

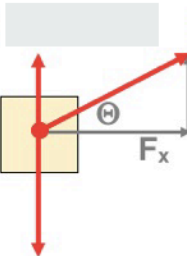
Solve It! (with Vectors and Newton's Second Law)

NOTE: Numerical values used in this Concept Builder are randomly generated and likely different than those published here.

Apprentice Difficulty Level

Question 1

Analyze this: A 58.2-N force is applied at an angle of 23.8° above the horizontal to accelerate a 3.15-kg object across a level, friction-free surface. Complete the diagram.



A free-body diagram of a yellow rectangular object on a level surface. A red arrow representing an applied force F_{app} points up and to the right at an angle θ above the horizontal. This force is decomposed into a horizontal component F_x and a vertical component F_y . A red arrow representing the normal force F_{norm} points vertically upwards from the top of the object. A red arrow representing the gravitational force F_{grav} points vertically downwards from the center of the object.

$F_{norm} =$ $F_{app} =$

$F_x =$

$F_y =$

$F_{grav} =$

Units
Force: N
Mass: kg
Accel'n: m/s/s

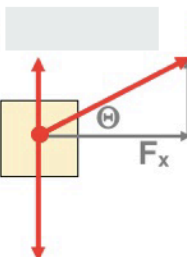
$m =$

$a =$

$F_{net} =$

Question 2

Analyze this: A 143-N force is applied at an angle of 39.5° above the horizontal to accelerate a 24.6-kg object across a level, friction-free surface. Complete the diagram.



A free-body diagram of a yellow rectangular object on a level surface. A red arrow representing an applied force F_{app} points up and to the right at an angle θ above the horizontal. This force is decomposed into a horizontal component F_x and a vertical component F_y . A red arrow representing the normal force F_{norm} points vertically upwards from the top of the object. A red arrow representing the gravitational force F_{grav} points vertically downwards from the center of the object.

$F_{norm} =$ $F_{app} =$

$F_x =$

$F_y =$

$F_{grav} =$

Units
Force: N
Mass: kg
Accel'n: m/s/s

$m =$

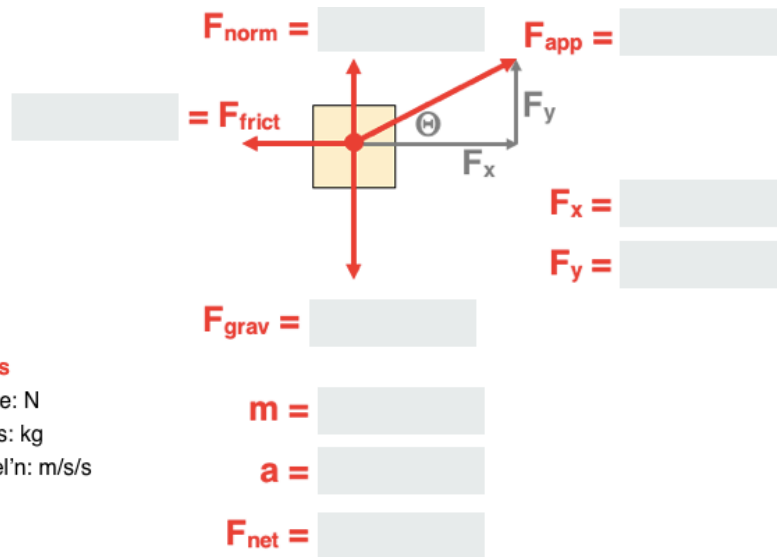
$a =$

$F_{net} =$

Master Difficulty Level

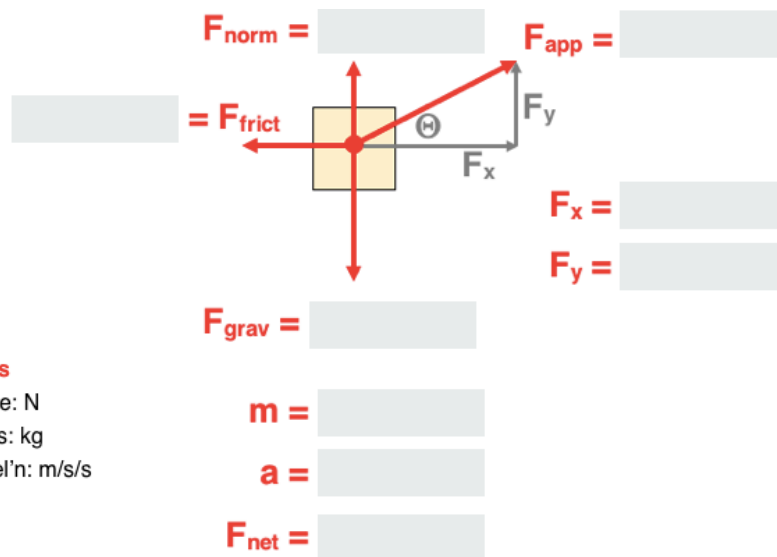
Question 3

Analyze this: A 80.4-N force is applied at an angle of 18.8° above the horizontal to accelerate a 5.64-kg object across a level surface. The object encounters 11.2 N of friction. Complete the diagram.



