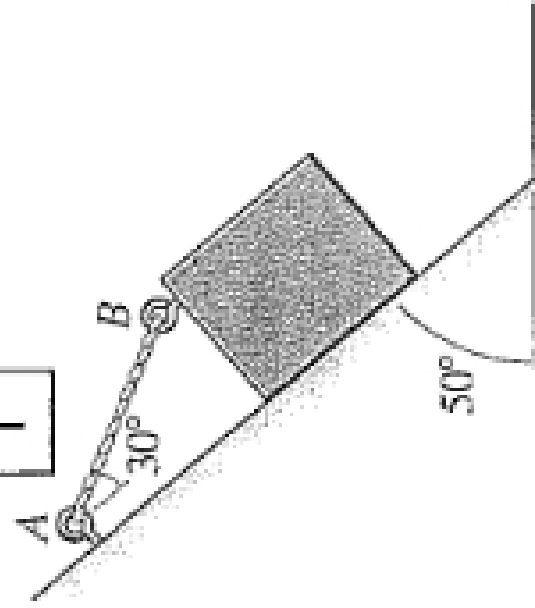


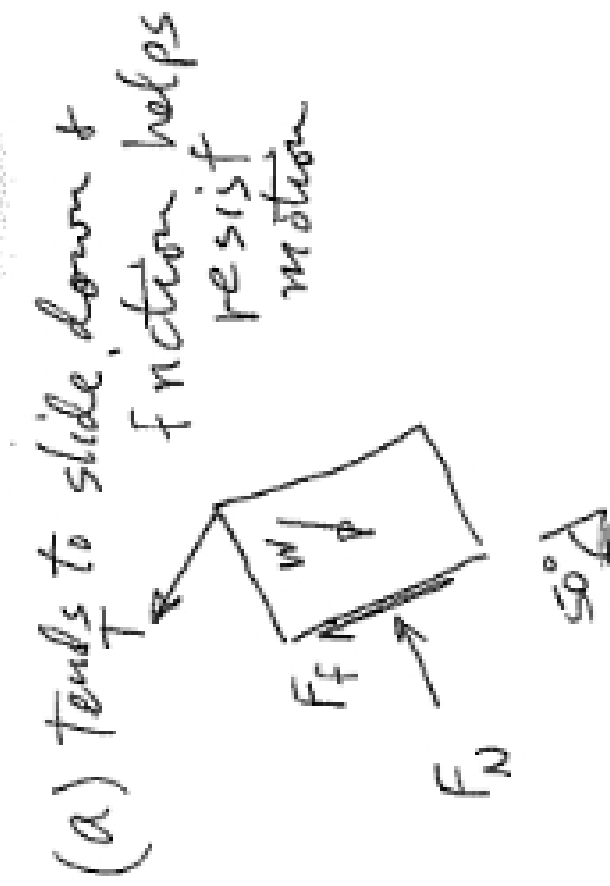
Learning Exercise 0: Intro to FBDs and KDs

1



If only the box has weight and there is friction between box and slope,

- Draw FBD of Box,
- If cable CD breaks and box slides, draw KD of cylinder
- In the static and in dynamic cases, think about where normal reaction is along bottom box.



