

**SANTA ROSA CITY SCHOOLS  
CONTENT AND PERFORMANCE STANDARDS  
SEVENTH GRADE PRE-ALGEBRA**

***NUMBERS:***

<b>Enduring Understanding</b>	<b>ILLUSTRATIONS</b>
<p>7NS1 The student will know the properties of, and compute with, rational numbers expressed in a variety of forms.</p> <p>7NS1.2 The student demonstrates a grasp of number sense by adding, subtracting, multiplying and dividing rational numbers [integers, fractions and decimals].</p> <p>7NS1.3 The student demonstrates a grasp of number sense by converting fractions and decimals [terminating and repeating] and percents and using representations in estimation, computation and application.</p>	<p>1.1 <math>2.5 \times 10^2 + 3.5 \times 10^3 =</math> approximately what #? (ans. 4,000)</p> <p>1.2 <math>5^{1/2} \div 2^{3/4} = ?</math> (ans. 2)</p> <p>1.3 <math>3/8 =</math> what decimal and what percent? (ans. .375 , <math>37^{1/2}\%</math>)</p> <p>1.3 Approximate <math>3/4 + .25 + .6</math> to nearest whole number. (ans. 2)</p> <p>1.4 Is the square root of 5 rational or irrational? (ans. Irrational)</p> <p>1.5 Find the % change in price from \$4 to \$5. (ans. 25% increase)</p> <p>1.5 What would \$80 shoes on sale for 20% off sell for? (ans. \$64)</p>
<b>Important to Know and Do</b>	
<p>7NS1.1 The student demonstrates a grasp of number sense by reading, writing and comparing rational numbers in scientific notation.</p> <p>7NS1.5 The student demonstrates a grasp of number sense by calculating the percent of increase or decrease of a quantity, discounts, markups and profits in real life situations.</p>	
<b>Worth Being Familiar With</b>	
<p>7NS1.4 The student demonstrates a grasp of number sense by differentiating between rational and irrational numbers.</p>	

***MATHEMATICAL OPERATIONS:***

<b>Enduring Understanding</b>	<b>ILLUSTRATIONS</b>
	<p>2.1 <math> -2  = ?</math> (ans. 2)</p> <p>2.2 <math>10^2 = \underline{\quad}</math> and <math>\sqrt{100} = \underline{\quad}</math> (ans. 100 , 10)</p> <p>2.3 <math>\sqrt{50}</math> is between <math>\underline{\quad}</math> and <math>\underline{\quad}</math> (ans. 7 , 8)</p>
<b>Important to Know and Do</b>	

<p><b>7NS2 The student will use absolute value, powers and roots to simplify integers and fractions.</b></p> <p>7NS2.1 The student demonstrates the ability to perform mathematical operations by determining the absolute value of real numbers.</p> <p>7NS2.2 The student demonstrates the ability to perform mathematical operations by showing the inverse relationship between squaring and root extraction.</p> <p>7NS2.3 The student demonstrates the ability to perform mathematical operations by determining for a counting number, that is not square, the two counting numbers between which its square root lies.</p> <p>7NS2.4 The student demonstrates the ability to perform mathematical operations by understanding negative integer exponents.</p> <p>7NS2.5 The student demonstrates the ability to perform mathematical operations by multiplying and dividing exponentials with common bases.</p> <p>7NS2.6 The student demonstrates the ability to perform mathematical operations by multiplying, dividing and simplifying fractions using exponent rules.</p>	<p>2.4 <math>2^{-3} = \frac{1}{2^3} = ?</math> (ans. <math>\frac{1}{8}</math>)</p> <p>2.5 <math>x^4 \cdot x^3 = ?</math> (ans. <math>x^7</math>)</p> <p>2.6 <math>(\frac{1}{3})^2 = ?</math> (ans. <math>\frac{1}{9}</math>)</p> <p>2.6 <math>2x^3/4x^2 = ?</math> (ans. <math>\frac{x}{2}</math>)</p>
<p><b>Worth Being Familiar With</b></p>	

