Possible Theory Questions

- What standard metric units are used for distance, time, and mass?

- Show how to add and subtract a pair of vectors (A and B).

- Give a real life example of each of Newton's 3 laws, and explain why each example illustrates the law.

- Is there a difference between mass and weight? If so, what is it?

- When firing a projectile, what parameters determine if you will hit a target some distance away?

- Draw the path of an object in uniform circular motion. Indicate the direction of motion. Pick a point on the circle and indicate the directions of the v, a, and F vectors.

- What causes and keeps a satellite in orbit around the Earth? Be very specific.

Possible Worked Questions

1. Unit conversion, built into the problems

   - Ch 3

2. Calculate speed, velocity, and acceleration

   - Ch 3

3. Problems using Newtons 2nd law, including where you have to combine forces applied at angles and opposing forces to find the total force on an object, in each direction.

   - Ch 4, Ch 5

4. Combining Newtons 2nd law and the equations for motion under constant acceleration to find out how far and object moved or long it took for it to move.

   - Ch 5

5. Identifying action-reaction pairs.

   - Ch 4, only in text, clicker problem, website I emailed

Possible Worked Questions

6. Motion of objects in free fall, and objects given some initial upward or downward velocity.

   - Ch 3

7. Firing a projectile horizontally from a height, and upward at an angle.

   - Ch 5

8. Finding the F and a for an object in uniform circular motion

   - Ch 6

9. F of gravity between two object

   - Ch 6

Combining Newtons 2nd law and the equations for motion under constant acceleration to find out how far and object moved or long it took for it to move.

A skier is accelerating down at 30 degree hill at 3.60 m/s². What is the vertical component of their acceleration?

Assuming they start from rest and accelerate uniformly, how long will it take them to reach the bottom of a 150 m high hill?

Motion of objects given some initial upward or downward velocity.

A ball is thrown upward with an initial velocity of 17.0 m/s. How high does it go?

Motion of objects given some initial upward or downward velocity.

A basketball player can jump to a vertical height of 1.29 m.

What is their initial velocity?

How long do they spend in the air? (hang time, total time in air)

Firing a projectile horizontally from a height.

An airplane, traveling 75 m/s, wants to release it's cargo so that it hits a mark 300 m below. How long before the plane is overhead should it drop the cargo?

Finding the F and a for an object in uniform circular motion.

A child moves with a speed of 1.8 m/s when 10 m from the center of a merry go round.

What is the centripetal acceleration of the child?
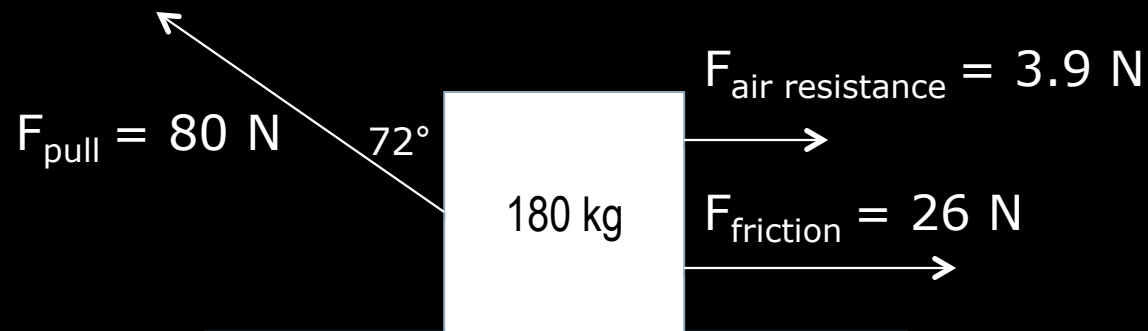
What is the centripetal force on the child, if they have a mass of 30 kg?

Problems using Newtons 2nd law, where you have to combine forces applied at angles and opposing forces to find the total force on an object, in each direction.

What is the net acceleration of this object?

$F_{pull} = 80$ N $72°$ $F_{air\ resistance} = 3.9$ N

180 kg $F_{friction} = 26$ N

Identifying action-reaction pairs.

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Identify 3 action-reaction pairs

Motion of objects in free fall.

A stone is dropped into a well. 10 seconds later the stone hits the water. How deep is the well?

Firing a projectile upward at an angle.

A cannon is fired upward at an angle of 67 degrees with respect to the ground. It has an initial velocity of 15 m/s, and takes 2.8 seconds to hit land.

How far away does it land?

What is the maximum height it obtains?

F of gravity between two objects.

Two objects attract each other with a F_{grav} = 29 N. If the distance between them is reduced by a factor of 5, what is the new F_{grav} between them?

F of gravity between two objects.

What is the force of gravity between a 70 kg person and an 80 kg person, who are separated by 1 m?