

TOAB Math & More

Learning Task Item and Number	Objective	Outcome Level	Assessment Item
Increase Eighth Grade ISAT Test Scores		Intellectual: Rule	
The Number System 1.0			
Define Rational Numbers 1.1	Given 10 integers, students will identify whether they are rational or irrational	Intellectual: Concrete	Analyze the five numbers provided. Classify each as rational or irrational and offer your explanation
Define Irrational Numbers 1.2	Given 5 irrational numbers (nonrepeating decimals, square root of 2, and irrational fractions, students will classify by explaining why each is irrational.	Intellectual: Concrete	Analyze the five numbers provided. Classify each as rational or irrational and offer your explanation
Convert Irrational Numbers into Rational Approximations 1.3	Given a cylinder, students will calculate surface area using 3.14 to 3.14159 for π and compare the difference. Students will then reflect on why standard measures convert irrational numbers into rational approximates, and when exact numbers might be necessary.	Discriminate; Generate	The measurements of an aluminum can are 2.75 diameter by 6.5 inches. Calculate the surface area using 3.14 to 3.14159 for π and compare the difference. Post to your blog your reflection on why standard measures convert irrational numbers into rational approximates, and when exact numbers might be necessary.

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Expressions & Equations 2.0			
Define, evaluate, & compare Radicals & Integer Exponents 2.1	Given the Internet, and choice of word processing or presentation software, students will research the base 10 number system and choose one other base system (up to hex, or base 16) and will then convert 10 numbers from one system to the next. Students will post their results in a blog or social presentation environment.	Intellectual: Concrete	Using the Internet and your choice of word processing or presentation software, research the base 10 number system and choose one other base system (up to hex, or base 16) and will then convert 10 numbers from one system to the next. Students will post their results in a blog or social presentation environment.
Evaluate and identify Square & Cube Roots 2.2	Learners roll counting cubes (dice) and decide which to use as a base and which to use as an exponent. After five turns, the players find the sum of the five exponential expressions they created. Player with the greatest sum, wins. Given a worksheet (UEN, 2011), students will calculate series of powers of 10. They will analyze data and determine decimal placement for multiplying by positive powers of 10 and by negative powers of 10.	Discriminate	Roll two counting cubes (dice) and decide which to use as a base and which to use as an exponent. After five turns, find the sum of the five exponential expressions you have created. Player with the greatest sum, wins.
Using Powers of 10 when estimating 2.3	Given a worksheet (UEN, 2011), students will calculate series of powers of 10. They will analyze data and determine decimal placement for multiplying by positive powers of 10 and by negative powers of 10.	Intellectual; rules	Complete the three tables shown, then analyze data to determine decimal placement for multiplying by positive powers of 10 and by negative powers of 10.
Define and evaluate Scientific Notation 2.4	Given Khan Academy video on Scientific Notation (Khan, 2011), students will define and evaluate 10 numbers using positive and negative scientific notation.	Intellectual: Concrete; Generate	After viewing the Khan Academy video on Scientific Notation (Khan, 2011), define and evaluate the 10 numbers on the handout provided using positive and negative scientific notation.
Plot Linear Equations on Cartesian Coordinate 2.5	Given state populations (in millions) and registered vehicles in each state, students will create a scatter plot, using the population for the horizontal axis, draw a trend line, and predict how many cars are registered by the 37.3 million people in California (U.S. Census Bureau, 2011). Students will then research the population of his or her birth state, write an equation for the resulting trend line and use it to predict the number of cars for the people in the student's state of birth.	Apply	The following table shows state populations (in millions) and registered vehicles in each state. Use the data to create a scatter plot, using the population for the horizontal axis, draw a trend line, and predict how many cars are registered by the 37.3 million people in California (U.S. Census Bureau, 2011). Students will then research the population of his or her birth state, write an equation for the resulting trend line and use it to predict the number of cars for the people in the student's state of birth.
Calculate Slope 2.6	Given Internet resources and open source software, students will develop a visual or mnemonic device to distinguish between a slope of 0 and an undefined slope.	Apply	Use the Internet and your choice of course approved open source software to develop a visual or mnemonic device to distinguish between a slope of 0 and an undefined slope.
Analyze and solve pairs of linear equations 2.7	Given a graph plotting a system of linear equations, students will write the system of linear equations for the lines and provide the correct solution of the system.	Generate	Using the following graphs, write the system of linear equations for the lines and provide the correct solution of the system.