***EXPRESSIONS, EQUATIONS AND INEQUALITIES:***

Enduring Understanding	ILLUSTRATIONS
<p><b>7FA1 The student will express relationships using algebraic terminology, expressions, equations, inequalities and graphs.</b></p> <p>7FA1.1 The student shows a working knowledge of vocabulary, expressions, equations and inequalities by using a variable in a given situation to represent an unknown quantity in a written expression, equation, inequality or system of equations or inequalities.</p> <p>7FA1.2 The student shows a working knowledge of vocabulary, expressions, equations and inequalities by using order of operations to evaluate algebraic expressions.</p> <p>7FA1.3 The student shows a working knowledge of vocabulary, expressions, equations and inequalities by simplifying algebraic expressions by applying properties [associative, commutative, distributive, inverse] of rational numbers.</p> <p>7FA1.4 The student shows a working knowledge of vocabulary, expressions, equations and inequalities by representing quantitative relationships with a graph and interpreting situations represented by graphs.</p>	<p>1.1 Two more than a number is three less than twice the number. (ans. <math>x + 2 = 2x - 3</math>)</p> <p>1.2 Evaluate <math>-3(2x+5)^2</math> if <math>x = -2</math> (ans. <math>-3</math>)</p> <p>1.3 <math>a(b+c) = ?</math> and what property does this illustrate? (ans. <math>ab + bc</math>, distributive)</p> <p>1.4 Show students the graph of a linear equation that compares dollar savings to time period. Ask students to explain what the graph displays and ask them to project what the savings will be at a particular point in time in the future.</p>

<b>Important to Know and Do</b>	<ul style="list-style-type: none"> <li>Have students write out the procedure for working a problem and require them to use proper mathematical terms like variable, expression, equation, inequality, term, coefficient, constant, etc. .</li> </ul>
7FA1.5 The student shows a workin7FA2.1 The student manipulates powers and roots by g knowledge of vocabulary, expressions, equations and inequalities by using algebraic terminology correctly.	
<b>Worth Being Familiar With</b>	

***EVALUATING POWERS AND ROOTS:***

<b>Enduring Understanding</b>	<b>ILLUSTRATIONS</b>
<b>7FA2</b> The student will interpret and evaluate expressions involving integers, powers and simple roots.	2.1 $4^2 = ?$ and $4^{-2} = ?$ (ans. $4 \cdot 4$ , $\frac{1}{4 \cdot 4}$ )
<b>Important to Know and Do</b>	2.2 Evaluate $3x^2$ if $x = -2$ (ans. 12)
7FA2.1 The student manipulates powers and roots by interpreting positive whole number powers as repeated multiplication and negative whole number powers as repeated division.	2.2 Simplify $(2xy^2)^3$ (ans. $8x^3y^6$ )
7FA2.2 The student manipulates powers and roots by simplifying and evaluating expressions that include exponents.	2.3 Simplify $12x^4y^3 / 4x^2y^{-2}$ so that your result has all positive exponents. (ans. $3x^2y^5$ )
7FA2.3 The student manipulates powers and roots by multiplying and dividing monomials, extending the process of raising powers and "extracting roots of" to monomials, when the latter results in a monomial with an integer exponent.	2.3 $(4x^3y)^2 = ?$ and $\sqrt{16x^6y^2} = ?$ (ans. $16x^6y^2$ , $4x^3y$ )
<b>Worth Being Familiar With</b>	

***GRAPHING LINEAR FUNCTIONS:***

Enduring Understanding	ILLUSTRATIONS
<p><b>7FA3 The student will graph and interpret linear functions representing a variety of real life situations.</b></p> <p>7FA3.1 The student demonstrates an understanding of linear functions by graphing linear functions, noting that the vertical change [change in y-value] per unit horizontal change [change in x-value] is always the same and that the ratio ["rise over run"] is called the slope of the graph.</p>	<p>3.1 Students should be able to look at the graph of an equation like <math>y=3x+2</math> on a Cartesian grid and understand that slope describes how "steep" the line is and that this slope remains constant.</p> <p>3.2 Students plot the circumference vs. the diameter of several circles on a Cartesian grid to find that the slope of the line connecting the points is approximately 3, which relates to <math>\pi</math>.</p>
<p><b>Important to Know and Do</b></p>	
<p>7FA3.2 The student demonstrates an understanding of linear functions by plotting on a Cartesian grid the values of two quantities whose ratio is always the same [feet vs. inches, circumference vs. diameter]. Fitting a line to the plot so that the slope of the line equals the ratio of y to x.</p>	
<p><b>Worth Being Familiar With</b></p>	

