems of equations, completing tables of values, and creating graphs to represent each location. Using all of the information gathered, students recommend which location best meets their needs for the most reasonable price. Lastly, students solve systems of linear equations using the method of their choice.	• Problem situations are expressed using systems of equations and solved for unknown quantities by graphing. • When a system has no solution, the graphed lines are parallel. • When a system has infinite solutions, the graphed lines are congruent.	8.9A	2
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					3

5 Applying Powers

Module Pacing: 46 Days

Topic 1: Real Numbers

ELPS: 1.A, 1.D, 1.E, 1.G, 2.A, 2.B, 2.C, 2.D, 2.F, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.F, 3.I, 4.A, 4.B, 4.C, 4.G, 4.J, 4.K, 5.A, 5.B, 5.D, 5.E **Topic Pacing:** 11 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**So Many Numbers, So Little Time** Sorting Numbers	Students sort numbers and justify their reasoning. They analyze the work of their peers and provide reasoning for the way in which their peers grouped their numbers. Students provide the rationale that was used to group given sets of numbers, and then they identify a set of numbers that satisfy a given description for a group.	• Numbers can be grouped in a variety of ways according to their characteristics. • Numbers may be categorized by their values or by the form and symbols used to represent them. • Some groups of numbers are subsets of larger groups of numbers.	8.2A	1
2	**Rational Decisions** Rational and Irrational Numbers	Students learn formal definitions for *rational* and *irrational numbers*. They order rational numbers using a number line. Then the sets of counting numbers, whole numbers, and integers are reviewed. Questions focus students on sets of numbers that are closed under addition, subtraction, multiplication, and division. Students conclude the set of rational numbers is closed under all operations (with the exception of division by zero), and includes the set of whole numbers, the set of integers, some fractions, and some decimals. Next, students write fractions as repeating decimals and convert terminating and repeating decimals to fractions.	• A number set is closed under an operation if combining any two members of the set using the given operation results in a member of the set. • A number set can be closed under an operation but not closed under the inverse operation. • Number sets are created to address lack of closure. • A *rational number* is a number that can be written in the form $\frac{a}{b}$, where a and b are both integers and b is not equal to 0. • All rational numbers can be written as terminating or repeating decimals. • A *repeating decimal* is a decimal that has one or more digits repeat indefinitely. • A *terminating decimal* is a decimal that has a finite number of non-zero digits. • A decimal that is not terminating and non-repeating is an *irrational number*. • Every terminating or repeating decimal can be converted to a rational number.	8.2A **8.2D**	2

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
3	**Establishing Roots** The Real Numbers	In this lesson, students study the square roots of numbers that are not perfect squares. They learn that, in many cases, these roots are irrational numbers. Students create a Venn diagram to represent the relationships formed between the set of real numbers and other number sets. They use the completed Venn diagram to answer questions related to the sets of numbers.	• Most square roots of numbers that are not perfect squares are irrational numbers. The exception is when a perfect square number is divided by 100 or any even power of 10. • The set of *real numbers* includes both the set of rational numbers and the set of irrational numbers. • A Venn diagram can be used to represent the relationship between number sets.	8.2A 8.2B **8.2D**	2
4	**The Big and Small of It** Scientific Notation	Students are introduced to scientific notation. The terms related to scientific notation, the process of converting between standard form and scientific notation, and reading scientific notation from technology are explored. Students convert from standard form to scientific notation and from scientific notation to standard form. Students compare mantissas and characteristics of numbers written in scientific notation.	• *Scientific notation* is a mathematical notation used to write and compare very large and very small numbers. • Scientific notation is a way to express a very large or very small number as the product of a number greater than or equal to 1 and less than 10 and a power of 10. • Scientific notation allows for easy recognition of the magnitude of values for comparison purposes.	8.2C	2
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					3

Topic 2: The Pythagorean Theorem

ELPS: 1.A, 1.C, 1.D, 1.E, 1.G, 2.C, 2.D, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.F, 4.A, 4.B, 4.C, 4.D, 4.G, 4.K, 5.E

