PreCalculus Summer Assignment

The following videos are available for you to review the skills you will need to have a successful Pre Calculus experience. Once you have reviewed a skill, try the practice problems provided.

Factoring
- Factoring with leading coefficient of 1
- Factoring by grouping (leading coefficient not 1)
- Factoring Difference of Two Squares
- Strategy for Factoring Quadratics (Part I)
- Strategy for Factoring Quadratics (Part II)
- Factoring the Sum or Difference of Two Cubes

Examples: Factor each of the following completely.
1. $x^2 + 8x + 15$
2. $x^2 - 3x - 18$
3. $2x^2 + 4x - 48$
4. $16x^2 - 25$
5. $x^4 - 13x^2 + 36$
6. $x^3 - 8$
7. $x^3 + 2x^2 - 9x - 18$
8. $8x^3 + 64$
9. $3x^2 - 11x - 20$

Working with Functions
- Evaluating
- Piecewise

Examples: Evaluate the function at the specified value of the independent variable and simplify.
1) $q(x) = \frac{1}{x^2 - 9}$
   a) $q(0) = \quad$ b) $q(3) = \quad$ c) $q(y + 3) =$

2) $f(x) = \begin{cases} 
   x^2 + 2, & x \leq 1 \\
   2x^2 + 2, & x > 1 
\end{cases}$
   a) $f(-2) = \quad$ b) $f(1) = \quad$ c) $f(2) = $
Solving Systems of Equations

- Three Methods for Solving Systems of Equations

Examples: Try these practice problems on Khan Academy:

Click Here for Substitution Practice

Click Here for Elimination Practice

Writing Equations of Lines

- Using the Slope-Intercept Formula

Examples: Please write the slope-intercept form of the equation of the line through the given point with the given slope.

1) Through (1,-5), slope = 0
2) Through (-5,-4), slope = \( \frac{5}{7} \)

Examples: Please write the slope-intercept form of the equation of the line through the given points.

3) Through (-2,1) and (2,0)
4) Through (-5,3) and (-2,-1)

- Using the Point-Slope Formula

Examples:

5) Please write the equation of the line that passes through (1,5) with a slope of -2. Leave your answer in point-slope form.
6) Please write the equation of the line that passes through (1,4) and (6,19). Leave your answer in point-slope form.

- Finding equations of Parallel or Perpendicular lines

Examples:

7) Please write the equation of the line parallel to \( y = 5x + 1 \) that passes through (3, 8).

8) Please write the equation of the line that passes through (-1, 0) and is parallel to the line that passes through (0, 1) and (2, -3).

9) Please write the equation of the line parallel to \( x - 3y = -12 \) and passes through (-3, 4).

10) Please write the equation of the line perpendicular to \( y = \frac{1}{2}x + 1 \) that passes through (1,4).

11) Please write the equation of the line that passes through (1, 2) and is perpendicular to the line through (3, -2) and (-3, 0).

12) Please write the equation of the line perpendicular to \( 2y = x + 5 \) that passes through (2, 1).
Adding and Subtracting Rational Expressions
• Adding and Subtracting Rational Expressions

Examples: Simplify each rational expression.

1. \[ \frac{5x}{x+8} + \frac{4x-9}{x^2+5x-24} \]
2. \[ \frac{x^2-5}{x^2+5x-14} - \frac{x+3}{x+7} \]

Describing Transformations
• Transformations of Functions
• Description of All Transformations on Functions

Examples: Please complete odd problems #23 - 45 below.
Rigid and Nonrigid Transformations In Exercises 35–46, compare the graph of the function with the graph of its parent function. 35–46. See margin.

35. \( y = -x \) 
36. \( y = \lvert -x \rvert \) 
37. \( y = (-x)^2 \) 
38. \( y = -x^3 \) 
39. \( y = \frac{1}{-x} \) 
40. \( y = -\frac{1}{x} \) 
41. \( h(x) = 4|x| \) 
42. \( p(x) = \frac{1}{2}x^2 \) 
43. \( g(x) = \frac{1}{4}x^3 \) 
44. \( y = 2\sqrt{x} \) 
45. \( f(x) = \sqrt{4x} \) 
46. \( y = \lvert \frac{1}{2}x \rvert \)
Answer Key to Example Problems:

Factoring
1) \((x+3)(x+5)\)  
2) \((x-6)(x+3)\)  
3) \(2(x+6)(x-4)\)  
4) \((4x+5)(4x-5)\)  
5) \((x+3)(x-3)(x+2)(x-2)\)  
6) \((x-2)(x^2 + 2x + 4)\)  
7) \((x+3)(x-3)(x+2)\)  
8) \(8(x+2)(x^2 - 2x + 4)\)  
9) \((3x+4)(x-5)\)

Working with Functions
1 a) -1/9  b) undefined  c) \(\frac{1}{y^2+6y}\)

Solving Systems
Answers provided through Khan Academy.

Writing Equations of Lines
1) \(y = -5\)  
2) \(y = \frac{7}{3}x + 3\)  
3) \(y = -\frac{1}{4}x + \frac{1}{2}\)  
4) \(y = -\frac{4}{3}x - \frac{11}{3}\)

Adding/Subtracting Rational Functions
1) \(\frac{5x^2-11x-9}{(x+8)(x-3)}\)  
2) \(\frac{-x+1}{(x+7)(x-2)}\)

Describing Transformations
23. Vertical shift upward 2 units
25. Horizontal shift four units to the right
27. Vertical shift downward 2 units
29. Vertical shift of \(y = x\); \(y = x + 3\)
31. Vertical shift of \(y = x^2\); \(y = x^2 - 3\)
33. Reflection in the x-axis and a vertical shift one unit upward of \(y = \sqrt{x}\); \(y = 1 - \sqrt{x}\)
35. Reflection in the x-axis
37. Reflection in the y-axis (identical)
39. Reflection in the x-axis
41. Vertical stretch
43. Vertical shrink
45. Horizontal shrink