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| Learning Objectives | Practices | | Reason & Explanations | | | Notes | |
| Rational Numbers | | | | | | | |
| **The first four learning objectives should be taught throughout the Rational Numbers Unit**  **7.NS.1.b.3** I can interpret sums of rational numbers using contextual situations.  **7.NS.2.a.2** I can interpret products of rational numbers using contextual situations.  **7.NS.2.b.3** I can interpret quotients of rational numbers using contextual situations.  **7.NS.3** I can solve contextual situations and mathematical problems involving the four operations with rational numbers. (When working with complex fractions use the same rules as simple fractions.)  **7.NS.1.c.2** I can show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in contextual situations.  **7.NS.1.b.1** I can understand that *p* + *q* is a number located a distance |*q*| from *p*, in the positive or negative direction depending on whether *q* is positive or negative.  **For example:**  is the number located 8 units from 6 in the negative direction  **7.NS.1.b.2** I can show that a number and its opposite have a sum of 0 (additive inverses)  **7.NS.1.c.1** I can understand subtraction of rational numbers as adding the additive inverse, *p* – *q* = *p* + (–*q*).  **7.NS.2.b.1** I can understand that integers can be divided, and every quotient of integers (with non-zero divisor) is a rational number.  **7.NS.2.c** I can apply properties of operations as strategies to multiply and divide rational numbers.  **7.NS.2.b.2** I can understand that if *p* and *q* are integers, then –(*p*/*q*) = (–*p*)/*q* = *p*/(–*q*).  **7.NS.1.d** I can apply properties of operations as strategies to add and subtract rational numbers.  **For example:**  it is the number located of a unit from 1 in a positive direction.  **For example:** 2 ¼ + 3 ½ = (2 + 3) + (¼ + ½)  **7.NS.2.a.1** I can understand the properties used to multiply fractions extend to all rational numbers, with a particular emphasis on the distributive property and signed numbers.  **For example:**  **For example:**  **7.NS.2.d.1** I can convert a rational number to a decimal using long division;  **7.NS.2.d.2** I can understand that the decimal form of a rational number terminates in 0s or eventually repeats.  **Note:** Operations with integers are NOT included in any previous grade level.  **7.NS.1.a** I can describe rational numbers in a contextual situation.  **For example:** The temperature dropped 5 degrees. The temperature raised 5 degrees.  **For example:** A hydrogen atom has 0 charge because its two constituents are oppositely charged. |  | |  | | |  | |
| Proportional Reasoning | | | | | | | |
| **The first two learning objectives should be taught throughout the Proportional Reasoning Unit**  **7.RP.3** I can use proportional reasoning to solve multistep ratio and percent problems.  **For example:** Simple interest, tax, markups, markdowns, gratuities, commissions, fees, percent increase, decrease, and percent error, etc…  **7.RP.2.c** I can represent proportional relationships by equations.  **For example:** The total cost = (the number of items)(the price per item)  **For example:** The total cost (*C*) for buying a certain number of hats (*n*) is $12 per hat, .  **7.SP.1.c** I understand that random sampling tends to produce representative samples and support valid inferences.  **7.SP.2.b** I can generate multiple samples of the same size from the same population to gauge the variation in estimates or predictions of the parameter.  **Note:** Parameter is the true value of the population’s unknown characteristic. A statistic is calculated from the sample and is only an estimate of the population’s parameter.  **For example:**  Students create additional random samples from the same population to determine the variation in their prediction of the average height of the students. (Using different samples of the same population will give slightly different results.)  **7.SP.1.b** I understand that the generalizations made are only valid if the sample is representative of the population.  **7.SP.2.a** I can use data from a random sample to draw inferences about a population with an unknown characteristic of interest (the desired information).  **For example:** Students can use a random sample of students to estimate the average height of all students in the school. (The average height of the students is the unknown characteristic of interest.)  **7.SP.1.a** I understand that information can be gathered about a population from a sample of the population.  **For example:** To estimate the amount of time the students at Mt. View JHS spend on homework, every 5th student in the lunch room was surveyed.  **7.RP.2.b** I can determine the constant of proportionality (unit rate) from a variety of representations (tables, graphs, equations, diagrams, and verbal descriptions).  **For example:** Find the unit rate for a snail that has crawled 6 inches in 2 hours.  **7.RP.2.d.1** I can explain the meaning of the *x-*value and *y*-value on the graph of a proportional relationship in terms of the contextual situation.  **7.RP.2.a**  I can determine whether 2 quantities are proportional (vary directly, ).    **For example:** Students can compare the side lengths of 2 rectangles using a table, the graphical representation at the right, or other methods to determine if the rectangles are proportional.  **7.RP.2.d.2** I can explain why *r* is the unit rate when the graph passes through the points (0,0) and (1,r).  **7.RP.1** I can compute unit rates associated with ratios of complex fractions such as: lengths, areas, and other quantities given in like or different units.  **For example:** If a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction *½/¼* miles per hour, equivalently 2 miles per hour.  **For example:** Every ¾ inch on a map represents 6 ½ miles, what is the unit scale of the map?  **7.G.1** I can solve problems involving scale drawings of geometric figures  **For example:** Students can compute actual length and areas from a scale drawing and create/reproduce scale drawings at a different scale. |  | |  | | |  | |
| Statistics and Probability | | | | | | | |
