net Force

understanding $\mathbf{F}_{net} = m\mathbf{a}$

(Click on the Next Page button or use the Page Down key on your keyboard)

Key Ideas

- $\mathbf{F}_{net}$ is the vector sum of all forces acting on a single object:

  $\mathbf{F}_{net} = \Sigma\mathbf{F} = \mathbf{F}_1 + \mathbf{F}_2 + \mathbf{F}_3 + \ldots$

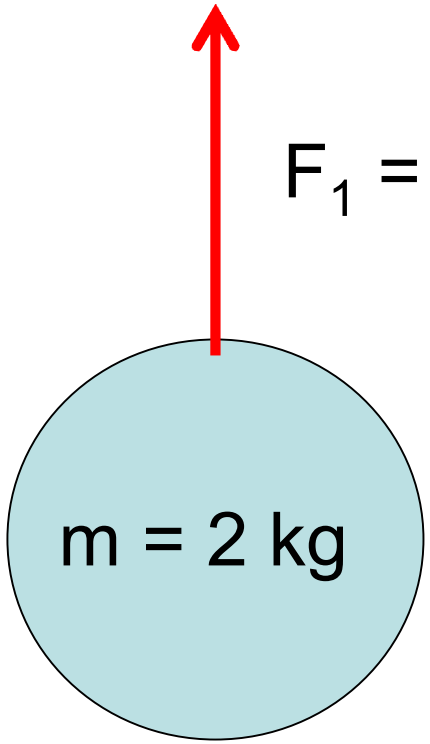
- It is always $\mathbf{F}_{net}$ that determines the acceleration of an object:

  $\mathbf{a} = \mathbf{F}_{net} / m$

A common use of Newton's 2nd Law:

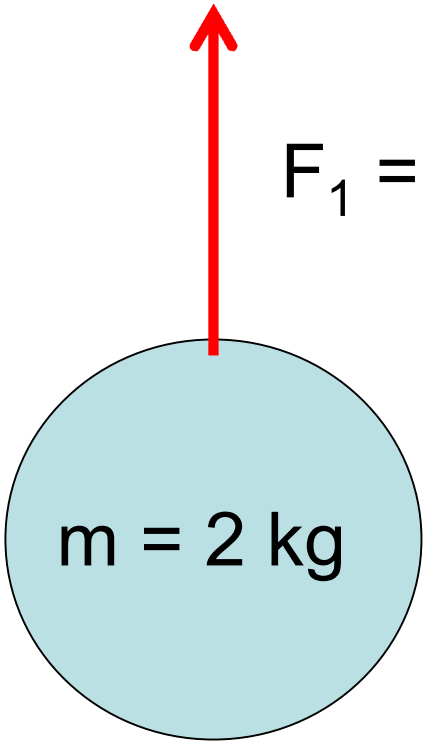
Solve for an object's acceleration, given force and mass.

$\mathbf{F}_{net} = ?$

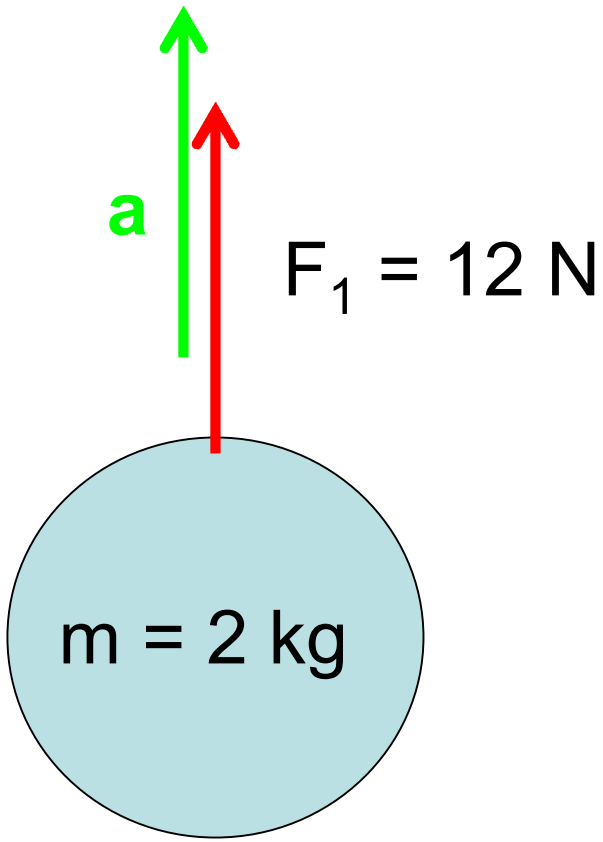


$\mathbf{a} = ?$

$\mathbf{F}_{net}$ = 12 N, 90°



a = ?

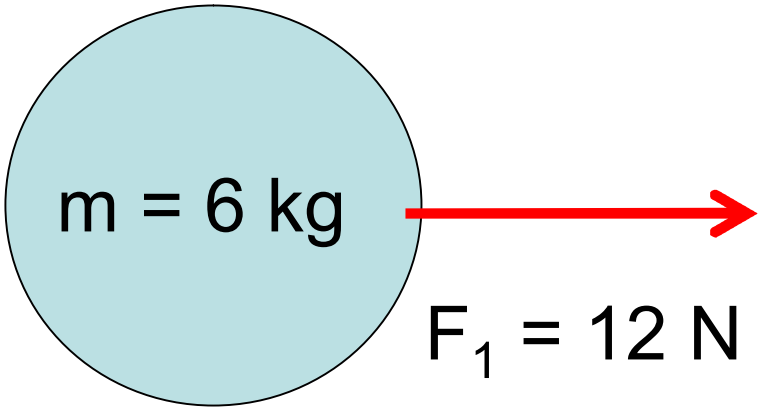


$\mathbf{F}_{net}$ = 12 N, 90°

a = 6 m/s^2, 90°

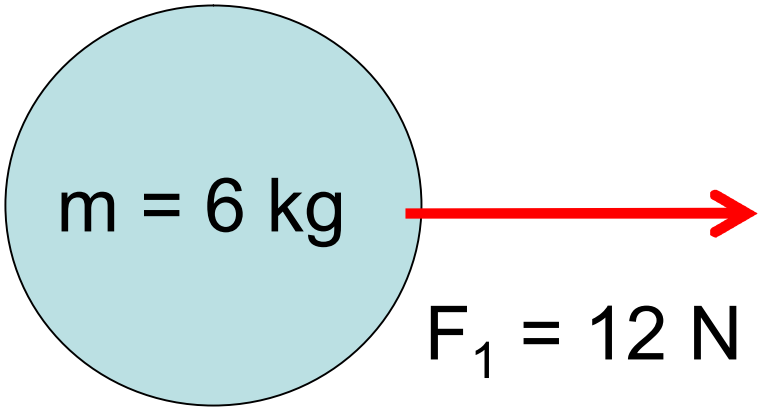
$\mathbf{F}_{net} = ?$

$\mathbf{a} = ?$



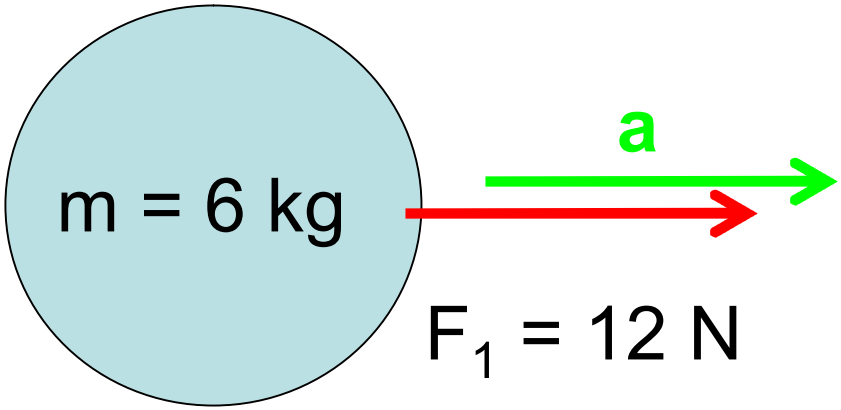
$\mathbf{F}_{net}$ = 12 N, 0°

a = ?



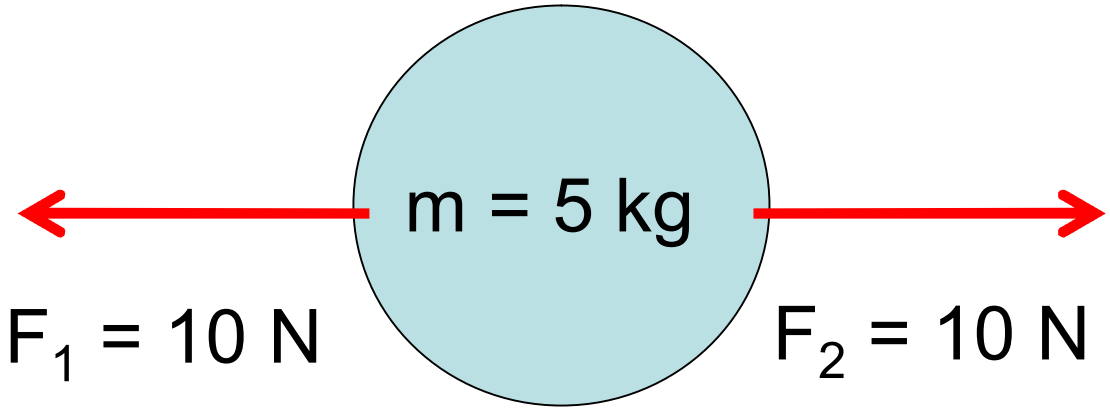
$\mathbf{F}_{net}$ = 12 N, 0°

$\mathbf{a}$ = 2 m/s^2, 0°



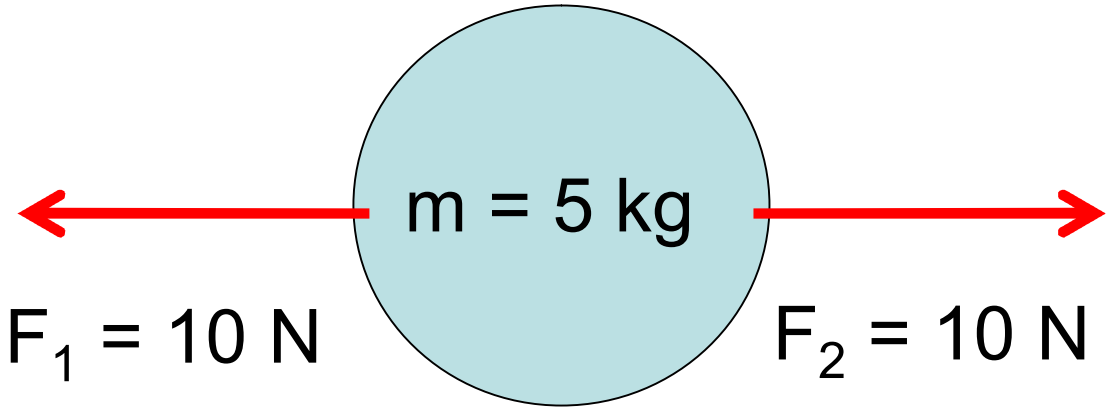
$\mathbf{F}_{net}$ = ?

a = ?



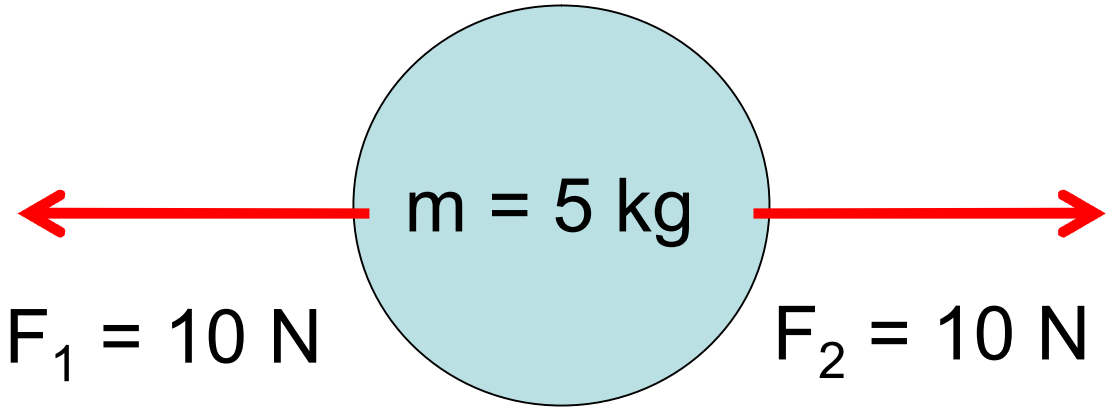
$\mathbf{F}_{net} = 0$ N

a = ?



