

Unit 3 Review

Long Answer

Base your answers to questions 188 and 189 on the information below.

A student and the waxed skis he is wearing have a combined weight of 850 newtons. The skier travels down a snow-covered hill and then glides to the east across a snow-covered, horizontal surface.

188. Calculate the magnitude of the force of friction acting on the skis as the skier glides across the snow-covered, horizontal surface. [Show all work, including the equation and substitution with units.]

$$F_N = 850 \text{ N}$$
$$\mu = .05 \text{ (PRT)}$$

$$F_f = \mu F_N = (.05)(850 \text{ N})$$
$$= 42.5 \text{ N}$$

$$F_f = ?$$

189. Determine the magnitude of the normal force exerted by the snow on the skis as the skier glides across the horizontal surface.

$$\underline{850 \text{ N}} \text{ N}$$

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190. A 0.50-kilogram frog is at rest on the bank surrounding a pond of water. As the frog leaps from the bank, the magnitude of the acceleration of the frog is 3.0 meters per second². Calculate the magnitude of the net force exerted on the frog as it leaps. [Show all work, including the equation and substitution with units.]

$$F_{\text{net}} = ma = (.5 \text{ kg})(3 \text{ m/s}^2) = 1.5 \text{ N}$$

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Base your answers to questions 191 through 193 on the information below.

An ice skater applies a horizontal force to a 20.-kilogram ^m block on frictionless, level ice, causing the block to accelerate uniformly at 1.4 meters per second² to the right. After the skater stops pushing the block, it slides onto a region of ice that is covered with a thin layer of sand. The coefficient of kinetic friction between the block and the sand-covered ice is 0.28.

191. Calculate the magnitude of the force of friction acting on the block as it slides over the sand-covered ice. [Show all work, including the equation and substitution with units.]

$$F_f = \mu F_N = (0.28)(20\text{kg})(9.8\text{m/s}^2) =$$

192. Determine the magnitude of the normal force acting on the block.

$$F_N = F_g = mg = (20\text{kg})(9.8\text{m/s}^2)$$

193. Calculate the magnitude of the force applied to the block by the skater [Show all work, including the equation and substitution with units.]

$$F_{\text{net}} = ma = (20\text{kg})(1.4\text{m/s}^2)$$

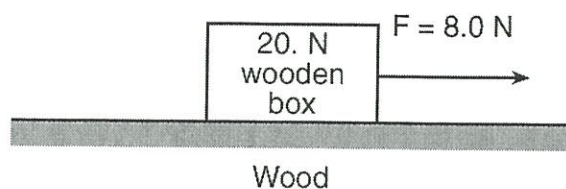
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194. A 70-kilogram hockey player skating east on an ice rink is hit by a 0.1-kilogram hockey puck moving toward the west. The puck exerts 50-newton force toward the west on the player. Determine the magnitude of the force that the player exerts on the puck during this collision.

$$50\text{N} \quad (3^{\text{rd}} \text{ Law})$$

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195. Base your answer to the following question on the information below.

A horizontal force of 8.0 newtons is used to pull a 20.-newton wooden box moving toward the right along a horizontal, wood surface, as shown.



Calculate the magnitude of the frictional force acting on the box. [Show all work, including the equation and substitution with units.]

$$\mu = 0.3$$

$$F_N = 20\text{ N}$$

$$F_f = \mu F_N$$

$$F_f = (0.3)(20\text{ N}) = 6\text{ N}$$