ConcepTest 6.2a Friction and Work I

A box is being pulled across a rough floor at a constant speed. What can you say about the work done by friction?

1) **friction does no work at all**
2) **friction does negative work**
3) **friction does positive work**

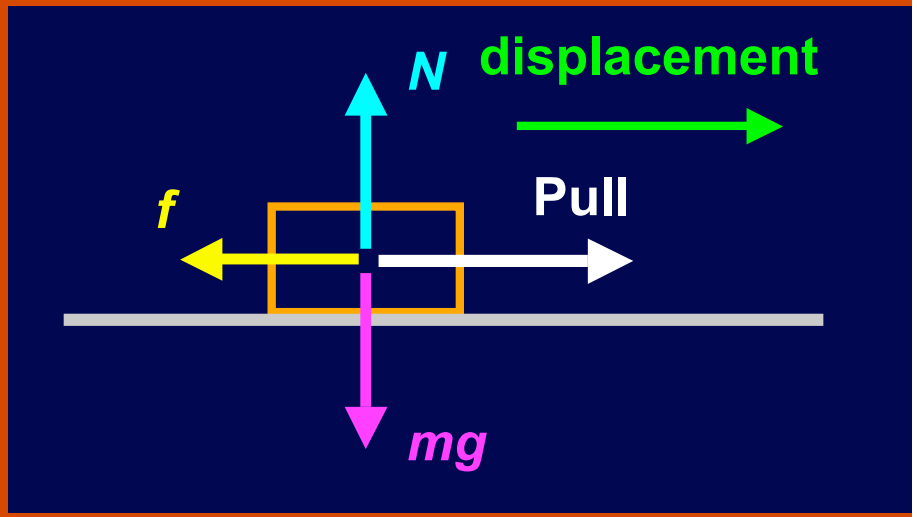
ConcepTest 6.2a Friction and Work I

A box is being pulled across a rough floor at a constant speed. What can you say about the work done by friction?

1) friction does no work at all
2) friction does negative work
3) friction does positive work

Friction acts in the opposite direction to the displacement, so the work is negative. Or using the definition of work: $W = F d \cos q$

since $q = 180^o$, then $W < 0$



ConcepTest 6.2d Tension and Work

A ball tied to a string is being whirled around in a circle. What can you say about the work done by tension?

1) **tension does no work at all**
2) **tension does negative work**
3) **tension does positive work**

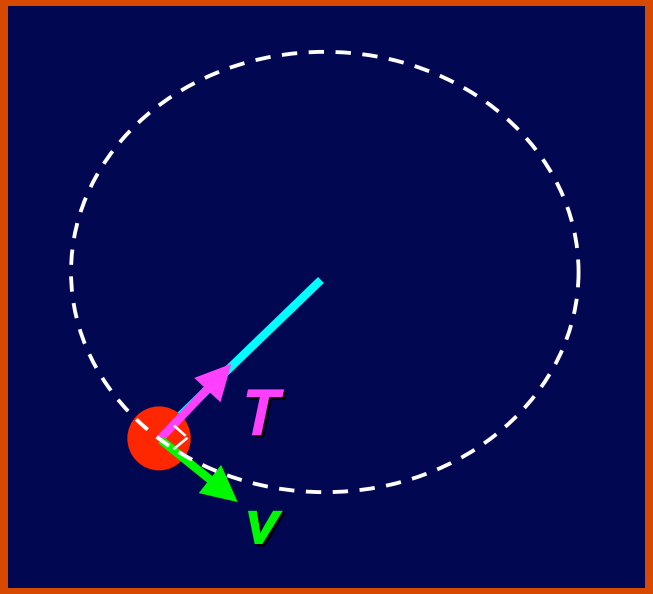
ConcepTest 6.2d Tension and Work

A ball tied to a string is being whirled around in a circle. What can you say about the work done by tension?

1) **tension does no work at all**
2) **tension does negative work**
3) **tension does positive work**

No work is done because the force acts in a perpendicular direction to the displacement. Or using the definition of work: $W = F\,d\cos\theta$

since $\theta = 90^\circ$, then $W = 0$



Follow-up: Is there a force in the direction of the velocity?

ConcepTest 6.5b Kinetic Energy II

Car #1 has twice the mass of car #2, but they both have the same kinetic energy. How do their speeds compare?

1) $2\,v_1 = v_2$
2) $\sqrt{2}\,v_1 = v_2$
3) $4\,v_1 = v_2$
4) $v_1 = v_2$
5) $8\,v_1 = v_2$

ConcepTest 6.5b Kinetic Energy II

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Since the kinetic energy is $1/2\,mv^2$, and the mass of car #1 is greater, then car #2 must be moving faster. If the ratio of m_1/m_2 is 2, then the ratio of v^2 values must also be 2. This means that the ratio of v_2/v_1 must be the square root of 2.

ConcepTest 6.7 Work and KE

A child on a skateboard is moving at a speed of 2 m/s. After a force acts on the child, her speed is 3 m/s. What can you say about the work done by the external force on the child?

1) positive work was done
2) negative work was done
3) zero work was done

ConcepTest 6.7 Work and KE

A child on a skateboard is moving at a speed of 2 m/s. After a force acts on the child, her speed is 3 m/s. What can you say about the work done by the external force on the child?

1) positive work was done
2) negative work was done
3) zero work was done

The kinetic energy of the child increased because her speed increased. This increase in KE was the result of positive work being done. Or, from the definition of work, since $W = \Delta KE = KE_f - KE_i$ and we know that $KE_f > KE_i$ in this case, then the work W must be positive.

Follow-up: What does it mean for negative work to be done on the child?

ConcepTest 6.9b Work and Energy II

A golfer making a putt gives the ball an initial velocity of v_0, but he has badly misjudged the putt, and the ball only travels one-quarter of the distance to the hole. If the resistance force due to the grass is constant, what speed should he have given the ball (from its original position) in order to make it into the hole?

1) $2\ v_0$
2) $3\ v_0$
3) $4\ v_0$
4) $8\ v_0$
5) $16\ v_0$

ConcepTest 6.9b Work and Energy II

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1) $2\ v_0$
2) $3\ v_0$
3) $4\ v_0$
4) $8\ v_0$
5) $16\ v_0$

In traveling 4 times the distance, the resistive force will do 4 times the work. Thus, the ball's initial KE must be 4 times greater in order to just reach the hole — this requires an increase in the initial speed by a factor of 2, since $KE = 1/2\ mv^2$.

ConcepTest 6.11c Power

Engine #1 produces twice the power of engine #2. Can we conclude that engine #1 does twice as much work as engine #2?

1) yes

2) no

ConcepTest 6.11c Power

Engine #1 produces twice the power of engine #2. Can we conclude that engine #1 does twice as much work as engine #2?

1) yes
2) no

No!! We cannot conclude anything about how much work each engine does. Given the power output, the work will depend upon how much time is used. For example, engine #1 may do the same amount of work as engine #2, but in half the time.