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Functions 3.0			
Define, evaluate & compare functions 3.1	Given a computer with spreadsheet software, teams of two students will alternate between making formulas and guessing the hidden formula to emphasize algorithms, formulas, and functions are distinct from other elements. (Driscoll, 1999)	Intellectual, Generate	With a partner, use a computer and launch the spreadsheet software. Alternate between making formulas and guessing the hidden formula to emphasize algorithms, formulas, and functions are distinct from other elements. Save your spreadsheet with the formulas and send electronically to your drop box(Driscoll, 1999)
Model relationships between two quantities 3.2	Given a quiz, students will add and subtract integers using mental math and develop a model showing the relationship using temperature, altitude, or a relevant model of their choice.	Intellectual; Apply	Add and subtract the following integers using mental math. Using the same concepts, develop a model showing the relationship between positive and negative numbers using temperature, altitude, or a relevant model of your choice (please get instructor's approval).
Determine Rate of Change 3.3	Given <i>Pascal's Triangle</i> student will correctly state how many even numbers are found in the 100th row.(Driscoll, 1999)	Intellectual; Concrete	
Analyze a Graph where the function is increasing or decreasing, linear or nonlinear 3.4	Given a graph plotting a system of linear equations, students will write the system of linear equations for the lines and provide the correct solution of the system.	Generate	From the following graphs, write the system of linear equations for the lines and provide the correct solution of the system.
Sketch a graph given a function that has been described verbally 3.5	Given Internet resources and open source software, students will create a podcast describing points on a graph (and submit the solution to the teacher). Students will listen to five peer podcasts of their choice and sketch the resulting graph.	Intellectual; Apply	Use the recording software on your computer to create a podcast describing points on a graph (and submit the solution to the teacher). Students will listen to five peer podcasts of their choice and sketch the resulting graph.

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Geometry 4.0			
Understand congruence and similarity using physical models, transparencies, or geometry software. 4.1	Given geometry sketchbook, the student will describe and classify relationships among types of one-, two-, and three dimensional geometric figures using their defining properties.	Discriminate	Use geometry sketch book and the attached figures to describe and classify relationships among types of one-, two-, and three dimensional geometric figures using their defining properties
Understand and apply the Pythagorean Theorem 4.2	Given the variables in an equation in the form of $a^2+b^2=c^2$, students will work the Pythagorean Theorem in reverse to determine if the measured triangle is a right triangle.	Intellectual; Apply	Based on your knowledge of the Pythagorean theorem, determine if the measured triangle is a right triangle.
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. 4.3	Given the diameter of our solar system's planets, students will calculate the approximate surface area and volume of each and rank them in order of size from smallest to largest.	Intellectual; Apply	From the following table showing the diameter of our solar system's planets, calculate the approximate surface area and volume of each and rank them in order of size from smallest to largest.

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Statistics & Probability 5.0			
Construct and interpret scatter plots 5.1	Given websites and other supporting information student will identify primary source research and use it to collect data from which to derive scatter plots, line graphs, line plots, bar graphs, histograms, and stem-and-leaf plots.	Intellectual; Rule	Find a set of data that you find interesting. You might consider data from the U.S. Census Bureau or from one of the major sports leagues (NBA, NFL, MLB). Enter some of the data into the cells below. Then, use the Preview button to view the data in various formats — as a bar graph, line graph, pie chart, or pictograph. Which representation is the most useful? Which representation is the least useful? Which data would you display and which type of representation would you use if you wanted to convince a friend that your favorite basketball player is the best player in the league? Which would you use if you wanted to convince a friend that a particular state has the most people?
Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept 5.2	Given a worksheet (illuminations, 2011), students will plot functions of time on a Cartesian coordinate prior to developing their own graph for a function of time. Learners will post their graph to a social networking site to have other students guess what it represents (in comments area).	Apply	Post a tally sheet on your refrigerator door at home and ask the members of your family to record when they open the door during a twenty-four-hour period. (You can use a magnetic clip to hold the tally sheet and hang a pencil on a string beside it for their convenience. Plot the results on graph paper, and compare the results to the graph of your prediction. Write a paragraph about your findings.
Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. 5.3	Given USA Today News SnapShots (2011), students will select from raw data to create various frequency charts including measures of central tendency and range to make predictions about future data.	Apply	When trying to get out of being issued a ticket, most drivers tell law enforcement officers they missed the sign; 17% cry and 11% claim to feel sick. When trying to get out of being issued a ticket, one half of all drivers tell law enforcement officers they missed the sign; 17% cry and 11% claim to feel sick. In a poll of 378 drivers, what number do not try to get out of a ticket? 2) calculate the mean, median, and mode of the 278 drivers. Create a table showing percentage of each measure that each excuse (including no excuse) offers.

Driscoll, M. (1999). *Fostering Algebraic Thinking*. Portsmouth: Heinemann.

Illuminations Mathematics as Communication. (2011). Retrieved July 4, 2011, from Illuminations; resources for teaching math: <http://illuminations.nctm.org/LessonDetail.aspx?ID=L375>

Kahn, S. (2011). *Scientific notation 1 and 2*. Retrieved July 5, 2011, from Khan Academy: <http://www.khanacademy.org/video/scientific-notation-1?playlist=Algebra%20I%20Worked%20Examples>

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Mathematics - Pre-Algebra . (2007). Retrieved July 4, 2011, from Utah Education Network: <http://www.uen.org/cc/uen/core/pub/displayCoreCourse.action?ccId=5200>
 U.S. Census Bureau. (2011, June 3). *Quick Facts - California* . Retrieved July 3, 2011, from U.S. Census Bureau: <http://quickfacts.census.gov/qfd/states/06000.html>
 USA Today. (2011). *News Snapshots* . Retrieved July 5, 2011, from USA Today: <http://www.usatoday.com/snapshot/news/snapndex.htm>