7 FEB 11

- HW ✓ & Q ⁊ A
- Determine g on an inclined plane
- Homework Assignment

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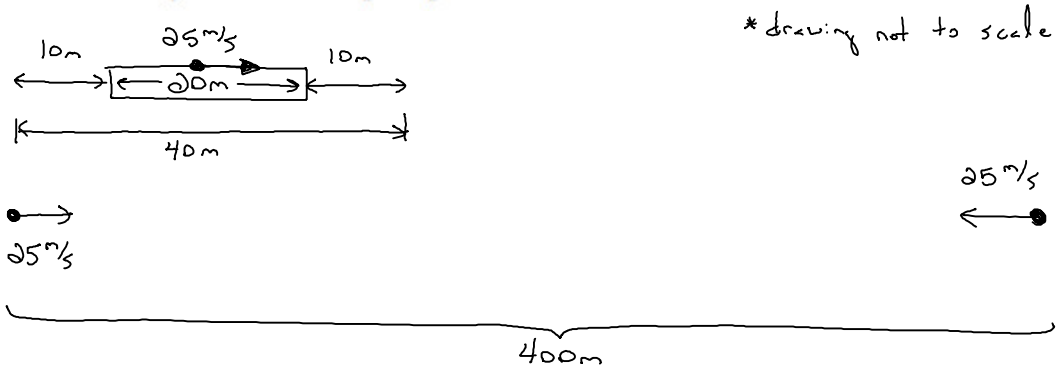
30. (III) A car is behind a truck going 25 m/s on the highway. The car's driver looks for an opportunity to pass, guessing that his car can accelerate at 1.0 m/s^2. He gauges that he has to cover the 20-m length of the truck, plus 10 m clear room at the rear of the truck and 10 m more at the front of it. In the oncoming lane, he sees a car approaching, probably also traveling at 25 m/s. He estimates that the car is about 400 m away. Should he attempt the pass? Give details.

* drawing not to scale

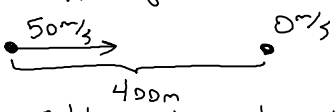


to pass the truck, how long would it take?
the velocity of the car relative to the truck is initially 0 m/s

$v_0 = 0\ m/s$
$x = 40\ m$
$a = 1\ m/s^2$

$x = \cancel{v_0 t}^{0} + \frac{1}{2}at^2 \Rightarrow t = \sqrt{\frac{2x}{a}} = \sqrt{\frac{2(40m)}{1\ m/s^2}} = 8.944\ s$

what's happening in the time relative to the other car?



in 8.944 s, how does the 400 m "gap" change?

$v_0 = 50\ m/s$
$t = 8.944\ s$
$a = 1\ m/s^2$

$x = v_0 t + \frac{1}{2}at^2 = (50\ m/s)(8.944\ s) + \frac{1}{2}(1\ m/s^2)(8.944\ s)^2$
$= 487.198\ m$

as $487.198\ m > 400\ m \Rightarrow$ the driver should NOT attempt to pass

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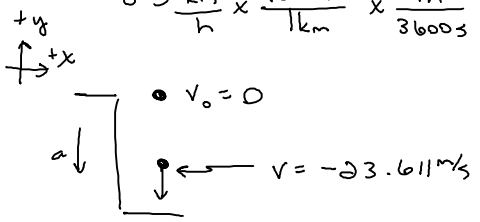
34. (I) If a car rolls gently $(v_0 = 0)$ off a vertical cliff, how long does it take it to reach 85 km/h?

$85\frac{km}{h} \times \frac{1000m}{1km} \times \frac{1h}{3600s} = 23.611\ m/s$



$a = \frac{v - v_0}{t} \Rightarrow t = \frac{v - v_0}{a} = \frac{-23.611 m/s - 0 m/s}{-9.8 m/s^2}$

$= 2.409\ s$

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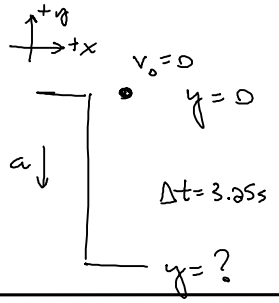
33. (I) A stone is dropped from the top of a cliff. It hits the ground below after 3.25 s. How high is the cliff?



$y = \cancel{v_0 t}^{0} + \frac{1}{2} a t^2 = \frac{1}{2}(-9.8 m/s^2)(3.25s)^2$

$= -51.756\ m$

∴ the cliff is $51.756m$ tall

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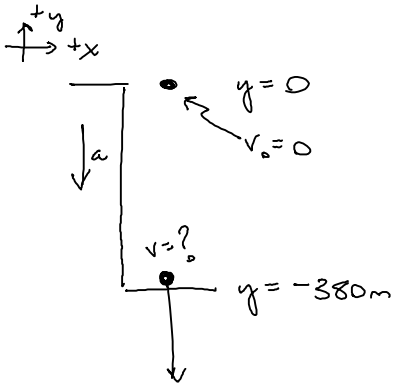
35. (I) Estimate (*a*) how long it took King Kong to fall straight down from the top of the Empire State Building (380 m high), and (*b*) his velocity just before "landing"?



(a) $y = \cancel{v_0 t}^{0} + \frac{1}{2} a t^2 \Rightarrow t = \sqrt{\frac{2y}{a}} = \sqrt{\frac{2(-380m)}{-9.8 m/s^2}} = 8.806s$

(b) $a = \frac{v - v_0}{t} \Rightarrow v = \cancel{v_0}^{0} + at = (-9.8 m/s^2)(8.806s)$

$= -86.299\ m/s$

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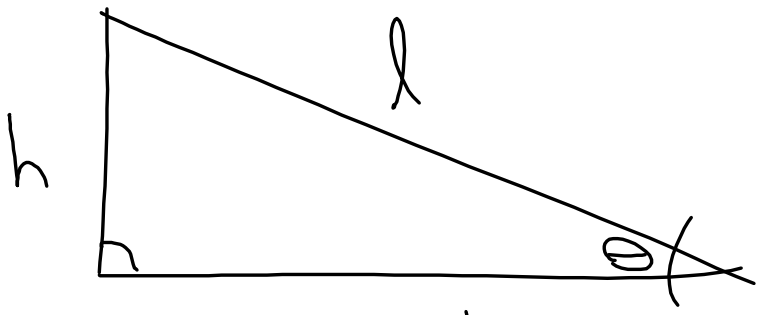

$$\sin\theta = \frac{h}{l}$$

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assign hw

★Homework Assignment★

Giancoli: Chapter 2

#'s 59, 63, 66, 80

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