(a) Tends to slide down + friction helps resist motion

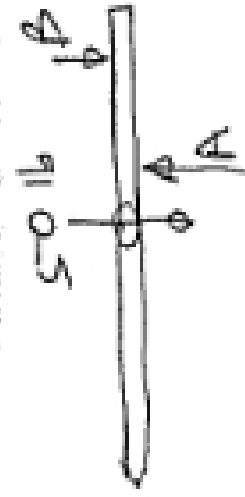
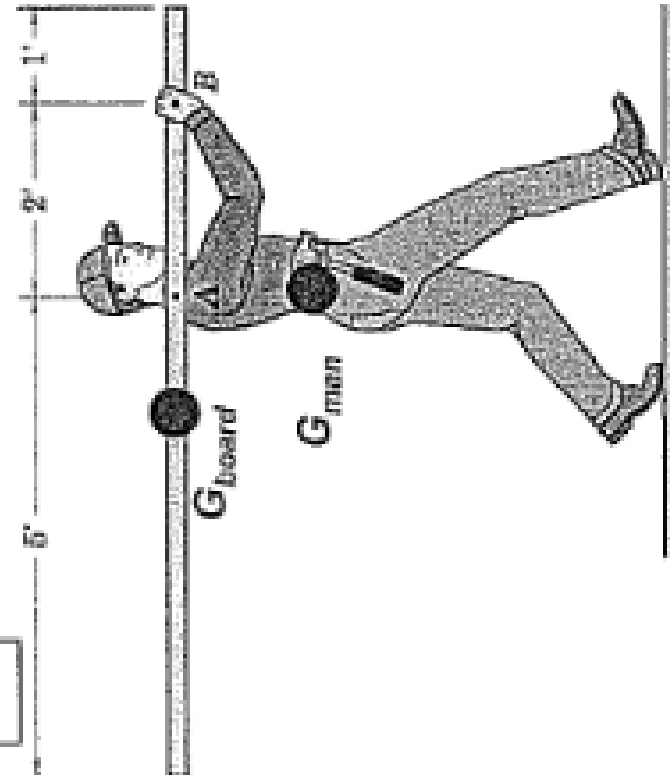
(b) would slide down if not enough friction



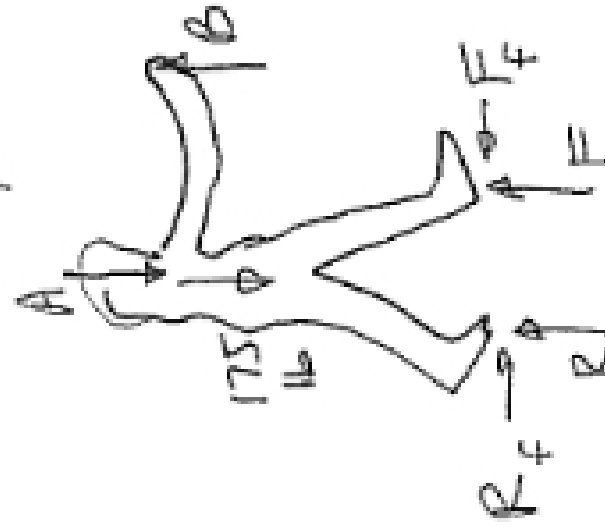
$$m = wt/g$$

(c) Cable Tension tends to push down more towards upper end of bottom. Weight tends to push down more towards lower end of bottom. So we can't tell yet!

