Catty Candi races into the classroom at 5.0 km/hr and slips and falls and slides to rest in 1.4 m. a) What is her acceleration? ... b) How long did the dreaded event take place?

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$v_1 = 5.0$ km/hr
$\hookrightarrow 1.4$ m/s

$v_2 = 0$

d = 1.4 m

a = ?

t = ?

$v_2^2 = v_1^2 + 2ad$

$v_2 = \sqrt{v_1^2 + 2ad}$

$a = v_2^2 - v_1^2 / 2d$

$a = [0 - (1.4 \text{ m/s})^2]/[2(1.4\text{m})]$

$a = -0.70 \text{ m/s}^2$

$d = \bar{v}t$

$t = d/\bar{v} = 1.4 \text{ m}/[(1.4 \text{ m/s} + 0)/2]$

t = 2.0 s ... talk about extending the pain

- A 1250 kg car traveling at 65 mph slams on the brakes and stops in 4.4 seconds. a) What is the deceleration? b) How far did it travel during the braking?

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m = 1250 kg

v_1 = 65 mph

↳29 m/s

v_2 = 0

t = 4.4 s

a) a =?

b) d = ?

a) $v_2 = v_1 + at$

$a = v_2 - v_1/t$

$a = [0 - (29\ m/s)]/4.4\ s$

$a = -6.6\ m/s^2$

b) $d = \bar{v}t$

$d = [(29\ m/s + 0)/2]4.4\ s$

$d = 64\ m$

A race car accelerates from rest to 125 mph in a 1/4 mile. a) What is the acceleration? b) How long did it take?

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$v_1 = 0$

$v_2 = 125$ mph

↳ 55.9 m/s

$d = 1/4$ mile

↳ 403 m

$a = ?$

$t = ?$

$v_2 = \sqrt{v_1^2 + 2ad}$

$a = v_2^2 - v_1^2 / 2d$

$a = [(55.9 \text{ m/s})^2 - 0]/2(403 \text{ m})$

$a = 3.88 \text{ m/s}^2$

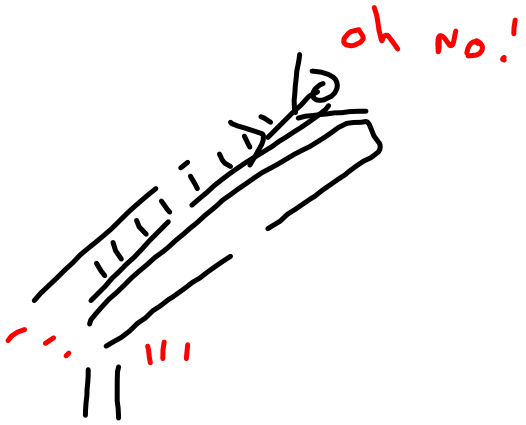
$d = (v_s + v_2)/2 \times t$

$t = d / 1/2(v_s + v_2)$

$t = 403 \text{ m} / [.5(0 + 55.9 \text{ m/s})$

$t = 14.4 \text{ s}$

A 92 kg (now a mere 87.0 kg) dude falls from a 20. foot ladder leaned up against a pole. (the pole broke) a) What velocity did he hit the ground at? b) How long did the fall take?



A 92 kg dude falls from a 20. foot ladder leaned up against a pole. (the pole broke) a) What velocity did he hit the ground at? b) How long did the fall take?

$v_2^2 = v_1^2 + 2ad$

$v_1 = 0$

$m = 92$ kg

$v_2 = \sqrt{v_1^2 + 2ad}$

$d = 20.\text{ft}$

$\hookrightarrow -6.1\text{m}$ $v_2 = \sqrt{2(-9.8\ \text{m/s}^2)(-6.1\text{m})}$

$a = -9.8\ \text{m/s}^2$

$v_2 = -11\ \text{m/s}$

$v_2 = ?$

$t = ?$

$d = v_1 t + \frac{1}{2} a t^2$

$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(-6.1\text{m})}{-9.8\ \text{m/s}^2}}$

$t = 1.1\text{s}$

You throw a 68 g rock upward at 23 ft/s. a) How high does it go? b) How long is it in the air?

