2nd Semester Final Review
Advanced Algebra

Name: _____
Date: _____ Period: _____

Target 6.A. Simplify expressions using properties of exponents.

Simplify the expressions.

1. $\left(\frac{y^5}{x^3}\right)^8$
2. $w^3w^7x^4x^{-5}$
3. $\left(\frac{y^9}{x^2}\right)^7$
4. $w^5w^{11}x^6x^{-7}$

Target 6.B. Perform operations on polynomial functions.

Simplify the expression.

5. $(x+2)(x^2-x+3)$
6. $(x+3)(x^2-2x+7)$

7. Use the functions $f(x)=7x-18$ and $g(x)=4x-6$ to find $f(x)-g(x)$.

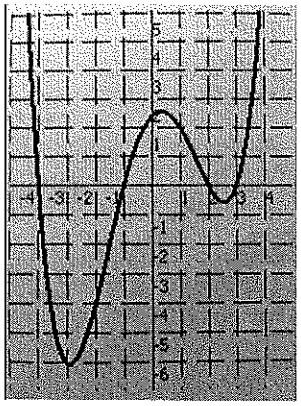
8. Use the functions $f(x)=x^3-4x-6$ and $g(x)=x-2$ to find $\frac{f(x)}{g(x)}$. Use synthetic division.

Target 6.C. Create compositions of polynomial functions.

9. Use the functions $f(x)=7x-18$ and $g(x)=4x-6$ to find $f\big(g(x)\big)$.

Target 7.A. Analyze the graph of a polynomial function by: identify its degree, number and location of its real zeros, determine its end behavior, and determining the maxima and minima.

Use the graph to the right for #10-13.



10. Determine whether the degree of the function is odd or even.

11. State the number of real zeros.

12. Determine the real zeros of the polynomial function.

13. Determine the ordered pair(s) of the local maximum.

Target 7.B. Write a polynomial function, in standard form, given its roots.

14. Write a polynomial function with the roots $x = -4, x = 5$, and $x = 7$.

Target 7.C. Apply the Remainder Theorem and the Factor Theorem to determine the factors and roots of a polynomial.

15. Given $f(x) = 6x^3 - 5x^2 + 7x + 3$, find $f(2)$.

16. Given the polynomial and one of its factors, find the remaining factors: $4x^3 - 4x^2 - 9x + 9;\ (x - 1)$

Target 8.A. Classify an equation as direct, inverse, or joint variation.

17. Determine which of the following equations represents an inverse variation equation.

a. $y = 5x$ b. $y = \sqrt{7x}$ c. $y = \frac{11}{x}$ d. $y = -9xz$ e. $y = |-10x|$

Target 8.B. Create equations to solve direct, inverse, or joint variation problems.

18. Suppose y varies jointly with x and z. If $y = 2$ when $x = 5$ and $z = 4$, find the value of y when $x = -5$ and $z = 12$.

Target 8.C. Perform operations and simplify rational expressions.
Simplify the expression for problems #19-20.

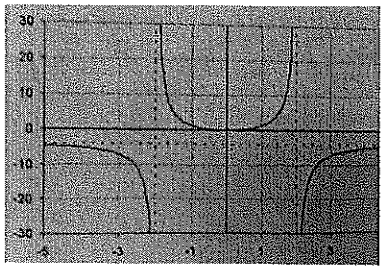
19. $\frac{25(x+3)}{x^2} \cdot \frac{x}{5(x+3)}$

20. $\frac{7}{6x} + \frac{x}{6x(x-5)}$

Target 8.D. Understand the relationship between a rational function and its graph.

21. Write the equation of the vertical asymptote of the graph of $y = \frac{x^2+3x-4}{x-5}$.

22. Determine the equation(s) of the vertical asymptote(s) from the graph to the right.



Target 8.E. Solve rational equations.

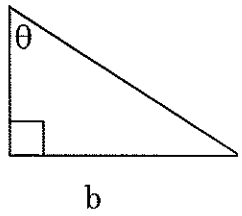
Solve each equation for problems #23-24.

23. $\frac{-8}{x+5} = \frac{4}{3}$

24. $\frac{6}{x+4} = 2 - \frac{12}{x+4}$

Target 9.A. Solve right triangles and extend knowledge of sine, cosine and tangent ratios to their respective reciprocals.

