Rotations and Trigonometry Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Period\_\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_

Think back to our first unit and write a 2 X 3 matrix to represent ∆ABC if A = (1, 1), B = (1, 3) and

C = (4, 3). Describe the transformation on the triangle if this matrix is multiplied by each of the following transformational matrices.

A)  B)  C)  D) 



Now, consider the point (4, 3). Sketch it to the right.

Write (4, 3) in terms of its distance from the origin

and its standard position angle.

Now rotate (4, 3) counterclockwise through some angle

Θ and graph the new point on your graph as well. Label

this new point K.

Consider the coordinates of K. K is the same distance from

the origin as (4, 3). The only thing that has changed is that the angle is larger than is preimage angle. This should help you write its coordinates.

What is the total standard position angle of K?

So what are the coordinates of K in terms of its distance from the origin and its standard position angle?

Use trig identities to expand this and then use what you know to find a formula for rotating (4, 3) through any angle θ.

If (x, y) is any point, write a formula for rotating (x, y) through any point θ.

The matrix basis theorem states that if the image of (1, 0) is (a, b) and the image of (0, 1) is (c, d) when it has been multiplied by a transformation matrix M, then M = . Use this information to write a general rotation matrix.

Use your matrix to rotate  90° and verify that your general rotation matrix is correct. If it isn’t, change it.

Problems: (Rotate all angles CCW unless told otherwise.)

1. Rotate the point (x, y) through a 45° angle.

2. Rotate (3, -3) through a 30° angle.

3. Rotate (4, 3) through a 60° angle clockwise. In what quadrant should the image lie?

4. A) Rotate (4, 8) through a 120° angle.

 B) Rotate the result of part A through a 60° angle.

5. A) Rotate (x, y) through angle A.

 B) Rotate the result of part B through the angle B and make any conclusions you can...

Rotations and Trigonometry Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Period\_\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_

Think back to our first unit and write a 2 X 3 matrix to represent ∆ABC if A = (1, 1), B = (1, 3) and

C = (4, 3). Describe the transformation on the triangle if this matrix is multiplied by each of the following transformational matrices. 

A)  B)  C)  D) 

**Reflect over y axis** **Reflect over y = x** **Rotate 180° Rotate 90°**

**about the origin CW about (0, 0)**



Now, consider the point (4, 3). Sketch it to the right. K

Write (4, 3) in terms of its distance from the origin

and its standard position angle. (4, 3)

 θ

Now rotate (4, 3) counterclockwise through some angle

Θ and graph the new point on your graph as well. Label 36.87°

this new point K.

Consider the coordinates of K. K is the same distance from

the origin as (4, 3). The only thing that has changed is that the angle is larger than is preimage angle. This should help you write its coordinates.

What is the total standard position angle of K? **36.87° + θ**

So what are the coordinates of K in terms of its distance from the origin and its standard position angle? **(5cos(36.87° + θ), 5sin(36.87° + θ))**

Use trig identities to expand this and then use what you know to find a formula for rotating (4, 3) through any angle θ.

**x =** **5cos(36.87° + θ) = 5(cos 36.87°cos θ – sin 36.87°sin θ) =**

 **5cos 36.87°cos θ – 5sin 36.87°sin θ = 4cos θ - 3sin θ**

**y = 5sin(36.87° + θ) = 5sin 36.87°cos θ + cos 36.87°sin θ) =**

 **5sin 36.87°cos θ + 5cos 36.87°sin θ = 3cos θ + 4sin θ**

If (x, y) is any point, write a formula for rotating (x, y) through any point θ.

 **(x, y) ⇒** (**xcos θ - ysin θ, ycos θ + xsin θ)**

The matrix basis theorem states that if the image of (1, 0) is (a, b) and the image of (0, 1) is (c, d) when it has been multiplied by a transformation matrix M, then M = . Use this information to write a general rotation matrix.

Use your matrix to rotate  90° and verify that your general rotation matrix is correct. If it isn’t, change it.

Problems: (Rotate all angles CCW unless told otherwise.)

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4. A) Rotate (4, 8) through a 120° angle.

 B) Rotate the result of part A through a 60° angle.

5. A) Rotate (x, y) through angle A.

 B) Rotate the result of part B through the angle B and make any conclusions you can...