



# Math 20-1 Unit Exam 5

Trigonometry  
Time: 110 minutes

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Show your work for full marks. Clearly indicate your final answer. Leave answers in exact, reduced form, do not convert to decimal unless asked.

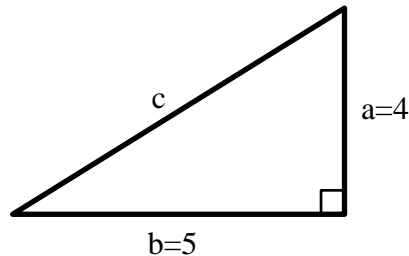
Formulas:  $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$        $c^2 = a^2 + b^2 - 2ab \cos C$

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

## Part I: Multiple Choice. (1 mark each, 9 marks total)

Circle the response that best answers the question.

Use the following diagram to answer the next 2 questions:



1. In the diagram above, the length of side c is:

a) 9

b) 41

c)  $\sqrt{21}$

d)  $\sqrt{29}$

e)  $\sqrt{41}$

2. In the diagram above, the size of angle B is:

a)  $0.675^\circ$

b)  $0.896^\circ$

c)  $38.7^\circ$

d)  $51.3^\circ$

e)  $53.1^\circ$

3. All of the following angles have the same reference angle EXCEPT:

a)  $-140^\circ$

b)  $130^\circ$

c)  $220^\circ$

d)  $320^\circ$

e)  $400^\circ$

4. If  $\sin \theta < 0$  and  $\tan \theta > 0$  then  $\theta$  is in quadrant:

a) I

b) II

c) III

d) IV

e) V

5. Given that  $\cos \theta = \frac{2}{3}$  and  $\theta$  is in quadrant IV, what is the value of  $\sin \theta$ ?

a)  $\frac{\sqrt{5}}{3}$

b)  $\frac{-\sqrt{5}}{3}$

c)  $\frac{\sqrt{13}}{3}$

d)  $\frac{-\sqrt{13}}{3}$

e)  $\frac{\sqrt{5}}{\sqrt{13}}$

6. Which of the following angles has its terminal arm in quadrant III?

a)  $-213.7^\circ$

b)  $-33.7^\circ$

c)  $146.3^\circ$

d)  $213.7^\circ$

e)  $326.3^\circ$

7. Given  $\triangle ABC$  with  $\angle A = 100^\circ$ ,  $\angle B = 50^\circ$ ,  $b = 25$ , which of the following expressions could be used to solve for side  $a$ ?

a)  $\frac{25 \sin 50^\circ}{\sin 100^\circ}$

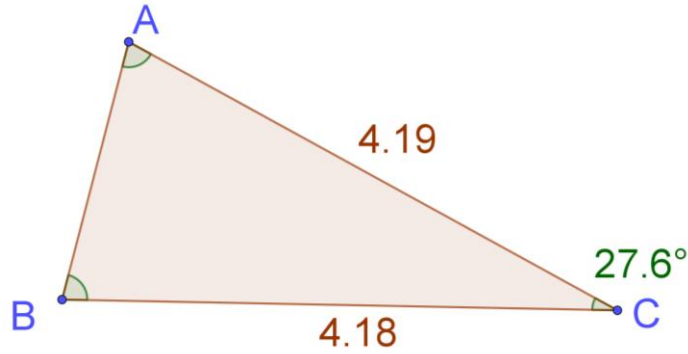
b)  $\frac{25 \sin 100^\circ}{\sin 50^\circ}$

c)  $\frac{\sin 100^\circ}{25 \sin 50^\circ}$

d)  $\frac{\sin 50^\circ}{25 \sin 100^\circ}$

e)  $25 \sin \left( \frac{50^\circ}{100^\circ} \right)$

Use the following diagram to answer the next two questions. Diagram may not be drawn to scale.



8. What is the length of side  $c$ ?

- a) 3.99      b) 3.27      c) 2.17      d) 2.09      e) 2.00

9. Which is the largest angle in the triangle?

- a)  $\angle A$       b)  $\angle B$       c)  $\angle C$

**Part II: TRUE/FALSE (1 mark each)**

[\_\_/4]

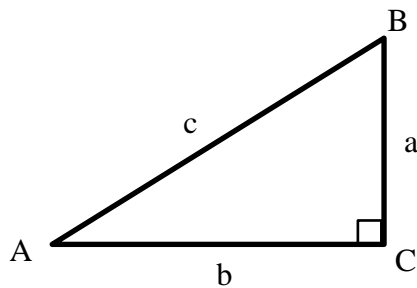
From the diagram below, indicate whether each equation is True (T) or False (F).

