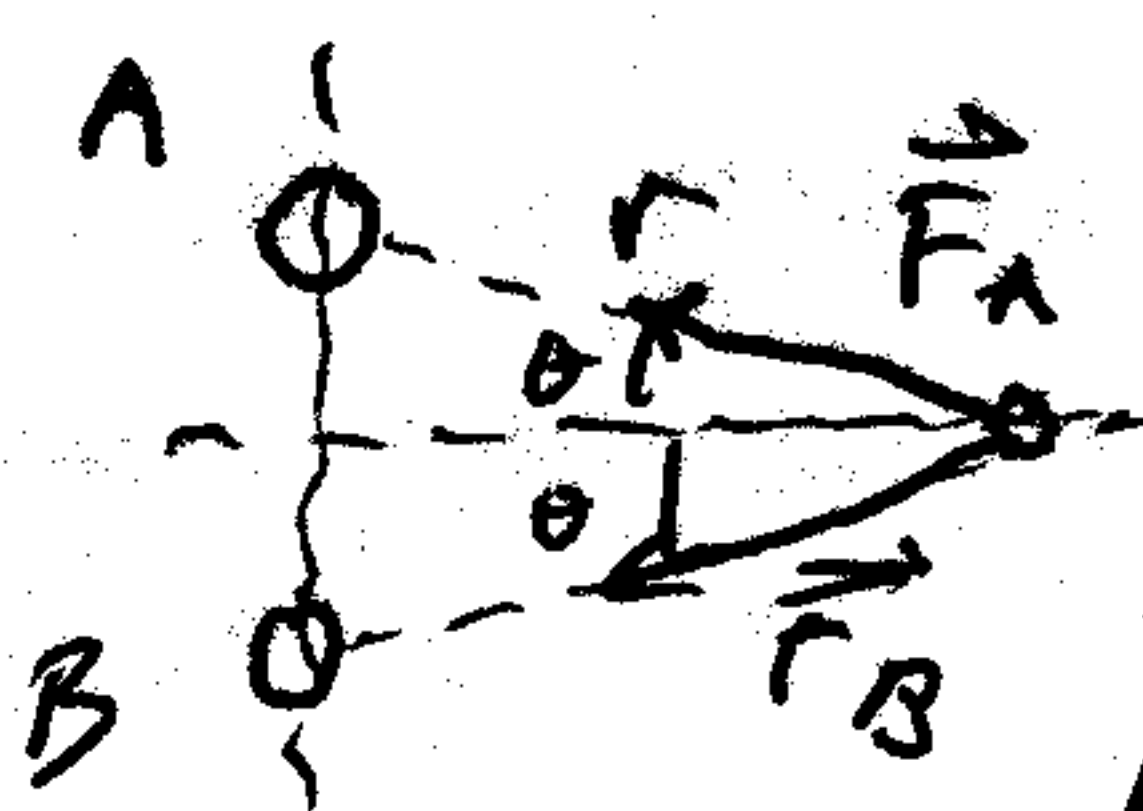


- b) Find the magnitude of the gravitational force on Mongo when it is on the perpendicular bisector to the line between Flambo A and Flambo B (that is, 90 degrees away in its orbit from the situation in part A).



$$r^2 = (1.0 \times 10^{16} \text{ m})^2 + (6.0 \times 10^{11} \text{ m})^2 = 3.7 \times 10^{23} \text{ m}^2$$

$$\theta = \tan^{-1}(1/6) = 9.46^\circ$$

$$|\vec{F}_A + \vec{F}_B| = 2|\vec{F}_A| \cos \theta$$

$$|\vec{F}_A| = \frac{G M M_f}{r^2} = (5.41 \times 10^{-4} \text{ N}) \frac{\text{kg}}{\text{kg}}$$

$$|\vec{F}_A + \vec{F}_B| = (1.07 \times 10^{-3} \text{ N}) \frac{\text{kg}}{\text{kg}} = 6.4 \times 10^{-4} \text{ N}$$

- c) From your results of A and B, is it reasonable that Mongo's orbit will be circular? Briefly discuss.

Not damn likely. The forces differ by 13%!

In a binary star system like this, you will not even have closed orbits that repeat.

3. A 35 kg box is pulled up a frictionless incline as shown on the right, by a 400 N force which makes a 20 degree angle to the plane of the ramp. The box starts at rest and moves a distance of 3.0 m along the ramp surface.

- a) find the work done by gravity.