$\mathbf{F}_{net} = 0$ N

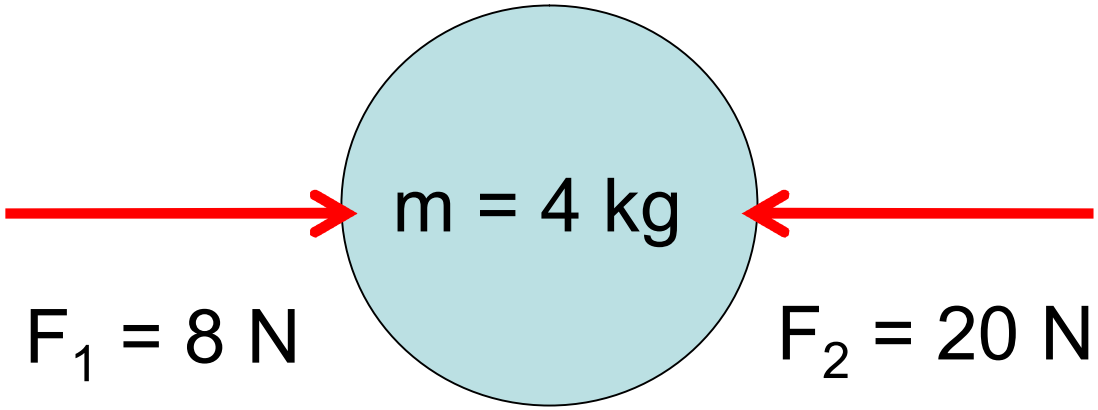
$\mathbf{a} = 0$ m/s^2



Note: object could be at rest or moving with constant velocity (in any direction).

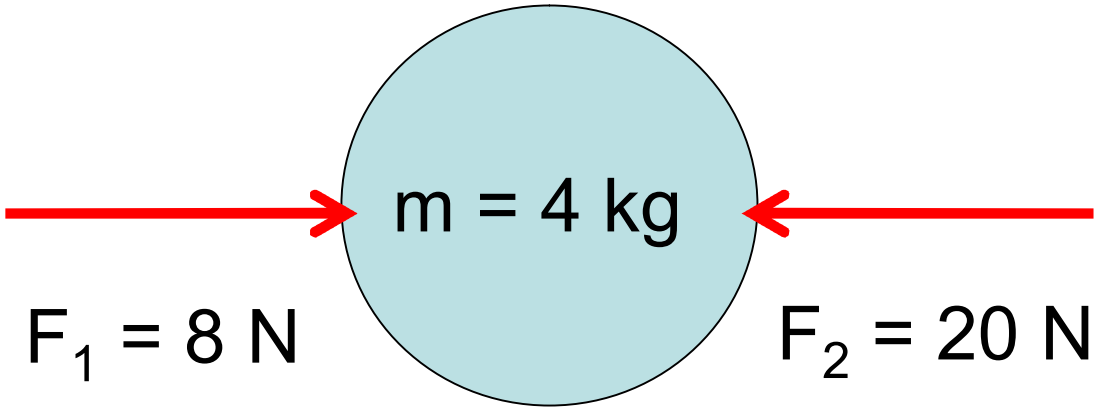
$\mathbf{F}_{net} = ?$

$\mathbf{a} = ?$



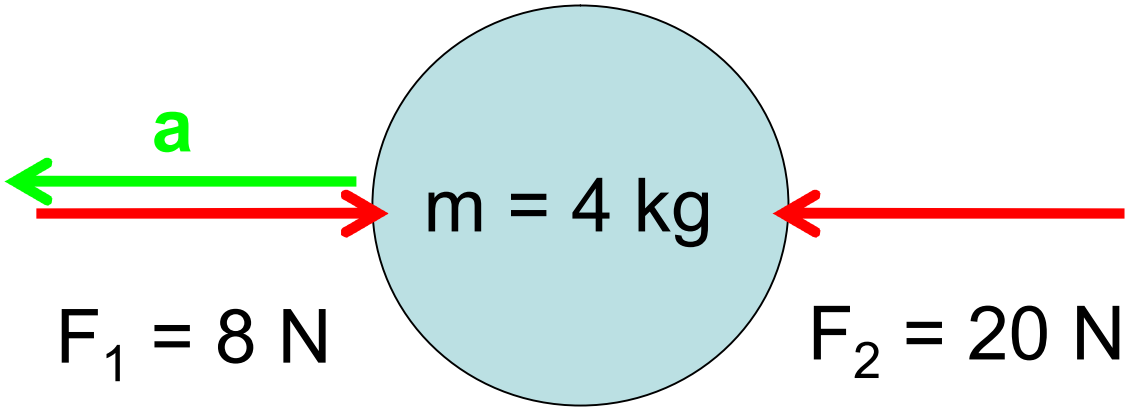
$\mathbf{F}_{net}$ = 12 N, 180°

a = ?



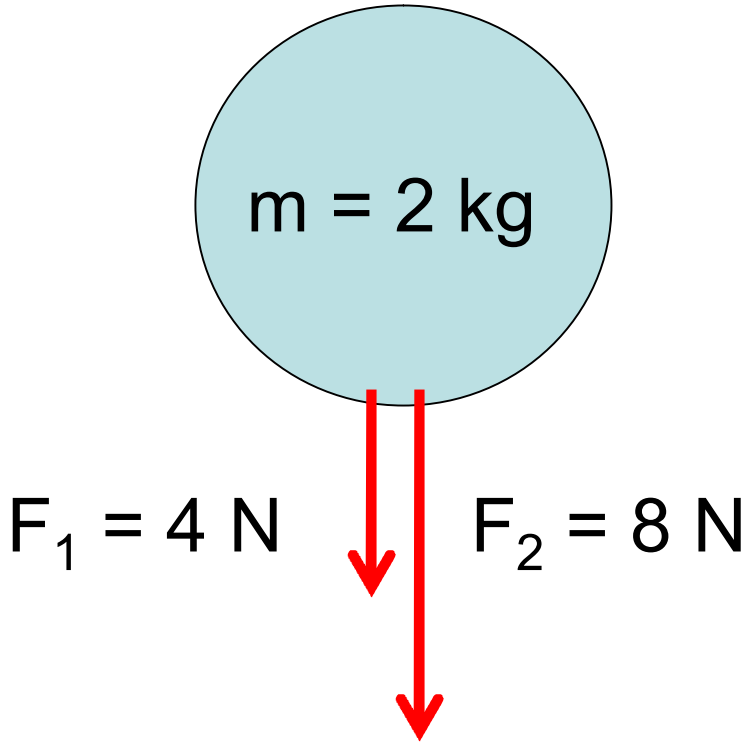
$\mathbf{F}_{net}$ = 12 N, 180°

a = 3 m/s^2, 180°



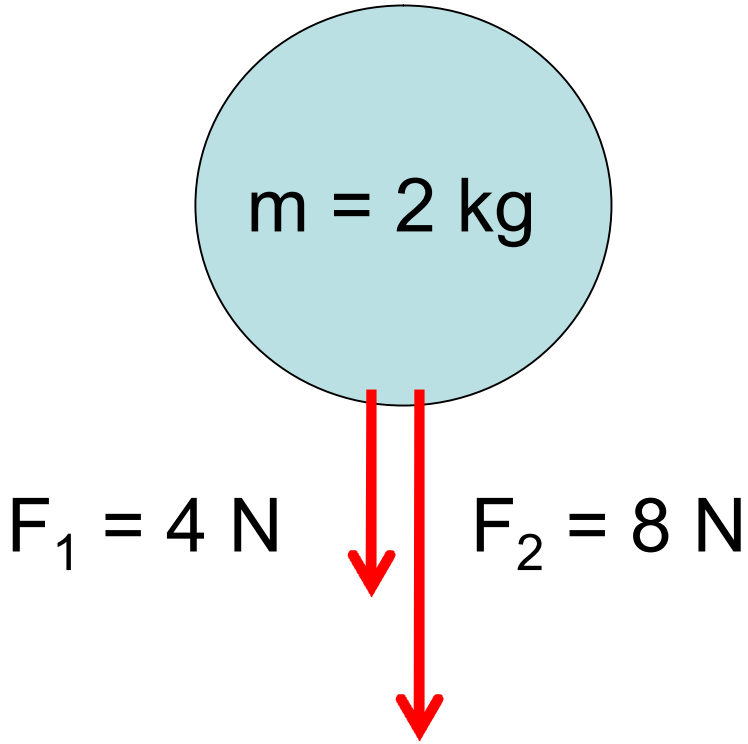
$\mathbf{F}_{net} = ?$

$\mathbf{a} = ?$



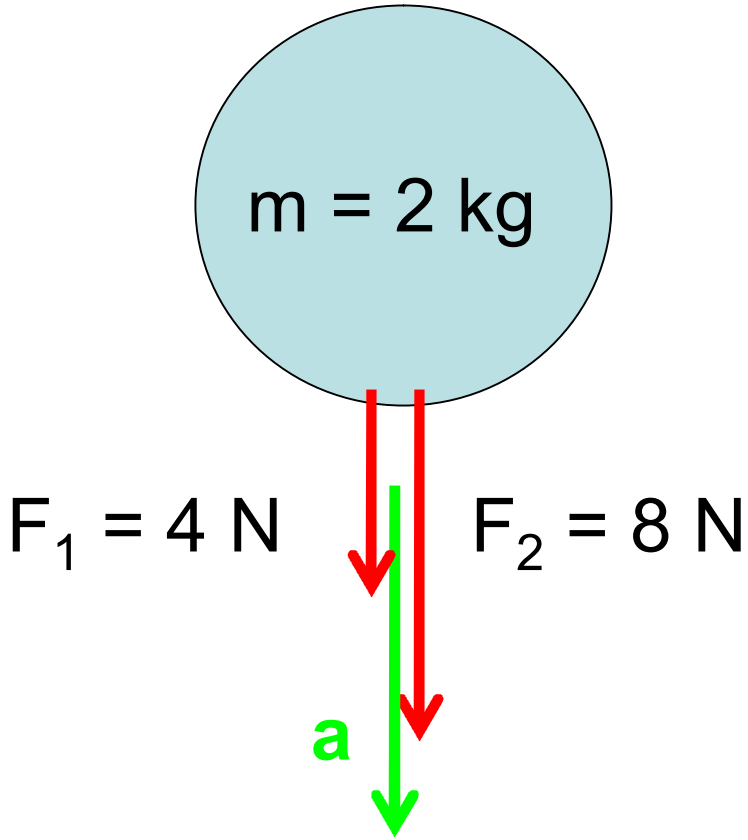
$\mathbf{F}_{net}$ = 12 N, 270°

a = ?



