

Math Models
PISD Curriculum: Year at a Glance

Bundle	Title	
	Big Ideas/Enduring Understandings	Guiding Questions
<i>Proportional vs. Non-proportional Relationships</i>		
1	A proportional relationship shows a constant rate of change between two quantities and both quantities reach 0 at the same point. Any relationship that doesn't have a constant rate of change and/or does not go through the origin can be called a non-proportional relationship.	<ol style="list-style-type: none"> How can you determine if the relationship between two variables is proportional or not? What models are most appropriate representations of proportional or non-proportional relationships?
<i>Direct and Inverse Variation</i>		
2	If two quantities are said to “vary directly” then the quantities change together – that is to say as one goes up or down, so does the other. If two quantities are said to “vary inversely” they change in opposite directions – that is to say that if one quantity increases the other will decrease and vice versa.	<ol style="list-style-type: none"> How can you determine if a function varies directly or an inversely from equation form? From a graph? How do you determine the domain and range of the graph of a function? What are the similarities and differences between proportional relationships and direct variation relationships?
<i>Linear Functions</i>		
3	<p>Linear functions can be used to model real life situations that have a constant rate of change.</p> <p>The rate of change in a real life situation represents the slope of the graph.</p> <p>The starting point (for example: initial distance from a point, a one time fee, etc...) represents the y-intercept.</p>	<ol style="list-style-type: none"> How are the rate of change of a function and the slope of a function related? How does slope affect the graph of a line? What does the y-intercept represent in a real life situation? X-intercept? How do you determine when a function has zero slope or undefined slope? How are linear functions, proportional relationships, and functions that vary directly related to each other?
<i>Solving Systems of Equations and Solving and Graphing Inequalities</i>		
4	Systems of equations are groups similar functions looked at together to compare their values – for example two cell phone plans, or the distances that two cars are traveling..	<ol style="list-style-type: none"> In what situation would you use a system of equations? What do you have to consider when writing a system of equations to model a situation? How many methods can you use to determine the solution to system of linear equations? How do you choose which method to use? What does the solution to a system represent in a real life situation?
	When solving a system, the “solution” represents the point of overlap/intersection where the values of both functions are the same.	
	When solving an inequality, the solution will not be a single point, but rather the boundary(s) of the set of all solutions.	<ol style="list-style-type: none"> How are equations and inequalities similar and different? How are the solutions to equations and inequalities similar and different?
<i>Probability and Statistics</i>		
5	Probability is a way of expressing knowledge or belief that an event will occur or has occurred based on all possible outcomes.	<ol style="list-style-type: none"> How do you determine the sample space for an experiment in probability? What is the difference between theoretical and experimental probability? How are independent events and dependent events alike and different?
	Data can be represented in many formats – graphs, tables, measures of central tendency, etc... - all of which can be informative, but can also be misleading if used incorrectly.	
		<ol style="list-style-type: none"> How can graphic models be used to misrepresent data and trends in a given situation? When is one measure of central tendency better to use than another in particular situations? When would you want to use median instead of mean? Etc... How does changing a set of data (adding a high point, adding a low point, changing the value of one of the data points, etc...) change the mean, median, mode, and range of a set?
<i>Math in Music</i>		
6	Periodic motion and geometric transformations can be used in composing music and in determining amplitude and frequency of musical notes.	<ol style="list-style-type: none"> How does musical composition relate to geometric patterns?

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7	<i>Geometric Transformations and Symmetry</i>	
	Geometric transformations, including reflections, rotations, and dilations, are seen in the real world both in nature and features on man-made objects.	<ol style="list-style-type: none"> 1. Where are some examples of the use of tessellations in the real world? 2. How can tell which transformations have been performed by examining an object and its image? 3. How has the golden ratio been found and utilized in nature and architecture?
8	<i>Graphing Quadratics and Start Solving Quadratics</i>	
	Quadratic functions can be used to model real world situations that do not have a constant rate of change, but do have a constant second difference.	<ol style="list-style-type: none"> 1. What are characteristics of a graph that will lead you to identify it as quadratic? 2. How many different methods can you use to find the solution(s) of a quadratic equation? How do you choose which method to use in a particular situation? 3. How are factoring a quadratic equation and using the quadratic formula to solve a quadratic equation alike and different?
9	<i>Finish Solving Quadratics and Parent Functions</i>	
	Quadratic functions can be used to model real world situations that do not have a constant rate of change, but do have a constant second difference.	<ol style="list-style-type: none"> 1. How many different methods can you use to find the solution(s) of a quadratic equation? How do you choose which method to use in a particular situation? 2. How are factoring a quadratic equation and using the quadratic formula to solve a quadratic equation alike and different?
10	<i>Exponential Growth and Decay and Right Triangle Relationships</i>	
	Just as a linear function is identified as a function that changes by a constant addend, an exponential function is identified as a function that changes by a constant positive factor.	<ol style="list-style-type: none"> 1. How can you determine if a given situation involves a growth factor or a decay factor? How can you determine the growth or decay factor of an exponential function? 2. Can there be an exponential function with a negative base? A fractional base? 3. How are exponential functions, linear functions, and quadratic functions alike and different?
	The Pythagorean Theorem and trigonometric ratios allow us to calculate distances using right triangles for models.	<ol style="list-style-type: none"> 1. What information is needed to be able to use the Pythagorean Theorem to find a distance? 2. What information is needed use a trigonometric ratio to find distances? 3. How are the Pythagorean Theorem and trig ratios alike and different?
11	<i>TAKS review , Begin Personal Finance</i>	
	When making financial decisions about renting/buying homes, leasing/buying vehicles, and purchasing using cash/credit in retail establishments, there are many aspects to consider – percentage rates, fees, time value of money, responsibilities, etc...	<ol style="list-style-type: none"> 1. What mathematical considerations should be made when making financial decisions? 2. What non-mathematical considerations should be made when making financial decisions? 3. What are the advantages to renting a home/leasing a car? What are the advantages to buying a home/buying a car? 4. How are buying a car and buying a house alike and different?
12	<i>Personal Finance</i>	
	Personal finance decisions include considerations that are both mathematical and non-mathematical.	<ol style="list-style-type: none"> 1. What are some of the different options for earning a wage? 2. What additional information is needed other than salary to determine take home pay? 3. What is the difference between simple interest and compound interest? 4. What forms are needed to do a simple tax return and where can you find the information needed to fill them out? 5. What options are available for investments? How are they alike and different – why would you decide which one to choose? 6. What types of insurance are required by law and what types are optional?