RobotsLAB

Teaching With Robots

TEACHING MATH AND SCIENCE USING ROBOTS

Imagine being taught quadratic equations by a quadcopter...

Curriculum Overview

V1.6, Aug. 2013

STAAR State of Texas Assessments of Academic Readiness

TEKS

- Lessons -

Algebra I Lessons

TEKS	Description	Lesson Name
111.32(b)3(A)	use symbols to represent unknowns and variables.	Variables in Time Travel (Fractions)
111.32(b)3(A)	use symbols to represent unknowns and variables.	Variables in Time Travel (Positive Numbers)
111.32(b)6(A)	develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations;	Variables in Time Travel (Positive Numbers)
111.32(b)6(B)	interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;	Variables in Time Travel (Positive Numbers)
111.32(b)6(F)	interpret and predict the effects of changing slope and y-intercept in applied situations;	Variables in Time Travel (Positive Numbers)
111.32(b)6(A)	develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations;	Variables in Time Travel (Positive Numbers)
111.32(b)6(B)	interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;	Variables in Time Travel (Positive Numbers)
111.32(b)6(F)	interpret and predict the effects of changing slope and y-intercept in applied situations;	Variables in Time Travel (Positive Numbers)
111.32(b)6(A)	develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations;	Variables in Time Travel (Positive Numbers)
111.32(b)6(B)	interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;	Variables in Time Travel (Positive Numbers)
111.32(b)6(F)	interpret and predict the effects of changing slope and y-intercept in applied situations;	Variables in Time Travel (Positive Numbers)
111.32(b)6(B)	interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;	Linear Course Creation: Slopes and Points (Fractions)

111.32(b)6(D)	graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and y-intercept;	Linear Course Creation: Slopes and Points (Fractions)
111.32(b)6(B)	interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;	Linear Course Creation: Slopes and Points (Integers)
111.32(b)6(D)	graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and y-intercept;	Linear Course Creation: Slopes and Points (Integers)
111.32(b)6(B)	interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;	Linear Course Creation: Slopes and Points (Positive Numbers)
111.32(b)6(D)	graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and y-intercept;	Linear Course Creation: Slopes and Points (Positive Numbers)
111.32(b)6(E)	determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations;	Linear Intercept Movements (Fractions)
111.32(b)6(E)	determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations;	Linear Intercept Movements (Integers)
111.32(b)6(E)	determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations;	Linear Intercept Movements (Positive Numbers)
111.32(b)6(C)	investigate, describe, and predict the effects of changes in m and b on the graph of y = mx + b;	Linear Hill Climb (Positive Numbers)
111.32(b)6(F)	interpret and predict the effects of changing slope and y-intercept in applied situations;	Linear Hill Climb (Positive Numbers)
111.32(b)6(C)	investigate, describe, and predict the effects of changes in m and b on the graph of y = mx + b;	Linear Hill Climb (Integers)
111.32(b)6(F)	interpret and predict the effects of changing slope and y-intercept in applied situations;	Linear Hill Climb (Integers)
111.32(b)6(C)	investigate, describe, and predict the effects of changes in m and b on the graph of y = mx + b;	Linear Hill Climb (Fractions)
111.32(b)6(F)	interpret and predict the effects of changing slope and y-intercept in applied situations;	Linear Hill Climb (Fractions)
111.39(c)7(A)	graph quadratic functions on the coordinate plane and use the graph to identify key attributes, if possible, including x-intercept, y-intercept, zeros, maximum value, minimum values, vertex, and the equation of the axis of symmetry;	Sneaky Quadratic Vertex (Positive Numbers)

111.39(c)7(A)	graph quadratic functions on the coordinate plane and use the graph to identify key attributes, if possible, including x-intercept, y-intercept, zeros, maximum value, minimum values, vertex, and the equation of the axis of symmetry;	Sneaky Quadratic Vertex (Integer Numbers)
111.39(c)7(A)	graph quadratic functions on the coordinate plane and use the graph to identify key attributes, if possible, including x-intercept, y-intercept, zeros, maximum value, minimum values, vertex, and the equation of the axis of symmetry;	Sneaky Quadratic Vertex (Fractions)
111.32(b)6(G)	relate direct variation to linear functions and solve problems involving proportional change.	Linear Search (Fractions)
111.39(c)6(B)	write equations of quadratic functions given the vertex and another point on the graph, write the equation in vertex form (f(x) = a(x - h)2+ k), and rewrite the equation from vertex form to standard form (f(x) = ax2+ bx + c); and	Quadratic Search (Fractions)
111.39(c)6(C)	write quadratic functions when given real solutions and graphs of their related equations.	Quadratic Search (Fractions)

Pages numbers in the teacher's book:

