H Intro to Calculus:
Chapter 6 Review Guide **ANSWERS**

Name: _____

Date: _____ Period: _____

6.1 The Law of Sines

- Using the Law of Sines to solve oblique triangles
- Finding two triangles with the Law of Sines
- Finding the area of a SAS triangle

Examples:

1. Solve the triangle with a = 18.7, c = 16.1, and C = 35°.

   $A_1 = 42°$, $B_1 = 103°$, $b_1 = 27.4$

   $A_2 = 138°$, $B_2 = 7°$, $b_2 = 3.4$

2. Find the area of the triangle with C = 115°, a = 4, and b = 5 yards.

   $A = 9\ yd^2$

6.2 The Law of Cosines

- Using the Law of Cosines to solve oblique triangles
- Solving applied problems using the Law of Cosines
- Finding the area of a triangle (Heron's Formula)

Examples:

3. Solve the triangle with a = 8, b = 6, and c = 4.

   A = 104°, B = 47°, C = 29°

4. Two points A and B are on opposite sides of a building. A surveyor selects a third point C to place a transit. Point C is 52 feet from point A and 74 feet from point B. The angle ACB is 51°. How far apart are points A and B?

   57.8 ft.

5. Find the area of the triangle with a = 8, b = 13, and c = 12 meters.

   $A = 47\ m^2$

6.3 Polar Coordinates

- Plotting points in the polar coordinate system
- Finding multiple representations for polar coordinates
- Converting between polar and rectangular coordinates
- Converting between polar and rectangular equations

Examples:

6. Plot the point $\left(4, \frac{\pi}{3}\right)$ in the polar coordinate system. Then find another representation for the point where r < 0 and $2\pi < \theta < 4\pi$.

   $(-4, \frac{10\pi}{3})$

7. Find the rectangular coordinates of the polar point $\left(9, \frac{3\pi}{4}\right)$.

   $\left(-\frac{9\sqrt{2}}{2}, \frac{9\sqrt{2}}{2}\right)$

8. Find the polar coordinates of the point $(-2\sqrt{2}, -2\sqrt{2})$.

   $(4, 225°)$

9. Convert the rectangular equation to a polar equation that expresses r in terms of θ.

   $4x + 3y - 6 = 0$

   $r = \frac{6}{4\cos\theta + 3\sin\theta}$

6.4 Graphs of Polar Equations

- Matching graphs of various polar equations, including circles, rose curves, lemniscates, and limaçons, to their equations.

Examples:

10. Sketch the graph of $r = 3\sin(7\theta)$.

    *The graph is a rose curve with 7 petals. Set calculator to POL/RADIAN mode.

6.5 Complex Numbers in Polar Form

- Writing complex numbers in polar form
- Converting complex numbers from polar to rectangular form
- Finding products and quotients of complex numbers in polar form
- Finding powers and roots of complex numbers in polar form

Examples:

11. Write the complex number 2 – 2i in polar form. Express the argument in radians.

$2\sqrt{2}\left(\cos\frac{7\pi}{4}+i\sin\frac{7\pi}{4}\right)$

12. Write the complex number -5($\cos\frac{2\pi}{3}+i\sin\frac{2\pi}{3}$) in rectangular form.

$\frac{5}{2}+\frac{-5\sqrt{3}}{2}i$

13. Find a) the product and b) the quotient of the complex numbers. Leave the answer in polar form.

$z_1=\sqrt{3}\left(\cos\frac{7\pi}{4}+i\sin\frac{7\pi}{4}\right)$

$z_2=\sqrt{6}\left(\cos\frac{9\pi}{4}+i\sin\frac{9\pi}{4}\right)$

a) $z_1z_2=3\sqrt{2}(\cos 4\pi+i\sin 4\pi)$ b) $\frac{z_1}{z_2}=\frac{\sqrt{2}}{2}\left(\cos\frac{3\pi}{2}+i\sin\frac{3\pi}{2}\right)$

14. Use DeMoivre's Theorem to find the indicated power of the complex number. Write the answer in rectangular form.

$\left[2\sqrt{2}\left(\cos\frac{7\pi}{4}+i\sin\frac{7\pi}{4}\right)\right]^5$

–128 + 128i

15. Find the complex cube roots of 216(cos 321° + *i* sin 321°) in polar form.

6(cos107° + *i* sin107°), 6(cos227° + *i* sin227°), 6(cos347° + *i* sin347°)

6.6 Vectors

- Find the magnitude of a vector
- Perform operations with vectors
- Write a vector in terms of i and j
- Find unit vectors
- Write a vector in terms of magnitude and direction

Examples:

16. Let **v** be the vector from in initial point $P_1(6, 4)$ to terminal point $P_2(-5, -4)$. Write **v** in terms of **i** and **j**.

    $\mathbf{v} = -11\mathbf{i} - 8\mathbf{j}$

17. Find $\|\mathbf{u} + \mathbf{v}\|$ if $\mathbf{u} = -7\mathbf{i} + j$ and $\mathbf{v} = 8\mathbf{i} + \mathbf{j}$.

    $\sqrt{5}$

18. Write a vector in terms of **i** and **j** with magnitude $\|\mathbf{v}\| = 6$ and $\theta = 240°$.

    $\mathbf{v} = -3\mathbf{i} - 3\sqrt{3}\mathbf{j}$

6.7 The Dot Product

- Find the dot product of two vectors
- Find the angle between two vectors
- Determine if two vectors are orthogonal or parallel

Examples:

19. Find $\mathbf{u} \cdot (\mathbf{v} + \mathbf{w})$ if $\mathbf{u} = 6\mathbf{i} + 10\mathbf{j}$, $\mathbf{v} = -2\mathbf{i} - 8\mathbf{j}$, and $\mathbf{w} = -4\mathbf{i} - 2\mathbf{j}$.

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20. Find the angle between the vectors $\mathbf{u} = -\mathbf{i} + 4\mathbf{j}$, $\mathbf{v} = 2\mathbf{i} - 5\mathbf{j}$.

    172.2°