PARK RIDGE HIGH SCHOOL

PreCalculus Honors

Summer Pre-View Packet

The problems in this packet are designed to help you review topics from previous mathematics courses that are important to your success in *PreCalculus Honors*

Show all work that leads you to each solution on separate sheets of paper. You may use your notes from previous mathematics courses to help you. You may use a calculator for all problems, unless otherwise indicated.

ENJOY YOUR SUMMER!

Reference Information

Quadratic Formula: Given $ax^2+bx+c=0$, then $x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$.

Factoring: $a^3+b^3=(a+b)(a^2-ab+b^2)$ $\qquad$ $a^3-b^3=(a-b)(a^2+ab+b^2)$

Laws of Exponents: $(a^m)^n=a^{mn}$ $\qquad$ $\dfrac{a^m}{a^n}=a^{m-n}$ $\qquad$ $(ab)^n=a^nb^n$

$\left(\dfrac{a}{b}\right)^n=\dfrac{a^n}{b^n}$ $\qquad$ $a^{-n}=\dfrac{1}{a^n}$ $\qquad$ $a^{\frac{m}{n}}=\sqrt[n]{a^m}$ *or* $\left(\sqrt[n]{a}\right)^m$

Forms of Equations of Lines:

General (Standard) Form: $Ax+By=C$ $\qquad$ Slope-Intercept Form: $y=mx+b$

Point – Slope Form: $y-y_1=m(x-x_1)$

Vertical Line: $x=a$ $\qquad$ Horizontal Line: $y=b$

Distance Formula (given points (x_1, y_1) and (x_2, y_2)): $d=\sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$

Midpoint Formula (given points (a, b) and (c, d)): $M\left(\dfrac{a+c}{2}, \dfrac{b+d}{2}\right)$

Changing between Logarithmic and Exponential Form: $y=\log_b(x)$ *iff* $b^y=x$

Basic Properties of Logarithms: $\log_b 1=0$ $\qquad$ $\log_b b=1$ $\qquad$ $\log_b b^y=y$ $\qquad$ $b^{\log_b x}=x$

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Properties of Logarithms: Product Rule: $\log_b (RS) = \log_b R + \log_b S$

Quotient Rule: $\log_b \frac{R}{S} = \log_b R - \log_b S$

Power Rule: $\log_b R^c = c \log_b R$

Imaginary Numbers: $i = \sqrt{-1}$ $i^2 = -1$

Complex Number written in Standard Form: a + bi

Properties of Absolute Value: $|a| \geq 0$ $|-a| = |a|$ $|ab| = |a||b|$ $\left|\frac{a}{b}\right| = \frac{|a|}{|b|}$

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SHOW ALL WORK ON A SEPARATE SHEET OF PAPER.
Unless otherwise specified, if a decimal approximation is used, it must be accurate to three places after the decimal point.

Simplify each expression.

1. $\sqrt{-100}$
2. $\sqrt{-4}\cdot\sqrt{-9}$
3. $(i\sqrt{7})^2$
4. $\sqrt[3]{2x}\cdot\sqrt[3]{4x^2y^2}\cdot\sqrt[3]{2y^4}$
5. $(3+2i)+(5+7i)$
6. $2i(3-i)$
7. $(3+2i)(3-2i)$
8. $(3+i\sqrt{5})^2$
9. $\dfrac{8}{-2i}$
10. $-\sqrt{-9}$
11. $(-2+\sqrt{-9})(6+\sqrt{-25})$

Factor each polynomial completely.

12. $t^2-4t-21$
13. $8x^3-1$
14. $6x^2-7x-3$
15. x^3-2x^2-4x+8

Simplify each expression.

16. $(5x^2)(2x^5)$
17. $(-2e^3)^2$
18. $(t^3)(t^{n-3})$
19. $\dfrac{10\cdot 2^6}{8\cdot 2^{-2}}$

Solve each quadratic equation.

20. $(x-1)(x+3)=0$
21. $x(x-4)=2(4-x)$
22. $x^2+4x=-3$
23. $2x^2-32x=0$

Graph the functions using a table of values, symmetry, rational zero theorem, or other properties of polynomials to plot points. Verify the graph with the calculator. Describe the following characteristics for each function:

a. domain and range b. zeros c. y-intercept d. end behavior
e. intervals where the function is increasing and/or decreasing

24. $f(x)=x^3-3x^2+x+1$
25. $g(x)=x^2+2x+1$
26. $f(x)=|x+3|-4$

Given $f(x) = x^2 - 4$ and $g(x) = \sqrt{2x+4}$, determine each of the following.

27. $f(3)$

28. $f(x) = 0$, when $x =$?

