

Honors Algebra 2
Semester 2 Exam Review

Name KEY
Date _____ Per _____

Chapter 7

Convert the following from radians to degrees.

$\frac{3\pi}{5} = 108^\circ$	$\frac{5\pi}{4} = 225^\circ$	$\frac{12\pi}{3} = 720^\circ$	$\frac{\pi}{6} = 30^\circ$
$\frac{16\pi}{9} = 320^\circ$	$\frac{23\pi}{12} = 345^\circ$	$\frac{6\pi}{4} = 270^\circ$	$\frac{9\pi}{2} = 810^\circ$

Convert the following from degrees to radians.

$30^\circ = \frac{\pi}{6}$	$100^\circ = \frac{5\pi}{9}$	$120^\circ = \frac{2\pi}{3}$	$150^\circ = \frac{5\pi}{6}$
$210^\circ = \frac{7\pi}{6}$	$265^\circ = \frac{53\pi}{36}$	$315^\circ = \frac{7\pi}{4}$	$325^\circ = \frac{65\pi}{36}$

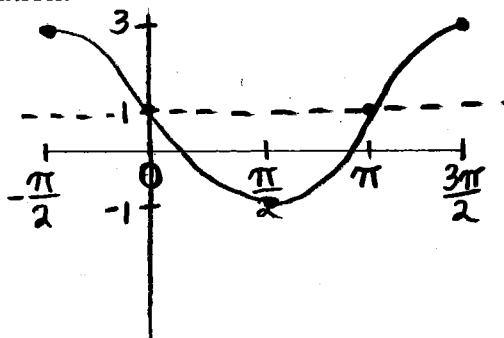
Find the exact value of each of the following.

$\cos \frac{\pi}{2} = 0$	$\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$	$\cos \frac{4\pi}{3} = -\frac{1}{2}$	$\sin \frac{11\pi}{6} = -\frac{1}{2}$
$\tan \frac{3\pi}{4} = -1$	$\cos \frac{5\pi}{6} = -\frac{\sqrt{3}}{2}$	$\tan \frac{4\pi}{3} = \sqrt{3}$	$\sin \frac{2\pi}{4} = 1$

Graph the following equation:

$$y = 2\cos(\theta + \frac{\pi}{2}) + 1$$

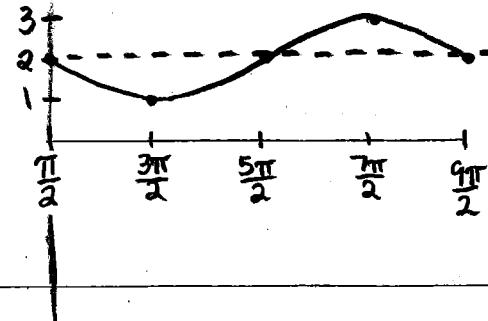
AMP- 2
PER- 2π
PS- $-\frac{\pi}{2}$
VS- $1, \frac{1}{2}$



Graph the following equation:

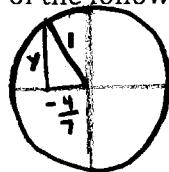
$$y = -\sin(\frac{1}{2}\theta - \frac{\pi}{4}) + 2$$

AMP- 1
PER- 4π
PS- $\frac{\pi}{2}$
VS- 2



Given that the $\cos \alpha = -\frac{4}{7}$ and $\sin \alpha > 0$, find the exact values of the following trigonometric functions.

$$\sin \alpha = \frac{\sqrt{33}}{7} \quad \tan \alpha = -\frac{\sqrt{33}}{4}$$



$$(-\frac{4}{7})^2 + y^2 = 1$$

$$\frac{16}{49} + y^2 = \frac{49}{49}$$

$$y^2 = \frac{33}{49} = \frac{33}{7}$$

$$y = \pm \frac{\sqrt{33}}{7}$$

$$-\frac{16}{49}$$

What is the exact coordinate of the point where the terminal side of the angle is located on the circle? $(-\frac{4}{7}, \frac{\sqrt{33}}{7})$

$$(\cos \alpha, \sin \alpha)$$

$$\tan \alpha = \frac{\sin \alpha}{\cos \alpha}$$

$$\frac{\frac{\sqrt{33}}{7}}{-\frac{4}{7}} = \frac{\sqrt{33}}{7} \cdot \frac{7}{-4} = \frac{\sqrt{33}}{-4}$$