$\mathbf{F}_{net}$ = 12 N, 270°

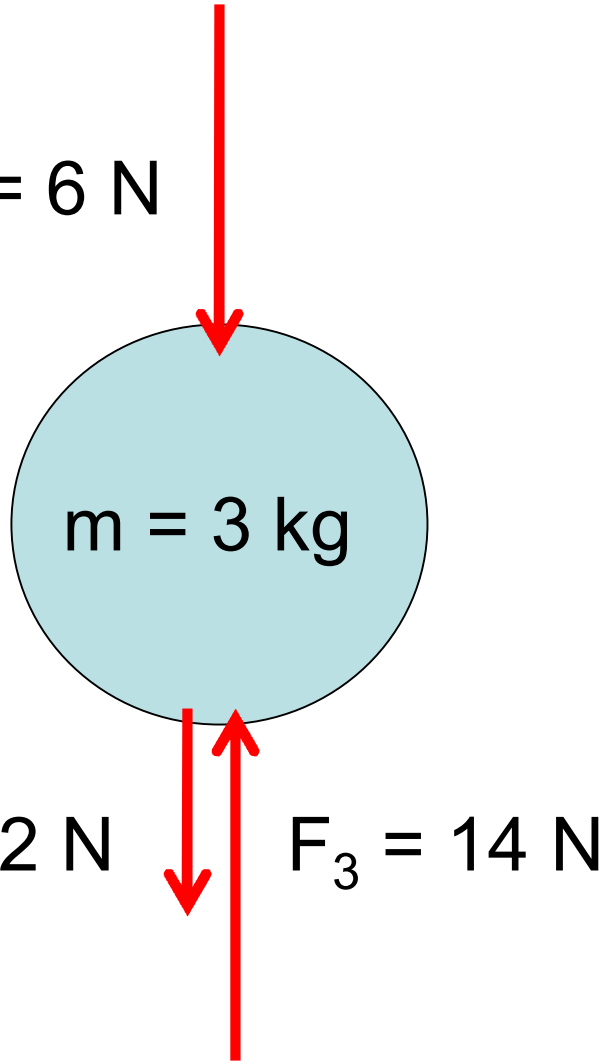
$\mathbf{a}$ = 6 m/s^2, 270°



$\mathbf{F}_{net} = ?$

$F_1 = 6$ N

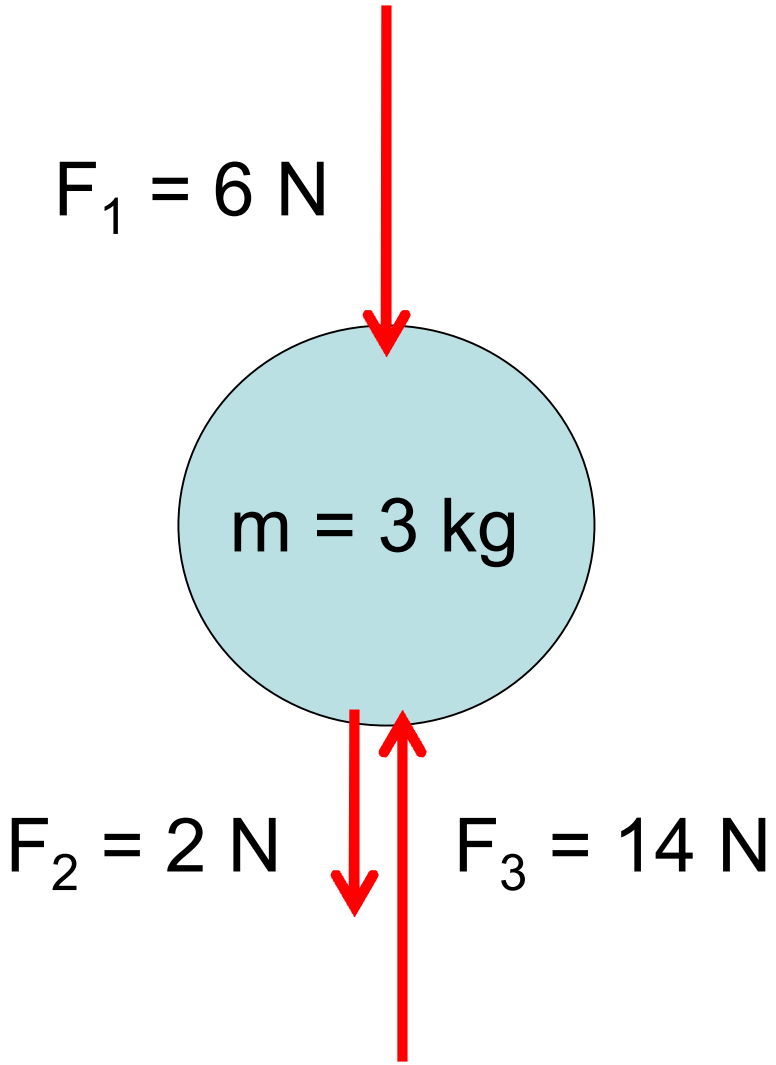
$\mathbf{a} = ?$



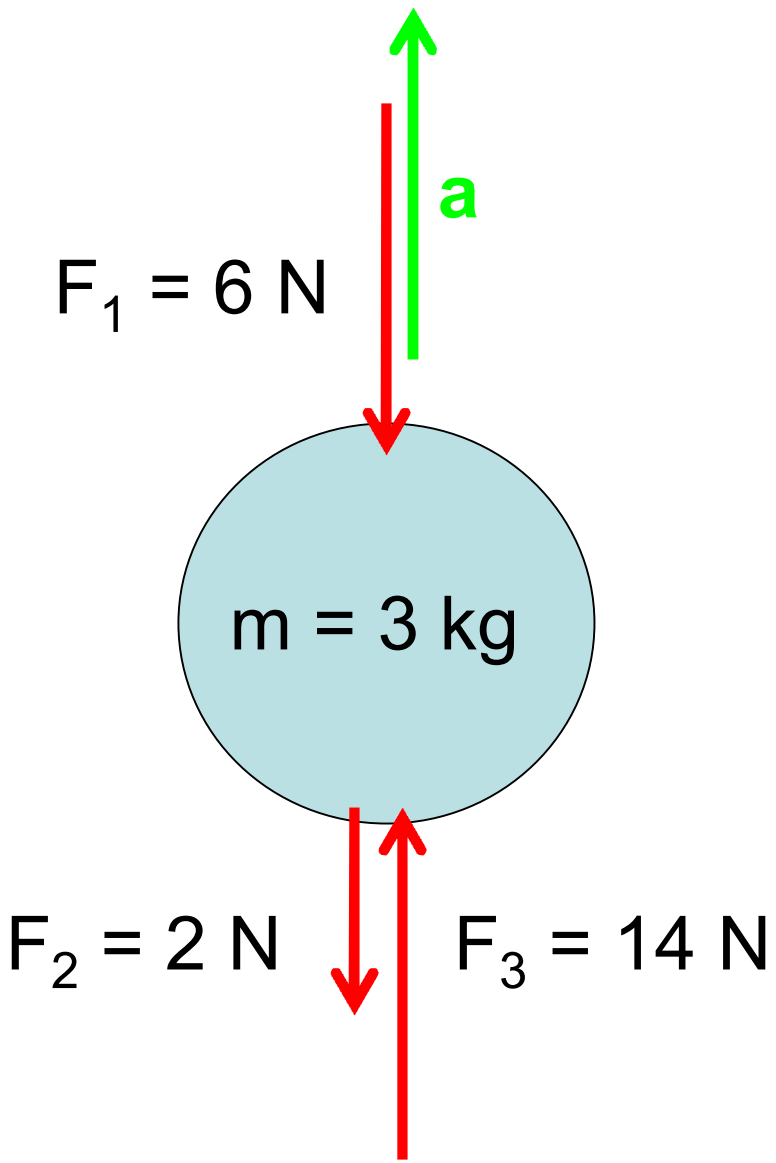
$F_2 = 2$ N

$F_3 = 14$ N

$\mathbf{F}_{net}$ = 6 N, 90°



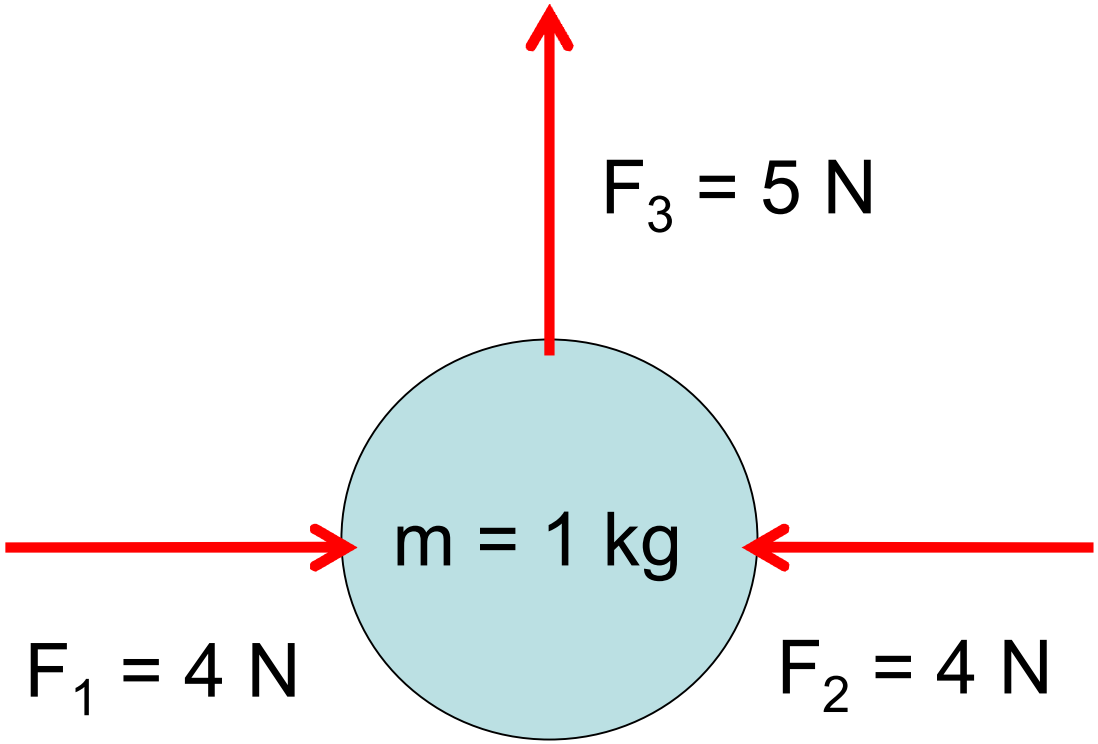
a = ?



$\mathbf{F}_{net}$ = 6 N, 90°

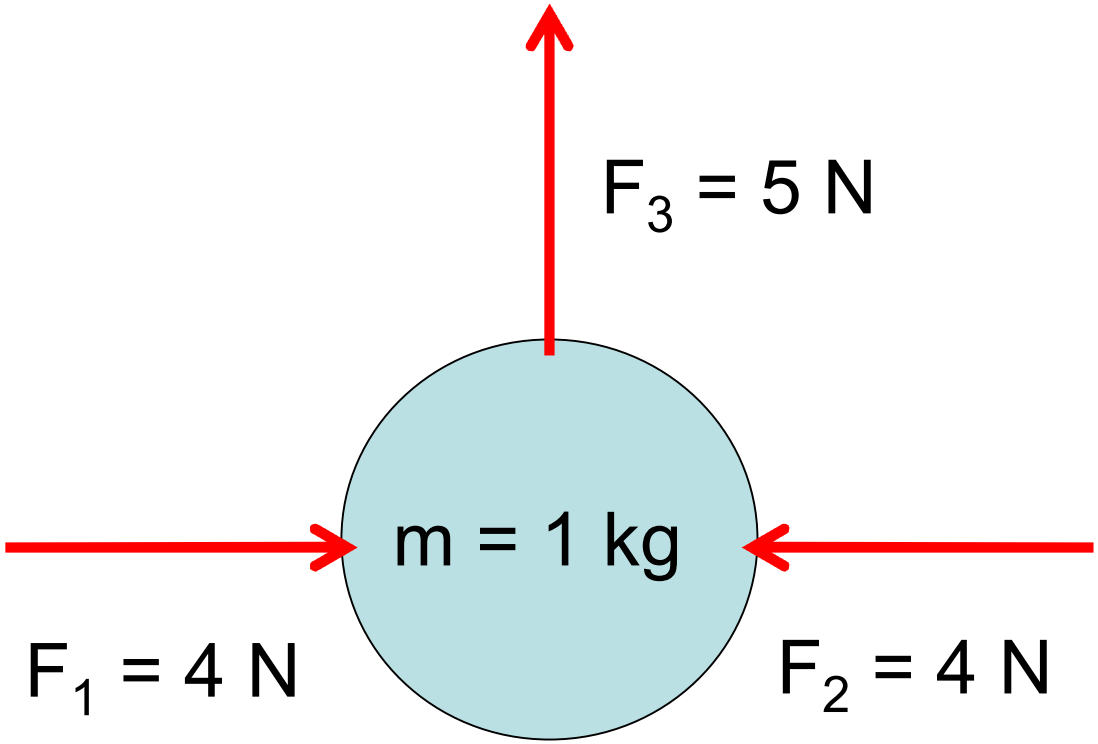
a = 2 m/s^2, 90°

$\mathbf{F}_{net} = ?$

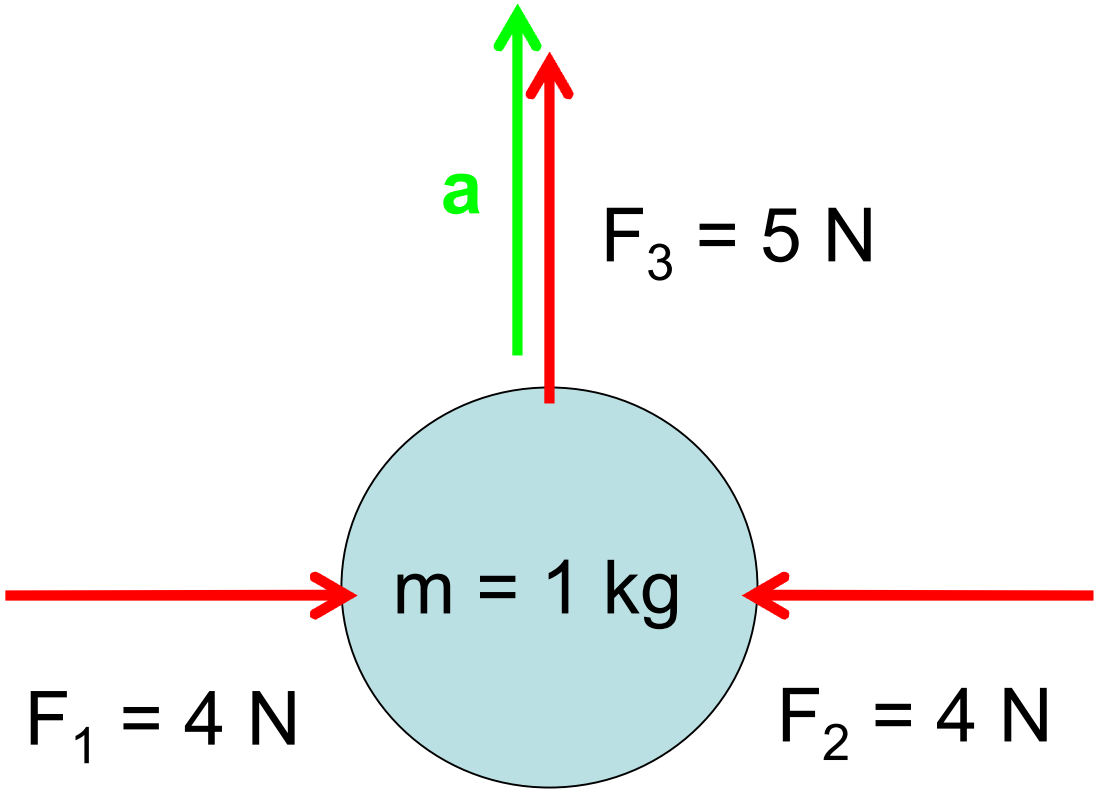


$\mathbf{a} = ?$

$\mathbf{F}_{net}$ = 5 N, 90°



a = ?

