Ice skaters often end their performances with spin turns, where they spin very fast about their center of mass with their arms folded in and legs together. Upon ending, their arms extend outward, proclaiming their finish. Not quite as noticeably, on leg goes out as well. Suppose that the moment of inertia of a skater with arms out and one leg extended is 3.2 kg·m\(^2\) and for arms and legs in is 0.80 kg·m\(^2\). If she starts out spinning at 5.0 rev/s, what is her angular speed (in rev/s) when her arms and one leg open outward?

1. 0.83 rev/s
2. 3.91 rev/s
3. 7.85 rev/s
4. 1.25 rev/s
5. 20.8 rev/s
Kinetic energy is equal to $\frac{1}{2}mv^2$, what type of quantity is energy?

1. Scalar
2. Vector
3. Unit-less
4. Vulcan
Which force does the most work?

1. the 10 N force
2. the 8 N force
3. the 6 N force
4. They all do the same amount of work
A particle moving along the $x$-axis experiences the force shown in the graph. If the particle has 2.0 J of kinetic energy as it passes $x = 0$ m, what is its kinetic energy when it reaches $x = 4$ m?

\[
\begin{array}{cccccc}
\hline
F_x\ (N) & 0 & 1 & 2 & 3 & 4 \\
\hline
x\ (m) & 0 & 1 & 2 & 3 & 4 \\
\hline
\end{array}
\]

1. 0 J
2. 2 J
3. 4 J
4. 6 J
5. -2 J
A crane lowers a steel girder into place at a construction site. The girder moves with constant speed. Consider the work $W_g$ done by gravity and the work $W_T$ done by the tension in the cable. Which of the following is correct?

1. $W_g$ and $W_T$ are both zero
2. $W_g$ is negative and $W_T$ is negative
3. $W_g$ is negative and $W_T$ is positive
4. $W_g$ is positive and $W_T$ is positive
5. $W_g$ is positive and $W_T$ is negative
B. The diagrams at right show two identical gliders that move to the right \textit{without friction}. The hands exert identical, horizontal forces on the gliders. The second glider experiences an additional, smaller force from a massless string held as shown.

Suppose the gliders move through identical displacements.

The work done on glider 1 by the hand \underline{__________} the work done on glider 2 by the hand.

1. Greater than
2. Less than
3. Equal to
B. The diagrams at right show two identical gliders that move to the right without friction. The hands exert identical, horizontal forces on the gliders. The second glider experiences an additional, smaller force from a massless string held as shown.

Suppose the gliders move through identical displacements.

The change in kinetic energy of glider 1 ______________ the change in kinetic energy of glider 2. Base your answer on your knowledge of the net work done on each

1. Greater than
2. Less than
3. Equal to
Three students are discussing the concept of work in regards to a situation where a dude is standing at rest holding some books. Which student do you agree with most?

1. “The books aren’t moving so there is no way any work is being done on them.”

2. “That doesn’t make sense because the dudes arms would be getting tired and thus he must be losing energy, if energy is being lost then work must be done on the dude”

3. “The only force connecting the books and that dude are the normal force, so if the books have no work being done on them but the dude does have work being done on him it can’t be due to the normal force from the books.”

4. All are correct statements
A 2-kg mass is compressed 1 m against a spring whose spring constant $k$ is 20 N/m. Once released the mass slides down a frictionless ramp then back up to another spring with the same spring constant. After compressing the second spring it comes to rest and is held in place. When does the normal force do the most work?

1. Between (a) and (b)
2. Between (b) and (c)
3. Between (c) and (d)
4. Between (d) and (e)
5. The normal force does no work
A pendulum swings in a vertical circle. At what point does the tension in the string do the most work?

1. Bottom of the loop
2. Top of the loop
3. The tension does no work