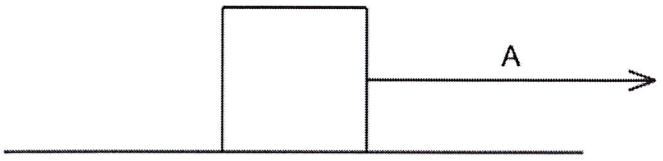
C.1: A person pulls a block of mass 7.00 kg on a frictionless surface with an applied force of 28.0 Newtons.



a. Fill out the table below to analyze all of the forces acting on the block.

free-body diagram					
Horizontal			Vertical		
force	sign	magnitude (N)	force	sign	magnitude (N)
F_a	+	28	F_g	−	68.6
			F_N	+	68.6

b. Determine the net force acting on the block and the acceleration of the block. Include both magnitude and direction in your answer.

$\Sigma \vec{F} = 28\ N \rightarrow$

$\Sigma F = m \cdot a$

$28 = 7 \cdot a$

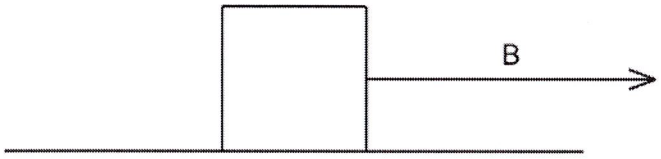
$\vec{a} = 4.00\ m/s^2 \rightarrow$

C.2: A person pulls a block of mass 9.00 kg on a frictionless surface with an applied force of 3.00 Newtons.

a. Fill out the table below to analyze all of the forces acting on the block.

free-body diagram					
Horizontal			**Vertical**		
force	sign	magnitude (N)	force	sign	magnitude (N)
F_a	+	3	F_g	−	88.2
			F_N	+	88.2

b. Determine the net force acting on the block and the acceleration of the block. Include both magnitude and direction in your answer.



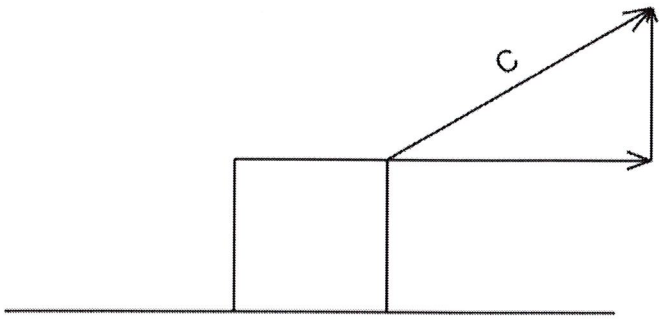
$\sum \vec{F} = 3\ N \rightarrow$

$\sum F = m \cdot a$

$3 = 9 \cdot a$

$\vec{a} = 0.333\ m/s^2 \rightarrow$

C.3: A person pulls a block of mass 5.00 kg on a frictionless surface upward at an angle of 30.0° with a force of 6.00 N.



$F_{Gy} = 6 \cdot \sin(30) = 3$

$F_{Gx} = 6 \cdot \cos(30) = 5.196\ N$

a. Only one force, the applied force, has both horizontal and vertical components. Break it into these two components.

b. Fill out the table below to analyze all of the forces acting on the surface:

free-body diagram					
Horizontal			Vertical		
force	sign	magnitude (N)	force	sign	magnitude (N)
F_{Gx}	+	5.196	F_{Gy}	+	3
			F_g	−	49
			F_N	+	46

c. Determine the net force and the acceleration of the block. Include both magnitude and direction in your answer.