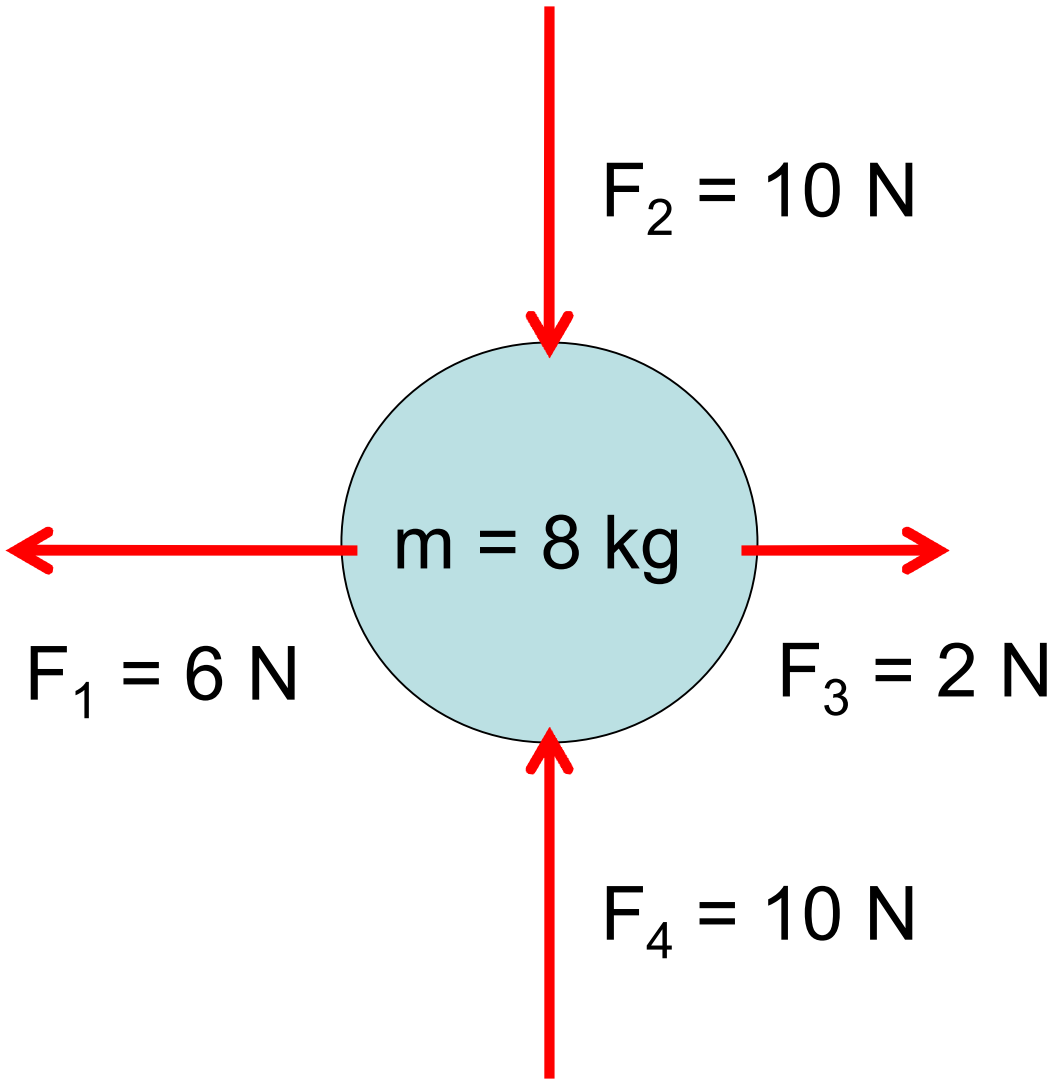


$\mathbf{F}_{net} = 5\ N, 90°$

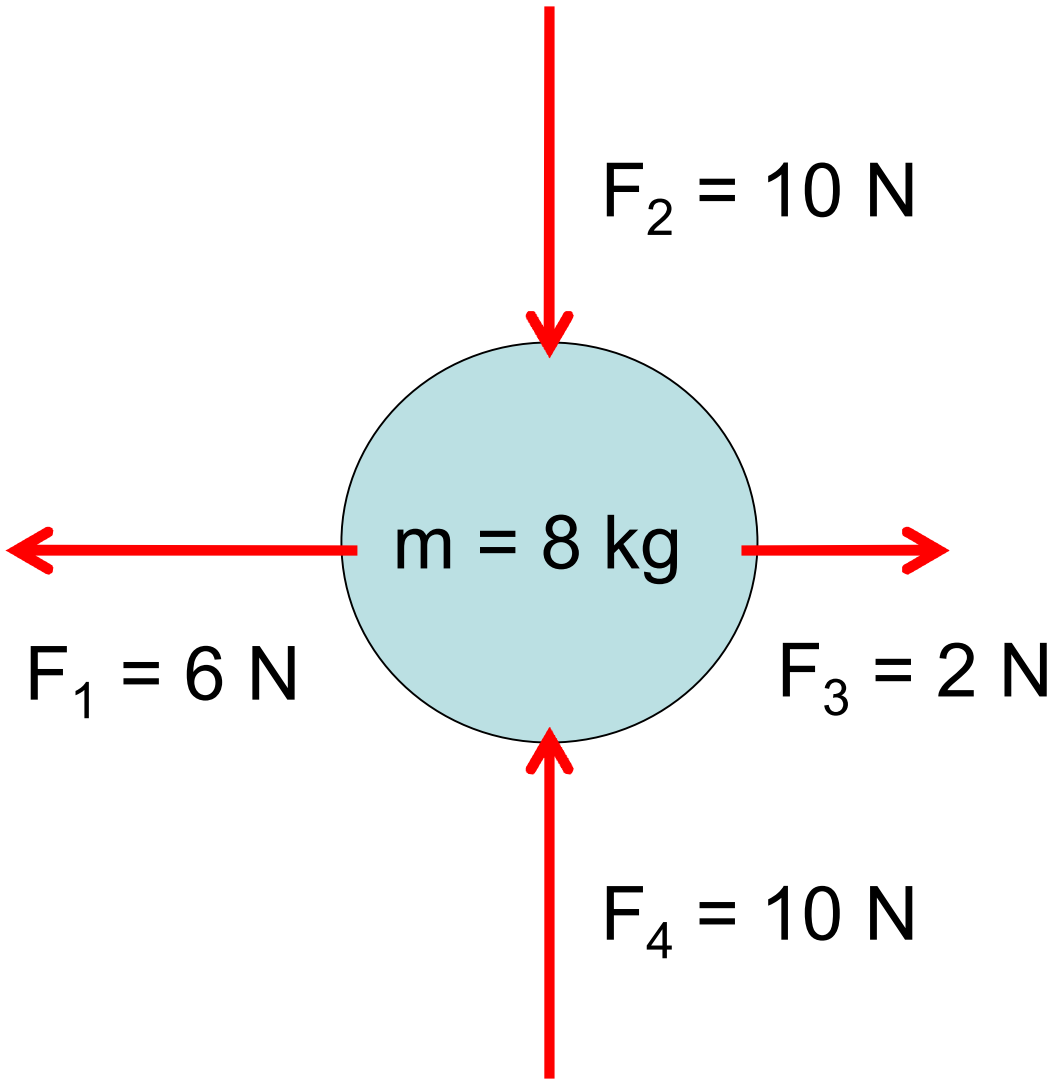
$\mathbf{a} = 5\ m/s^2, 90°$

$\mathbf{F}_{net} = ?$

$\mathbf{a} = ?$



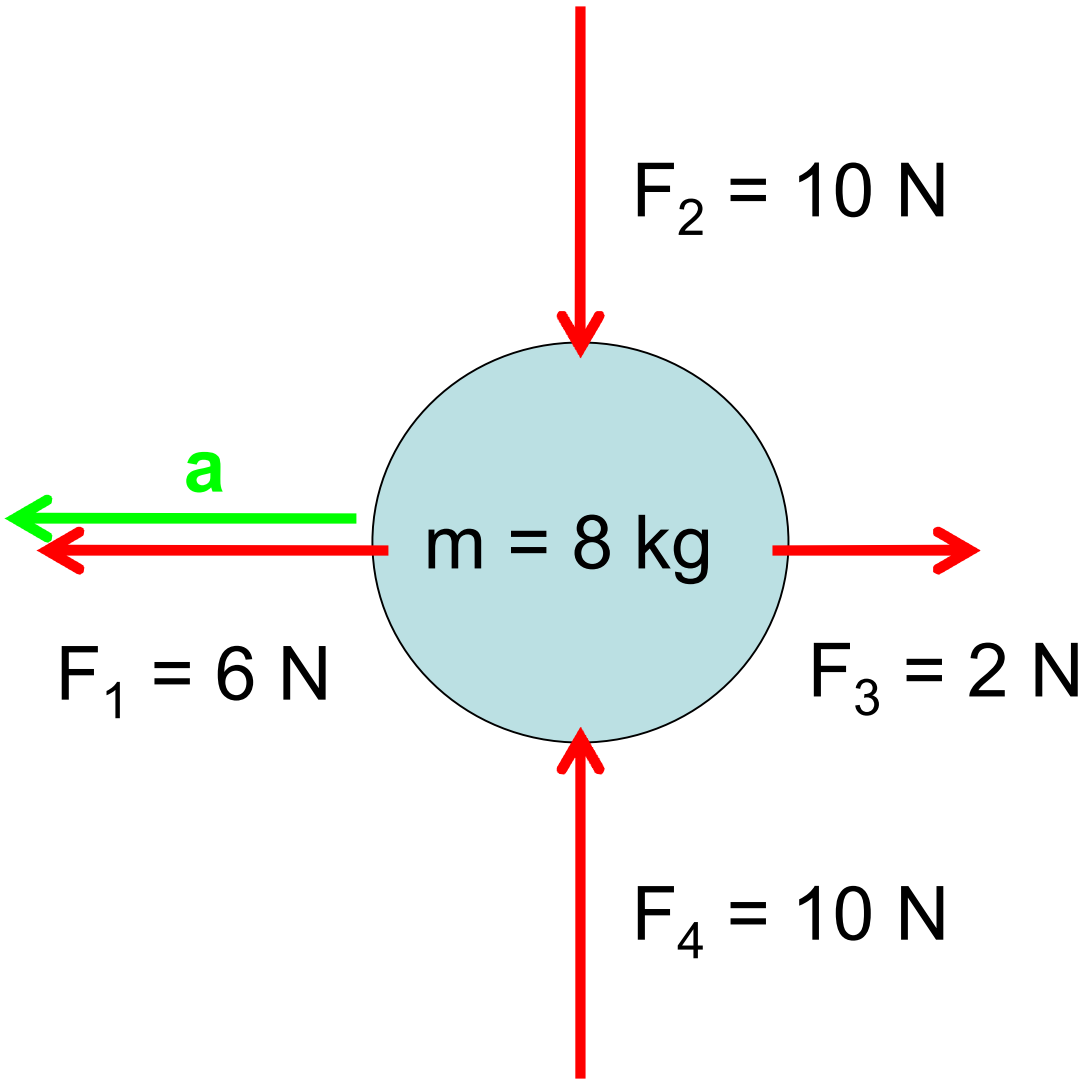
$\mathbf{F}_{net}$ = 4 N, 180°



a = ?

$\mathbf{F}_{net}$ = 4 N, 180°

$\mathbf{a}$ = 0.5 m/s^2, 180°

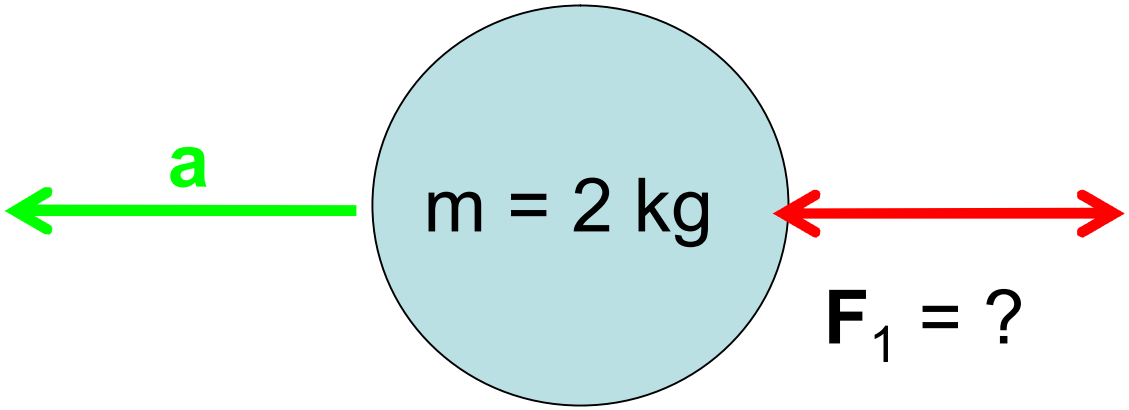


Another use of Newton's 2nd Law:

Solve for force(s) acting on an object, given acceleration and mass.

