

Mathematics Lesson Plan High School

Objective	<p>The students will analyze the research given and graph the number of automobiles in the United States from 1900 to the present. They will also graph, on a separate sheet, the U.S. oil consumption from the time period. Along with the graphs the students will create a pie chart or similar chart to demonstrate the growth or decline of the numbers.</p>
TEKS	<p>§111.39. Algebra I (c) Knowledge and skills.</p> <p>(1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:</p> <ul style="list-style-type: none"> (A) apply mathematics to problems arising in everyday life, society, and the workplace; (B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution; (C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems; (D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate; (E) create and use representations to organize, record, and communicate mathematical ideas; (F) analyze mathematical relationships to connect and communicate mathematical ideas; and (G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication. <p>(12) Number and algebraic methods. The student applies the mathematical process standards and algebraic methods to write, solve, analyze, and evaluate equations, relations, and functions. The student is expected to:</p> <ul style="list-style-type: none"> (A) decide whether relations represented verbally, tabularly, graphically, and symbolically define a function; (B) evaluate functions, expressed in function notation, given one or more elements in their domains; (C) identify terms of arithmetic and geometric sequences when the sequences are given in function form using recursive processes; (D) write a formula for the n^{th} term of arithmetic and geometric sequences, given the value of several of their terms; and (E) solve mathematic and scientific formulas, and other literal equations, for a specified variable. <p>§111.40. Algebra II (c) Knowledge and skills.</p>

- (7) Number and algebraic methods. The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. The student is expected to:
- (A) add, subtract, and multiply complex numbers;
 - (B) add, subtract, and multiply polynomials;
 - (C) determine the quotient of a polynomial of degree three and of degree four when divided by a polynomial of degree one and of degree two;
 - (D) determine the linear factors of a polynomial function of degree three and of degree four using algebraic methods;
 - (E) determine linear and quadratic factors of a polynomial expression of degree three and of degree four, including factoring the sum and difference of two cubes and factoring by grouping;
 - (F) determine the sum, difference, product, and quotient of rational expressions with integral exponents of degree one and of degree two;
 - (G) rewrite radical expressions that contain variables to equivalent forms;
 - (H) solve equations involving rational exponents; and
 - (I) write the domain and range of a function in interval notation, inequalities, and set notation.
- (8) Data. The student applies mathematical processes to analyze data, select appropriate models, write corresponding functions, and make predictions. The student is expected to:
- (A) analyze data to select the appropriate model from among linear, quadratic, and exponential models;
 - (B) use regression methods available through technology to write a linear function, a quadratic function, and an exponential function from a given set of data; and
 - (C) predict and make decisions and critical judgments from a given set of data using linear, quadratic, and exponential models.

§111.41. Geometry

(c) Knowledge and skills.

- (2) Coordinate and transformational geometry. The student uses the process skills to understand the connections between algebra and geometry and uses the one- and two-dimensional coordinate systems to verify geometric conjectures. The student is expected to:
- (A) determine the coordinates of a point that is a given fractional distance less than one from one end of a line segment to the other in one- and two-dimensional coordinate systems, including finding the midpoint;
 - (B) derive and use the distance, slope, and midpoint formulas to verify geometric relationships, including congruence of segments and parallelism or perpendicularity of pairs of lines; and
 - (C) determine an equation of a line parallel or perpendicular to a given line that passes through a given point.
- (3) Coordinate and transformational geometry. The student uses the process skills to generate and describe rigid transformations (translation, reflection, and rotation) and non-rigid

transformations (dilations that preserve similarity and reductions and enlargements that do not preserve similarity). The student is expected to:

- (A) describe and perform transformations of figures in a plane using coordinate notation;
- (B) determine the image or pre-image of a given two-dimensional figure under a composition of rigid transformations, a composition of non-rigid transformations, and a composition of both, including dilations where the center can be any point in the plane;
- (C) identify the sequence of transformations that will carry a given pre-image onto an image on and off the coordinate plane; and
- (D) identify and distinguish between reflectional and rotational symmetry in a plane figure.

§111.42. Precalculus

(c) Knowledge and skills.

(3) Relations and geometric reasoning. The student uses the process standards in mathematics to model and make connections between algebraic and geometric relations. The student is expected to:

- (A) graph a set of parametric equations;
- (B) convert parametric equations into rectangular relations and convert rectangular relations into parametric equations;
- (C) use parametric equations to model and solve mathematical and real-world problems;
- (D) graph points in the polar coordinate system and convert between rectangular coordinates and polar coordinates;
- (E) graph polar equations by plotting points and using technology;
- (F) determine the conic section formed when a plane intersects a double-napped cone;
- (G) make connections between the locus definition of conic sections and their equations in rectangular coordinates;
- (H) use the characteristics of an ellipse to write the equation of an ellipse with center (h, k) ; and
- (I) use the characteristics of a hyperbola to write the equation of a hyperbola with center (h, k) .