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$23 \frac{ft}{s}\left(\frac{1\ m}{3.28\ ft}\right)$

m = 68 g

v_1 = 23 ft/s

↳ 7.0 m/s

a = -9.8 m/s^2

d = ?

t = ?

$v_2^2 = v_1^2 + 2ad$

$d = \frac{v_2^2 - v_1^2}{2a} = \frac{0 - (7.0\ m/s)^2}{2(-9.8\ m/s^2)}$

$d = 2.5\ m$

$v_2 = v_1 + at$

$t = \frac{v_2 - v_1}{a} = \frac{-7.0\ m/s - (7.0\ m/s)}{-9.8\ m/s^2}$

$t = 1.4\ s$

You throw a 34 g rock downward at 22 m/s from a 33 ft. cliff. What velocity does it hit the ground at?

You throw a 34 g rock downward at 22 m/s from a 33 ft. cliff. What velocity does it hit the ground at?
b) How long does it take to hit the ground?

m = 34 g
v_1 = -22 m/s
d = -33 ft
↳ -10. m
v_2 = ?
a = -9.8 m/s^2
t = ?

$$v_2 = \sqrt{v_1^2 + 2ad}$$

$$v_2 = \sqrt{(-22\ \text{m/s})^2 + [2(-9.8\text{m/s}^2)(-10.\text{m})}$$

$$v_2 = -26\ \text{m/s}$$

$$d = \bar{v}t$$

$$t = d/\bar{v} = -10\text{m}/[(-22\ \text{m/s} + -26\ \text{m/s})/2]$$

$$t = 0.42\ \text{s}$$

A 450 g cart is on a 1.3 m ramp that is 23 cm high. a) What acceleration will the cart experience? b) What velocity will it reach at the bottom of the ramp? c) How long will it take? (from top to bottom)

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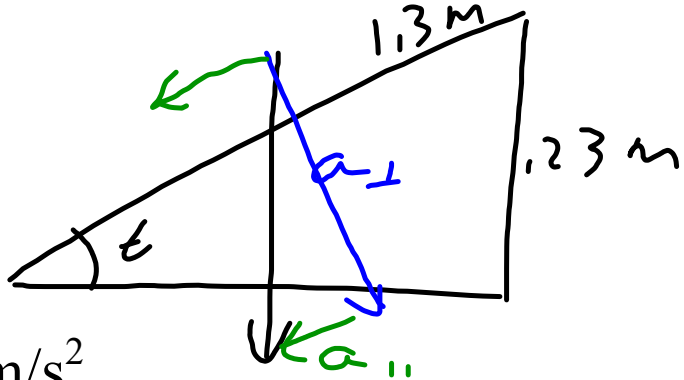

m = 450 g
d = 1.3 m
h = 23 cm

a in vertical = -9.8 m/s^2

a = ?
v_2 = ?
t = ?

$\sin\theta = \frac{.23\ m}{1.3\ m}$

$\theta = 10°$

$a_{\parallel} = \sin 10 (9.8\ m/s^2)$

$a_{\parallel} = 1.7\ m/s^2$

$v_2^2 = v_1^2 + 2ad$

$v_2 = \sqrt{2ad} = \sqrt{2(1.7\ m/s^2)(1.3\ m)}$

$v_2 = 2.1\ m/s$

$d = v_1 t + \frac{1}{2} a t^2$

$t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(1.3\ m)}{1.7\ m/s^2}} = 1.2\ s$

You drop your pencil (ya- the lead breaks) from 1.0 m above the ground. What velocity does it hit at? How long did it take?

You drop your pencil (ya- the lead breaks) from 1.0 m above the ground. What velocity does it hit at? How long did it take?

d = -1.0 m
a = -9.8 m/s^2
v_2 = ?
t = ?

TM: accel.

$$v_2 = \sqrt{v_1^2 + 2ad}$$

$$v_2 = \sqrt{0} + [2(-9.8\text{m/s}^2)(-1.0\text{.m})$$

$$v_2 = -4.4 \text{ m/s}$$

$$d = vt$$

$$t = d/v = -1.0 \text{ m}/[(0 + -4.4 \text{ m/s})/2]$$

$$t = 0.45 \text{ s}$$