Algebra II Lessons

TEKS	Description	Lesson Name
111.40(c)6(D)	formulate absolute value linear equations;	Absolute Borders (Fractions)
111.40(c)6(D)	formulate absolute value linear equations;	Absolute Borders (Integers)
111.40(c)6(D)	formulate absolute value linear equations;	Absolute Equations (Fractions)
111.40(c)6(D)	formulate absolute value linear equations;	Absolute Equations (Integers)
111.40(c)6(D)	formulate absolute value linear equations;	Absolutely Dangerous Inequalities (Fractions)
111.33(b)3(C)	interpret and determine the reasonableness of solutions to systems of equations or inequalities for given contexts.	Absolutely Dangerous Inequalities (Fractions)
111.40(c)6(D)	formulate absolute value linear equations;	Absolutely Dangerous Inequalities (Integers)
111.33(b)3(C)	interpret and determine the reasonableness of solutions to systems of equations or inequalities for given contexts.	Absolutely Dangerous Inequalities (Integers)
111.33(b)8(C)	compare and translate between algebraic and graphical solutions of quadratic equations.	Linear Meets Quadratic (Positive Numbers)
111.33(b)8(D)	solve quadratic equations and inequalities using graphs, tables, and algebraic methods.	Linear Meets Quadratic (Positive Numbers)
111.33(b)8(C)	compare and translate between algebraic and graphical solutions of quadratic equations.	Linear Meets Quadratic (Integers)
111.33(b)8(D)	solve quadratic equations and inequalities using graphs, tables, and algebraic methods.	Linear Meets Quadratic (Integers)
111.33(b)8(C)	compare and translate between algebraic and graphical solutions of quadratic equations.	Linear Meets Quadratic (Fractions)
111.33(b)8(D)	solve quadratic equations and inequalities using graphs, tables, and algebraic methods.	Linear Meets Quadratic (Fractions)

Pages numbers in the teacher's book:

Geometry Lessons

TEKS	Description	Lesson Name
111.41(c)1(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;	Building Circles
111.41(c)12(B)	apply the proportional relationship between the measure of an arc length of a circle and the circumference of the circle to solve problems;	Building Circles
111.22(b)6(c)	describe the relationship between radius, diameter, and circumference of a circle.	Building Circles
111.41(c)12(E)	show that the equation of a circle with center at the origin and radius r is x2 + y2 = r2 and determine the equation for the graph of a circle with radius r and center (h, k), (x - h)^2 + (y - k)^2 =r^2.	Building Circles
111.41(c)6(A)	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;	Arc Length (Radians)
111.41(c)12(B)	apply the proportional relationship between the measure of an arc length of a circle and the circumference of the circle to solve problems;	Arc Length (Radians)
111.22(b)6(c)	describe the relationship between radius, diameter, and circumference of a circle.	Arc Length (Radians)
111.22(b)8(a)	estimate measurements (including circumference) and evaluate reasonableness of results;	Arc Length (Radians)
111.27(b)5(b)	describe π as the ratio of the circumference of a circle to its diameter; and	Arc Length (Radians)
111.27(b)9(b)	determine the circumference and area of circles;	Arc Length (Radians)
111.41(c)12(D)	describe radian measure of an angle as the ratio of the length of an arc intercepted by a central angle and the radius of the circle; and	Arc Length (Degrees)
111.41(c)12(B)	apply the proportional relationship between the measure of an arc length of a circle and the circumference of the circle to solve problems;	Arc Length (Degrees)
111.22(b)6(c)	describe the relationship between radius, diameter, and circumference of a circle.	Arc Length (Degrees)
111.22(b)8(a)	estimate measurements (including circumference) and evaluate reasonableness of results;	Arc Length (Degrees)
111.27(b)5(b)	describe π as the ratio of the circumference of a circle to its diameter; and	Arc Length (Degrees)

111.27(b)9(b)	determine the circumference and area of circles;	Arc Length (Degrees)
111.34(b)7(B)	use slopes and equations of lines to investigate geometric relationships, including parallel lines, perpendicular lines, and special segments of triangles and other polygons; and	Slope Based Linear Guidance (Fractions)
111.34(b)7(B)	use slopes and equations of lines to investigate geometric relationships, including parallel lines, perpendicular lines, and special segments of triangles and other polygons; and	Slope Based Linear Guidance (Integers)
111.34(b)7(B)	use slopes and equations of lines to investigate geometric relationships, including parallel lines, perpendicular lines, and special segments of triangles and other polygons; and	Slope Based Linear Guidance (Positive Numbers)
111.22(b)6(c)	describe the relationship between radius, diameter, and circumference of a circle.	Driving Circumference (Integers)
111.22(b)8(a)	estimate measurements (including circumference) and evaluate reasonableness of results;	Driving Circumference (Integers)
111.27(b)5(b)	describe π as the ratio of the circumference of a circle to its diameter; and	Driving Circumference (Integers)
111.27(b)9(b)	determine the circumference and area of circles;	Driving Circumference (Integers)
111.22(b)6(c)	describe the relationship between radius, diameter, and circumference of a circle.	Driving Circumference (Fractions)
111.22(b)8(a)	estimate measurements (including circumference) and evaluate reasonableness of results;	Driving Circumference (Fractions)
111.27(b)5(b)	describe π as the ratio of the circumference of a circle to its diameter; and	Driving Circumference (Fractions)
111.27(b)9(b)	determine the circumference and area of circles;	Driving Circumference (Fractions)

