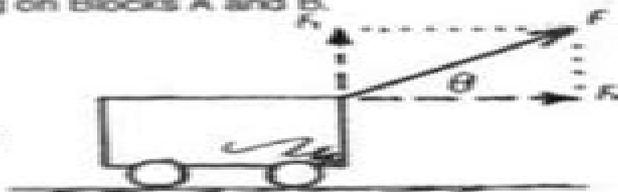


Chapter 5 Newton's Third Law of Motion
More on Vectors



1. Each of the vertically-suspended blocks has the same weight W . The two forces acting on Block C (W and rope tension T) are shown. Draw vectors to a reasonable scale for rope tensions acting on Blocks A and B.

2. The cart is pulled with force F at angle θ as shown. F_x and F_y are components of F .



a. How will the magnitude of F_x change if the angle θ is increased by a few degrees?

[more] [less] [no change]

b. How will the magnitude of F_y change if the angle θ is increased by a few degrees?

[more] [less] [no change]

c. What will be the value of F_x if angle θ is 90° ?

[more than F] [zero] [no change]

3. Force F pulls three blocks of equal mass across a friction-free table. Draw vectors of appropriate lengths for the rope tensions on each block.



If you're into trig,

$$\sin \theta = \frac{F_y}{F} ; \text{ so } F_y = F \sin \theta.$$

$$\cos \theta = \frac{F_x}{F} ; \text{ so } F_x = F \cos \theta.$$


4. Consider the boom supported by hinge A and by a cable B. Vectors are shown for the weight W of the boom at its center, and $W/2$ for vertical component of upward force supplied by the hinge.

a. Draw a vector representing the cable tension T at B. Why is it correct to draw its length so that the vertical component of $T = W/2$?

b. Draw component T_x at B. Then draw the horizontal component of the force at A. How do these horizontal components compare, and why?

5. The block rests on the inclined plane. The vector for its weight W is shown. How many other forces act on the block, including static friction? _____ . Draw them to a reasonable scale.

a. How does the component of W parallel to the plane compare with the force of friction? _____

b. How does the component of W perpendicular to the plane compare with the normal force? _____



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M Lipman



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