



# Force analysis, part 4

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# Introduction

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- We are now analyzing motion in terms of forces acting on a body.
- This is often the first step of a process to solve for the acceleration so that we can continue and solve a larger kinematics problem.
- Problem solving strategy:
  1. Draw a picture
  2. List knowns and unknowns
  3. For force analysis – free body diagram and components
  4. Develop a strategy for solving for the unknown

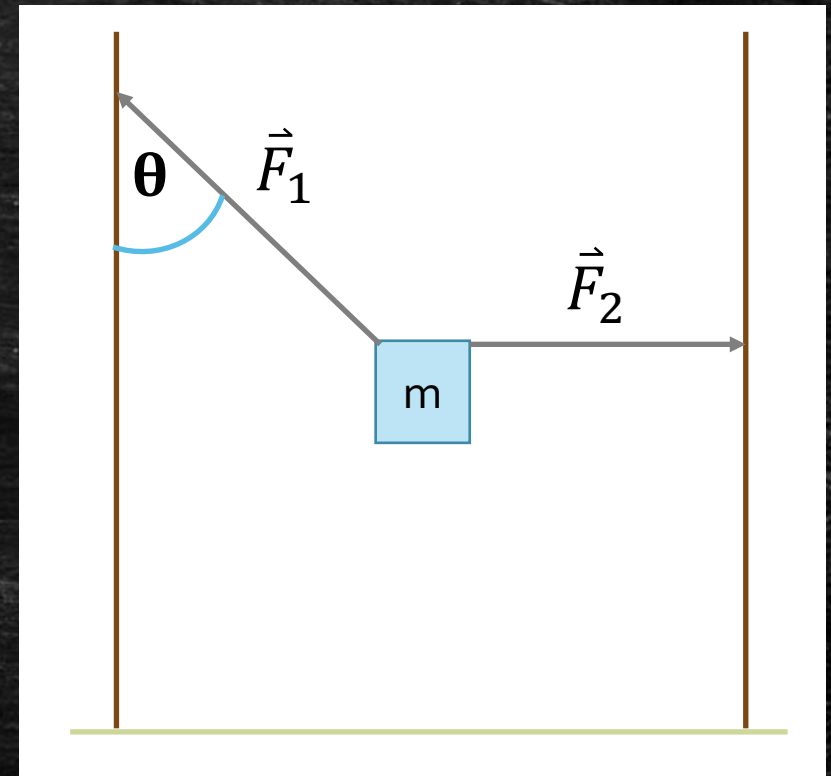
# Goals for the day

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- Solve some 2D force problems
  - Draw free body diagrams
  - Set up the force analysis
  - Analyze in terms of components
  - Look at problems with static and kinetic friction

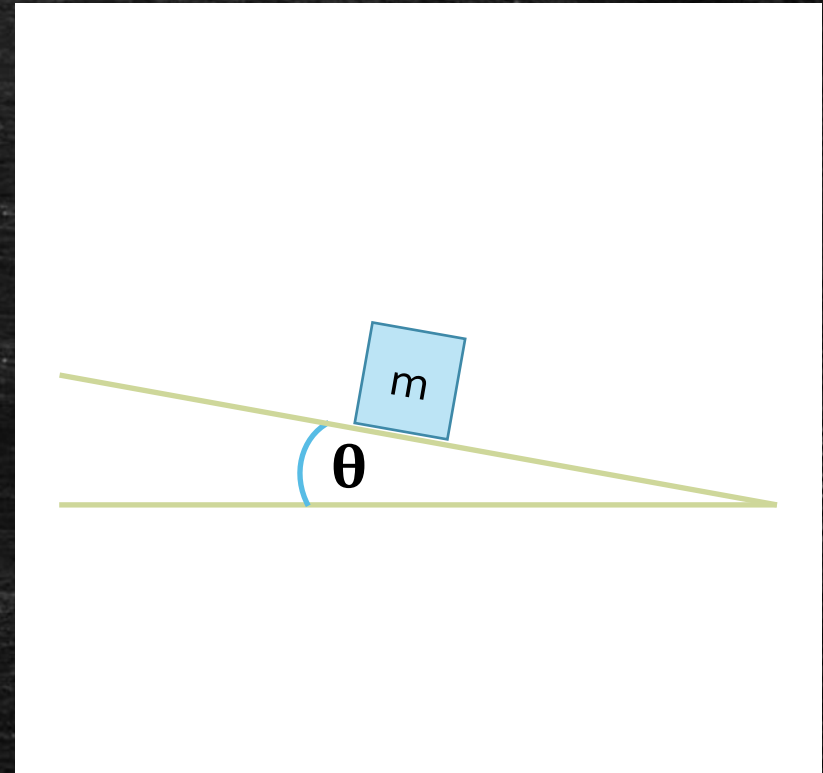
## Question 5

- Take  $\theta = 55^\circ$  and  $|\vec{F}_1| = 192 \text{ N}$ .  
Find the following:
  - the components of  $\vec{F}_1$
  - the hanging mass
  - the magnitude of  $\vec{F}_2$