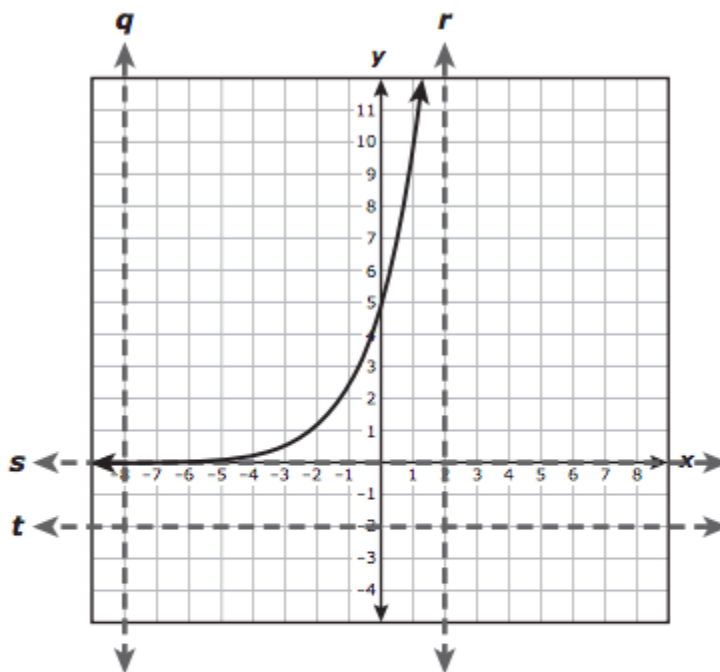
(4) Number and measure. The student uses process standards in mathematics to apply appropriate techniques, tools, and formulas to calculate measures in mathematical and real-world problems. The student is expected to:

- (A) determine the relationship between the unit circle and the definition of a periodic function to evaluate trigonometric functions in mathematical and real-world problems;
- (B) describe the relationship between degree and radian measure on the unit circle;
- (C) represent angles in radians or degrees based on the concept of rotation and find the measure of reference angles and angles in standard position;
- (D) represent angles in radians or degrees based on the concept of rotation in mathematical and real-world problems, including linear and angular velocity;
- (E) determine the value of trigonometric ratios of angles and solve problems involving trigonometric ratios in mathematical and real-world problems;

- (F) use trigonometry in mathematical and real-world problems, including directional bearing;
- (G) use the Law of Sines in mathematical and real-world problems;
- (H) use the Law of Cosines in mathematical and real-world problems

STAAR

8 The graph of an exponential function is shown on the grid.



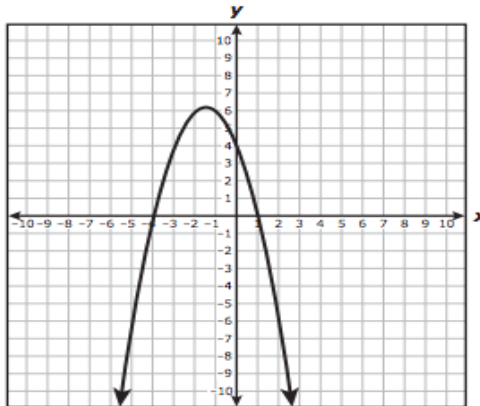
H

Which dashed line is an asymptote for the graph?

- F** Line q
- G** Line r
- H** Line s
- J** Line t

G

10 The graph of a quadratic function is shown on the grid.



Which function is best represented by this graph?