Question 4

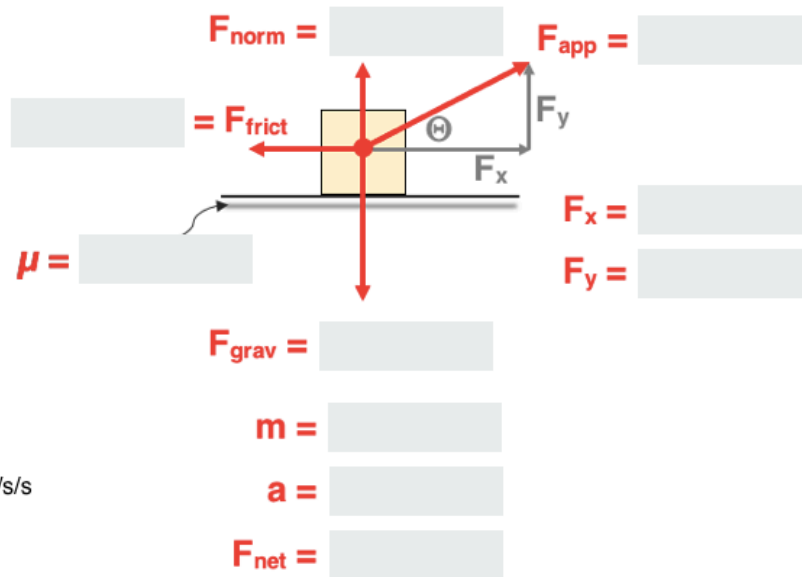
Analyze this: A 139-N force is applied at an angle of 26.9° above the horizontal to accelerate a 17.1-kg object across a level surface. The object encounters 31.5 N of friction. Complete the diagram.



Wizard Difficulty Level

Question 5

Analyze this: A 184-N force is applied at an angle of 20.4° above the horizontal to accelerate a 16.9-kg object across a level surface. The coefficient of friction is 0.156. Complete the diagram.



Units

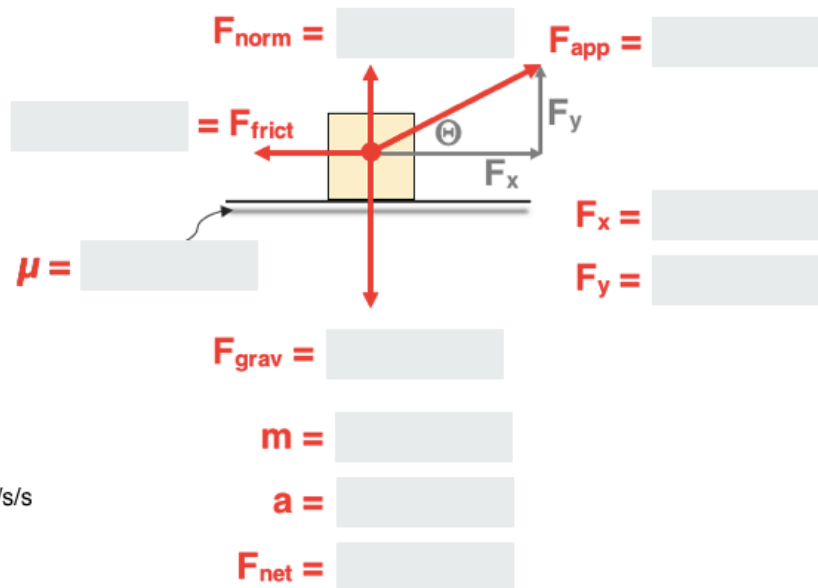
Force: N

Mass: kg

Accel'n: m/s/s

Question 6

Analyze this: A 275-N force is applied at an angle of 26.2° above the horizontal to accelerate a 27.7-kg object across a level surface. The coefficient of friction is 0.286. Complete the diagram.



Units

Force: N

Mass: kg

Accel'n: m/s/s