| **7.SP.8.c** I can design and use a simulation to generate frequencies for compound events.  **For example:** Use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take **at least** 4 donors to find one with type A blood?  **7.SP.8.b** I can create representations (organized lists, tables and tree diagrams) of sample spaces for compound events.  **7.SP.7.a** I can develop a uniform probability model (all outcomes equally likely) and use it to determine the likelihood of a given event.  **For example**: The probability of choosing any one student in a class. The probability of rolling a 2 on a number cube.  **7.SP.5** I can understand the probability of a chance event is the likelihood of the event occurring and is expressed as a number between 0 and 1.  **For example:** A probability near 0 represents an unlikely event, a probability of ½ represents an equally likely chance, and probability near 1 represents a near certainty.  **7.SP.8.b.1** I can identify the outcomes for a given event.  **For example:** Flipping two coins has possible outcomes of HH, HT, TH, TT.  **7.SP.8.a** I can understand that just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.  **7.SP.6.a** I can approximate the probability of an event by collecting data and observing its long-run relative frequency.  **For example:** Rolling a number cube 40 times and approximating the likelihood of rolling a six on any single roll.  **7.SP.4** I can use measures of center (mean and median) and variability (interquartile range, mean absolute deviation) from random samples to make informal comparative inferences about two populations.  **For example -** Decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.  **7.SP.6.b** I can predict the approximate relative frequency given the theoretical probability.  **For example:** When rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.  **7.SP.7.b** I can create a probability model, eg. bar graph, circle graph, (which may not be uniform) by observing frequencies in data generated from an experiment.  **For example:**  Toss a paper cup 20 times and observe how many times it lands open face down. Then draw a probability model based on your results.  **7.SP.3** I can use visual representations (box & whisker plots, dot plots, etc.) to compare the centers(mean and median) and variability (interquartile range, mean absolute deviation) of two data sets *(This standard builds on 6.SP.5 where mean absolute deviation is introduced.)*.  **Note – How to find the Mean Absolute Deviation from a data set.**  The Mean Absolute Deviation is calculated in three simple steps.   1) Determine the Mean: Add all numbers and divide by the count   example: the weights of the following three people, denoted by letters are  A - 56 Kgs B - 78 Kgs C - 90 Kgs   Mean = (56+78+90)/3= 74.6  2) Determine deviation of each variable from the Mean  i.e 56-74.6 = -18.67  78-74.6= 3.33  90-74.6 =15.33  3) Find the average of the absolute values of the deviations. i.e eliminate the negative aspect  Thus the Mean Absolute Deviation is (18.67 +3.33+15.33)/3 =12.44  Alternatively, you can use the excel formula =AVEDEV(56,78,90) to obtain the result.  **Note:** For a detailed example please see pages 22-24 of Arizona’s Grade 7 explanation of the Common Core.  [Click here for Arizona explanation](http://www.ade.az.gov/standards/math/2010MathStandards/Gradelevel/MathGr7.pdf) |  | | |  | | |  |
| Geometry | | | | | | | |
| **7.G.3** I can describe cross sections of three-dimensional figures.  **For example:**  Students can identify plane sections of right rectangular prisms, right rectangular pyramids and cylinders.  [Click here for Web resource](http://www.shodor.org/interactivate/activities/CrossSectionFlyer/)  **7.G.2** I can draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions, focusing on triangles.  **For example:** Given three measures of angles or sides, a student can determine whether it will yield a unique triangle, more than one triangle, or no triangle.  **Alpine School District objective:** Develop the idea of supplementary and complementary angles  **7.G.1** I can solve problems involving scale drawings of geometric figures.  **For example:**  Students can compute actual length and areas from a scale drawing and create/reproduce scale drawings at a different scale.  **7.G.6** I can solve contextual situations and math problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.  **7.G.4.c**  I can visually demonstrate the relationship between area and circumference of a circle.    **For Example:**  **7.G.4.a**  I can recite the formulas for the area and circumference of a circle.  **7.G.4.b** I can solve problems involving area and circumference. |  | | |  | | |  |
| Solving Equations | | | | | | | |
| **7.EE.4.b.2** I can graph the solution set of an inequality and interpret it in the context of the problem.  **For example:** As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, solve and graph the inequality, and describe the solutions.  **7.EE.2** I can understand that rewriting an expression in different forms in a contextual situation can shed light on the problem and how the quantities in it are related.  **For example:** a + 0.05a = 1.05a means that “increase by 5%” is the same as “multiply by 1.05.”  **7.EE.4.a.1** I can develop and solve simple equations of the form *px* + *q* = *r* and *p*(*x* + *q*) = *r*, where *p*, *q*, and *r* are specific rational numbers, for contextual situations  **7.G.5** I can use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.  **For example:** Given A and B are supplementary, *m*A is 3x + 10 and *m*B is 7x + 20. Find the measures of angles A and B.  **Note: The focus of this objective in the Solving Equations unit should be to find missing angles by solving an equation**.  **7.EE.3.b** I can convert between numerical forms as appropriate and assess the reasonableness of answers using mental computation and estimation strategies.  **For example:** If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50.  **For example:** If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.  **7.EE.4.a.2** I can solve a contextual situation numerically or by solving an equation and compare the processes involved in each case.  **For example:** The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?  Numerically: 54 - 6 – 6 = 42, 42/2 = 21 so the width is 21 cm.  Algebraically: 2(6) + 2w = 54, 2w = 42, w = 21 so the width is 21 cm.  Compare and discuss the steps in each process.  **7.EE.3.a** I can solve multi-step contextual situations posed with positive and negative rational numbers in any form.(whole numbers, fractions, and decimals)  **7.EE.4.b.1** I can develop and solve simple inequalities of the form *px* + *q* > *r* and *p*x + q < *r*, where *p*, *q*, and *r* are specific rational numbers, for contextual situations.  **7.EE.1** I can apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.  **For example:** Factor the expression  **For example:** Combine like terms of the expressions |  | | |  | | |  |
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