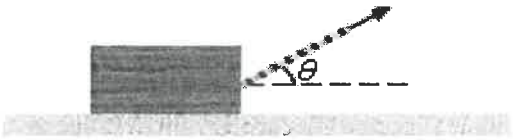
Physics 11
Spring 2026

ave. = 7.2
σ = 2.1

Name Answer Key

Quiz #6: Work and Energy

Problem 1 (2 points)
A concrete block is pulled 7.0 m across a frictionless surface by means of a rope. The tension in the rope is 40.0 N, and the total work done on the block is 247 J. What angle does the rope make with the horizontal?



$W = Fd\cos\theta$

$\cos\theta = \frac{W}{Fd} = \frac{247\,J}{(40.0N)(7.0m)}$

$\cos\theta = 0.882 \rightarrow \theta = 28°$

A

A) 28°
B) 41°
C) 47°
D) 62°
E) 88°

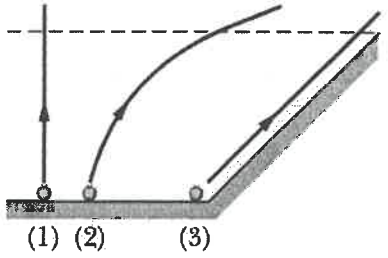
note: work done by normal force and gravity = 0 J

Problem 2 (2 points)
The figure to the below shows three rocks that are launched from the same level with the same speed. One is launched straight upward, one is launched at an angle, and one is launched along a frictionless incline. Ignoring air resistance and friction, which rock has the greatest speed when they reach the dashed line?

D

a) 1
b) 2
c) 3
d) all tie
e) I have no idea but please give me 1 point :)

from conservation of energy



Problem 3 (2 points)
A child does work to climb to the top of a slide, thus giving herself potential energy. Explain what has happened to all this potential energy as the child, still moving, nears the bottom of the (not frictionless) slide.

$U_g \rightarrow K + E_{th}$

All of the child's gravitational potential energy is converted to kinetic energy + thermal energy.

Problem 4 (4 points)
A ball is thrown off of a 75.0 m tall building with an initial velocity of 28.0 m/s at a 40 degree angle in the absence of air resistance.

a) With what speed does the ball hit the ground?

system → ball + earth

$y_i = 75.0\,m$

$v_i = 28.0\,m/s$

$y_f = 0\,m$

$v_f = ?$

$W + K_i + (U_g)_i + (U_s)_i = K_f + (U_g)_f + (U_s)_f + \Delta E_{th}$ (all terms $=0$ except K_i and K_f)

$\frac{1}{2} m v_i^2 + mg y_i = \frac{1}{2} m v_f^2$

$v_f = \sqrt{v_i^2 + 2gy_i}$

$v_f = \sqrt{(28.0\,m/s)^2 + 2(9.80\,m/s^2)(75.0\,m)}$

$v_f = 47.5\,m/s$

b) At what height will the speed of the ball be 34 m/s?

$y_i = 75.0\,m$

$v_i = 28.0\,m/s$

$y_f = ?$

$v_f = 34.0\,m/s$

$\frac{1}{2} m v_i^2 + mg y_i = \frac{1}{2} m v_f^2 + mg y_f$

$y_f = y_i + \frac{v_i^2}{2g} - \frac{v_f^2}{2g}$

$y_f = 75.0\,m + \frac{(28.0\,m/s)^2}{2(9.80\,m/s^2)} - \frac{(34.0\,m/s)^2}{2(9.80\,m/s^2)}$

$y_f = 56\,m$