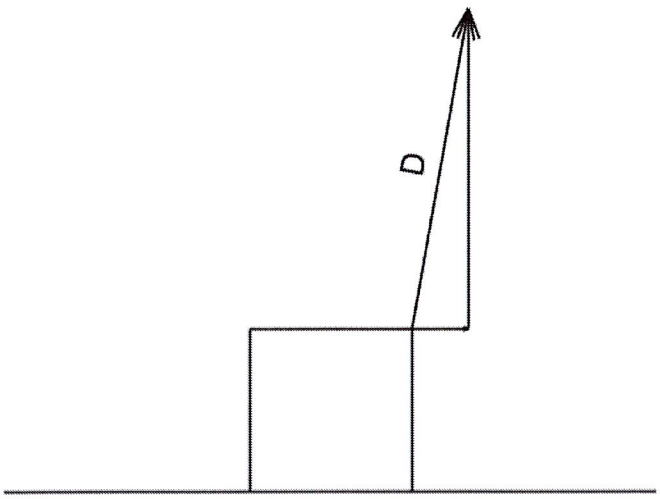
$\Sigma \vec{F} = 5.196\ N \rightarrow$

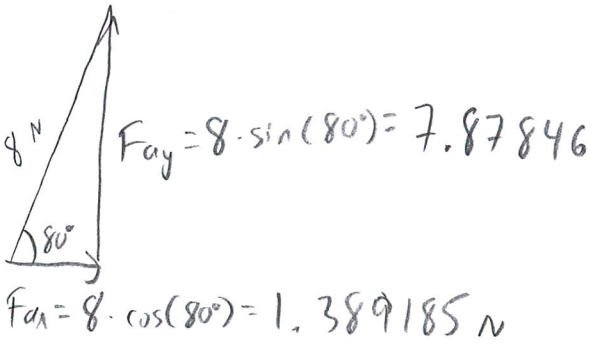
$\Sigma F = m \cdot a$

$5.196 = 5 \cdot a$

$\vec{a} = 1.04\ m/s^2 \rightarrow$

C.4: A person pulls a block of mass 8.00 kg on a frictionless surface upward at an angle of 80.0° with a force of 8.00 N.





a. Only one force, the applied force, has both horizontal and vertical components. Break it into these two components.

b. Fill out the table below to analyze all of the forces acting on the surface:

free-body diagram					
Horizontal			Vertical		
force	sign	magnitude (N)	force	sign	magnitude (N)
F_{ax}	+	1.389185	F_g	−	78.4
			F_{ay}	+	7.87846
			F_N	+	70.52

$F_g = m \cdot g$
$= 8 \times 9.8$

c. Determine the net force and the acceleration of the block. Include both magnitude and direction in your answer.

$\sum F = 1.389185$ N →

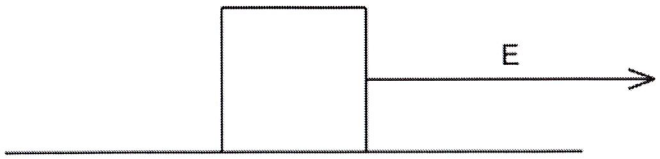
$\sum F = m \cdot a$

$1.389185 = 8 \cdot a$

$a = 0.174$ m/s² →

Directions: For full credit you must write formulas before you use them, show trigonometry and geometry you used in finding your answer, properly label quantities, and include units.

C.5: A person pulls a block with mass of 3.00 kg horizontally with a force of 12.5 Newtons while the block is moving to the right. The coefficient of kinetic friction between the block and the ground is 0.100.



a. Fill out the table below to analyze all of the forces acting on the block.

free-body diagram					
Horizontal			Vertical		
force	sign	magnitude (N)	force	sign	magnitude (N)
F_a	+	12.5	F_g	−	29.4
F_{frk}	−	2.94	F_N	+	29.4

$F_g = m \cdot g$
$= 3 \times 9.8$
$= 29.4\,N$

$F_{frk} = \mu_k \cdot F_N$
$= 0.1 \times 29.4 = 2.94\,N$

b. Determine the net force acting on the block and the acceleration of the block. Include both magnitude and direction in your answer.

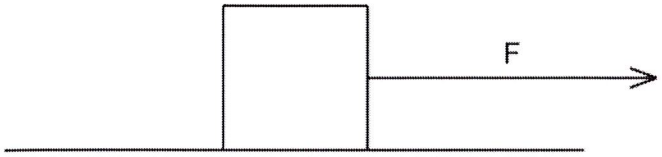
$\sum F = 9.56\,N \rightarrow$

$\sum F = m \cdot a$

$9.56 = 3 \times a$

$a = 3.19\ m/s^2 \rightarrow$

C.6: A person pulls a block with mass of 8.00 kg horizontally with a force of 24.5 Newtons while the block is moving to the right. The coefficient of kinetic friction between the block and the ground is 0.0300.



a. Fill out the table below to analyze all of the forces acting on the block.

free-body diagram					
Horizontal			Vertical		
force	sign	magnitude (N)	force	sign	magnitude (N)
F_a	+	24.5	F_g	−	78.4
F_{frk}	−	2.352	F_N	+	78.4

$F_g = m \cdot g$

$= 8 \times 9.8$

$= 78.4\ N$

$F_{frk} = \mu_k \cdot F_N$

$= 0.03 \times 78.4$

$= 2.352$

b. Determine the net force acting on the block and the acceleration of the block. Include both magnitude and direction in your answer.

