CENTRAL NET FORCE (CENTRIPETAL FORCE) WORKSHEET

1. Draw a force diagram (side view) for a rollercoaster on level track. Should the forces perpendicular to the track be balanced? If the forces are unbalanced, explain why there is a net force and the direction of the net force.

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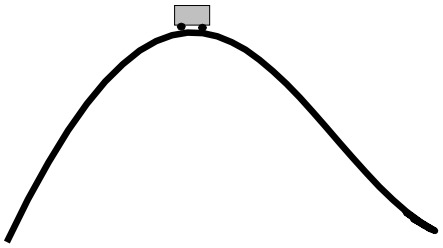
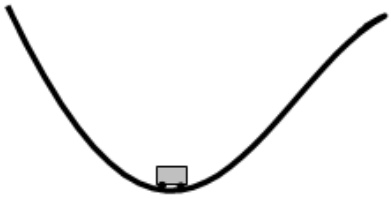
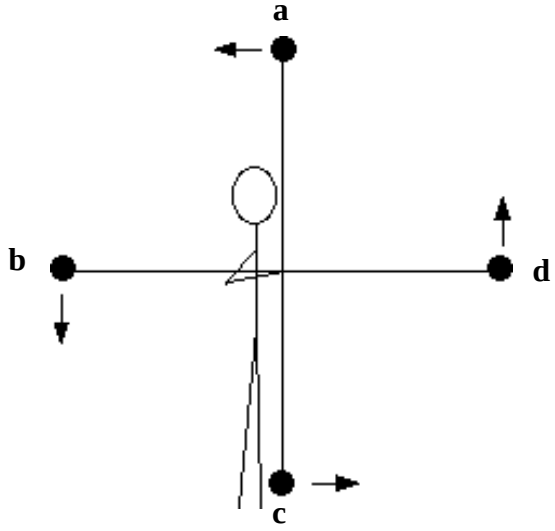
2. Draw a force diagram (side view) for a rollercoaster traveling over the top of a hill. Should the forces perpendicular to the track be balanced? If the forces are unbalanced, explain why there is a net force and the direction of the net force.



3. Draw a force diagram (side view) for a rollercoaster traveling through a valley. Should the forces perpendicular to the track be balanced? If the forces are unbalanced, explain why there is a net force and the direction of the net force.



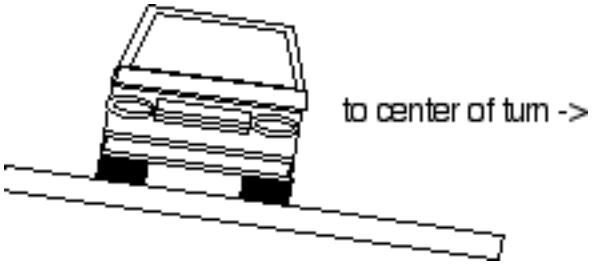
4. A yo-yo pro swings the yo-yo "around the world." Draw force diagrams for the yo-yo at each of the four positions shown: top, descending side, bottom, ascending side. For each of the positions, indicate which force or combination of forces provides the force needed for circular motion.



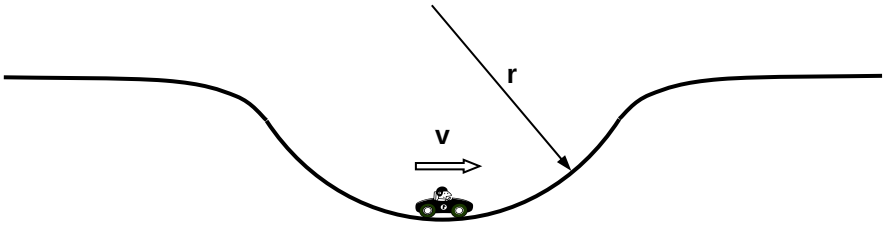
Roads are banked (tilted) in curves in order to make turning a car at high speeds safer.

5. For the situation of an unbanked road, draw a force diagram for a car coming toward you as it is turning. Which force provides the force needed to make the turn?

6. For the situation of a banked road, draw a force diagram for a car coming toward you as it is turning. Identify all of the forces and components of forces that contribute to the force needed to make the turn. Ignore friction.



7. A car travels through a valley at constant speed, though not at constant velocity. Explain how this is possible.



   a. Is the car accelerating? What direction is the car's acceleration? (Explain how you know.)

   b. If the car's speed is 25 m/s, its mass is 1200 kg and the radius of valley (r) is 25 meters, determine the magnitude of the centripetal force acting on the car.

Givens	Unknown	Equation	Substitute into equation	Answer with Units

   c. Construct a **quantitative** force diagram for the car at the bottom of the valley.