Topic Pacing: 13 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**The Right Triangle Connection** The Pythagorean Theorem	Students conjecture about the lengths of the sides of a right triangle. They notice a pattern in the squares of the side lengths of right triangles and learn this as the Pythagorean Theorem. Students prove the Pythagorean Theorem using one of three different geometric methods. Students conclude that the area of the largest square is equal to the sum of the areas of the two smaller squares. They then use the Pythagorean Theorem to solve for the length of unknown sides of right triangles set in a variety of contexts.	• The *leg* of a right triangle is one of the two shorter sides and the *hypotenuse* is the side opposite the right angle. • The *Pythagorean Theorem* states that the sum of the squares of the legs of a right triangle is equal to the square of the hypotenuse. If a and b are the lengths of the legs of a right triangle and c is the length of the hypotenuse, then $a^2 + b^2 = c^2$. • Area models can be used to prove the Pythagorean Theorem. • The Pythagorean Theorem is used to determine unknown lengths in right triangles in mathematical and contextual problems.	8.6C	3
2	**Can That Be Right?** The Converse of the Pythagorean Theorem	Students begin by determining if triangles are right triangles by using a protractor. They then determine if three side lengths form a right triangle by whether or not the side lengths satisfy the Pythagorean Theorem. Students are given a definition of the term *Pythagorean triple* and complete tables composed of multiples of Pythagorean triples. They then provide the rationale for a proof of the Converse of the Pythagorean Theorem. Finally, students use either the Pythagorean Theorem or the Converse of the Pythagorean Theorem to solve problems.	• The *converse* of a theorem is created when the if-then parts of that theorem are exchanged. • The *Converse of the Pythagorean Theorem* states that if the sum of the squares of two sides of a triangle equals the square of the third side, then the triangle is a right triangle. • A *Pythagorean triple* is any set of three positive integers that satisfy the equation $a^2 + b^2 = c^2$. • Multiples of Pythagorean triples are also Pythagorean triples. • The Pythagorean Theorem and its converse are used to solve mathematical and contextual problems.	**8.7C**	2
Mid-Topic Assessment					1

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
3	**Pythagoras Meets Descartes** Distances in a Coordinate System	Students apply the Pythagorean Theorem to a map context on a grid. They calculate various distances of points aligned either horizontally or vertically using subtraction and aligned diagonally using the Pythagorean Theorem. Students then plot pairs of points on the coordinate plane and use the Pythagorean Theorem to determine the distance between the two given points.	• The Pythagorean Theorem is used to determine the distance between two points on a coordinate plane. • The Pythagorean Theorem states that if a and b are the lengths of the legs of a right triangle and c is the length of the hypotenuse, then $a^2 + b^2 = c^2$.	8.7D	1
4	**Catty Corner** Side Lengths in Two and Three Dimensions	Students apply the Pythagorean Theorem to determine the lengths of the diagonals of a rectangle, square, trapezoid, and isosceles trapezoid. They determine the areas of complex figures requiring the use of the Pythagorean Theorem. Students use the Pythagorean Theorem to determine the lengths of diagonals in three-dimensional rectangular prisms.	• The Pythagorean Theorem can be used to investigate relationships between diagonals in two-dimensional quadrilateral figures. • The Pythagorean Theorem can be extended to calculate the length of diagonals in three-dimensional figures.	**8.7C** 8.7D	**2**
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					3

Topic 3: Financial Literacy: Your Financial Future

ELPS: 1.A, 1.B, 1.C, 1.D, 1.E, 1.G, 2.C, 2.D, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.F, 4.A, 4.B, 4.C, 4.D, 4.G, 4.H, 4.K, 5.E

Topic Pacing: 8 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**Terms of Financial Endearment** Simple and Compound Interest	This lesson begins with developing a conceptual understanding of growth functions. Students compare linear and exponential growth through a pay scenario, and then they compare simple interest and compound interest for a specific investment through a given table of values. Next, students extend their understanding to other representations and develop the mathematical skills involved in calculating simple and compound interest. They deal with two other representations—graphs and equations—for both types of interest. They are given different representations of interest problems, and they determine whether the problem refers to simple or compound interest. The formula for compound interest is reintroduced from students' 7th grade experience. Students calculate simple interest using a formula and compound interest using both a table and a formula.	• When comparing the behavior of growth functions, the *y*-values of a linear function with a high constant rate will eventually be surpassed by the *y*-values of an exponential function with a much lower, but increasing, rate as the value of *x* increases. • An investment/loan with compound interest increases much more quickly than the same investment/loan with *simple interest*. • The *terms of an investment* include the amount of money invested, the interest rate, the length of time of the investment, and the method with which the interest is calculated, whether it be simple interest or compound interest. • The simple interest formula is $I = Prt$, where I is interest, P is principal, r is the interest rate, and t is time (in years). • Simple interest calculations produce a constant rate of change and a linear graph. • *Compound interest* is a percentage of the principal and the interest that is already added to the investment over time. The compound interest formula is, $B = P_0(1 + r)^t$, where B represents the final balance, P_0 represents the original principal amount invested, r represents the annual interest rate, and t represents the time in years. • Compound interest calculations produce an increasing rate of change and a graph that curves upward. • You can determine whether the interest on an investment was calculated using simple or compound interest by analyzing an equation, table, or graph that represents the time and total investment value.	8.12C **8.12D**	1