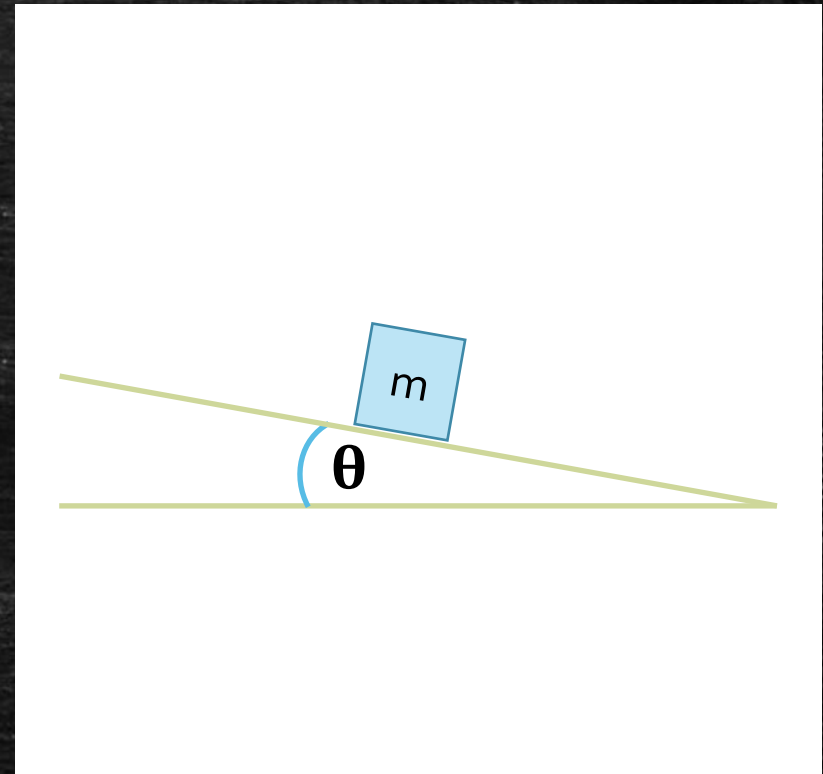
## Question 6

- Take the box to be initially at rest and consider values of  $\theta=25^\circ$ ,  $m=200\text{ kg}$ ,  $\mu_s=0.6$ , and  $\mu_k=0.2$ .
- Do a force analysis to consider how the box moves.



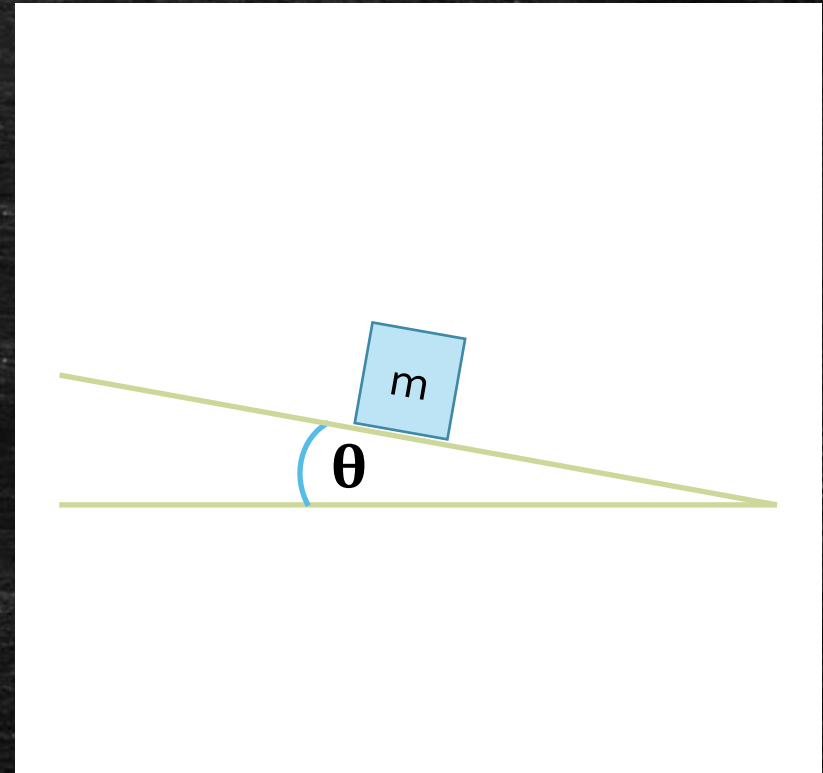
## Question 7

- What is the best description of the direction of the kinetic friction force?



## Question 8

- You nudge the box so that it starts moving down the slope. Consider values of  $\theta=25^\circ$ ,  $m=200$  kg,  $\mu_s=0.6$ , and  $\mu_k=0.2$ .
- How long does it take to travel a distance of 10 meters?



## Question 9

- Given the same values as before, is the acceleration different if the box is moving up the slope instead of down the slope?
- Calculate its acceleration if it is moving up the slope with an initial speed of 1.5 m/s.

