PreCalculus UNIT 4

TRIG RATIOS (MCR + MHF) – journal questions

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. FIND COORDINATES OF A POINT. Explain your thinking/steps (MCR)
   a. A point (1,0) is rotated 225°, find the new coordinates of the point
   b. A point (1,0) is rotated 300°, find the new coordinates of the point
   c. A point (8,0) is rotated 150°, find the new coordinates of the point

2. GENERAL SOLUTION using sequences. Talk about period for tangent/cotangent versus all other trig ratios. (MCR)
   a. Solve $\tan\theta = -\sqrt{3}$, record all possible solutions in degrees.
   b. Solve $\csc\theta = 2$ record all possible solutions in degrees.

3. RADIAN measure (MHF)
   a. Explain what radians are, make a note that there is no actual unit for radians since it's a ratio of lengths
   b. Show how to convert degrees to radians and vice versa. Record both exact and approximate versions (exact version can't have decimal within a fraction)
      ex. 75°, $\frac{3}{4}\pi$, 2.56
   c. Show how to draw radian angles. Explain and label the related acute angle on your diagram
      ex. $\frac{7\pi}{8}$, $\frac{9}{7}\pi$, 5.2

4. ROTATIONAL TRIG – Working in RADIANS without using a calculator. Explain all steps. (MHF)

Find output RATIO values given angles

a. SPECIAL TRIANGLE ANGLES

$\sec\frac{11\pi}{6}$ and $\sin(-\frac{2\pi}{3})$ and $\cot\frac{5\pi}{4}$

b. QUADRANTAL ANGLES

$\cos\frac{\pi}{2}$ and $\csc(-\frac{3\pi}{2})$ and $\tan 4\pi$

Find input ANGLES given ratios. **Record as sequences in radians**:

c. QUADRANTAL ANGLES

$\sec\theta = undefined$

$\sin\theta = -1$

$\tan\theta = 0$

d. SPECIAL TRIANGLE ANGLES

$\cot\theta = -\frac{\sqrt{3}}{3}$

$\sin\theta = \frac{1}{2}$

$\cos\theta = -\frac{\sqrt{2}}{2}$

e. USING CALCULATOR TYPE

$\csc\theta = -6.5$

$\cos\theta = -\frac{\sqrt{2}}{3}$

$\tan\theta = \frac{1}{2}$

why are the last two not special?

5. IDENTITY PROOFS (MCR)
   a. What is the difference between an identity and equation?
   b. Copy and memorize the following identities. Prove the new ones using elementary definitions.

Reciprocal Id	Quotient Id	Pythagorean Id
$\csc\theta = \frac{1}{\sin\theta}$ $\sec\theta = \frac{1}{\cos\theta}$ $\cot\theta = \frac{1}{\tan\theta}$	$\tan\theta = \frac{\sin\theta}{\cos\theta}$ $\cot\theta = \frac{\cos\theta}{\sin\theta}$	$\sin^2\theta + \cos^2\theta = 1$ $1 + \tan^2\theta = \sec^2\theta$ $1 + \cot^2\theta = \csc^2\theta$

   c. Write down the things you should try when you prove trig identities
   d. Prove and explain all steps
      i. $\frac{\cos\theta}{1+\sin\theta} - \frac{1}{\cos\theta} = -\tan\theta$
      ii. $\frac{\tan\theta - \sin\theta}{\sin^3\theta} = \frac{1}{\cos\theta(1+\cos\theta)}$

6. AMBIGUOUS case - when given no picture and SSA (For other types like SSS, SAS, ASA, AAS see your UNIT E Trig journal summary) (MCR)
   a. Explain the ambiguous case that arises from Sine Law.
      i. $A = 45°,\ a = 1.4,\ b = 2.$
      ii. $A = 45°,\ a = 1.8,\ b = 2.$
      iii. $A = 45°,\ a = 2,\ b = 1.5.$
   b. For the two triangle case, solve the triangles using Sine Law. Talk about how to find the other version.
   c. For the two triangle case above, show how there is no ambiguity when Cosine Law is used to find the side c. What tells you that there will be 2 triangles to solve?

7. QUADRANT/COMPASS BEARINGS versus TRUE BEARING (AP)

a. Explain each type of bearing measurement (make a note - not to confuse bearings that start from the North line with math angle rotations that start from positive x-axis). Show how to convert back and forth between compass and true bearings

i. 163^0 ii. 245^0 iii. $N35^0W$ iv. $S80^0W$

b. Show a word problem with true bearing

Distance of a Plane An airplane flies 180 mi from point X at a bearing of 125°, and then turns and flies at a bearing of 230° for 100 mi. How far is the plane from point X?

c. Show a word problem and solution with compass bearing

A boat is sailing due east parallel to the shoreline at a speed of 15 miles per hour. At a given time the, the bearing to a lighthouse is S 54° E, and 2 hours later the bearing is S 36° E. Find the distance from Boat Position 2 to the lighthouse.