F $f(x) = x^2 + 3x - 4$

G $f(x) = -x^2 - 3x + 4$

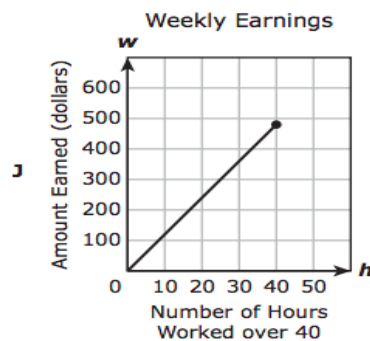
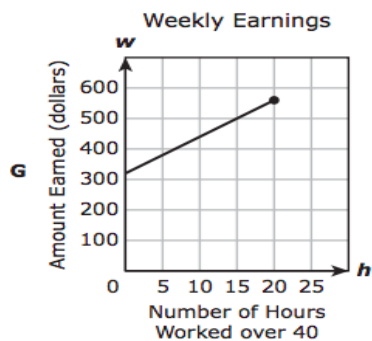
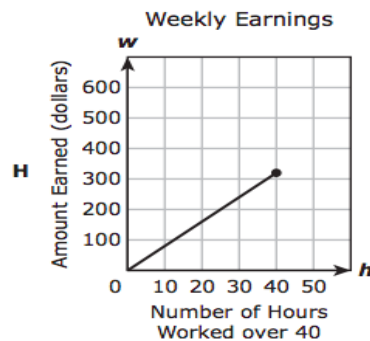
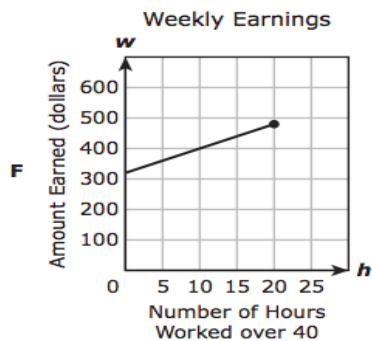
H $f(x) = x^2 - 3x - 4$

J $f(x) = -x^2 + 3x + 4$

G

12 A lifeguard earns \$320 per week for working 40 hours plus \$12 per hour worked over 40 hours. A lifeguard can work a maximum of 60 hours per week.

Which graph best represents the lifeguard's weekly earnings in dollars for working h hours over 40?



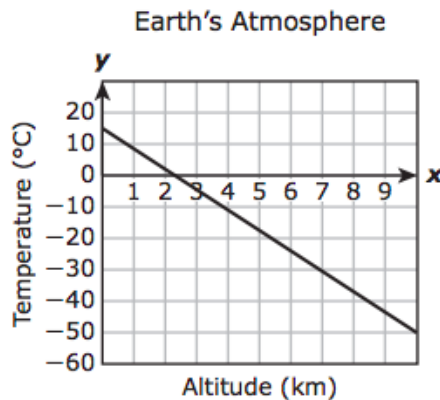
C

- 19** The table shows the heights and the lengths of several rectangles.

Height (in.)	41	70	21	34	10	92	54	24	10	35	42	66
Length (in.)	21	25	32	12	16	45	40	23	45	35	21	14

What does the correlation coefficient for the data indicate about the strength of the linear association between the height and the length of these rectangles?

- A** Weak negative correlation
 - B** Strong negative correlation
 - C** Weak positive correlation
 - D** Strong positive correlation
- 26** The graph models the linear relationship between the temperature of Earth's atmosphere and the altitude above sea level.



Which of these best represents the rate of change of the temperature with respect to altitude?

- F** $-6.5^{\circ}\text{C}/\text{km}$
- G** $-3.5^{\circ}\text{C}/\text{km}$
- H** $-0.29^{\circ}\text{C}/\text{km}$
- J** $-0.15^{\circ}\text{C}/\text{km}$

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H

38 Which table does NOT show y as a function of x ?

F

x	$\frac{1}{10}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{2}$
y	9	11	9	14	7

G

x	14	15	16	17	18
y	100	80	110	100	90

H

x	-0.2	0.6	-1.3	1.0	-0.2
y	5.8	-3.7	4.4	-0.9	8.1

J

x	-24	21	24	-27	29
y	2.7	2.8	2.7	2.5	2.5

Struggling Learners

- These students will create only one graph.
- These students maximum requirement will be three to five points, depending on the student.

Advanced Learners

- These students will create both graphs, individually, or in a group depending on the student.
- These students are required to have five to eight points per graph.

Helpful Links

[Ocean Energy](#) [Oil History](#)

Engage

The students will have a bell work that asks them a series of questions. Such as how did you get to school? Why did you come that way? What is the most common way of transportation in their city? What is the most common way of transportation in their state? The students will be required to write a brief paragraph answering the questions.

Explore

At this time the students will begin the research part for their graph activity. The students will be broken into groups of four. There will be one person working on the graph and one person working on the pie chart. The other two students will be working on the research part.

Explain

Students will be working on their research. The goal is that the students that are conducting the research will be able to hand off information to the students that will be graphing, therefore, they should be able to begin the graphing process. If there is any need for additional time for redirection or

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	reteaching for a better understanding. This is the time that the teacher will be in the power zone all over the classroom.
Elaborate	This is the time that the students will begin graphing their graphs. They should have already worked on the research sector and began actually plotting their points on the graph and working on their pie chart.
Evaluate	The evaluation will simply be observing the students creating their graphs. I should be in the power zone during the entire construction and research section are being conducted. After all students have completed their graphs the groups will present their findings to the class, either at the end of the class period or the next class period.