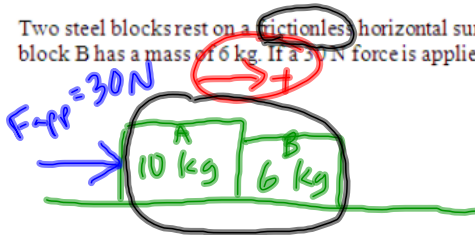


Solving Newton's 3rd Law Word Problems

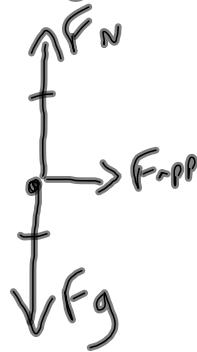
THE PERFECT SOLUTION (FOR FORCE PROBLEMS):

- 1a. Sketch a quick diagram of the entire situation
- 1b. Draw a FBD for the relevant object(s) and then choose your positive coordinate system
2. Write out all variables with signs and units
3. Convert units to m, s, or kg
4. Pick the appropriate equation – box it
5. Rearrange for the variable you need
6. Sub in numbers in brackets
7. Type into calculator in one step
8. Answer with units and direction – circle it

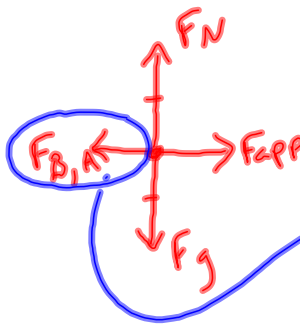
1. Two steel blocks rest on a frictionless horizontal surface side by side. Block A has a mass of 10 kg and block B has a mass of 6 kg. If a 30 N force is applied to block A, what is the force of block B on block A?



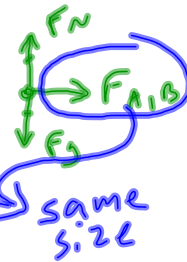
① FBD of entire 16-kg system



② FBD of box A



③ FBD of box B



System:

$$\boxed{F_{\text{net}} = ma}$$

$$\begin{aligned}
 & \downarrow \\
 & F_{\text{app}} \\
 a &= \frac{F_{\text{app}}}{m} \\
 &= \frac{+30 \text{ N}}{16 \text{ kg}} \\
 &= +1.875 \frac{\text{m}}{\text{s}^2}
 \end{aligned}$$

*same acc. for system, box A, and box B.

Box B:

$$\begin{aligned}
 & \boxed{F_{\text{net}} = ma} \\
 & \downarrow \\
 F_{A,B} &= (6 \text{ kg})(+1.875 \frac{\text{m}}{\text{s}^2}) \\
 &= +11.25 \text{ N}
 \end{aligned}$$

$$\vec{F}_{A,B} = 11.25 \text{ N} [\rightarrow]$$

$$\vec{F}_{B,A} = 11.25 \text{ N} [\leftarrow]$$