2



③



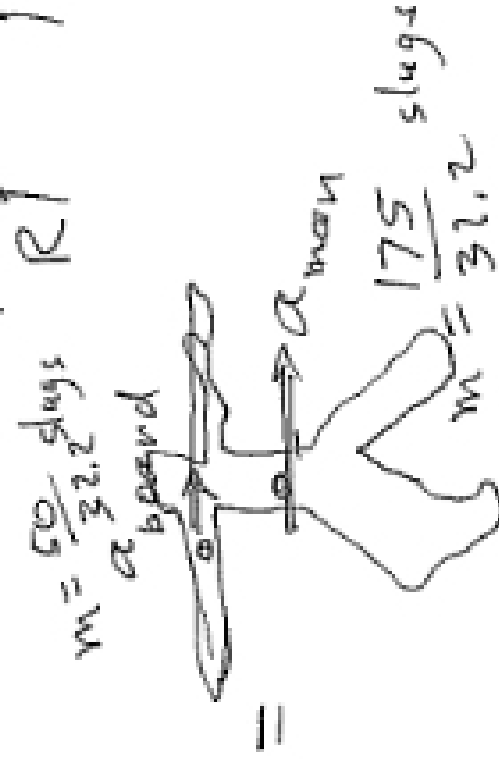
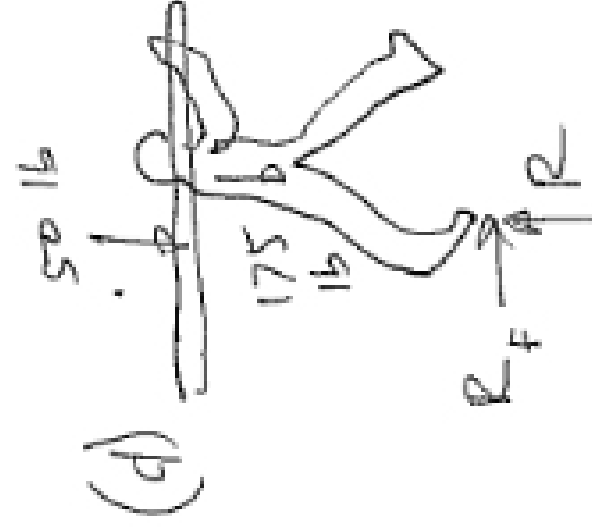
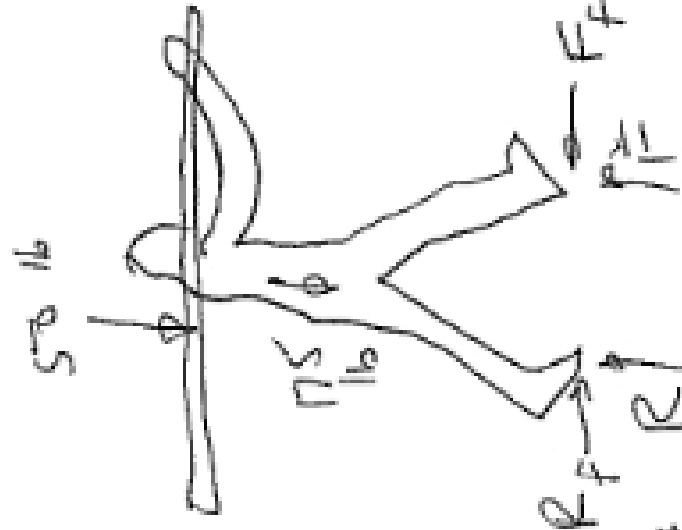
⑤

If man is static, draw FBDs of:

- (a) Board alone (uniform, 50 lb),
- (b) Man (175 lb) alone,
- (c) Man and Board together.

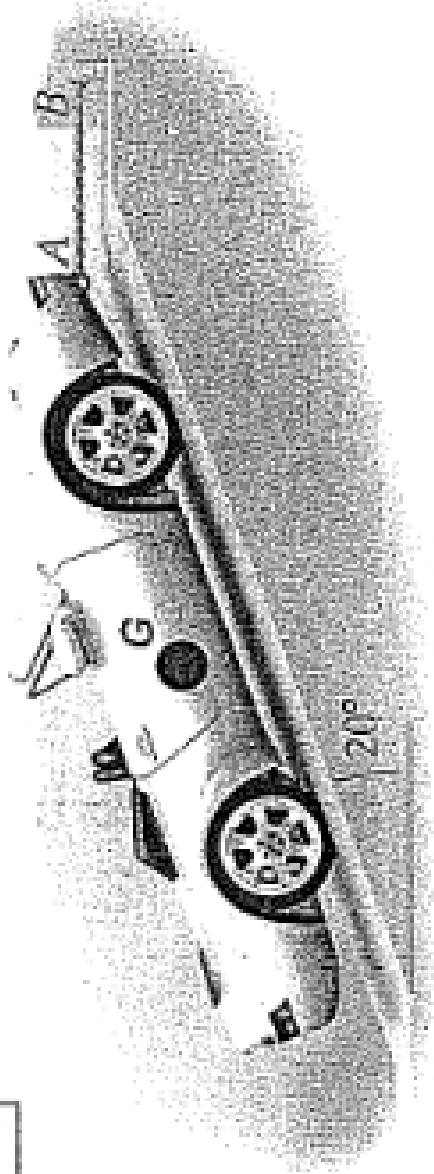
Now draw FBD and KD of Man and Board together assuming man just starting to walk, only back foot on ground, board held level.