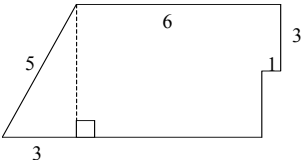
***SOLVING EQUATIONS AND INEQUALITIES:***

Enduring Understanding	ILLUSTRATIONS
<p><b>7FA4 The student will solve simple linear equations and inequalities over the rational numbers.</b></p> <p>7FA4.1 The student works with equations and inequalities by solving two-step linear equations and inequalities in one variable, over the rational numbers and interpreting the reasonableness of the results.</p>	<p>4.1 Solve <math>3x+9 = 24</math> (ans. 5)</p> <p>4.1 Solve <math>3x+9 &gt; 24</math> (ans. <math>x &gt; 5</math>)</p> <p>4.2 Since distance = rate x time, if John traveled for 3 hours at 50 mph, how far would he go?</p>
<p><b>Important to Know and Do</b></p>	
<p>7FA4.2 The student works with equations and inequalities by solving multi-step problems involving rate, average speed, distance and time, or direct variation.</p>	
<p><b>Worth Being Familiar With</b></p>	

**UNITS OF MEASURE:**

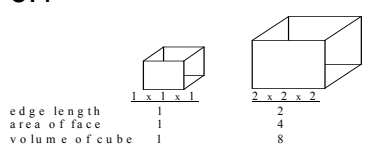
Enduring Understanding	ILLUSTRATIONS
<p><b>7GM1 The student will choose appropriate units of measure and uses ratios to convert within measurement systems.</b></p>	<p>1.1 Convert 30 mph into feet per second.</p> <p>1.3 Make use of rates, such as speed and density in problems.</p>
<p><b>Important to Know and Do</b></p>	
<p>7GM1.1 The student shows knowledge of units by comparing weighs, capacities, geometric measures, times and temperatures within measurement system.</p> <p>7GM1.2 The student shows knowledge of units by constructing and reading scale drawings and models.</p> <p>7GM1.3 The student shows knowledge of units by using measures, expressed as rates, to solve problems, checking units of the solutions and checking the reasonableness of the answers.</p>	
<p><b>Worth Being Familiar With</b></p>	

**PERIMETER AND AREA:**

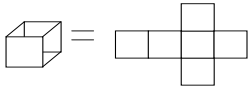
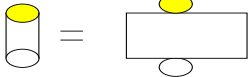
Enduring Understanding	ILLUSTRATIONS
<p>7GM2.2 The student shows understanding of two- and three- dimensional shapes by using formulas for finding the perimeter and area of basic two-dimensional figures [e.g., rectangles, trapezoids, squares, triangles, circles].</p>	 <p>2.3 Find the area of the figure above.</p>
<p><b>Important to Know and Do</b></p>	
<p><b>GM2 The student will understand the relationships of elements of two- and three-dimensional shapes.</b></p> <p>7GM2.1 The student shows understanding of two- and three- dimensional shapes by using formulas to compute the surface area and volume of common three-dimensional geometric objects such as prisms and cylinders.</p> <p>7GM2.3 The student shows understanding of two- and three- dimensional shapes by estimating and computing the area of complex or irregular two- or three- dimensional figures by breaking them up into more basic geometric objects.</p>	

<b>Worth Being Familiar With</b>	
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**SCALE FACTOR:**

