9.6 Application Problems Using Vectors

SCORE:

/

Name _____ **Date** _____ **Period** _____

Solve. Draw a diagram and show all your work. Round all answers to the nearest tenth if necessary.

1. One rope pulls a barge directly east with a force of 45 N, and another rope pulls the barge *N* 23° *E* with a force of 68 N. Find the magnitude of the resultant force acting on the barge.

2. A force of 689 lb. is required to pull a boat up a ramp inclined at 16° with the horizontal. How much does the boat weigh?

3. The resultant of a 10-lb force and another force has a magnitude of 12.3 lb at an angle of 23.4° with the 10-lb force. Find the magnitude of the other force and the angle between the two forces.

4. Ronnie, Phyllis, and Ted are conducting a vector experiment in a Wal-Mart parking lot. Ronnie is pushing a cart containing Phyllis to the east at 5 mph while Ted is pushing it north at 3 mph. What is Phyllis's speed and in what direction (measured from north) is she moving?

5. In Greek mythology, Sisyphus, King of Corinth, revealed a secret of Zeus and thus incurred the god's wrath. As punishment, Zeus banished him to Hades where he was doomed for eternity to roll a rock uphill, only to have it roll back on him. If Sisyphus stands in front of a 4000-lb spherical rock on a 20 degree incline, what force applied in the direction of incline would keep the rock from rolling down the incline?

6. If Superman exerts 1000 pounds of force to prevent a 5000-lb boulder from rolling down a hill and crushing a bus full of children, then what is the angle of inclination of the hill?

7. A plane is headed due east with an air speed of 240 mph. The wind is from the north at 30 mph. Find the bearing for the course and the ground speed of the plane.

8. An airplane is heading on a bearing of 102° with an air speed of 480 mph. If the wind is out of the northeast (bearing 225°) at 58 mph, then what are the bearing of the course and the ground speed of the airplane?

9. The heading of a helicopter has a bearing of 240°. If the 70-mph wind has a bearing of 185° and the air speed of the helicopter is 195 mph, then what are the bearing of the course and the ground speed of the helicopter?

Review

Write the complex number in trigonometric form, using degree measure for the argument.

10. $3 + 3i$

Write the complex number in the form $a + bi$.

11. $6(\cos 45° + i \sin 45°)$

12. Find the trigonometric form for the complex number $3 - 3i\sqrt{3}$. Use radian measure for the argument.

Find the component form for each vector v with the given magnitude and direction angle Θ. Give exact values using radicals when possible. Otherwise round to the nearest tenth.

13. $|v| = 10$, $\theta = 150°$

14. $|v| = 18$, $\theta = 315°$

Given that $A = \langle 4, -2 \rangle$ *and* $B = \langle -3, 5 \rangle$**, find the magnitude and direction angle for each of the following vectors. Give exact answers using radicals when possible. Otherwise round to the nearest tenth.**

15. **-2A**

16. **B − A**

Find the exact magnitude and direction angle to the nearest tenth of a degree of each vector.

17. $\langle \sqrt{3}, 1 \rangle$

18. $\langle -3, 2 \rangle$