

<p>1. The equation <math>\sqrt{x^2} = x</math> is <i>not</i> satisfied by</p> <p>(1) negative numbers  (2) zero  (3) positive integers  (4) positive irrational numbers</p>	<p>2. Find the positive value of <math>k</math> for which the equation <math>kx^2 + 9x + 4k = 0</math> will have equal roots.</p>
<p>3. Express in lowest terms:</p> $\frac{\frac{y+x}{x+5}}{\frac{y}{x+5} - \frac{x+5}{x}}$	
<p>4. Which of the following sets contains all real numbers that are <i>not</i> in the domain of <math>f(x) = \frac{x^2 + 2x + 1}{x^2 + 1}</math>?</p> <p>(1) <math>\{-1\}</math>                      (3) <math>\{1, -1\}</math>  (2) <math>\{0, -1\}</math>                    (4) <math>\{ \}</math></p>	<p>5. Rationalize the denominator and express in simplest radical form: <math>\frac{\sqrt{7}}{4\sqrt{2} - \sqrt{7}}</math></p>
<p>6. If <math>s(x) - 4 =  3x - 4 </math>, what is the value of <math>s(0)</math>?</p>	<p>7. What are the coordinates of the turning point of the parabola represented by the equation <math>y = -4x^2 + 7</math>?</p>
<p>8. What is the range of <math>f(x) = \frac{1}{2}x - 3</math> if the function is defined for <math>x \leq 8</math>?</p> <p>(1) <math>f(x) \leq 22</math>                      (3) <math>f(x) \leq 8</math>  (2) <math>f(x) \leq 1</math>                        (4) all real numbers</p>	<p>9. If <math>z = 1 - \frac{2}{3}i</math> is complex number, then in which quadrant does <math>z^2 + 4z</math> lie?</p>
<p>10. If <math>y = -\frac{1}{2}x^2 + 3x - 4</math> and <math>P</math> represents the product of the roots and <math>S</math> represents the sum of the roots, find the value of <math>S^2 - P^2</math></p>	<p>11. The equation of the axis of symmetry of the parabola <math>y = x^2 + px + q</math> is <math>x = 3</math>. Find the value of <math>p</math>.</p>

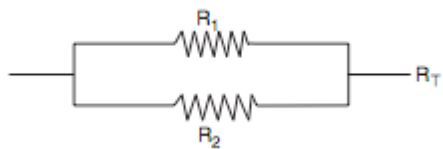
12. If  $f(x) = x^2 - x$  and  $g(x) = x + 2$ , find all values of  $y$  satisfying the equation  $(f \circ g)(2y) = 0$ .

13. The kinetic energy ( $K$ ) of an object is dependent on its mass ( $m$ ) and velocity ( $v$ ) and is given by the equation  $K = 0.5mv^2$ . If an object has a velocity of 5 and a kinetic energy of 75, what is its mass?

14. The period  $T$ , in seconds, of a mass-spring system is given by  $T = 2\pi\sqrt{\frac{m}{10}}$ , where  $m$  is the mass in kg. What must the mass be, to the nearest kg, so that the period is 12.5 seconds?

15. A certain drug raises a patient's heart rate,  $h(x)$ , in beats per minute, according to the function  $h(x) = 70 + 0.2x$ , where  $x$  is the bloodstream drug level, in milligrams. The level of the drug in the patient's bloodstream is a function of time,  $t$ , in hours, according to the formula  $(g)(t) = 300(0.8)^t$ . Find the value of  $(h \circ g)(4)$ , the patient's heart rate in beats per minute, to the nearest whole number.

16. Electrical circuits can be connected in series, one after another, or in parallel circuits that branch off a main line. If circuits are hooked up in parallel, the reciprocal of the total resistance in the series is found by adding the reciprocals of each resistance, as shown in the accompanying diagram.



$$\frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{R_T}$$

If  $R_1 = x$ ,  $R_2 = 2x - 3$ , and the total resistance,  $R_T$ , is 5.25 ohms, find the larger value of  $R_1$  to the nearest hundredth of an ohm.