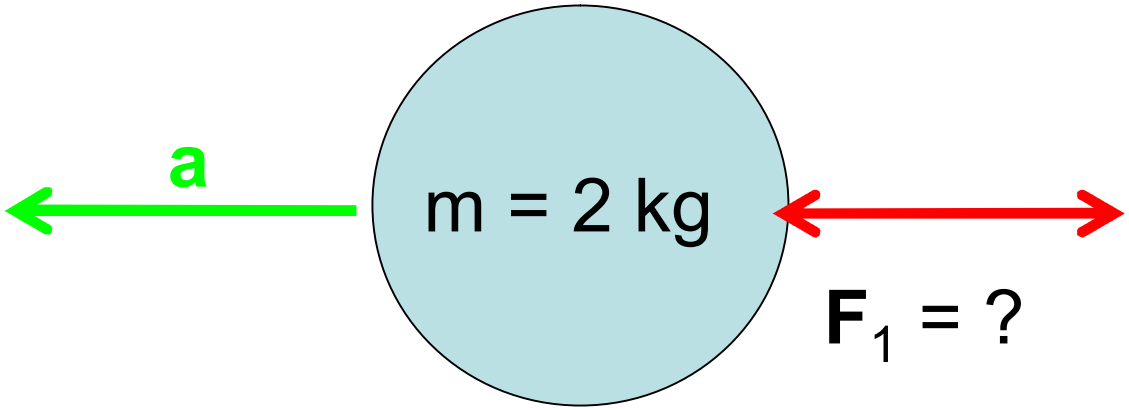
$\mathbf{F}_{net} = ?$

$\mathbf{a} = 3\ m/s^2, 180°$



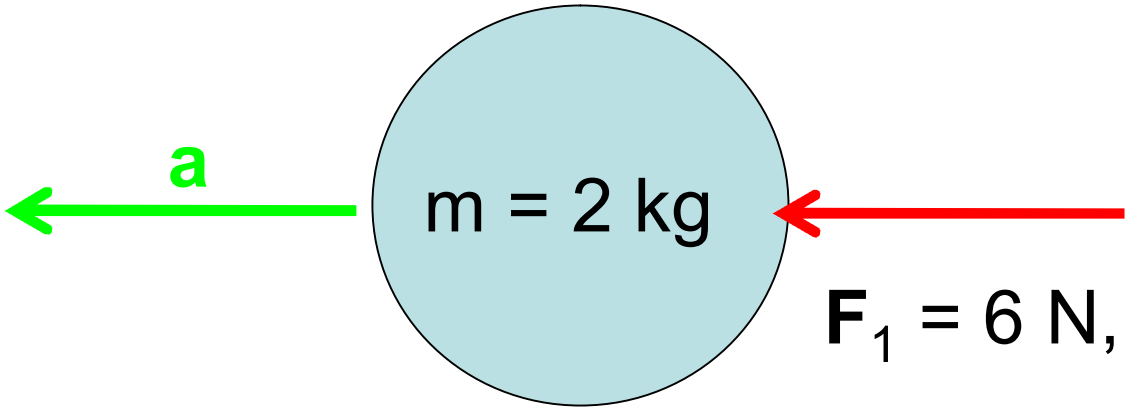
$\mathbf{F}_{net}$ = 6 N, 180°

a = 3 m/s^2, 180°



$\mathbf{F}_{net}$ = 6 N, 180°

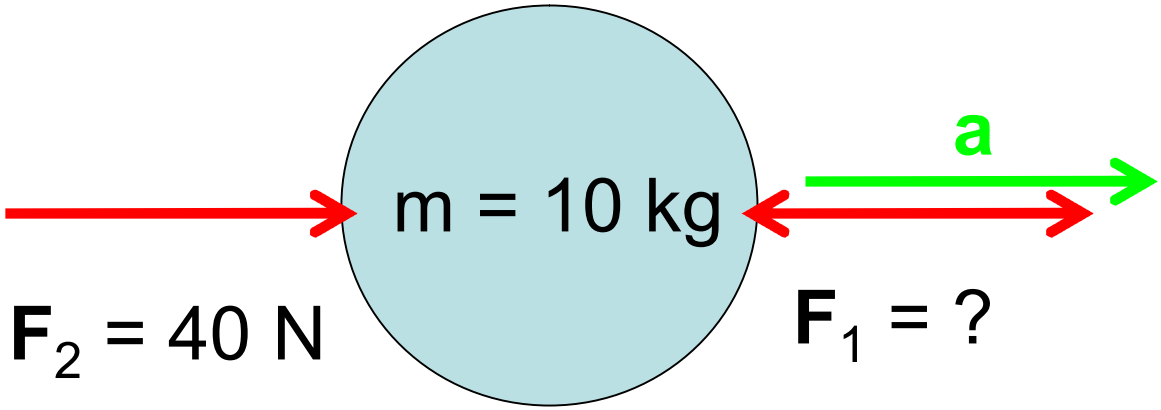
$\mathbf{a}$ = 3 m/s^2, 180°



$\mathbf{F}_1$ = 6 N, 180°

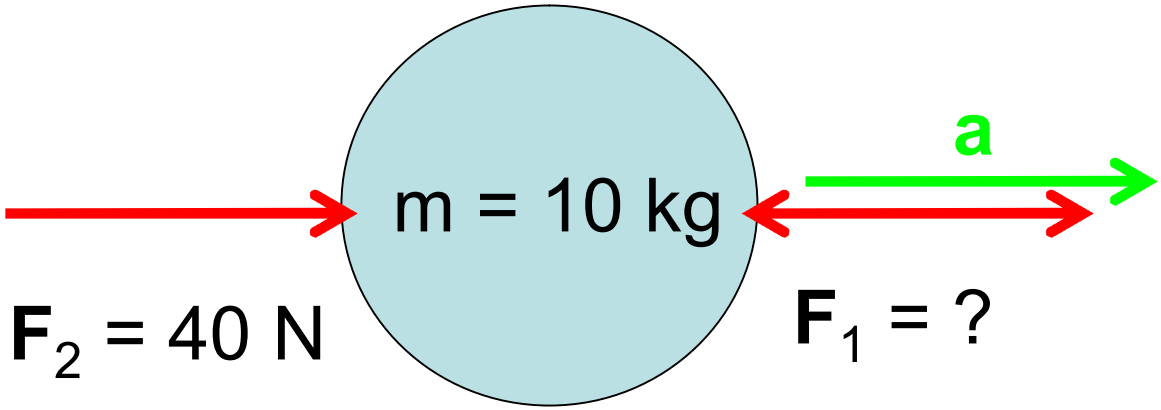
$\mathbf{F}_{net} = ?$

$\mathbf{a} = 3\ m/s^2, 0°$



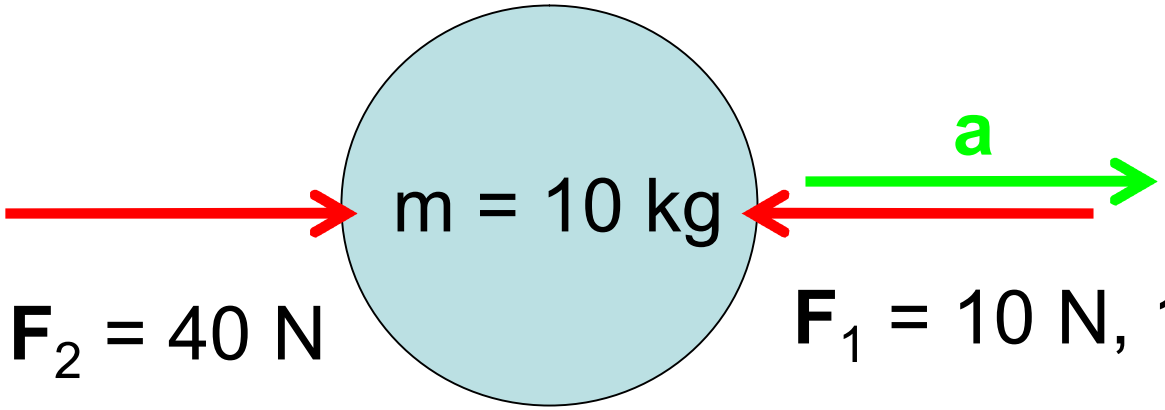
$\mathbf{F}_{net}$ = 30 N, 0°

a = 3 m/s^2, 0°

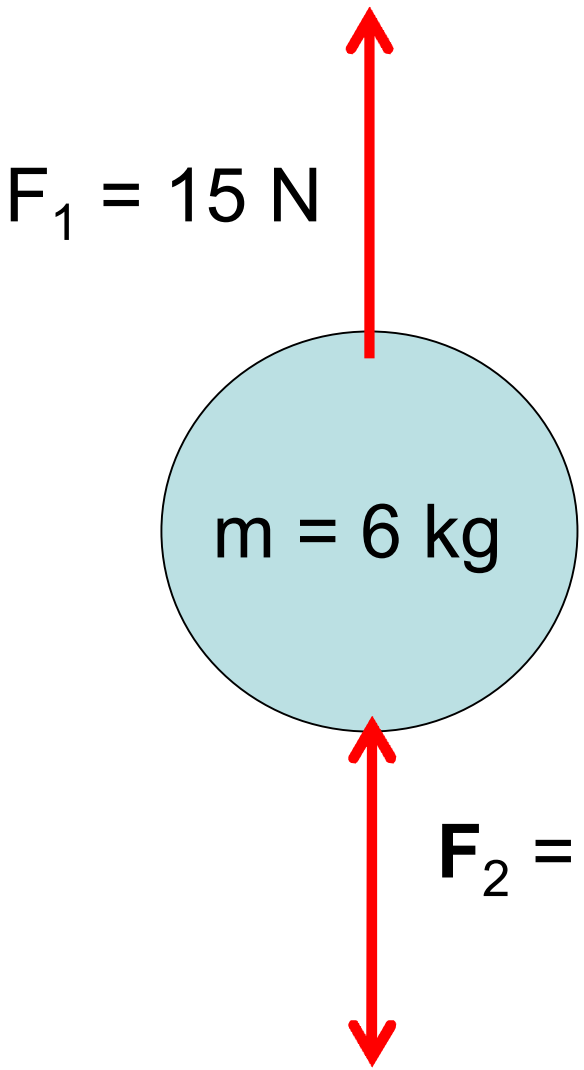


$\mathbf{F}_{net}$ = 30 N, 0°

$\mathbf{a}$ = 3 m/s^2, 0°



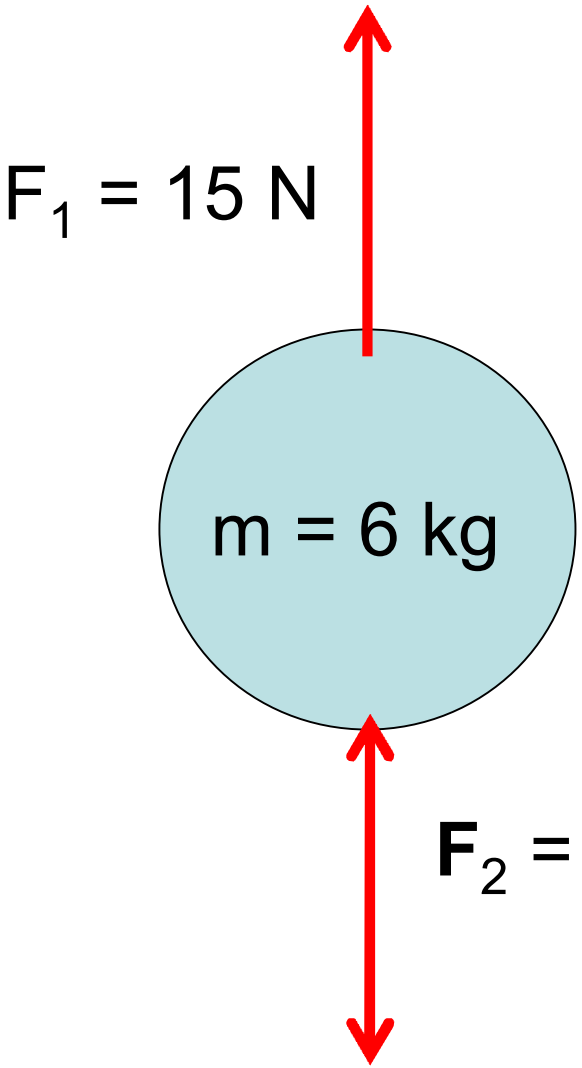
$\mathbf{F}_{net} = ?$



$\mathbf{a} = 0$ m/s^2

Object is at rest or moving with a constant velocity.

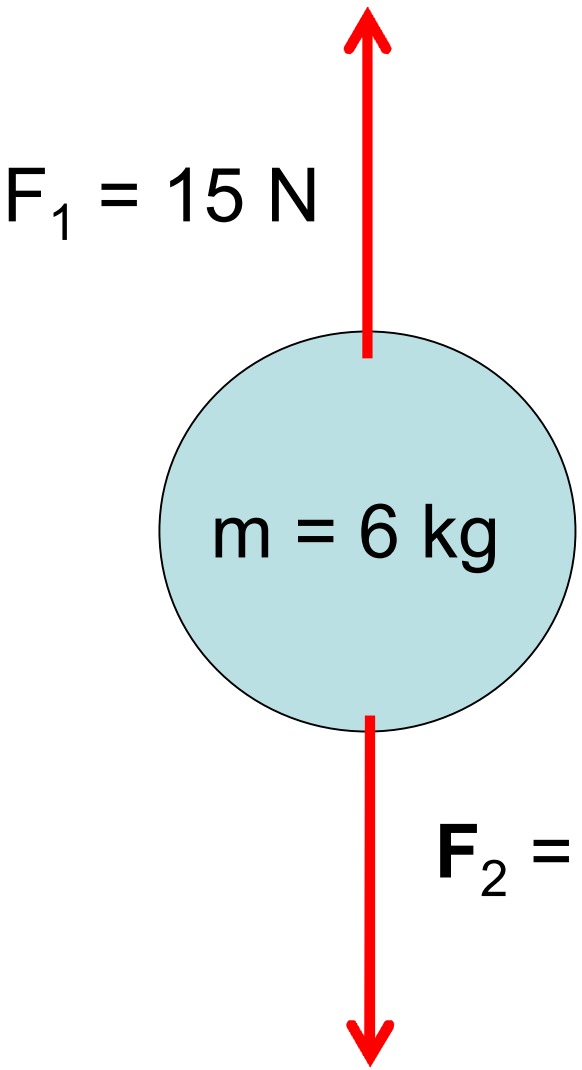
$\mathbf{F}_{net} = 0$ N



a = 0 m/s^2

Object is at rest or moving with a constant velocity.

