1. An object of mass \( m \) starts moving from rest at a constant acceleration. After \( t \) seconds, a distance \( d \) is covered. What is the kinetic energy of the object at that moment? (Check all that ARE correct).

\( (b) \ K = mad \)

\( (g) \ K = 2m\left(\frac{d}{t}\right)^2 \)

Remember that \( K = \frac{1}{2}mv^2 \). So if we want to know \( K \) after \( t \) seconds, we need to find \( v \) at this time. Note that we are given acceleration, \( a \). We use

\[ v_f^2 = v_0^2 + 2ad \]

Since \( v_0 = 0 \), we have that \( v_f^2 = 2ad \). Thus, \( K = \frac{1}{2}m(2ad) = mad \). So (b) is correct.

Next, we try to figure out if any of the formulas involving \( t \) are correct. So we use

\[ d = v_0t + \frac{1}{2}at^2 \]

Once again, \( v_0 = 0 \), so

\[ d = \frac{1}{2}at^2 \]

If we multiply both sides by \( d \), we get

\[ d^2 = \frac{1}{2}adt^2 \]

Solving for \( ad \) on the right gives

\[ 2 \frac{d^2}{t^2} = ad \]

Plugging this into (b) gives (g).

2. A block of mass \( m \) is at rest at the top of a ramp of vertical height \( h \). The block starts to slide down the frictionless ramp and reaches a speed \( v \) at the bottom. If a block of mass \( 2m \) were to reach the same speed \( v \) at the bottom, it would need to slide down the ramp starting at the height of:

\( (b) \ h \)

So the only work done is that by gravity. If we look at example 7.2, we know that \( W = mgh \). So for the first block, we have \( mgh = \frac{1}{2}mv^2 \). For the second block, we have \( 2mgh = \frac{1}{2}(2m)v^2 \). Solving for \( h \) in both of these yields the same result. Thus \( h \) is the correct answer.