

4.8B Vectors

AP Precalculus

Name: _____

CA #2

Instructions: Find the unit vector for the given vector.

1) $\langle 6, -8 \rangle$

2) $\langle 3, -12 \rangle$

Directions: Find the dot product for the following vectors.

3) $\langle 4, -3 \rangle$ and $\langle -5, 6 \rangle$

4) $\langle -4, 7 \rangle$ and $\langle 4, 1 \rangle$

Directions: Find the angle between the two vectors.

5) $\langle 4, -3 \rangle$ and $\langle -5, 6 \rangle$

6) $\langle -4, 7 \rangle$ and $\langle 4, 1 \rangle$

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

7) A boat leaves the south bank of a river and heads 80° north of east at 40 mph. The river current flows at 20° north of east at 15 mph. What is the ground speed and direction of the boat as it heads for the north bank?

8) A plane flies at 80° south of east at 250 mph. A wind is blowing 30° north of east at 60 mph. What is the ground speed and direction the plane is flying?

ANSWERS

- 1) $\langle \frac{6}{10}, \frac{-8}{10} \rangle$
- 2) $\langle \frac{3}{\sqrt{153}}, \frac{-12}{\sqrt{153}} \rangle$
- 3) -38
- 4) -9
- 5) 166.7°
- 6) 105.7°
- 7) A boat leaves the south bank of a river and heads 80° north of east at 40 mph. The river current flows at 20° north of east at 15 mph. What is the ground speed and direction of the boat as it heads for the north bank?

$C^2 = 40^2 + 15^2 - 2(40)(15)\cos 120$
 $C^2 = 2425$
 $C = 49.2 \text{ mph}$

$\frac{\sin x}{15} = \frac{\sin 120}{49.2}$
 $\sin x = 0.26$
 $x = 15.3^\circ$
 so $80 - 15.3 = 64.7^\circ$
NORTH OF EAST

- 8) A plane flies at 80° south of east at 250 mph. A wind is blowing 30° north of east at 60 mph. What is the ground speed and direction the plane is flying?

$C^2 = 250^2 + 60^2 - 2(250)(60)\cos 70$
 $C^2 = 55839.4$
 $C = 236.3 \text{ mph}$

$\frac{\sin 70}{236.3} = \frac{\sin x}{60}$
 $\frac{60 \cdot \sin 70}{236.3} = \sin x$
 $.238 = \sin x$
 $13.8^\circ = x$
 $80 - 13.8 = 66.2^\circ$
South of EAST