Kinematics II

Friday, February 2, 2018 8:53 AM

Ph_12 Kinematics HO 2

PHYSICS 12

NAME: _____

Kinematics II

$V = \frac{d}{t}$ — $d = v \cdot t$

1) A car traveled up a hill at constant speed of 10.0 m/s and then returned down the hill at 20.0 m/s. If the time to turn around is ignored, what was the average speed for the trip?

$V_{ave} = \frac{\text{total } d}{\text{total } t} = \frac{2x}{3x/20} = 2x\left(\frac{20}{3x}\right) = \frac{40}{3}$

$t_1 = \frac{d}{v} = \frac{x}{10}$ $\quad t_2 = \frac{d}{v} = \frac{x}{20}$

$t_1 + t_2$

$\frac{x}{10} + \frac{x}{20}$

$\frac{2x}{20} + \frac{x}{20} = \frac{3x}{20}$

$V = 13.3\ m/s$

2) A late passenger, sprinting at 8 m/s, is 30 m away from the rear end of a train when it starts out of the station with uniform acceleration of 1 m/s^2. Can the passenger catch the train if the platform is long enough?

$V = 8\ m/s$, $V_0 = 0$, $a = 1\ m/s^2$

$d_p = d_t + 30m$

$8t = 0.5t^2 + 30$

$0.5t^2 - 8t + 30 = 0$

$t^2 - 16t + 60 = 0$

$(t-6)(t-10) = 0$

$t = 6s, 10s$

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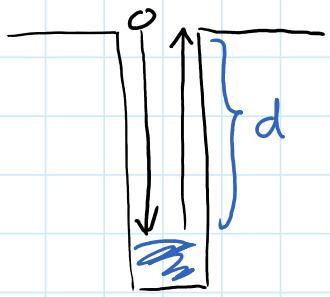
Assignment

3) A ball is thrown vertically up at 3.0 m/s off the edge of a 12 m cliff. How long will it take for the ball to hit the ground at the bottom of the cliff?

4) A stone is thrown vertically upward with a speed of 10.0 m/s from the edge of a cliff 65 m high. a) How much later does it reach the bottom of the cliff? b) What is its speed just before hitting? c) What total distance did it travel?

5) A 90 m long train begins accelerating from rest. The front of the train passes a railway worker, who is standing 200 m from where the front of the train started, at a speed of 25 m/s. What will be the speed of the last car as it passes the worker?

Ex A rock is dropped down a well. The rock is heard hitting water 2.20 s after it is dropped. How far down is the water. $V_{sound} = 340\ m/s$, $a = 9.8\ m/s^2$, $V_0 = 0\ m/s$



① $t_r + t_s = t$ $\quad t_s = 2.2 - t_r$

$d_r = d_s$

$\frac{1}{2}(9.8)t_r^2 = 340 t_s$ ②

$4.9 t_r^2 = 340(2.2 - t_r)$

$4.9 t_r^2 = 748 - 340 t_r$

$4.9 t_r^2 + 340 t_r - 748 = 0$ $\quad t_r = 2.13\ s$

$d_r = 4.9(2.13)^2 = 22.2\ m$