POSITIVE B/C
IN QUADRANT II

Write an equation of a periodic function based on its description.

a) The graph of $y = \cos x$ has been vertically shifted up 4 units.

$$y = \cos(x) + 4$$

$$y = \cos(x) + k$$

b) The graph of $y = \cos x$ has been compressed so that it has a period of $\frac{\pi}{3}$.

$$y = \cos(6x)$$

$$y = \cos(bx) \quad \frac{2\pi}{b} = \frac{\pi}{3} \quad \frac{b \cdot \pi}{\pi} = \frac{6\pi}{\pi} \quad b = 6$$

c) The graph of $y = \cos x$ has an amplitude of 4 and is reflected across the x-axis.

$$y = -4\cos(x)$$

$$y = a \cdot \cos(x)$$

d) The graph of $y = \cos x$ has been shifted to the right $\frac{\pi}{4}$ units.

$$y = \cos(x - \frac{\pi}{4})$$

$$y = \cos(x - h)$$

Given the equation: $y = 2x^2 - 12x + 10$

Complete the square to find its graphing form:

$$y = 2x^2 - 12x + 10$$

$$-10$$

$$y - 10 = 2x^2 - 12x$$

$$18 + y - 10 = 2(x^2 - 6x + 9)$$

$$y + 8 = 2(x - 3)^2$$

$$y = 2(x - 3)^2 - 8$$

$$0 = 2(x-3)^2 - 8$$

$$\frac{8}{2} = \frac{2(x-3)^2}{2}$$

$$\sqrt{4} = \sqrt{(x-3)^2}$$

$$2 = |x-3|$$

$$\pm 2 = x-3$$

$$3 \pm 2 = x$$

$$3+2 = 5 = x$$

$$3-2 = 1 = x$$

What are the roots?	What is the y-int?	Equation for Line of Symmetry?	What is the vertex?
$(5, 0) (1, 0)$	$(0, 10)$	$x = 3$	$(3, -8)$

What is the domain?	What is the range?
$-\infty < x < \infty$ $(-\infty, \infty)$ All Real #'s	$y \geq -8$ $[-8, \infty)$

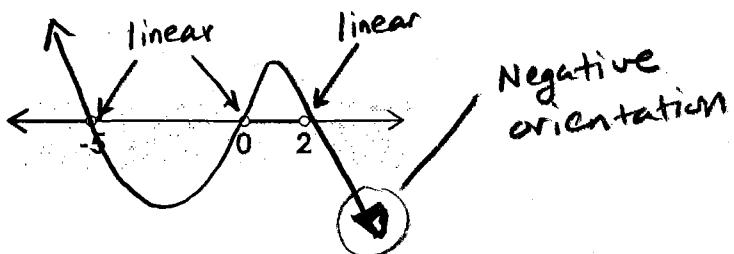
Chapter 8

Simplify the following expressions.

i^{27} $(i^4)^6 \cdot i^3$ $(1)^6 \cdot (-i) = -i$	i^{60} $(i^4)^{15}$ $(1)^{15} = 1$	$\sqrt{-3} \cdot \sqrt{-27}$ $i\sqrt{3} \cdot 3i\sqrt{3}$ $3i^2\sqrt{9} = -3 \cdot 3$ $= -9$	$5i \cdot 3i$ $15i^2$ -15
$(8i)^2$ $64i^2$ -64	$(3i\sqrt{5})^2$ $9i^2(\sqrt{5})^2$ -45	$(7-2i)(7+2i)$ $49 + 14i - 14i - 4i^2$ 53	$(3+4i)^2$ $9 + 12i + 12i + 16i^2$ $-7 + 24i$

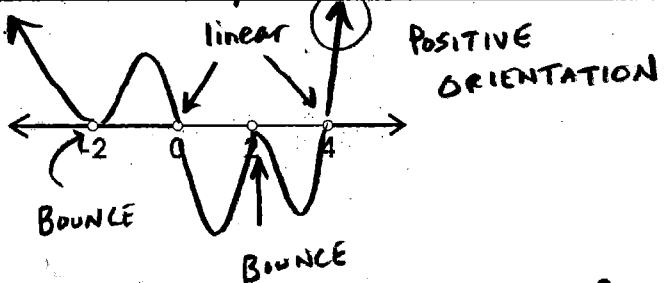
Sketch the graph to fit each number line, and then write a possible equation.