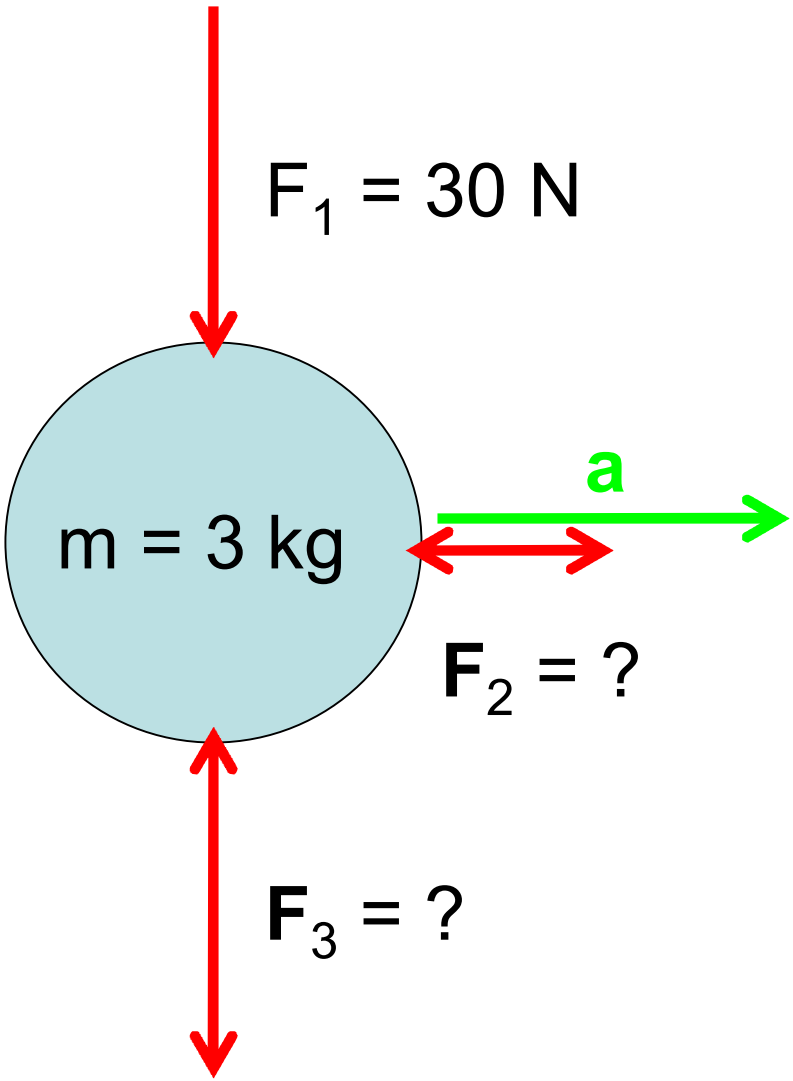
$\mathbf{F}_{net} = 0$ N



$\mathbf{a} = 0$ m/s^2

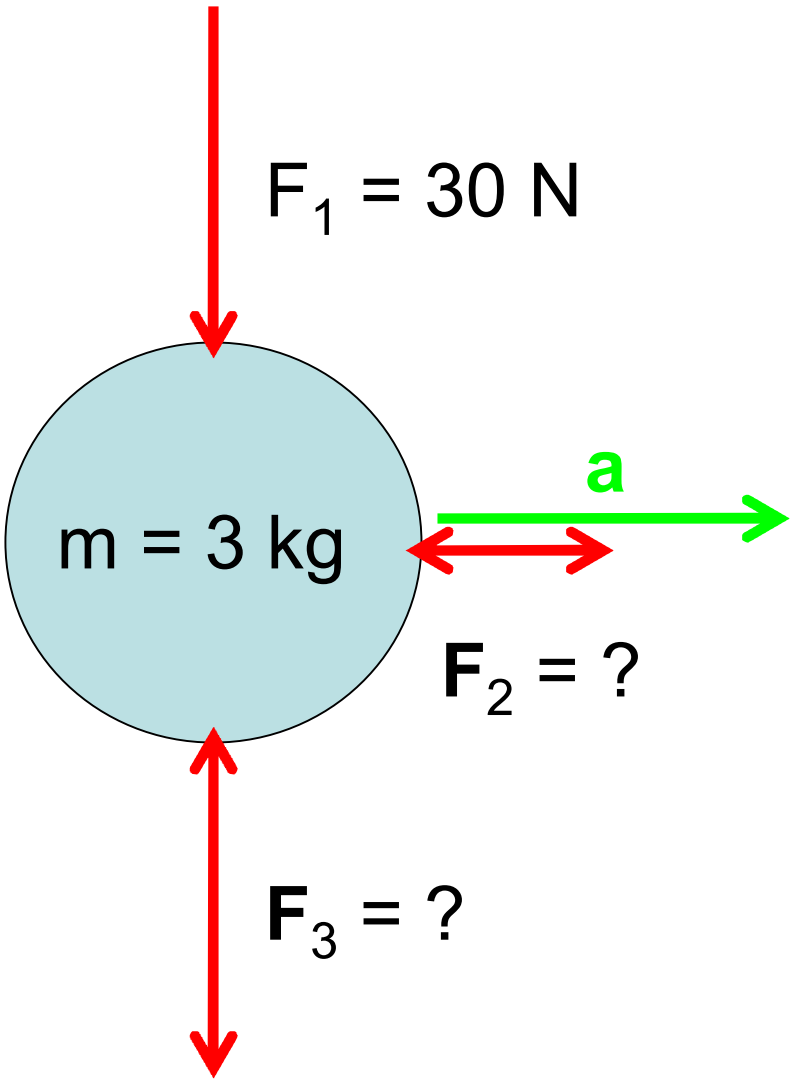
Object is at rest or moving with a constant velocity.

$\mathbf{F}_{net} = ?$



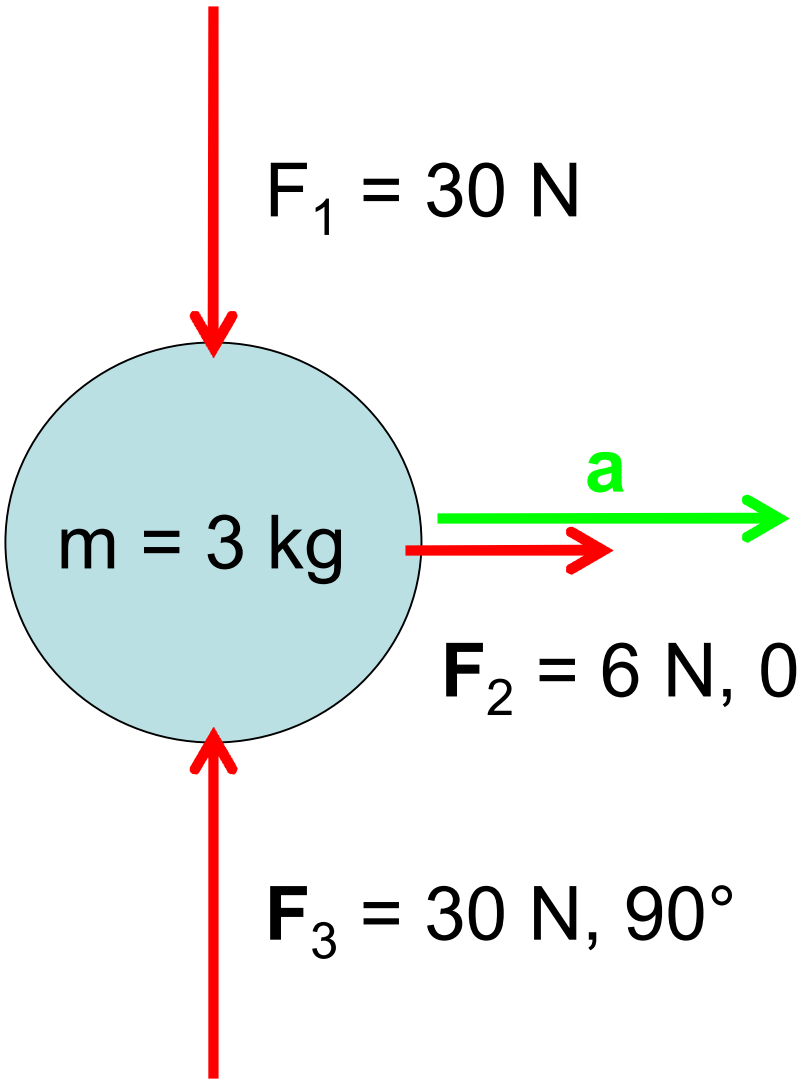
$\mathbf{a} = 2\ m/s^2,\ 0°$

$\mathbf{F}_{net}$ = 6 N, 0°



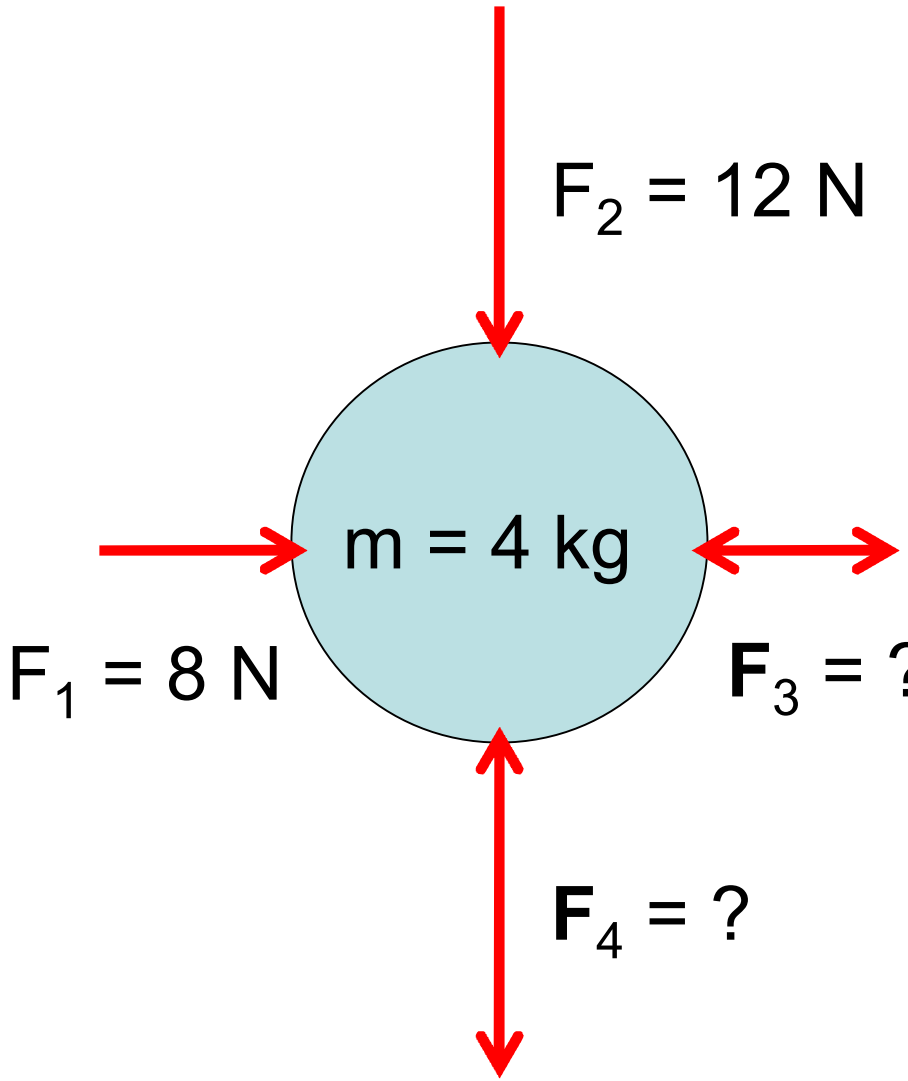
a = 2 m/s^2, 0°

$\mathbf{F}_{net}$ = 6 N, 0°



a = 2 m/s^2, 0°

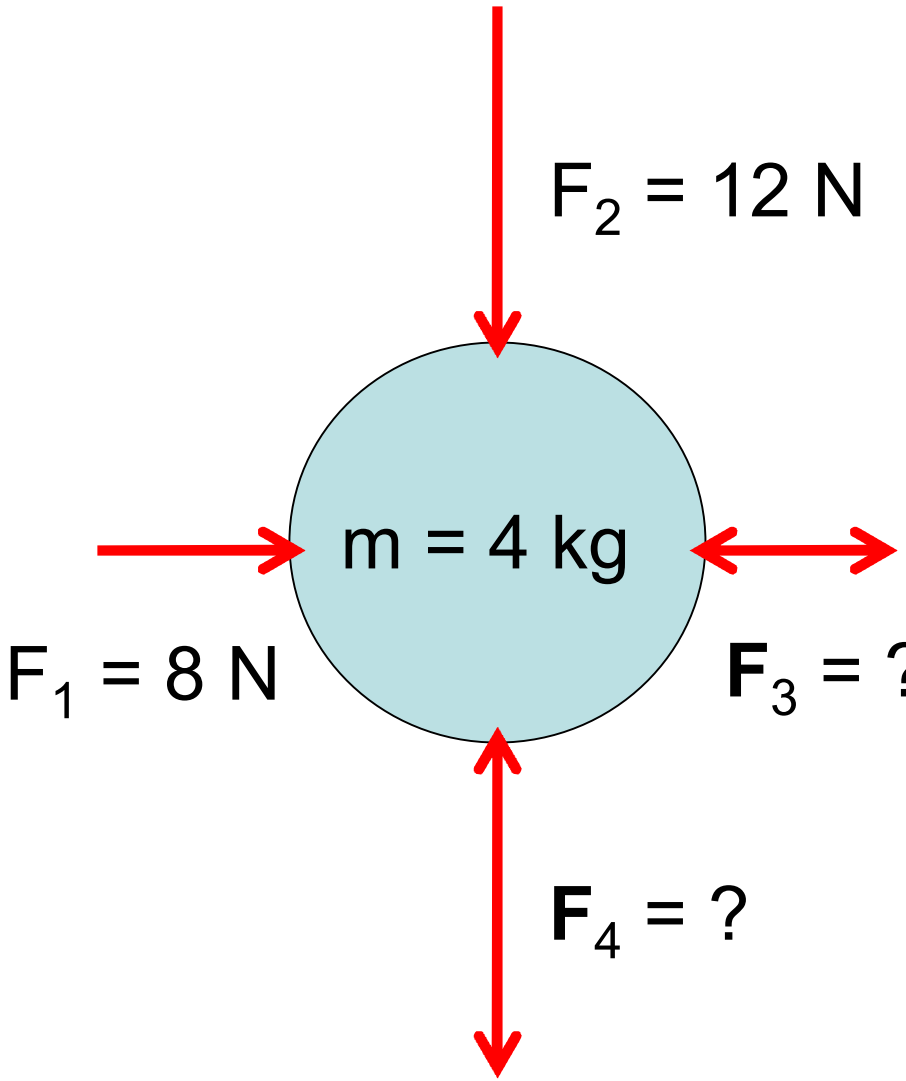
$\mathbf{F}_{net} = ?$



$\mathbf{a} = ?$

Object is moving to the right with constant velocity.

