Notes for *statics of a particle* slide set

1d-particle-1.rcd

Illustrates that F=ma. The particle accelerates in the direction of the force (not surprising).

1d-particle-2.rcd

Illustrates the idea of equivalent force systems. The two particles have the same response. (not surprising).

1d-particle-3.rcd

Illustrates that equilibrium means that the sum of the forces is zero. It can be fun to use the hook tool to toss each particle around. The particle with no forces is no more difficult to move than the one with canceling 20 K forces.

parallelogram-rule-1.rcd

Illustrates that the two force systems are equivalent by the parallelogram rule, since the particles respond in the same way. You can trace the parallelogram for the left force system by counting the squares.

2d-particle-1.rcd

Illustrates the application of the parallelogram rule in reverse, dividing the force into vertical and horizontal components. The motion of the particles is the same.

2d-particle-2.rcd

Illustrates that perpendicular forces do not influence one another. The particle which has both a horizontal and vertical components moves vertically the same as the particle with only a vertical component, and horizontally the same as the particle with only a horizontal component.

2d-particle-3.rcd

Illustrates ways to visualize equilibrium. The left and right systems are obviously in equilibrium, since each force has an equal and opposite counterpart. The middle system is less obvious, but should still be clear.

particle-race.rcd

Illustrates that equivalent force systems may appear quite different. Posing the question “Which particle wins the race to the top of the screen?” should conclude that it will be a tie. By counting squares, it turns out that all the systems have a resultant of 2 squares upward.

2d-particle-4.rcd

Illustrates solving for equilibrium. Ask the question “One of the particles is not in equilibrium. Which one is it? If you figure that out, then figure which way it will move.” The answer can be found by summing the components through counting squares. Particle B is in equilibrium, but in particle A there is a net force of one square horizontal, so the particle moves to the left.