

Worksheet 4.1 Newton's 2nd Law

1. For each of the following diagrams determine the magnitude and direction of the net force.

$F_{net} = 0\text{ N}$

$F_{net} = T - F_g = 400 - 150 = 250\text{ N up}$

$F_{net} = F_{app} - F_g = 250 - 75 = 175\text{ N right}$

$F_{net} = F_{app} = 60\text{ N right}$

$F_{net} = F_1 + F_2 - F_f = 120 + 60 - 80 = 100\text{ N right}$

$F_{net} = F_f = 55\text{ N left}$

2. Use the information given for each diagram to fill in missing blanks.

$F_{net} = F_{app} - F_f = 50\text{ N}$

$F_{net} = ma$
 $a = \frac{F_{net}}{m} = \frac{50}{5} = 10\text{ m/s}^2$

$m = 5\text{ kg}$
 $a = 10\text{ m/s}^2$

$F_N = 118\text{ N}$

$F_g = mg = (12)(9.8) = 118\text{ N}$

$m = 12\text{ kg}$
 $a = 0\text{ m/s}^2$

$F_{net} = F_{app} - F_f = 240 - 80 = 160\text{ N}$

$F_{net} = ma$
 $m = \frac{F_{net}}{a} = \frac{160}{4} = 40\text{ kg}$

$m = 40\text{ kg}$
 $a = 4\text{ m/s}^2\text{ right}$

$F_{net} = F_N - F_g = 160 - 78 = 82\text{ N}$

$F_{net} = ma$
 $a = \frac{F_{net}}{m} = \frac{82}{8} = 10\text{ m/s}^2$

$m = 8\text{ kg}$
 $a = 10\text{ m/s}^2$

$F_{net} = F_{app} - F_f = 200 - 160 = 40\text{ N}$

$F_{net} = ma$
 $a = \frac{40}{10} = 4\text{ m/s}^2\text{ right}$

$m = 40\text{ kg}$
 $a = 4\text{ m/s}^2\text{ right}$

$m = \frac{F_g}{g} = \frac{500}{9.8} = 51\text{ kg}$

$F_{net} = F_{app} - F_g = 240 - 500 = -260\text{ N}$

$a = \frac{F_{net}}{m} = \frac{-260}{51} = -5.1\text{ m/s}^2$

$m = 51\text{ kg}$
 $a = 2.4\text{ m/s}^2$