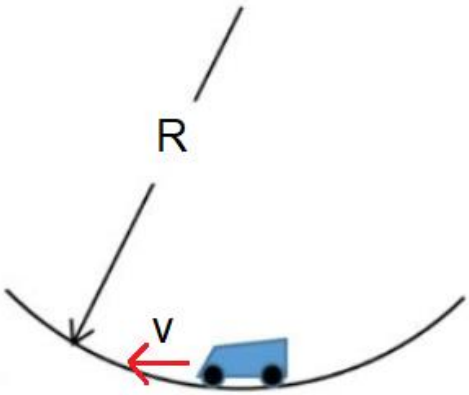
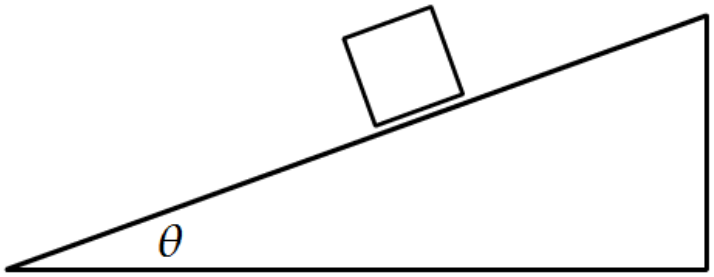
1. A 1000 kg car moves with a speed of 30 m/s as it goes across the bottom of a valley. The valley has a radius of curvature of R = 200 m. Friction and drag forces are negligible.
    a. On your paper, draw an FBD of the forces acting on the car at the moment shown in the picture. (Nothing to enter on Canvas).
        i. All forces should be labeled as weights (w) or normal forces (n).
        ii. All forces should have proper subscripts, where F_{AB} indicates a forces of object A acting on object B. Use the subscripts C for the car, E for the Earth, and S for the surface.
    b. What is the magnitude of the normal force from the road acting on the car? Show all your work on paper, and enter just your final answer in Canvas.



2. A 10 kg block sits on a θ = 20 degree ramp without moving. The coefficient of static friction between the block and the ramp is 0.5. Find the magnitude of the force exerted by static friction on the box in this situation. Hint: this is a bit of a "trick" question in that more information is given than is needed. Think carefully about what you know about how static friction works. Show your work and explain your reasoning on paper. An FBD is required for full credit. Enter just your final answer on Canvas.



3. Box A, with mass 3.0 kg, sits on top of box B, with mass 4.0 kg. A force F = 40 N pushes to the right on the lower box. In response, box B starts accelerating to the right. There is not enough static friction to cause A to accelerate at the same rate as B, so A starts to slide relative to B. (Hint: this means you CANNOT treat both boxes as a single system). The coefficient of kinetic friction between blocks A and B is 0.1, and the coefficient of kinetic friction between block B and the surface is 0.3.
    a. On your paper, draw FBDs for both block A and block B. (Nothing to enter on Canvas). For full credit, on your FBDs:
        i. All forces should be labeled as weights (w), normal forces (n), or kinetic friction forces (f_k). You can just label the pushing force as "F".
        ii. All forces except for F should have proper subscripts, where F_{AB} indicates a forces of object A acting on object B. Use the subscripts A and B for the boxes, E for the Earth, and S for the surface.
        iii. Label any third law pairs with hatch marks. If there are multiple third law pairs, label the first pair with a single hatch mark, the second with a double hatch mark, etc.
    b. On your paper, using your FBDs to replace each "Fnet" with the forces present, write out Newton's Second Law in both the x and the y direction for both box A and box B. (Nothing to enter on Canvas).
    c. Find the acceleration of box A. Show all your work on paper, and enter just your final answer in Canvas.
    d. Find the acceleration of box B. Show all your work on paper, and enter just your final answer in Canvas.