1.  $\sqrt{b^2 - a^2} = c$       T    F    (Circle One)

2.  $\cos A = \frac{b}{c}$       T    F    (Circle One)

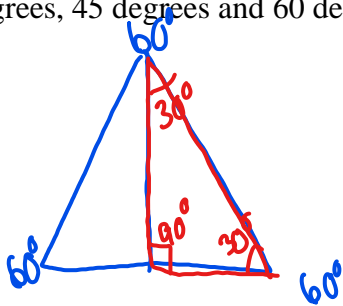
3.  $\sin^{-1}\left(\frac{a}{c}\right) = B$       T    F    (Circle One)

4.  $\frac{b}{\tan B} = a$       T    F    (Circle One)



**Part III: Short Answer.** Part marks may be given for the short answer questions. Be sure to show your work! Please write as neatly as possible.

1. Draw and label the two special triangles that can be used for determining trigonometric functions of 30 degrees, 45 degrees and 60 degrees [ \_\_\_2]



2. Using CAST and special triangles, determine the exact value of each of the following trigonometric function values. Rationalize the denominators if necessary. [ \_\_\_/3]

a)  $\sin 120^\circ = \frac{\sqrt{3}}{2}$

b)  $\cos 135^\circ = \frac{-\sqrt{2}}{2}$

c)  $\tan 330^\circ = \frac{-\sqrt{3}}{2}$

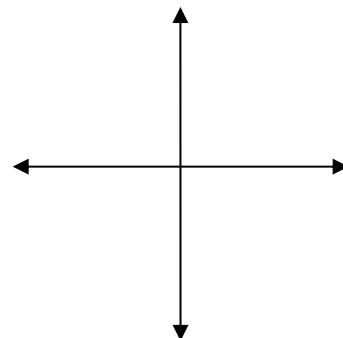
3. Calculate the following trig ratios in exact form (no decimals) for the angle that has its terminal arm passing through  $(-3, \sqrt{6})$ . Draw and label a diagram. Rationalize denominators in your answers.

[ \_\_\_/4]

a)  $\sin \theta$

b)  $\cos \theta$

c)  $\tan \theta$



4. Solve for  $\theta$ , where  $0^\circ \leq \theta < 360^\circ$ . Round angles to 1 decimal place if necessary. [ \_\_\_/9]

a)  $\cos \theta = 0.5$       *Reference Angle:* \_\_\_\_\_       $\theta =$  \_\_\_\_\_ *and*  $\theta =$  \_\_\_\_\_

b)  $\sin \theta = -0.8358$       *Reference Angle:* \_\_\_\_\_       $\theta =$  \_\_\_\_\_ *and*  $\theta =$  \_\_\_\_\_

c)  $\tan \theta = -2.089$       *Reference Angle:* \_\_\_\_\_       $\theta =$  \_\_\_\_\_ *and*  $\theta =$  \_\_\_\_\_

5. Given  $\triangle ABC$  with side  $a = 15.0$  m and side  $b = 18.0$  m and angle  $C = 90.0^\circ$ , solve for the unknown angles and side. Round your answers to 1 decimal place. [ \_\_\_/3]

$\angle A =$  \_\_\_\_\_

$\angle B =$  \_\_\_\_\_

$c =$  \_\_\_\_\_

6. Given  $\triangle ABC$  with side  $a = 15.2 \text{ cm}$  and side  $b = 13.1 \text{ cm}$  and,  $\angle A = 62.8^\circ$  solve for the unknown angles. Round your answers to 1 decimal place. [\_\_\_/3]

$$\angle B = \underline{\hspace{2cm}}$$

$$\angle C = \underline{\hspace{2cm}}$$

$$c = \underline{\hspace{2cm}}$$

7. Given  $\triangle ABC$  with side  $a = 4.88 \text{ cm}$  and side  $b = 3.83 \text{ cm}$  and side  $c = 2.81 \text{ cm}$ , solve for the unknown angles. Round your answers to 1 decimal place. [\_\_\_/3]

$$\angle A = \underline{\hspace{2cm}}$$

$$\angle B = \underline{\hspace{2cm}}$$

$$\angle C = \underline{\hspace{2cm}}$$