Forces at an Angle Practice

All questions should be read, drawn, and solved using the GUESS method:

1. A force of 25.0 N acts on an object at an angle of 35° west of north. What are the magnitudes of the northward and westward components of this force?
2. A student pushes straight along the handles of a mower with a force of 200 N. The handles make an angle of 20°, with respect to the horizontal. The frictional force for the 25 kg mower is 100 N. What is the normal force on the mower, and what is the acceleration of the mower?
3. What single force is needed to support a stationary mass of 25.0 kg near the Earth’s surface?
4. A wagon is pulled by a handle making an upward angle of 25° with a force of 37 N. What is the horizontal force pulling the wagon forward? What is the upward force on the wagon that is being balanced by the wagon’s weight?
5. The wagon in problem 4 above has a mass of 3 kg. What is the normal force exerted by the ground on the wagon?
6. A person pushes with 150.0 N of force on a 27.8 kg lawnmower. The angle between the handle and the ground is 45.0°. Determine the magnitudes of the horizontal and vertical components of this force. Find the vertical and horizontal acceleration. Find the normal force of the ground on the lawnmower.
7. A boy pulls a 12.5 kg sled along level ground. The rope with which he pulls the sled makes an angle of 20.0° with the ground as the boy pulls with a force of 78.0 N. What are the horizontal and vertical components of the force? Find the vertical and horizontal acceleration. Find the normal force of the ground on the lawnmower.
8. A shopper pushes straight along the handles of a shopping cart with a force of 150 N. The handles make an angle of 30°, with respect to the horizontal. The frictional force for the 33 kg cart is 88 N. What is the normal force on the mower, and what is the acceleration of the mower?
9. Two forces, 439 N at 23˚ and 260 N at 329˚ are applied to a car in an effort to accelerate it. Find the resultant (magnitude and direction) of these two forces. Answer in N.
10. If the car from number 9 has a mass of 3600 kg, what is its acceleration?
11. If the car from number 9 was originally at rest, what would be its velocity after 12 s?
12. How much distance would the car from number 9 displace in 32 s?