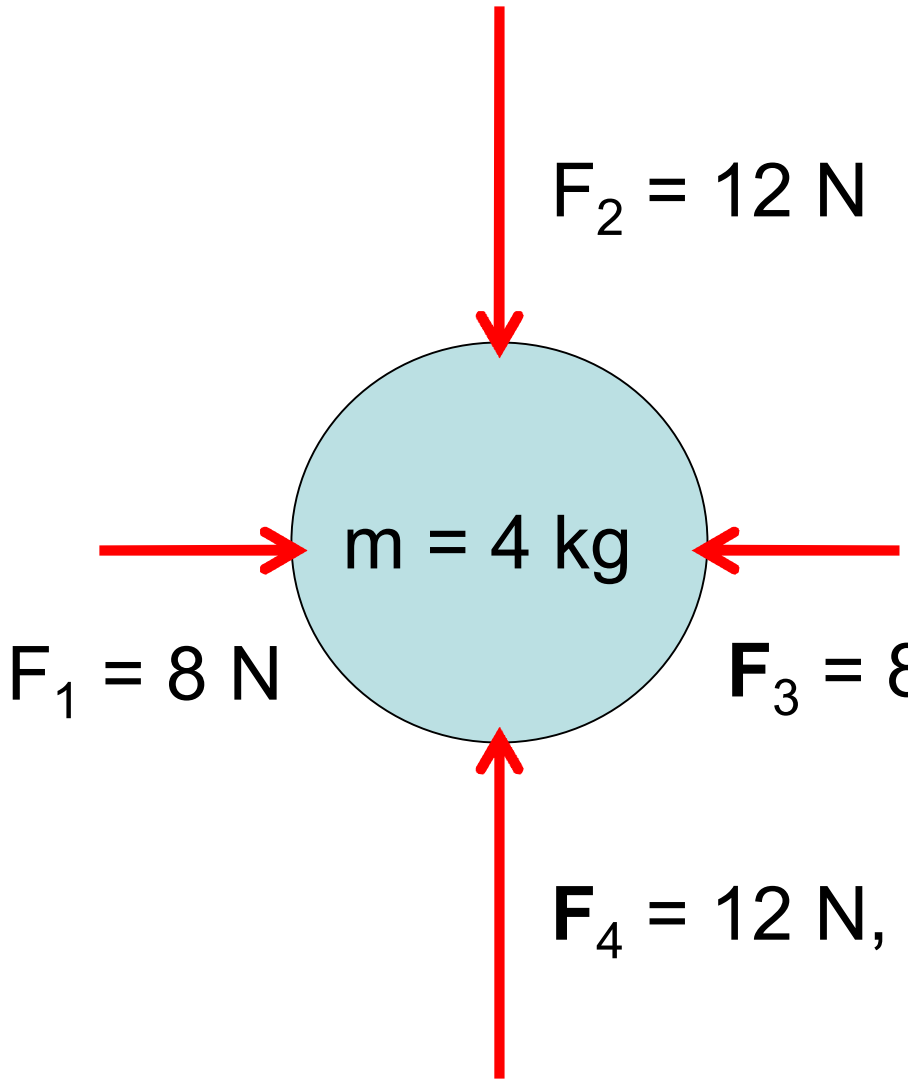
$\mathbf{F}_{net} = 0$ N



$\mathbf{a} = 0$ m/s^2

Object is moving to the right with constant velocity.

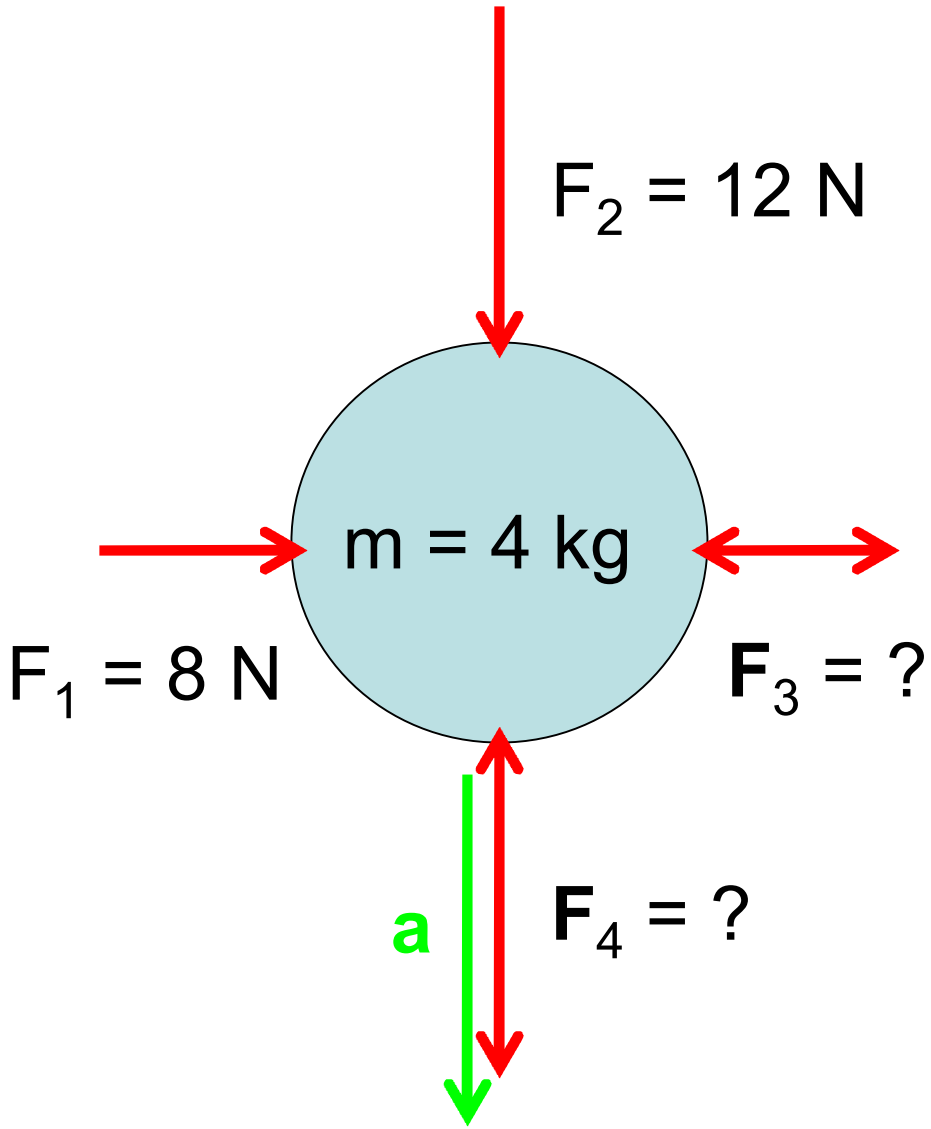
$\mathbf{F}_{net} = 0$ N



$\mathbf{a} = 0$ m/s^2

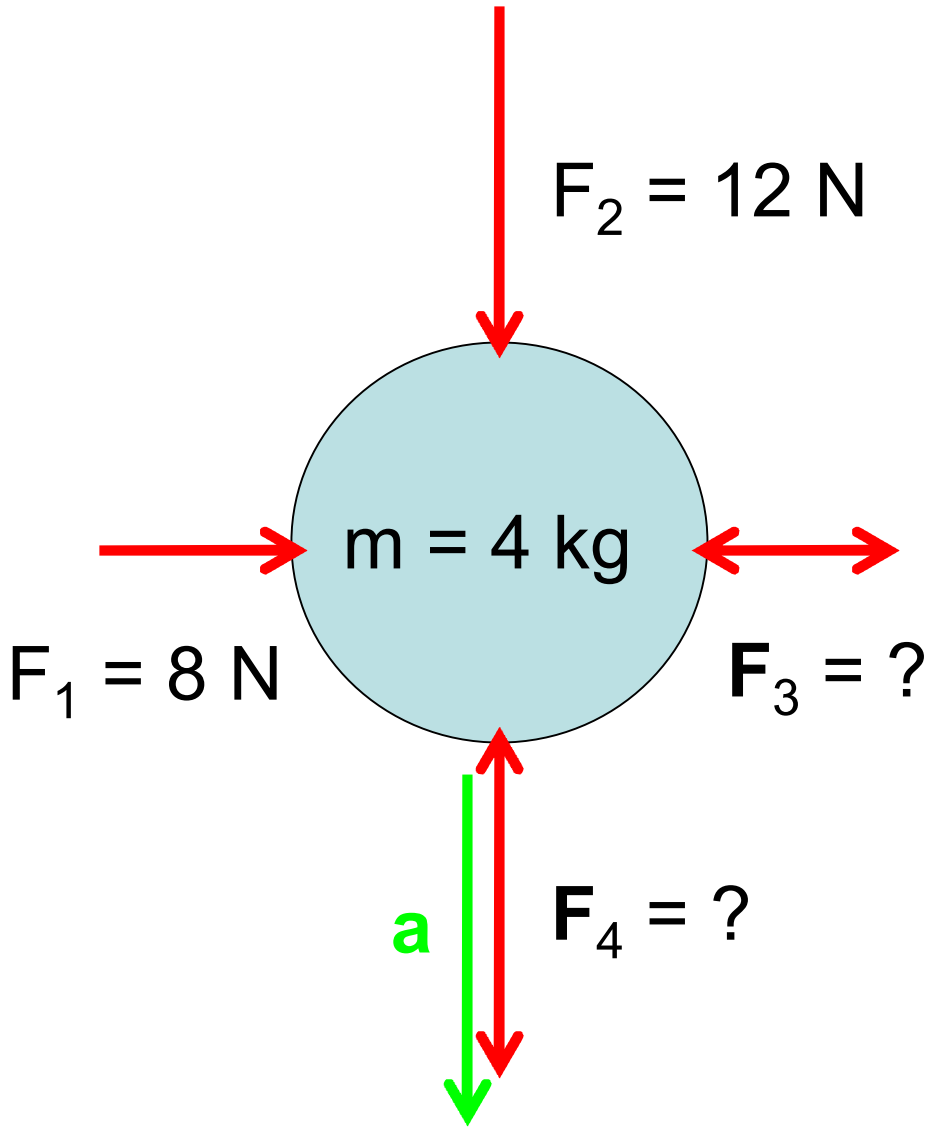
Object is moving to the right with constant velocity.

$\mathbf{F}_{net}$ = ?



