Name: _____ Class: _____ Date: _____ ID: A

PQ2: Calculation of motion

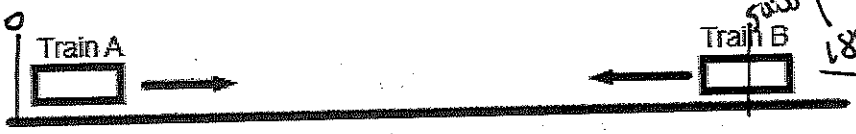
$a = \frac{\Delta v}{\Delta t} = \frac{6}{12} = .5\ m/s^2$

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. A car is traveling down a straight road at 15.0m/s accelerates uniformly to a speed of 21.0m/s in 12.0 seconds. The total distance traveled by the car in this 12.0 send time interval is?
a. 36.0m
b. 180m
c. 216m
d. 252m

$x_f = x_i + v_i t + \frac{1}{2} a t^2$
$= 0 + 15(12) + \frac{1}{2}(.5)(12)^2$
$180 + 36$
$216\ m$

____ 2.



Train A is 5000m away from train "b" moving east at 5m/s with an acceleration of 0m/s² and Train B is moving west at 2m/s slowing down at 0.1m/s². How much time is required for the trains to collide?
a. 253 sec
b. 393sec
c. 314 ← closest
d. trains will stop before colliding.

____ 3. A stick is thrown at 5.0m/s into a pumpkin and sticks 5cm into the front of it. Using the formula below rearrange the formula to determine the acceleration of the stick as it sticks into the pumpkin.

$v^2 = v_0^2 + 2a(x - x_0)$

a. $\frac{v_0^2}{(x - x_0)} = a$

b. $\sqrt{\frac{v_0}{2(x_0)}} = a$

c. $\sqrt{\frac{v_0^2}{2(x_0)}} = a$

d. $\frac{v_0^2}{2(\Delta x)} = a$ ←

A
$0 + 5t = 5000 + -7t + \frac{1}{2}.1t^2$
$0 = 5000 + -7t + .05t^2$
solve for t use quadratic
$t = 308$ sec

____ 4. A stick is thrown at 5.0m/s into a pumpkin and sticks 5cm into the front of it. Using the formula below rearrange the formula to determine the acceleration of the stick as it sticks into the pumpkin.

a. -500 m/s
b. +250 m/s
c. +500 m/s
d. -250 m/s

$\frac{5^2}{2(.05)} = 250$

____ 5. A student is holding a meter stick in the middle at the 50cm mark. If the student lets go allowing the meter stick to fall. She then closes her fingers as fast as possible. After which she notices that she now holds the stick at the 35cm mark. How much time was the meter stick in free fall?
a. 0.07sec
b. 0.17
c. 0.03 sec
d. 0.26

$-.35 = 0 + 0 + \frac{1}{2}(-9.8)t^2$
$t = 0.26\ sec$

Name: _____

Short Answer

6. A ball is rolling on long a downward 5° decline with a velocity of 2m/s and an acceleration of 3.0 m/s^2. Answer the following question.
   a. After rolling down the hill for 3 seconds
      i. How fast is the ball going?

$V_f = V_i + at$ $\quad 2 + 3.0(3) = 11 m/s$

      ii. How far did the ball travel?

$X_f = X_i + V_i t + \frac{1}{2} a t^2$ | $0 + 2(3) + \frac{1}{2}(3)3^2$

$6 + 13.5$

$= 19.5m$

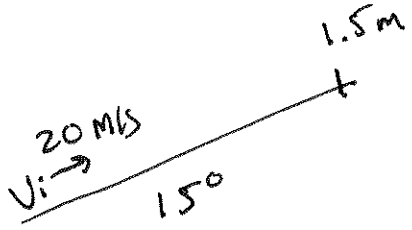
      iii. At this point, draw a vector representing its motion.

$\sin 5 \cdot 11 = .95 m/s$

$\cos 5 \cdot 11 = 10.9m$

      iv. Calculate the X and Y components of velocity.

7. A 50g steel ball was rolling up a 15° ball with an initial velocity of 20m/s. The ball rolled 1.5m up the ramp until the ball stopped.
   a. What is the acceleration of the ball?
   b. How much time was needed for the ball to stop?



$V_f^2 = V_i^2 + 2ad$

$0 = 20 + 2a(1.5m)$

$\frac{-V_i^2}{2d} = a$

$\frac{-20^2}{2(1.5)} = a$

$= -133 m/s^2$

b) $V_f = V_i + at$

$= 20 + (-133)t$

$\frac{V_f - V_i}{a} = t$

$\frac{-V_i}{a} = t \quad \frac{-20}{-133} = 0.15 sec$