$\qquad$ Date $\qquad$ Per $\qquad$

1. Forces of 3 lbs . and 9 lbs . act at an angle of $60^{\circ}$ to each other. Find the magnitude of the resultant force and the angle between the resultant and each force. Round to the nearest tenth.
2. The resultant of a $10-\mathrm{lb}$. force and another force has a magnitude of 7.3 lb . at an angle of $23.4^{\circ}$ with the $10-\mathrm{lb}$. force. Find the magnitude of the other force and the angle between the two forces.
3. Two prospectors are pulling on ropes attached around the neck of a donkey that does not want to move. One prospector pulls with a force of 55 lb ., and the other pulls with a force of 75 lb . If the angle between the ropes is $25^{\circ}$, then how much force must the donkey use in order to stay put? (The donkey knows the proper direction in which to apply his force.)
4. Ronnie, Phyllis, and Ted are conducting a vector experiment in a Walmart parking lot. Ronnie is pushing a cart containing Phyllis to the east at 5 mph while Ted is pushing it to the 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 behind a $4000-\mathrm{lb}$. spherical rock on a $20^{\circ}$ incline, then what force applied in the direction of the incline must he exert to keep the rock from rolling back down the hill?
6. A solid steel ball is placed on a $10^{\circ}$ incline. If a force of 3.2 lb . in the direction of the incline is required to keep the ball in place, then what is the weight of the ball?
7. If Superman exerts 1000 pounds of force to prevent a $5000-\mathrm{lb}$. boulder from rolling down a hill and crushing a bus full of children, then what is the angle of inclination of the hill?
8. A plane is headed due east with an air speed of 250 mph . The wind is from the north at 65 mph . Find the ground speed of the plane, its drift angle, and the bearing of its course.
9. A superlight airplane is flying southwest (bearing $225^{\circ}$ ) at 80 mph . The wind is from the south at 30 mph . Find the ground speed of the plane, its drift angle, and the bearing of its course.
10. An airplane is heading on a bearing of $102^{\circ}$ with an air speed of 480 mph . The wind is blowing southwest (bearing $225^{\circ}$ ) at 58 mph . Find the ground speed of the airplane, its drift angle, and the bearing of its course.
11. The heading of a helicopter has a bearing of $240^{\circ}$. If the $70-\mathrm{mph}$ wind has a bearing of $185^{\circ}$ and the air speed of the helicopter is 195 mph , then find the ground speed of the helicopter, its drift angle, and the bearing of its course.
12. A boat is traveling at 15 mph with a bearing of $\mathrm{N} 35^{\circ} \mathrm{E}$. The current is moving at 3 mph with a bearing of $\mathrm{S} 20^{\circ} \mathrm{E}$. Find the boat's true speed, drift angle, and the bearing of its course.