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
2	**On Good Terms** Terms of a Loan	This lesson is about how to make financially responsible decisions based upon analyzing the terms of loans. Students compare two scenarios with the same principal and time, but different interest rates, in order to see the effect interest has on the payback amount. Next, students make the most cost-effective decision when given two loans with the same principal but different interest rates and lengths of time. Students also discuss appropriate questions to ask a lender regarding the terms of a loan when making decisions. The loan process is expanded to include student loans and the concept of loan deferment. By calculating the interest that is still accrued when student loan payments are deferred, students see the costly consequences of this sometimes necessary, sometimes not-so-necessary, financial decision.	• Borrowers must shop for a loan. They consider the terms of a loan and their budget in order to make a financially responsible decision. • Interest rates vary depending upon the lender, the length of time of the loan, and the borrower's credit rating. • Although one loan may be more cost-effective than another, the borrower must also consider whether the monthly payment is affordable based on their budget before selecting the most cost-effective loan. • A *deferment* is a period of time, usually up to two years, in which a student can delay paying their student loan or the interest on their loan. Additional interest will accrue on the student loan while payments are deferred. • Deferment of a student loan may be necessary while a college student is searching for employment, but the consequences of this decision can be costly.	8.12A 8.12E 8.12F	1
3	**Tech Savvy and Responsible** Online Calculators	Because credit card debt is more complicated than calculating simple interest or interest compounded annually, students are introduced to the idea of an online calculator—an internet-based application that quickly performs credit card payment options. They use this online tool to determine the amount of time it takes to pay off a credit card, the interest amount, and the total debt payment amount when given the principal, interest rate, and monthly payment. Students are also made aware of a credit card cash advance and the fees associated with it through an explanation and problem. Similarly, students are introduced to an online calculator specifically for post-secondary student loans. They use this online tool to determine the amount of monthly student loan payments, the total cost of the student loan, and the salary necessary to pay the loan when given the principal, interest rate, and time to pay off the loan. Other scenarios are also provided, in which students make use of this online tool. The lesson concludes with a series of questions that generate discussion about the necessity of planning and practicality in order to pay for postsecondary education.	• Credit card debt is more complicated than calculating simple interest or interest compounded annually. • An *online calculator* is an internet-based application that quickly performs credit card payment options. • When making the minimum payment on a credit card, a small debt may take years to pay and end up costing significantly more than the original debt. • A *cash advance* is a service provided by credit card companies that allows their customers to take out money directly from a bank or ATM. • A cash advance is more costly than regular use of a credit card for merchandise/service purchases. A percentage of the cash advance is added to the original cash advance amount and a higher interest rate is applied than what is used for merchandise/service purchases. • An online calculator is available specifically to deal with post-secondary student loans. Not only can this tool be used to determine interest and monthly loan payments, it can also be used to project the salary necessary to pay the loan. • Both planning and practicality are necessary to make post-secondary education a viable option for all students.	8.12A 8.12B 8.12F	1

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
4	**Why All the Fuss Over Post-Secondary Education?** Financing Your Education	This lesson sends a three-pronged message: (1) every student can benefit from some form of post-secondary education; (2) post-secondary tuition costs vary widely, and there is an option that makes sense and is affordable for every student, and (3) all students can find a way to manage the cost of post-secondary education. Each activity leads students through a series of fact or fiction questions to help them gain knowledge and develop the mindset that attending some form of post-secondary institution is an achievable goal. The first activity sets the stage by linking high school curriculum and choices to preparedness for post-secondary education. Next, students access the College for All Texans website to research the costs of several colleges in their area and the average costs of the different types of schools. Students research the opportunities available to both gain financial assistance and save funds for post-secondary tuition costs; the importance of the FAFSA form is addressed, and three savings plans specific to Texas are explained. The lesson concludes with students devising a plan to gain funds for their first year of college tuition.	• Post-secondary education greatly benefits everybody. Many people improve their lives through specific classes, trade schools, associate degrees, and four-year programs. • Post-secondary tuition costs vary widely, and there is an option that makes sense and is affordable for every student. • All students can find a way to manage the cost of post-secondary education. • It is never too early to start planning for post-secondary education. • There are different types of post-secondary schools with varying average costs for tuition. Private schools have the highest average tuition, followed by public universities, public technical colleges, and then public community colleges. • The Free Application for Federal Student Aid (FAFSA) is an application that makes students potentially eligible for grants, loans, and work-study funds. • The Texas College Savings Plan, The Texas Tuition Promise Fund®, and the Education IRAs are specific to the state of Texas to support families as they save for post-secondary tuition.	8.12G	2
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					2

Topic 4: Volume of Curved Figures

ELPS: 1.A, 1.C, 1.D, 1.E, 1.G, 2.C, 2.D, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.F, 4.A, 4.B, 4.C, 4.D, 4.G, 4.K, 5.E