ODD
(3rd)



Possible Equation: $y = -x(x+5)(x-2)$

EVEN
(6th)



Possible Equation: $y = x(x+2)^2(x-2)^2(x-4)$

Decide if each of the following equations is a polynomial. If it is, state the degree. If it is not, explain how you know.

$P(x) = 3x(x-2)^2(x+5)$
P(x) IS A POLYNOMIAL.
4th degree

$Q(x) = x^3 - 3x^2 + \frac{2}{x} - 5$
Q(x) is not a polynomial b/c
 $\frac{2}{x}$ is $2x^{-1}$ and polynomial do not

contain negative exponents.

Write a polynomial equation for a graph that passes through the point (2, 9) and has single roots where $x = -4$ & -1 , and a double root where $x = 3$.

$$y = a(x+4)(x+1)(x-3)^2$$

$$9 = a(2+4)(2+1)(2-3)$$

$$9 = a(6)(3)(1)$$

$$\underline{9} = \underline{18a} \quad a = \frac{1}{2}$$

$$y = \frac{1}{2}(x+4)(x+1)(x-3)^2$$

Use Polynomial division to divide:

$$\frac{2x^3 + 5x^2 - 4x - 12}{2x - 3} = \boxed{x^2 + 4x + 4}$$

	x^2	$4x$	4
$2x$	$2x^3$	$8x^2$	$8x$
-3	$-3x^2$	$-12x$	-12
$2x^3 + 5x^2 - 4x - 12$			

$$\begin{array}{r} x^2 + 4x + 4 \\ 2x - 3) 2x^3 + 5x^2 - 4x - 12 \\ - (2x^3 - 3x^2) \\ \hline 8x^2 - 4x \\ - (8x^2 - 12x) \\ \hline 8x - 12 \\ - (8x - 12) \\ \hline 0 \end{array}$$

Find the cubic equation in standard form with integral coefficients that has -6 and $2+i$ as roots.

ROOTS: $-6, 2+i, 2-i$ ← MUST ALSO BE A ROOT
FACTORS: $(x+6)(x-2-i)(x-2+i)$ ← B/C COMPLEX ROOTS COME IN PAIRS!

$$y = (x+6)(x-2-i)(x-2+i)$$

$$y = (x+6)(x^2 - 4x + 5) \quad \leftarrow$$

$$y = x^3 + 2x^2 - 19x + 30$$

$$\text{SUM OF } 2+i, 2-i = 4$$

$$\text{PRODUCT OF } 2+i, 2-i = 5$$

Determine the nature of the roots (real or complex) of the following equations.

DISCRIMINANT
 $b^2 - 4ac$

$$3a^2 - 10a + 11 = 0$$

$$(-10)^2 - 4(3)(11) = -32$$

$$100 - 132 = -32$$

2 complex roots
NO x-int.

$$x^2 + 8x + 16 = 0$$

$$(8)^2 - 4(1)(16) = 0$$

$$64 - 64 = 0$$

1 REAL DOUBLE ROOT
* VERTEX

$$3x^2 - 6x + 2 = 0$$

$$(-6)^2 - 4(3)(2) = 12$$

$$36 - 24 = 12$$

2 Real Roots
2 x-int.

$$5a^2 + 2\sqrt{10}a + 2 = 0$$

$$(2\sqrt{10})^2 - 4(5)(2) = 40 - 40 = 0$$

1 REAL DOUBLE ROOT
* VERTEX

Chapter 7 & 8 Checkpoints:

Chapter 7 - Checkpoint 7A

Finding the x- and y- Intercepts of a Quadratic Function (p811)

Chapter 7 - Checkpoint 7B

Completing the Square to Find the Vertex of a Parabola (p813)

Chapter 8 - Checkpoint 8A

Solving and Graphing Inequalities (p816)

Chapter 8 - Checkpoint 8B

Solving Complicated Equations (p819)