<b>Enduring Understanding</b>	<b>ILLUSTRATIONS</b>									
<b>Important to Know and Do</b>	<p><b>3.1</b></p>  <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding-right: 10px;">edge length</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> </tr> <tr> <td style="padding-right: 10px;">area of face</td> <td style="text-align: center;">1</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="padding-right: 10px;">volume of cube</td> <td style="text-align: center;">1</td> <td style="text-align: center;">8</td> </tr> </table> <p><b>3.2</b>      1 yard = 3 feet, but 1 sq. yard = 9 sq. feet, and 1 cubic yard = 27 cubic feet</p>	edge length	1	2	area of face	1	4	volume of cube	1	8
edge length		1	2							
area of face		1	4							
volume of cube	1	8								
<p>7GM3.1 The student shows understanding of two- and three- dimensional scale by knowing that when the length of all dimensions of a three-dimensional object are multiplied by a scale factor, the surface area is multiplied by the square of the scale factor and the volume is multiplied by the cube of the scale factor.</p> <p>7GM3.2 The student shows understanding of two- and three- dimensional scale by knowing the difference between linear, square and cubic units and knowing when to use them and how to convert them.</p>										
<b>Worth Being Familiar With</b>										
<b>7GM3 The student will understand the effects of changing scale on two- and three-dimensional shapes.</b>										

***ELEMENTS OF FIGURES AND PYTHAGOREAN THEOREM:***

Enduring Understanding	ILLUSTRATIONS
	4.3
<p style="text-align: center;"><b>Important to Know and Do</b></p>	
<p><b>7GM4 The student will deepen his/her understanding of plane and solid geometric shapes and knows the Pythagorean Theorem.</b></p> <p>7GM4.1 The student demonstrates their understanding of geometric figures and the Pythagorean Theorem by identifying and constructing basic elements [e.g., altitudes, midpoints, angle bisectors, perpendicular bisectors, central angles, radii, diameters and chords].</p> <p>7GM4.2 The student demonstrates their understanding of geometric figures and the Pythagorean Theorem by using coordinate graphs to plot simple figures, see their reflections and translations, and determine their edge lengths and areas.</p> <p>7GM4.4 The student demonstrates their understanding of geometric figures and the Pythagorean Theorem by knowing when two figures are congruent.</p> <p>7GM4.1 The student demonstrates their understanding of geometric figures and the Pythagorean Theorem by knowing the meaning of the Pythagorean Theorem and using it to find the lengths of unknown sides.</p>	
<p style="text-align: center;"><b>Worth Being Familiar With</b></p>	
<p>7GM4.3 The student demonstrates their understanding of geometric figures and the Pythagorean Theorem by constructing two-dimensional patterns of three-dimensional objects like rectangular solids, prisms, cylinders and cones.</p>	

**STATISTICS:**

<b>Enduring Understanding</b>	<b>ILLUSTRATIONS</b>
<b>Important to Know and Do</b>	
<p><b>7SP1 The student will collect, organize, and represent data sets that have one or more variables within a data set both manually and/or by using an electronic spreadsheet computing and analyzing statistical measurements for data sets.</b></p> <p>7SP1.1 The student demonstrates an understanding of statistics by organizing and displaying data sets in a variety of formats to analyze one data set or to compare two data sets.</p> <p>7SP1.2 The student demonstrates an understanding of statistics by representing numerical variables on a scatter plot and informally describing how the data points are distributed and whether there is an apparent relationship between the two variables.</p> <p>7SP1.3 <b>IMPORTANT TO KNOW AND DO</b> The student demonstrates an understanding of statistics by understanding, comparing and computing the minimum, the lower quartile, the median, the upper quartile and the maximum of a data set.</p>	<p>1.1 Use a box-and-whisker, histogram, stem-and-leaf, circle graph or line graph to represent data for certain purposes. (e.g., line for trends and showing several quantities simultaneously, circle to show relative amounts)</p> <p>1.2 Gather data, plot on coordinate graph, and look for line of best fit.</p> <p>1.3 Use a box and whisker plot to represent the mean, quartiles, and range of a data set.</p>
<b>Worth Being Familiar With</b>	