Name: _____

Billy, Sally, and Bruno are playing three way tug of war using ropes attached to a bicycle tire. Billy is pulling with 15 N of force, Sally with 20 N of force, and Bruno with 5 N of force. Sally's rope is 120^0 counterclockwise from Billy's rope. Bruno's rope is 110^0 clockwise from Billy's rope.

a) What is the net force on the tire? Write your answer in unit vector notation.

b) In what direction is the tire's acceleration?

Billy

θ_s θ_B
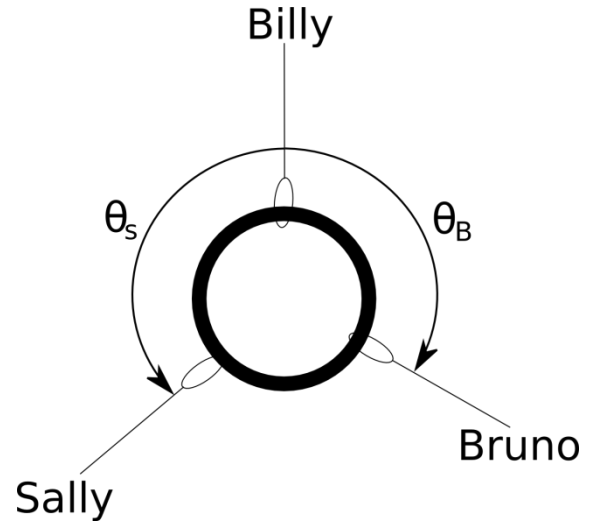
Bruno

Sally

For each figure, draw the net gravitational <u>force</u> vector, $\vec{F}_{g,net}$, acting on each of the masses. The lengths of your vectors should indicate the relative magnitudes of the forces.

(a)

(b)

(c)
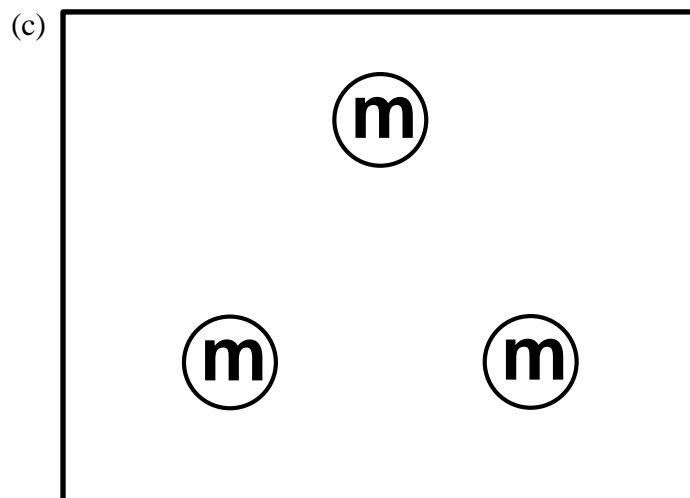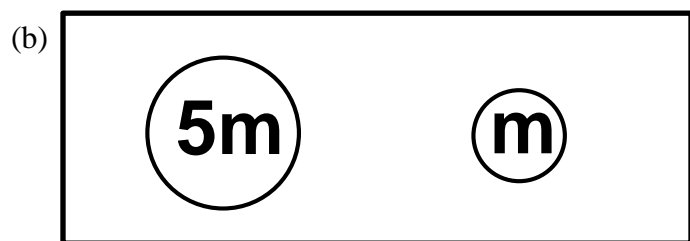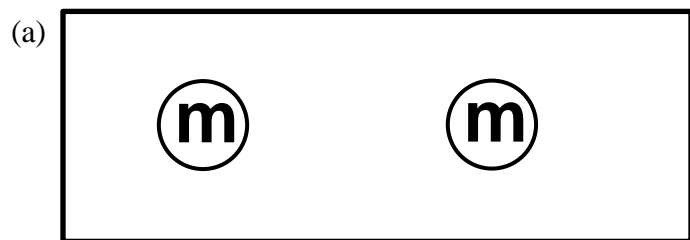
Billy, Sally, and Bruno have suddenly become small planets and are attempting to pull the tire with without touching it, using only their gravitational force. Billy is 6×10^3 m away from the tire and has a mass of 2×10^6 kg. Sally is 3×10^3 m away from the tire and has a mass of 1.5×10^6 kg. Bruno is 1×10^3 m away from the tire and has a mass of 5×10^5 kg. The mass of the tire is 10 kg. $\theta_s = 120^\circ$ and $\theta_B = 110^\circ$
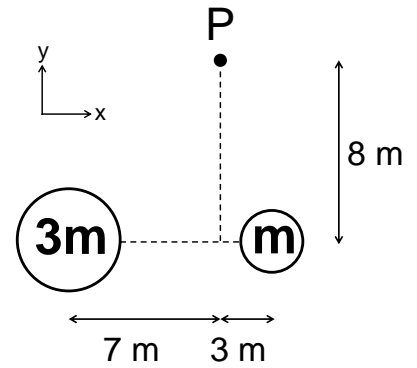
What is the net force on the tire?
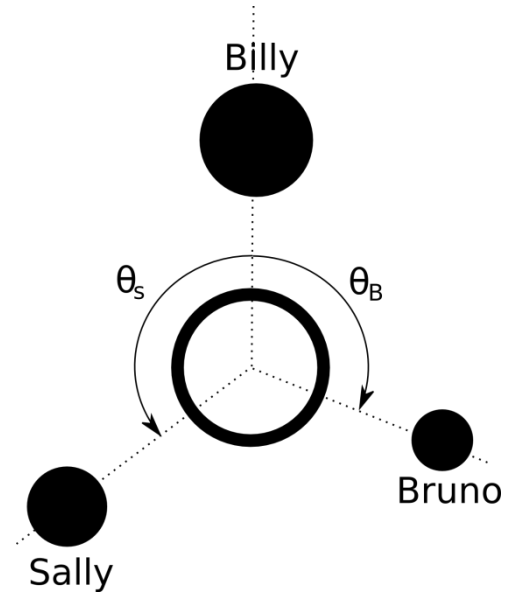
Consider the figure.   A mass of $2m$ is placed at point P.

a) Calculate the net gravitational force vector, $\vec{F}_{g,net}$, that will act on it.
Write your answer in unit vector notation. (Let $m = 3.2 \times 10^4$ kg.)

b) Calculate the magnitude and direction of $\vec{F}_{g,net}$.

Two masses M and $4M$ are separated by a distance D. Determine the location x of a point measured from M at which the net force on a *third* mass weighing m_3 would be zero.
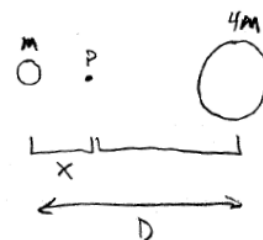
Wolfson Chapter 8 Question 11

Wolfson Chapter 8 Question 36