

## ROTATIONAL TRIGONOMETRY – journal questions – MCR

Summarize everything you need to know about these topics. Use examples and concise (not long – but with enough detail) explanations. Include definitions and diagrams if necessary

### 1. New Terminology

PRIMARY and SECONDARY Trig Ratios

a. Copy/Paste the definitions of all 6 ratios (3 of them are new)

$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

sine

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

cosine

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

tangent

$$\csc \theta = \frac{\text{hyp}}{\text{opp}}$$

cosecant

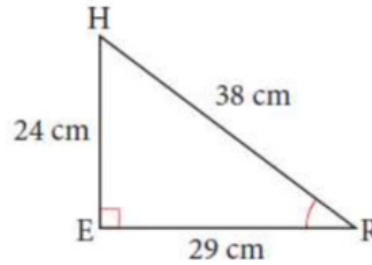
$$\sec \theta = \frac{\text{hyp}}{\text{adj}}$$

secant

$$\cot \theta = \frac{\text{adj}}{\text{opp}}$$

cotangent

b. Find the new ratios from a right triangle for angle R.



Key DEFINITIONS and DIAGRAMS for rotating angles

c. standard position, initial arm, terminal arm (make a note that the rotation arm must always be attached to the origin), labeling of quadrants, coterminal angles, principal angle, reference/related acute angle, positive/negative rotation angles, quadrantal angles

SIGNS of Trig Ratios

d. Talk about either CAST rule or “All Students Take Calculus” (the 2<sup>nd</sup> one is better since it starts in quadrant I not IV)

NEW TRIG DEFINITIONS

e. Do the following in your journal:

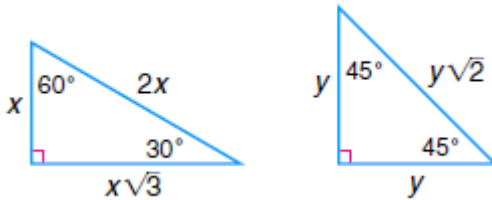
- Draw a circle that takes up half the page, then draw any rotation angle (don't pick quadrant 1)
- Draw a right triangle (make a note that the triangle drawn must always hug the x-axis, never the y-axis)
- Label the point on terminal arm as (x,y) and the triangle sides with x, y, r (make a note that x's will be negative on the left side of origin, y's will be negative below the origin and that radius is never negative)
- State the new definitions for the 6 trig ratios using x,y,r

UNIT CIRCLE

- Scale down the circle to a unit circle. Ie. Draw smaller circle and label radius =1, and draw a smaller triangle, again hugging x-axis. Label the sides of this smaller triangle using the scale down factor, ÷ by r.
- Notice what these sides on the smaller triangle represent (see your definitions with x,y,r above) What are the new coordinates of the point on this unit circle at the terminal arm in terms of trig ratios?

### 2. SPECIAL TRIANGLES

a. Copy these two special triangles



b. Where are the numbers for sides coming from? What's a good way to remember which side is across what angle?

### 3. ROTATIONAL TRIG – Working in DEGREES. Explain all steps.

a. Find output RATIO values given ANGLES:

- VALUES of Trig for SPECIAL TRIANGLE ANGLES  
 $\sec 330^\circ$  and  $\sin(-120^\circ)$  and  $\cot 225^\circ$

- VALUES of Trig for QUADRANTAL ANGLES  
 $\cos 90^\circ$  and  $\csc(-270^\circ)$  and  $\tan 720^\circ$

b. Find input ANGLES given RATIOS:

- If ratios are 0, +1, -1, undefined, find  $\theta_1, \theta_2$  the quadrantal angles  
 $\sec \theta = \text{undefined}$   
 $\sin \theta = -1$   
 $\tan \theta = 0$

- If ratios are made up of numbers like, 1,  $\sqrt{2}$ , 2,  $\sqrt{3}$  find  $\theta_1, \theta_2$  special triangle angles  
 $\cot \theta = -\frac{\sqrt{3}}{3}$   
 $\sin \theta = \frac{1}{2}$   
 $\cos \theta = -\frac{\sqrt{2}}{2}$

- If ratios are not like the ones above, neither special nor quadrantal angles, find  $\theta_1, \theta_2$  using a calculator  
 $\csc \theta = -6.5$   
 $\cos \theta = -\frac{\sqrt{2}}{3}$   
 $\tan \theta = \frac{1}{2}$   
 why are the last two not special?