General Physics: Mechanics

PHYS-101(en)

Lecture 8b: Kinetic energy and work

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Conceptual question

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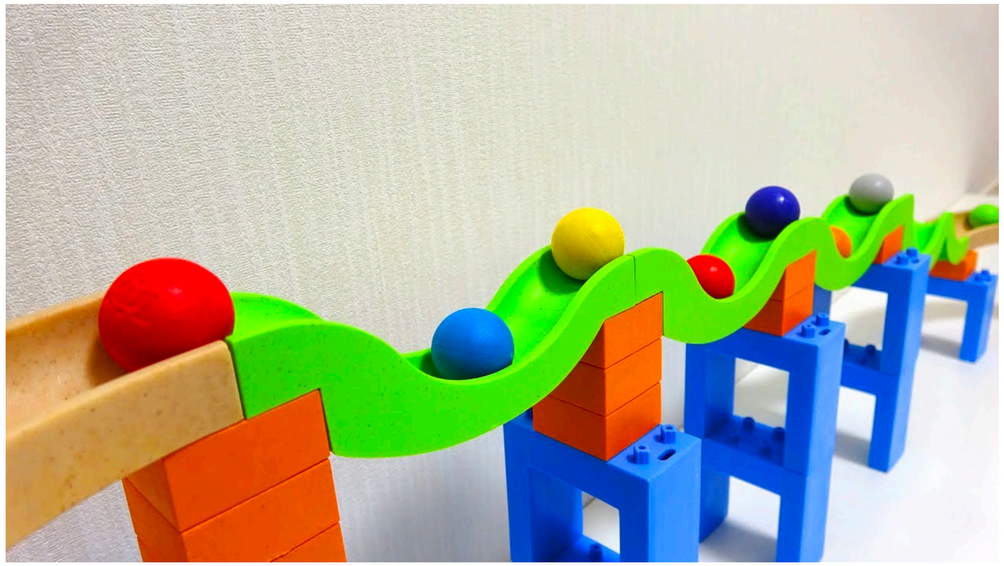
Compared to the amount of energy required to accelerate a car from rest to 10 km/h, the work required to accelerate the same car from 10 km/h to 20 km/h is…

A. the same.
B. twice as much.
C. three times as much.
D. four times as much.

Example: Marbula One racing

You're designing a *marble racing* track! The course is straight (i.e. no left or right turns) and the marbles are released from rest at a height h_0. Given the height $h(s)$ as a function of the distance s along the track, you need to calculate the marble's speed $v(s)$ to ensure they can make it to the bottom. Ignore friction and drag.



Example: Marbula One racing

Example: Marbula One racing (w/ friction)

You're designing a *marble racing* track! The course is straight (i.e. no left or right turns) and the marbles are released from rest at the top. Given a **linear height profile that makes an angle θ *below* the horizon,** $h(s) = -\sin\theta\ s + h_0$**,** you need to calculate the marble's speed $v(s)$ to ensure they can make it to the bottom. Let the friction coefficient be μ_k and ignore drag.

Example: Marbula One racing (w/ friction)

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An acorn falls to the earth from a tree. Which of the following graphs best represents the time dependence of the acorn's kinetic energy? Neglect air resistance.