4.5 Resolution of Vectors into Rectangular Components Worksheet

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1) Determine the magnitudes of the horizontal and vertical components of each force.

a) magnitude of 570 N, $\theta = 37°$ counterclockwise from the horizontal

b) magnitude of 29 N, $\theta = 52°$ clockwise from the horizontal

2) A woman is pulling on a rope attached to a toboggan with a 370 N force at an angle of 35° to the horizontal. Find the magnitude of the force pulling the sled forward and the magnitude of the force pulling the sled upward.

3) A 10 kg block lies on a smooth ramp that is inclined at 30°. What force, parallel to the ramp, would prevent the block from moving. (Assume that 1 kg exerts a force of 9.8 N)

4) A 20 kg box rests on a ramp that is inclined 18°. Resolve the weight into rectangular vector components that keep the box at rest.

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5) Resolve a 200 N force into two rectangular vector components such that the ratio of their magnitudes is 3:1. Calculate the angle between the greater component and the 200 N force.

6) A sign is supported as shown in the diagram. The tension in the slanted rod supporting the sign is 110 N at an angle of 25° to the horizontal.



a) Draw a vector diagram showing the vector components of the tension vector.

b) What are the vertical and horizontal vector components of the tension?

Answer Key

1) a) $|\vec{F_x}| = 455.2$ N, $|\vec{F_y}| = 343.0$ N b) $|\vec{F_x}| = 17.9$ N, $|\vec{F_y}| = 22.9$ N

2) forward: 303.1 N; upward: 212.2 N

3) 49 N

4) $|\vec{n}| = 186.41$ N $|\vec{f}| = 60.57$ N

5) 18.4°

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6) b) 99.7 N c) 46.5 N

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