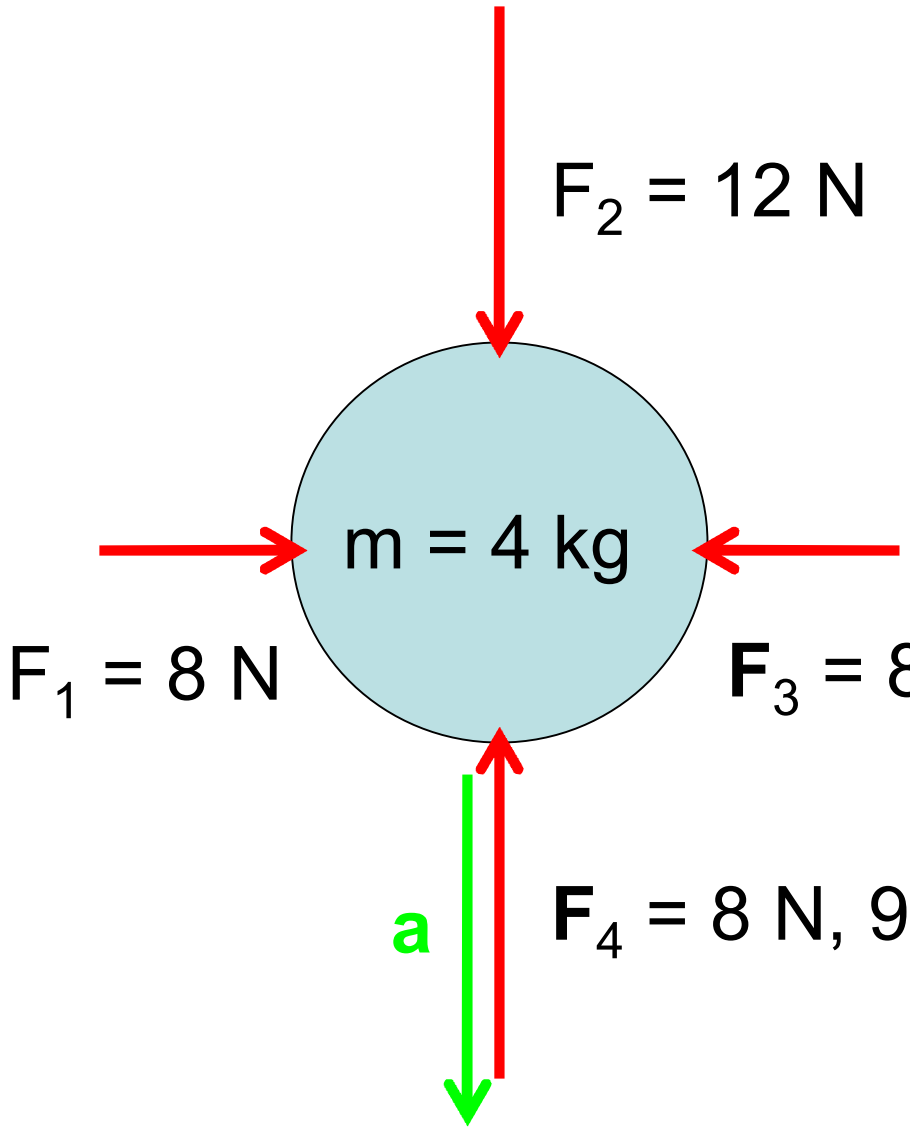
a = 1 m/s^2, 270°

$\mathbf{F}_{net}$ = 4 N, 270°



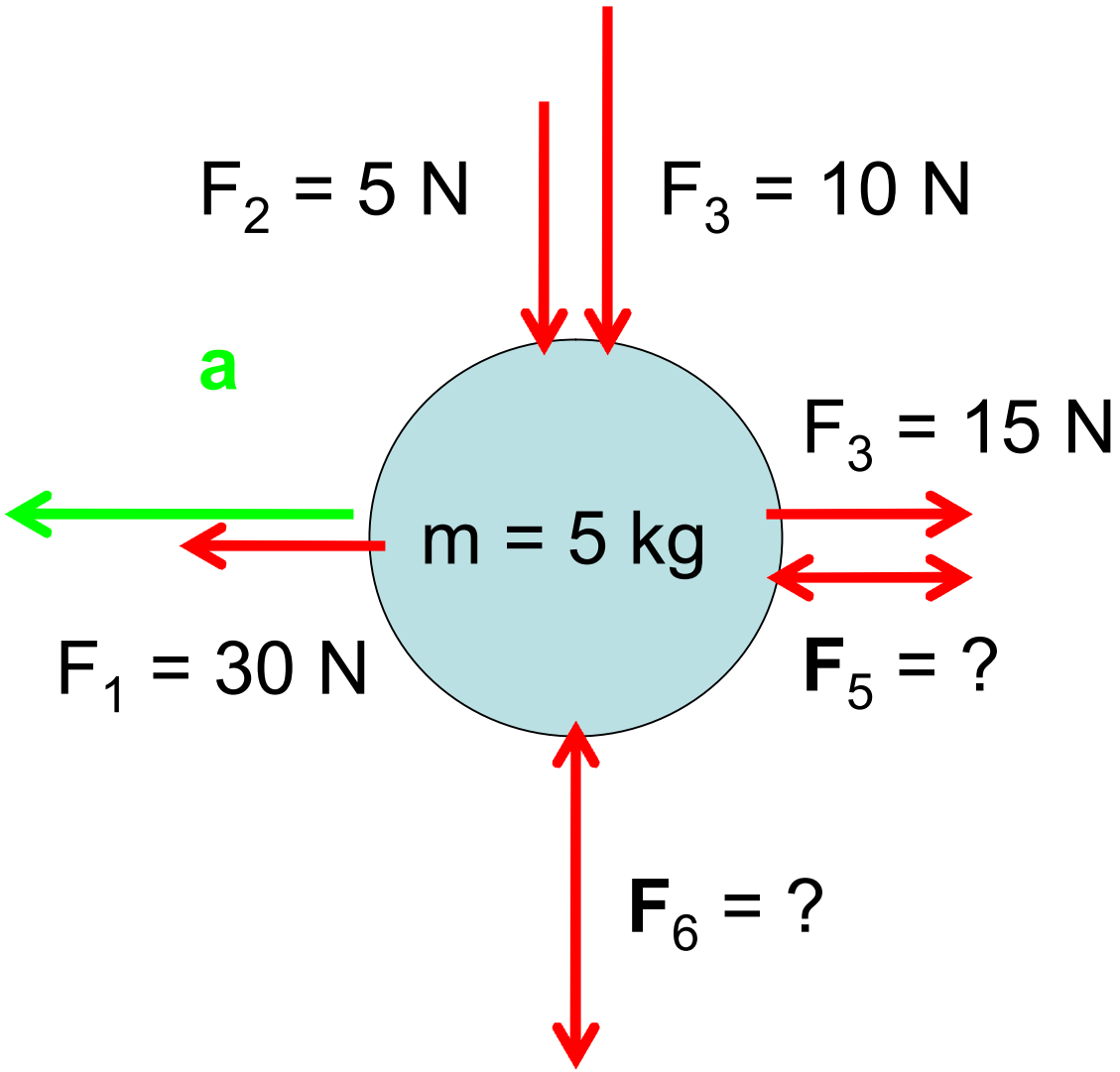
a = 1 m/s^2, 270°

$\mathbf{F}_{net}$ = 4 N, 270°



a = 1 m/s^2, 270°

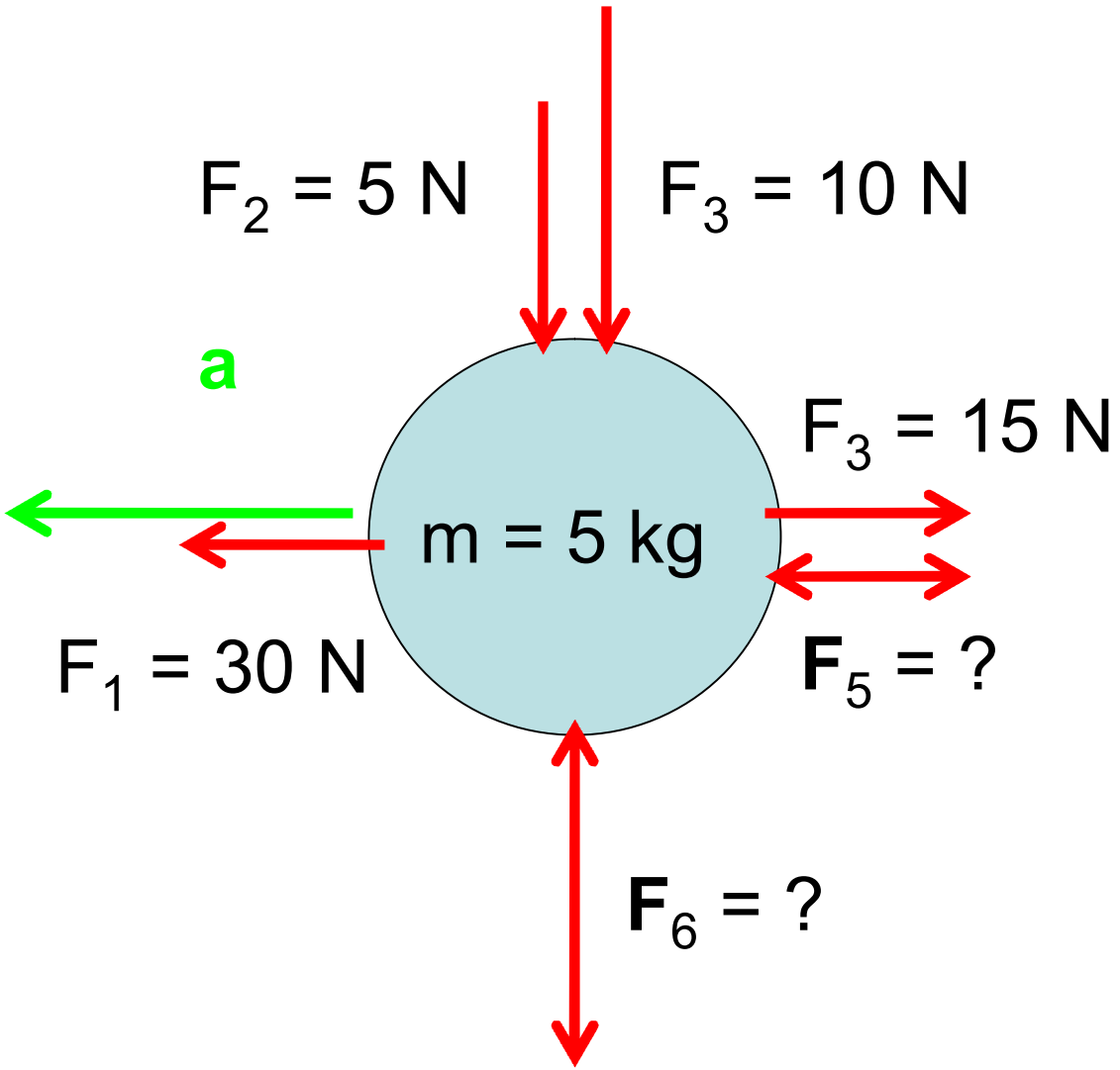
$\mathbf{F}_{net} = ?$



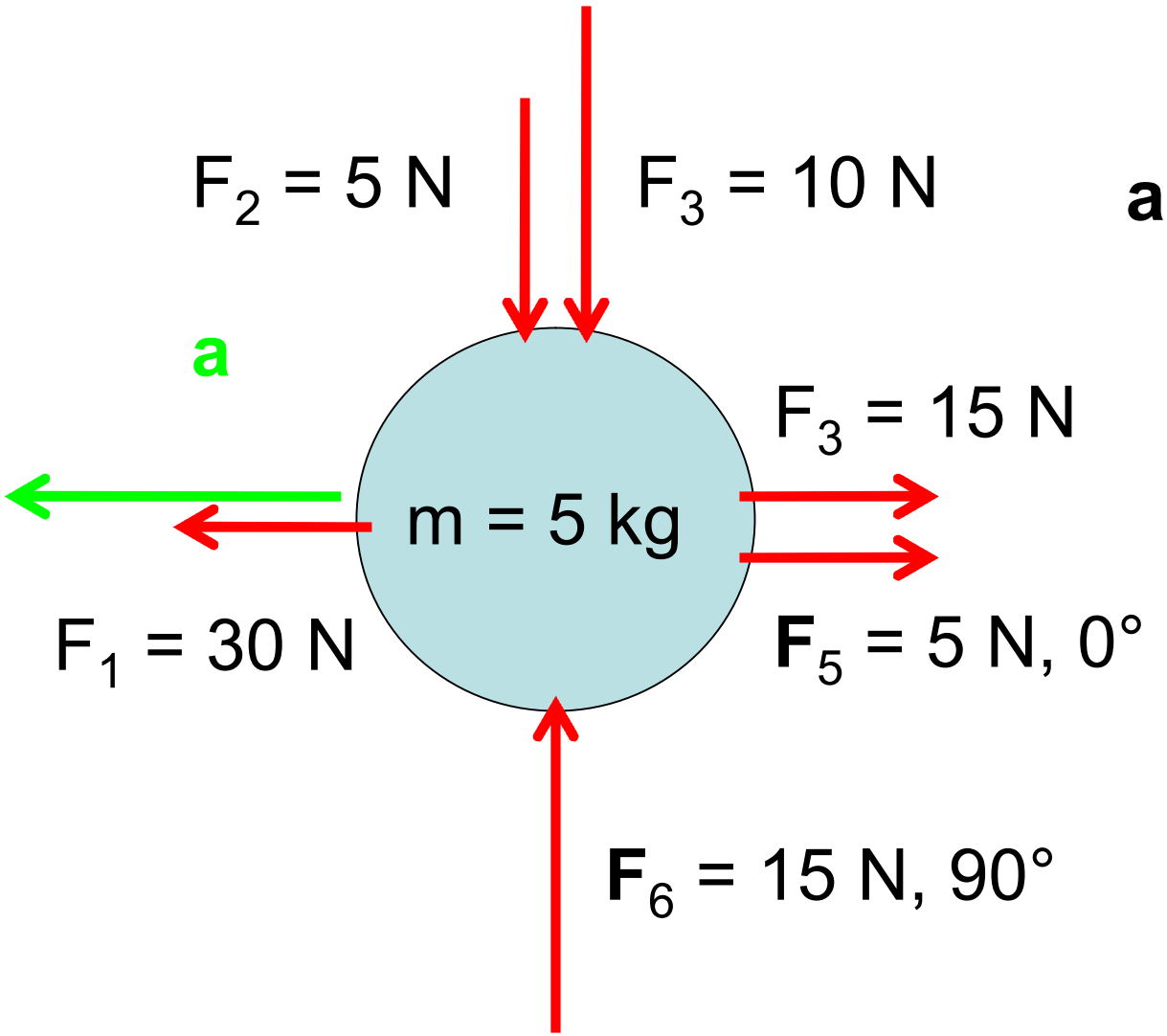
$\mathbf{a} = 2\ m/s^2, 180°$

$\mathbf{F}_{net}$ = 10 N, 180°

$\mathbf{a}$ = 2 m/s^2, 180°



$\mathbf{F}_{net}$ = 10 N, 180°



a = 2 m/s^2, 180°