Pages numbers in the teacher's book:

Physics Lessons

TEKS	Description	Lesson Name
112(c)4(B)	describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration;	Driving Circumference (Fractions)
112(c)4(B)	describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration;	Driving Circumference (Fractions)
112.38(c)4(B)	measure and graph distance and speed as a function of time using moving toys;	Driving Circumference (Fractions)
112.38(c)4(B)	measure and graph distance and speed as a function of time using moving toys;	Driving Circumference (Fractions)
112.38(c)4(C)	investigate how an object's motion changes only when a net force is applied, including activities and equipment such as toy cars, vehicle restraints, sports activities, and classroom objects;	Defy Gravity
112.38(c)4(D)	assess the relationship between force, mass, and acceleration, noting the relationship is independent of the nature of the force, using equipment such as dynamic carts, moving toys, vehicles, and falling objects;	Defy Gravity
112.38(c)4(A)	describe and calculate an object's motion in terms of position, displacement, speed, and acceleration;	Defy Gravity
112.38(c)4(B)	measure and graph distance and speed as a function of time using moving toys;	Defy Gravity
112.38(c)4(A)	describe and calculate an object's motion in terms of position, displacement, speed, and acceleration;	Defy Gravity
112.38(c)4(B)	measure and graph distance and speed as a function of time using moving toys;	Defy Gravity
112.39(c)4(F)	identify and describe motion relative to different frames of reference.	Relative Velocity Challenge (Radians)
112.39(c)4(F)	identify and describe motion relative to different frames of reference.	Relative Velocity Challenge (Degrees)

Pages numbers in the teacher's book:

Pre-Calculus & Trig Lessons

TEKS	Description	Lesson Name
111.42(c)3(D)	graph points in the polar coordinate system and convert between rectangular coordinates and polar coordinates;	Polar Time
111.42(c)3(E)	graph polar equations by plotting points and using technology;	Polar Time
111.42(c)4(B)	describe the relationship between degree and radian measure on the unit circle;	Get the Radians-Degrees
111.42(c)4(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;	Get the Radians-Degrees
111.42(c)4(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;	Get the Radians-Degrees
111.42(c)4(D)	represent angles in radians or degrees based on the concept of rotation in mathematical and real-world problems, including linear and angular velocity;	Angular Velocity Spinner
111.42(c)4(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;	Angular Velocity Spinner
111.42(c)4(D)	represent angles in radians or degrees based on the concept of rotation in mathematical and real-world problems, including linear and angular velocity;	Rotation Rumble: Radians vs Degrees
111.42(c)4(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;	Rotation Rumble: Radians vs Degrees
111.35(c)3(E)	solve problems from physical situations using trigonometry, including the use of Law of Sines, Law of Cosines, and area formulas and incorporate radian measure where needed.	Get The Cosines Law
111.42(c)4(H)	use the Law of Cosines in mathematical and real-world problems;	Get The Cosines Law
111.35(c)3(E)	solve problems from physical situations using trigonometry, including the use of Law of Sines, Law of Cosines, and area formulas and incorporate radian measure where needed.	Get The Sines Law
111.42(c)4(G)	use the Law of Sines in mathematical and real-world problems;	Get The Sines Law
111.42(c)3(D)	graph points in the polar coordinate system and convert between rectangular coordinates and polar coordinates;	Get The Sines Law
111.42(c)3(E)	graph polar equations by plotting points and using technology;	Get The Sines Law

111.35(c)6(A)	use the concept of vectors to model situations defined by magnitude and direction; and	Get The Sines Law
111.35(c)6(B)	analyze and solve vector problems generated by real-life situations.	Get The Sines Law
111.35(c)6(A)	use the concept of vectors to model situations defined by magnitude and direction; and	Get The Sines Law
111.35(c)6(B)	analyze and solve vector problems generated by real-life situations.	Get The Sines Law

Pages numbers in the teacher's book:

- Polar Time – Polar Coordinates 175
- Polar Transitions– Polar & Cartesian Coordinate transformations 177
- Completely Lost – Arcs and Direction 179
- Baking Pi's – The Unit Circle 183
- Spinner – Angular Velocity 185
- Get In Shape – Sine and Cosine 189
- Polar Rose Equation – Polar Graphing 191