4.8B Vectors

AP Precalculus Name: _____ **CA #1**

Instructions: Find the unit vector for the given vector.

1) $< -4, 8 >$

2) $< 9, -10 >$

Directions: Find the dot product for the following vectors.

3) $< 4, 8 >$ and $< -2, 3 >$

4) $< -5, -7 >$ and $< 4, 3 >$

Directions: Find the angle between the two vectors.

5) $< 4, 8 >$ and $< -2, 3 >$

6) $< -5, -7 >$ and $< 4, 3 >$

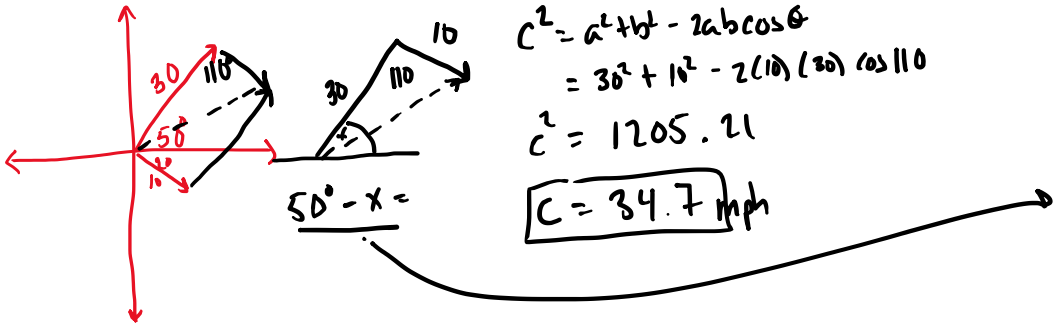
Instructions: Use the Law of Sines and Cosines to solve the following.

7) A boat leaves the south bank of a river and heads 50^{o} north of east at 30 mph. The river current flows at 20^{o} east of north at 10 mph. What is the ground speed and direction of the boat as it heads for the north bank?

8) A plane flies at 40^{o} south of east at 450 mph. Its fighting a wind that is blowing 15^{o} north of east at 45 mph. What is the ground speed and direction the plane is flying?

ANSWERS

1) $< -\frac{4}{\sqrt{80}}, \frac{8}{\sqrt{80}} >$
2) $< \frac{9}{\sqrt{181}}, -\frac{10}{\sqrt{181}}$
3) 16
4) -41
5) $\theta = 60.3°$
6) $\theta = 162.4°$
7) A boat leaves the south bank of a river and heads 50° north of east at 30 mph. The river current flows at 20° south of east at 10 mph. What is the ground speed and direction of the boat as it heads for the north bank?



$c^2 = a^2 + b^2 - 2ab\cos\theta$

$= 30^2 + 10^2 - 2(10)(30)\cos 110$

$c^2 = 1205.21$

$c = 34.7$ mph

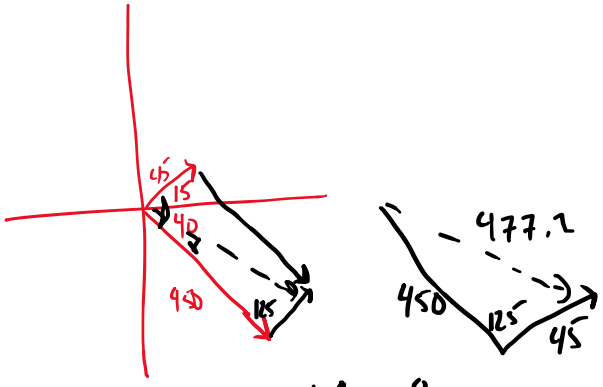
$\frac{\sin 110}{34.7} = \frac{\sin x}{10}$

$15.7° = x$

$50 - 15.7 = x$

$34.3° = x$ NORTH OF EAST

8) A plane flies at 40° south of east at 450 mph. Its fighting a wind that is blowing 15° north of east at 45 mph. What is the ground speed and direction the plane is flying?



$c^2 = 450^2 + 45^2 - 2(450)(45)\cos 125$

$c^2 = 227754.85$

$c = 477.2$ mph

$\frac{\sin 125}{477.2} = \frac{\sin x}{45}$

$4.4 = x$

$40 - 4.4 =$ 35.6° south of east