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## MCR 3U - Unit 4 Test- Trigonometry

Unless directed otherwise, round lengths to one place after decimal and angles to nearest degree.

**Part A:** Fill in the blank with the simplified answer to each question. [19] [1 mark each]

1. State which trigonometric functions are positive in quadrant IV \_\_\_\_\_

2. State the reciprocal function of sine \_\_\_\_\_

3. Evaluate, to four decimal places.  $\cos 316^\circ =$  \_\_\_\_\_

4. Find the exact values of  $\tan 60^\circ =$  \_\_\_\_\_

5. Evaluate angle  $\theta$  to the nearest degree if  $0^\circ \leq \theta \leq 90^\circ$ ,  $\sin \theta = 0.7563$   $\theta =$  \_\_\_\_\_

6. Evaluate angle  $\theta$  to the nearest degree if  $180^\circ \leq \theta \leq 270^\circ$ ,  $\tan \theta = \frac{1}{\sqrt{3}}$   $\theta =$  \_\_\_\_\_

7. State the following for angle  $210^\circ$  a) the related acute angle \_\_\_\_\_

b) the quadrant in which the terminal arm lies in \_\_\_\_\_

8. The point  $(-1,-1)$  lies on the terminal arm of  $\theta$ . State the exact value of  $\cos \theta$  \_\_\_\_\_

9. If  $90^\circ \leq \theta \leq 180^\circ$  for which  $\sin \theta = \frac{5}{13}$ . Determine the exact value of  $\tan \theta$  \_\_\_\_\_

10. Determine the number of triangles that could be drawn with the given measures.

a)  $\triangle ABC$ , where  $\angle A = 30^\circ$ ,  $a = 18$  m,  $b = 24$  m a) \_\_\_\_\_

b)  $\triangle RST$ , where  $\angle S = 52.5^\circ$ ,  $s = 30$  cm,  $r = 45$  cm b) \_\_\_\_\_

11. State which method you would use to solve for  $x$

a)  a) \_\_\_\_\_

b)  b) \_\_\_\_\_

12. Solve for  $x$

a)  $\tan x = \frac{13}{15}$  b)  $\sin 42^\circ = \frac{13}{x}$  c)  $x^2 = 3^2 + 5^2 - 2(3)(5)\cos 37^\circ$  a) \_\_\_\_\_

b) \_\_\_\_\_

c) \_\_\_\_\_

13. State an equivalent expression for each of the following:

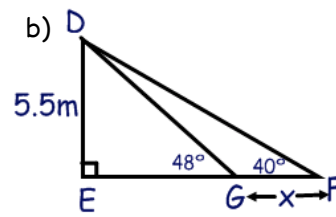
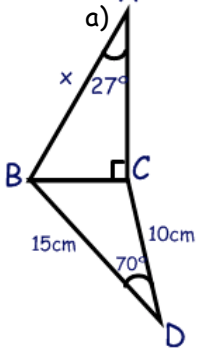
a)  $1 - \sin^2 \theta =$  \_\_\_\_\_

b)  $\frac{\cos^2 \theta}{\sin^2 \theta} =$  \_\_\_\_\_

Part B: Write complete simplified solutions for each of the following questions. [33]

14. How do you decide when to use the sine law or the cosine law to solve a problem. [2]

15. Solve for the variable  $x$  [8]



16. Find the exact simplified value of  $\sin 225^\circ \cos 315^\circ + \tan 240^\circ$  (show all work) [4]

17. If  $\cos \theta = -\frac{6}{11}$  and  $0^\circ \leq \theta \leq 360^\circ$ , [4]

a) Determine  $\theta$ .

b) Determine the exact value of  $\csc \theta$

18. Find the measure of the smallest angle in a triangle with sides of 4 m, 6 m and 8 m. Draw the diagram.[3]

19. Prove the following identities [3,3]

a)  $\tan x + \frac{1}{\tan x} = \frac{1}{\sin x \cos x}$

b)  $\frac{\cos^2 x - \sin^2 x}{\cos^2 x + \sin x \cos x} = \frac{\cot x - 1}{\cot x}$

20. Aiden and Beth are part of a scientific team studying thunderclouds. The team is about to launch a weather balloon into an active part of the cloud. Aiden's rope to the cloud is 7.8 m long and makes an angle of  $36^\circ$  with the ground. Beth's rope to the same cloud is 5.9 m long. Determine distance(s) between Aiden and Beth to the nearest tenth of a meter. [6]