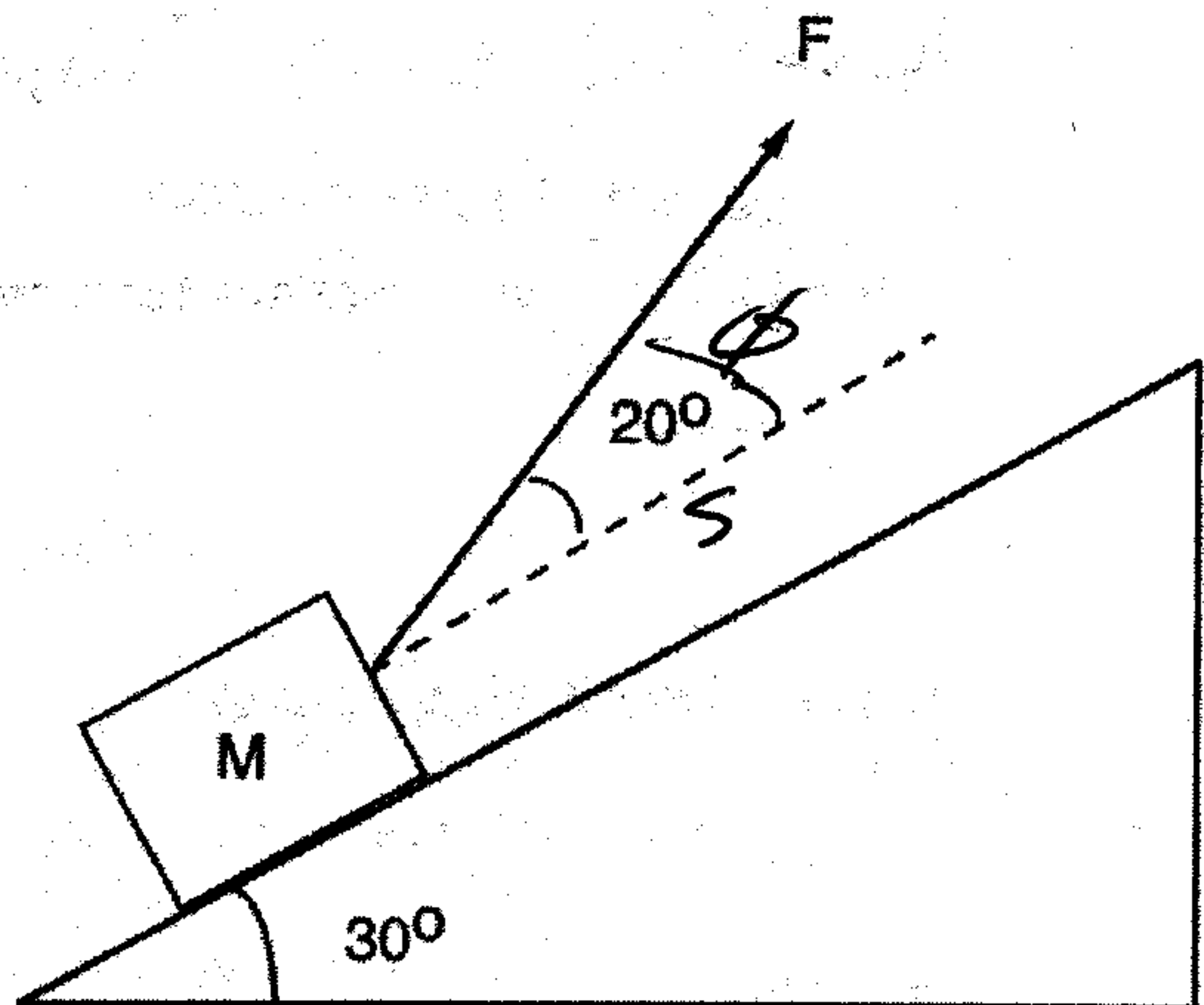
$$y_f - y_i = s (\sin \theta) = 1.5 \text{ m}$$

$$W_g = -mg(y_f - y_i) = -515 \text{ J}$$

- b) find the work done by the applied force.

$$W_F = F s \cos \phi$$

$$= 1130 \text{ J}$$



- c) find the final speed of the block, using the work-energy theorem.

$$W_{\text{net}} = W_F + W_g = 610 \text{ J} = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2 = 0 = 610 \text{ J}$$

$$v_f = \sqrt{\frac{2(610 \text{ J})}{35 \text{ kg}}} = 5.9 \text{ m/s}$$