

Question #53212, Physics / Other

If a box weighing 536 N is pulled forward at constant speed by a force of 150. N at an angle of 37.0 degrees with the ground, what normal force does the supporting surface exert on the box?

**Answer:**

According to the third Newton's law the weight ( $W$ ) of the box equals the sum of the normal force ( $F_n$ ) and the projection of the pulling force to the normal ( $F_p$ ).

$$W = F_n + F_p$$

Taking into account that  $F_p = F \times \sin(37^\circ)$  (where  $F$  – the pulling force) the  $F_n$  can be calculated as follows:

$$F_n = W - F_p = W - F \times \sin(37^\circ)$$

Thus, the normal force equals:

$$F_n = 536 \text{ N} - 150 \text{ N} \times 0.6018 = 445.73 \text{ N}$$