Topic Pacing: 14 Days

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
1	**Start the Drum Roll!** Volume, Lateral, and Total Surface Area of a Cylinder	Students explore how to determine the volume of a cylinder. The terms *cylinder, right cylinder, radius of a cylinder*, and *height of a cylinder* are introduced. Students identify characteristics of a cylinder such as the radius, diameter, and height. Using circular discs, students calculate the volume of a cylinder. They then answer several questions related to the formula used to compute the volume of a cylinder. One problem emphasizes that a specific volume may be associated with the dimensions of more than one cylinder. Students then develop the formulas for the lateral and total surface area of a cylinder and apply them in several situations.	• A *cylinder* is a three-dimensional object with two parallel, congruent circular bases. • A *right cylinder* is a cylinder in which the bases are circles and are aligned one directly above the other. • The formula for the volume of a cylinder is written two different ways: as $V = Bh$, where V is the volume of the cylinder, B is the area of the base of the cylinder, and h is the *height of the cylinder*, and as $V = \pi r^2h$, where V is the volume of the cylinder, r is the length of the radius of the base of the cylinder, and h is the height of the cylinder. • The formula for the surface area of a cylinder is $SA = 2\pi r^2 + 2\pi rh$, where r is the length of the radius of the base and h is the height of the cylinder. The first term in the formula represents the area of the two circular bases, and the second term represents the area of the rectangle that covers the curved surface of the cylinder. • The formula for the lateral surface area of a cylinder is $L = 2\pi rh$, where r is the length of the radius of the base and h is the height of the cylinder.	8.6A **8.7A** **8.7B**	2
2	**Cone of Silence** Volume of a Cone	Students learn how to calculate the volume of a cone and how to solve problems involving cones. They sketch a cone and answer questions relevant to their sketches. Students use nets for a cylinder and a cone to assemble models and explore the volume of a cone in comparison to the volume of the cylinder. Students use the formula for the volume of a cylinder and the volume of a pyramid to write the formula for the volume of a cone. They solve problems when given different dimensions of a cone, including the slant height. Students explore the effect on the volume of a cone when the length of the radius of a cone doubles while the height remains the same and when the height of a cone doubles while the length of the radius remains the same.	• A *cone* is a three-dimensional object with a circular base and one vertex. • The formula for the volume of the cone can be written two different ways: as $V = \frac{1}{3}Bh$, where V is the volume, B is the area of the base and h is the height, and as $V = \frac{1}{3}\pi r^2h$, where V is the volume, r is the length of the radius of the base, and h is the height. • The Pythagorean Theorem is used to determine the *height of a cone* when given the length of the radius and slant height.	8.6B **8.7A**	2
Mid-Topic Assessment					1

Lesson	Lesson Title	Highlights	Essential Ideas	TEKS*	Pacing**
3	**Pulled in All Directions** Volume of a Sphere	The terms *sphere, center of a sphere, radius of a sphere, diameter of a sphere,* and *great circle* are introduced in this lesson. Students create a sphere out of modeling clay and place it inside a cylinder of the same height to investigate the volume occupied by the material of the sphere inside the cylinder. They arrive at a formula for the volume of a sphere. Students then use the formula to calculate the volume of various spheres. Students also use their knowledge of the circumference formula to solve problems.	• A *sphere* is defined as the set of all points in three dimensions that are equidistant from a given point called the center. • The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^2$, where V is the volume of the sphere and r is the length of the radius of the sphere.	**8.7A**	2
4	**Pack It Up** Volume and Surface Area Problems with Prisms, Cylinders, Cones, and Spheres	Students review all of the formulas they have learned up to this point and use them to solve real-world and mathematical problems. Students compare the amount of cardboard used on two different cereal box designs, and they determine the amount of sustainable plastic substitute needed for cheese packaging. They also determine the volume of grain needed to fill a silo, the volume of a cone and a melted scoop of frozen yogurt, and the volume of cylindrical and conical popcorn containers.	• The formula for the volume of a cylinder is $V = \pi r^2 h$, where V is the volume of the cylinder, r is the length of the radius of the base of the cylinder, and h is the height of the cylinder. • The formula for the volume of a cone is $V = \frac{1}{3}\pi r^2 h$, where V is the volume of the cone, r is the length of the radius of the base of the cone, and h is the height of the cone. • The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$, where V is the volume of the sphere and r is the length of the radius of the sphere. • The formula for the surface area of a prism is $SA = Ph + 2B$, where SA is the surface area of the prism, P is the perimeter of the base, h is the height, and B is the area of a base. • The formula for the lateral surface area of a prism is $L = Ph$, where L is the lateral surface area of the prism, P is the perimeter of the base, and h is the height.	**8.7A** **8.7B**	2
End of Topic Assessment					1
Learning Individually with Skills Practice or MATHia *Schedule these days strategically throughout the topic to support student learning.*					4

Total Days: 165

Learning Together: 103

Learning Individually: 43

Assessments: 19