29. $f(g(4))$

30. $f(g(x))$

31. Domain of $f(g(x))$

32. $f^{-1}(x)$

33. Is the inverse of $f(x)$ a function? If not, how could the domain of $f(x)$ be restricted to make its inverse a function?

Simplify each and write your answer as a single fraction. State any restrictions on the variable.

34. $\dfrac{x^2-25}{x^2+7x+10}$

35. $\dfrac{x^2-5x+6}{x^2-4} \bullet \dfrac{x^2+3x+2}{x^2-2x-3}$

36. $\dfrac{2x}{x+5} \div \dfrac{6x^2}{2x+10}$

37. $\dfrac{2x}{x-3} - \dfrac{x}{x+3}$

Solve each equation for y.

38. $7y+6x=10$

39. $\dfrac{1}{4}y - 7x = \dfrac{15}{2}$

Find the solution(s) of the given systems of equations. Write answers in the form (x, y).

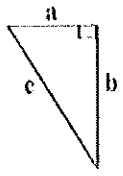
40. $\begin{cases} -2x-5y=7 \\ 7x+y=-8 \end{cases}$

41. $\begin{cases} 4x+9y=2 \\ 2x+6y=1 \end{cases}$

Solve for the missing side of the triangle using the Pythagorean Theorem, $a^2 + b^2 = c^2$.

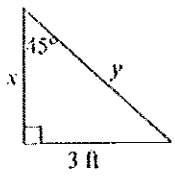
42. a = 6 ft., b = 8 ft.

43. b = 17 ft., c = 19 ft.



Solve for x and y using a 45-45-90 (ratio of sides $1:1:\sqrt{2}$) or a 30-60-90 triangle (ratio of sides $1:\sqrt{3}:2$).

44.



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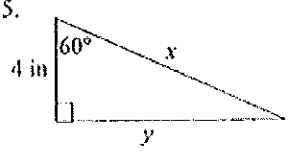

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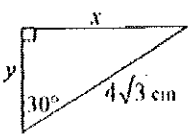
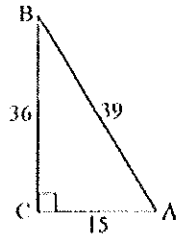


Given the right triangle, determine the trigonometric ratios.



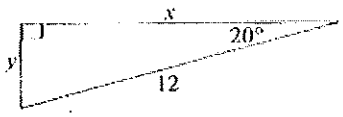
47. $\sin A$ 48. $\cos A$

49. $\tan A$ 50. $\sin B$

51. $\cos B$ 52. $\tan B$

Use trig ratios to solve for x and y (to the nearest thousandth) in each right triangle.

53.



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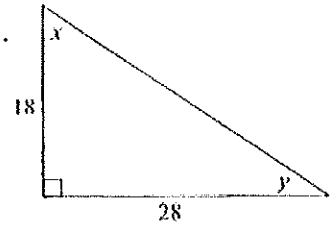

Evaluate each logarithmic expression without a calculator.

55. $\ln\frac{1}{e}$ 56. $\log.01$ 57. $\log_3\frac{1}{9}$ 58. $\log_5 25$

Solve each equation or inequality.

59. $|2x-1|+3=6$ 60. $|x+4|>6$ 61. $2|4-3x|-2<10$

Find an equation in slope intercept form for the line described.

62. The line through (3, -2) with slope m = 4/5

63. The line through the points (-1, -4) and (3, 2)

64. The line through (-2, 4) with a slope m = 0

65. The line through (2, -3) and parallel to the line 2x + 5y = 3

66. The line through (2, -3) and perpendicular to the line 2x + 5y = 3

Find the distance between the two points. Then find the midpoint of the segment joining the two points.

67. (-4, -3), (1, 1)

COMPLETE THE TABLE!

θ	θ	$\sin\theta$	$\cos\theta$	$\tan\theta$	$\sec\theta$	$\csc\theta$	$\cot\theta$
0	0°						
$\frac{\pi}{6}$	30°						
$\frac{\pi}{4}$	45°						
$\frac{\pi}{3}$	60°						
$\frac{\pi}{2}$	90°						
$\frac{2\pi}{3}$	120°						
$\frac{3\pi}{4}$	135°						
$\frac{5\pi}{6}$	150°						
π	180°						
$\frac{7\pi}{6}$	210°						
$\frac{5\pi}{4}$	225°						
$\frac{4\pi}{3}$	240°						
$\frac{3\pi}{2}$	270°						
$\frac{5\pi}{3}$	300°						
$\frac{7\pi}{4}$	315°						
$\frac{11\pi}{6}$	330°						
2π	360°						