$\Sigma F = 22.148\ N \rightarrow$

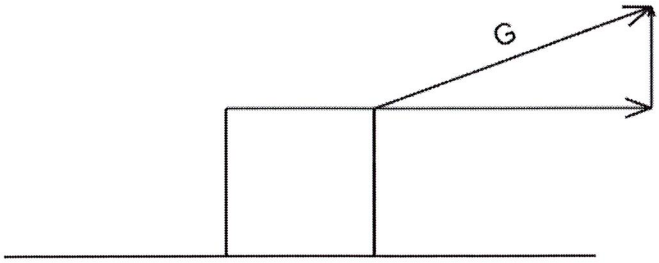
$\Sigma F = m \cdot a$

$22.148 = 8 \times a$

$a = 2.77\ m/s^2 \rightarrow$

Directions: For full credit you must write formulas before you use them, show trigonometry and geometry you used in finding your answer, properly label quantities, and include units.

C.7: A person pulls a block of mass 1.20 kg on at an angle of 20.0° upward from the horizontal with a strength of 8.00 N while the block is moving to the right. The surface and block have a coefficient of kinetic friction of 0.150.



$F_{ay} = 8 \cdot \sin(20) = 2.7361611$ N

$F_{ax} = 8 \cdot \cos(20) = 7.51754$ N

a. Only one force, the applied force, has both horizontal and vertical components. Break it into these two components.

b. Fill out the table below to analyze all of the forces acting on the surface:

free-body diagram					
Horizontal			Vertical		
force	sign	magnitude (N)	force	sign	magnitude (N)
F_{ax}	+	7.51754	F_g	−	11.76
F_{frik}	−	1.353576	F_{ay}	+	2.7361611
			F_N	+	9.0238389

$F_g = m \cdot g$

$= 1.2 \times 9.8$

$= 11.76$ N

c. Determine the net force and the acceleration of the block. Include both magnitude and direction in your answer.

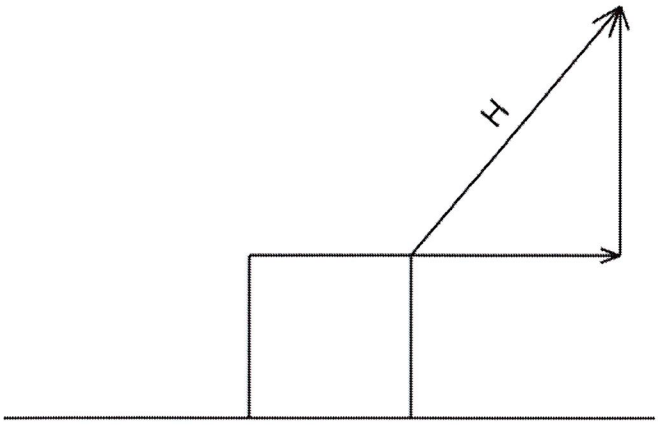
$\sum F = 6.163964$ N →

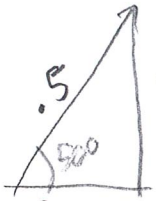
$\sum F = m \cdot a$

$6.163964 = 1.2 \times a$

$a = 5.14$ m/s² →

C.8: A person pulls a block of mass .400 kg on at an angle of 50.0° upward from the horizontal with a strength of 0.500 N. The surface and block have a coefficient of kinetic friction of 0.350.





$F_{oy} = .5 \cdot \sin(50) = 0.3830222$

$F_{ox} = .5 \cdot \cos(50) = 0.321394$ N

a. Only one force, the applied force, has both horizontal and vertical components. Break it into these two components.

b. Fill out the table below to analyze all of the forces acting on the surface:

free-body diagram					
Horizontal			Vertical		
force	sign	magnitude (N)	force	sign	magnitude (N)
F_{ox}	+	0.321394	F_g	−	3.92
F_{Frk}	−	1.2379422	F_{oy}	+	0.3830222
			F_N	+	3.536478

$F_g = m \cdot g$

$= .4 \times 9.8$

$= 3.92$

$F_{Frk} = \mu_K \cdot F_N$

$= .35 \times 3.536478$

$= 1.2379422$

c. Determine the net force and the acceleration of the block. Include both magnitude and direction in your answer.

$\Sigma F = 0.91654822$ N ←

$\Sigma F = m \cdot a$ $\quad a = 2.29\ m/s^2$ ←

$0.91654822 = .4 \cdot a$