25. The measure of $\theta = 74°$, find the value of b. Round your answer to the nearest tenth.



26. A 20 m long ladder rests against a wall at an angle of 60° with the ground. How far is the foot of the ladder from the bottom of the wall?

27. A kite is flying over the football field at a height of 1600 ft with an angle of elevation of 35°. Calculate the length of string that is used to fly the kite. Round your answer to the nearest foot.

Target 9.B. Draw an angle of rotation, find its coterminal angles and determine the quadrant in which it lands.

28. Find two angles that are coterminal with a 125° angle.

29. Sketch the graph of an angle measuring $-65°$.

Target 9.C. Understand how to move between radian measure and degree measure.

30. Convert $\frac{3\pi}{4}$ *radians* to degrees.

31. Convert 180° to radians.

Target 9.D. Determine the exact values of the six trigonometric functions given the terminal side of θ passing through a given point P(x,y) or using reference triangles.

32. Given the point $(-4,-3)$ on the terminal side of an angle θ, evaluate tan θ.

Target 10.A. Simplify radical expressions with various indices.

Simplify the expression; assume all variables are positive for problems #33-36.

33. $\sqrt[4]{81x^8}$ 34. $\sqrt{75x^6y^{13}}$ 35. $\sqrt[4]{256x^4}$ 36. $\sqrt{72x^{12}y^7}$

Target 10.B. Perform operations on radical expressions with various indices.

Simplify the expression for problems #37-40.

37. $x\sqrt[4]{x} + 3x\sqrt[4]{x}$ 38. $\sqrt[5]{2} \cdot \sqrt[5]{16}$ 39. $x\sqrt[3]{2x} + 5x\sqrt[3]{2x}$ 40. $\sqrt[4]{3} \cdot \sqrt[4]{27}$

Target 10.C. Solve equations containing radicals.

Solve the equation for problems #41-44.

41. $5 \cdot \sqrt[3]{x+7} = 15$ 42. $\sqrt{5x} + 23 = 18$ 43. $8 \cdot \sqrt[3]{x+9} = 32$ 44. $\sqrt{7x} + 31 = 22$

Target 10.D. Graph and state the domain and range of radical functions in $f(x) = a\sqrt{x-h} + k$ form.

45. State the domain of $y = \sqrt{x+11}$.

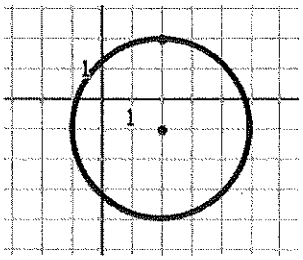
Target 11.A. Write an equation in vertex form for a parabola and in standard form for a circle by completing the square.

46. Write the equation of the circle in standard form: $x^2 + 6x + y^2 - 12y + 17 = 0$

47. Write the equation of the parabola in vertex form: $x = y^2 - 8y + 5$

Target 11.B. Write an equation in vertex form for a parabola and in standard form for a circle given its graph.

48. Write the equation for the circle graphed to the right.



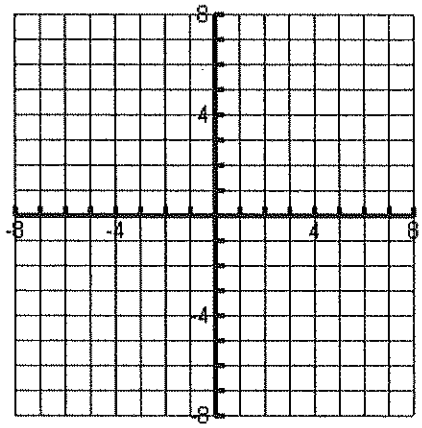
Target 11.D. Identify a conic section and its characteristics given its equation

49. Identify this equation (circle, parabola, straight line): $6x^2 + 6y^2 + 8x - 12y - 34 = 0$

50. Determine which direction the parabola opens given its equation: $x = 5(y-4)^2 + 7$

Target 11.E. Solve a system involving a quadratic equation with a linear equation graphically and algebraically.

51. Solve the system of equations (find all points of intersection): $\begin{matrix} y=x+1 \\ y=x^2 \end{matrix}$



Target 11.C. Graph parabolas and circles and label their parts.

52. Find the center & radius of a circle, then graph the circle: $(x-2)^2 + (y+1)^2 = 9$