(c) Don't need to show internal contact forces



$$m = \frac{50}{32.2} \text{ slug}$$

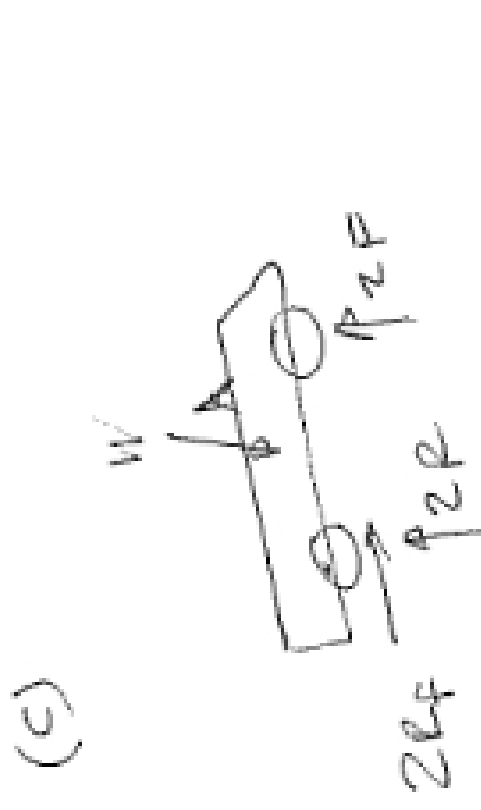
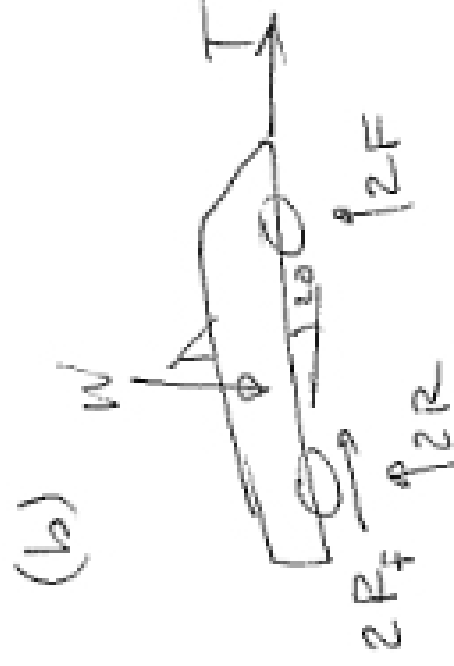
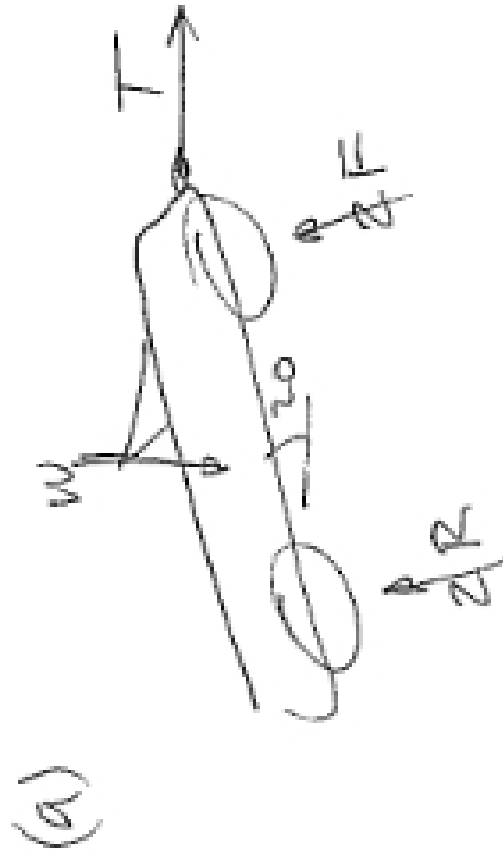
$$m = \frac{175 \text{ slugs}}{32.2}$$



Cable AB is horizontal. Draw the FBD of the car if:

- (a) No brakes are applied,
- (b) Rear brakes are applied.

Now draw the FBD and KD if the cable breaks and rear brakes are applied and we assume sliding occurs.



using $2R + 2F$ assumes car is symmetric along longitudinal-vertical plane, i.e. left + right wheels give same reaction.

$$m = w/g$$