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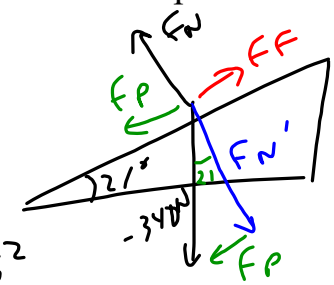
∴ "−" = down ramp



$F_p = \sin 21 (347N)$

$F_p = -120N$

$F_N' = \cos 21 (347N)$

$F_N' = 320N$

$a = -1.1 m/s^2$

$m = 35 kg$

$\hookrightarrow -347N$

⊥	∥
not acc	acc
$\Sigma F = 0$	$\Sigma F = ma$
$F_N' + F_N = 0$	$F_p + F_F = ma$
$F_N = -F_N'$	$F_f = ma - F_p$
$F_N = 320N$	$F_F = 35kg(1.1 m/s^2) - (-120N)$
	$F_F = 82 N$

$$\mu = \frac{F_F}{F_N} = \frac{82N}{320N} = .26$$

What is the equilibrant of 25 N acting at 15^0 and 45 N at 345^0 ?

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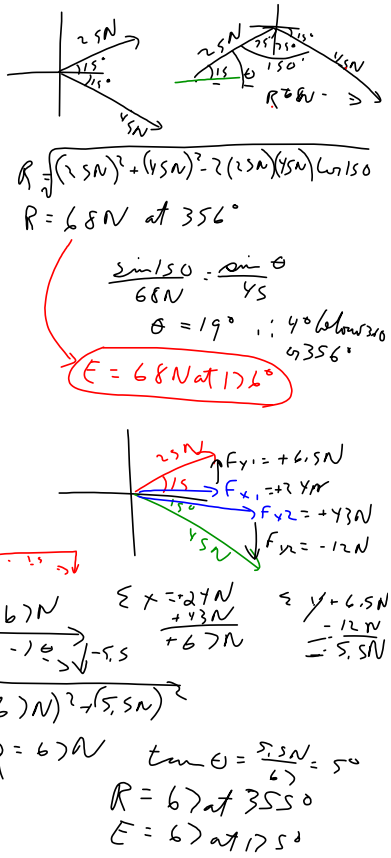

Physics dude mows the lawn for physics dad.
What is μ if he pushes the 45 kg physics mower at a constant velocity with a force of 145 N directed downward along a handle that makes an angle of 33^0 with the horizontal?

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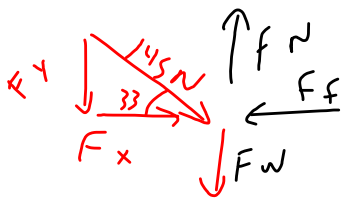

m = 45 kg → 441 N

F_a = 145 N

θ = 33°

$F_x = \cos 33(145N) = 122N$

$F_y = \sin 33(145N) = -79N$

ΣF_x: $F_x + F_f = 0$

$F_f = -F_x$

$F_f = -122N$

ΣF_y: $F_N + F_W + F_y = 0$

$F_N = -F_W - F_y$

$F_N = -(-441N) - (-79N)$

$F_N = 519N$

$\mu = \frac{122N}{519N} = .24$

A 25 kg rock is thrown horizontally off a 24 m high cliff at 15 m/s. What is the resulting velocity (size and angle) it strikes the ground at?
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$d_y = -24\ m$

$v_x = 15\ m/s$

$a_y = -9.8\ m/s^2$

$v_{y1} = 0$

$v_{y2} = \sqrt{2(-9.8\ m/s^2)(-24\ m)}$

$v_{y2} = -22\ m/s$

$v_R = \sqrt{(-22\ m/s)^2 + (15\ m/s)^2}$

$v_R = 27\ m/s$

$\tan\theta = \frac{15\ m/s}{22\ m/s} = 34°$ from y

A 5.0 kg ball is kicked and goes 25 m in 3.4 seconds? a) How high did it go? b) What was its vertical velocity? c) What was its initial velocity?

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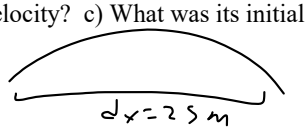


$m = 5\ kg$

$\hookrightarrow 49\ N$

$d_x = 25\ m$

$t = 3.4\ s$

a) d_y

b) v_y

a) $a = -9.8\ m/s^2$

$t = 1.7\ s \left(\frac{1}{2} \text{ of } 3.4\right)$

$d_y = ?$

$d_y = \frac{1}{2} a t^2 = \frac{1}{2}(-9.8\ m/s^2)(1.7\ s)^2$

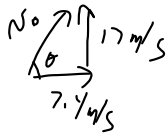
$d_y = 14\ m$

b) $v_y = ?$

$v = at = 9.8\ m/s^2 (1.7\ s)$

$v_y = 17\ m/s$

c) $v_x = \frac{d_x}{t} = \frac{25\ m}{3.4\ s} = 7.4\ m/s$



$v_0 = \sqrt{(7.4\ m/s)^2 + (17\ m/s)^2}$

$v_0 = 19\ m/s$

$\tan\theta = \frac{17\ m/s}{7.4\ m/s} = 66°$

a) What's the fastest a 1450 kg car can round a 48.0 m curve at if μ is 0.65? ..b)what's that in mph?
c) If the curve is 1/2 a circle, how many revolutions did a 72 cm high tire make?

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$F_w = 14{,}200N$

$F_N = -F_w$

$F_f = \mu F_N = .65(14200N) = 9240N$

$f_f \rightarrow F_c$

$F_c = \frac{mv^2}{r}$ $v = \sqrt{\frac{Fr}{m}} = \sqrt{\frac{9240N(48m)}{1450kg}}$

$v = 17.5 m/s$

$\hookrightarrow 39mph$

$C = 2\pi r$

$\frac{1}{2}$ circle $C = \frac{2\pi(48m)}{2} = 301m$

$C_T = 2\pi r = 2\pi(.36m) = 2.26m$

$rev_T = 133 rev$