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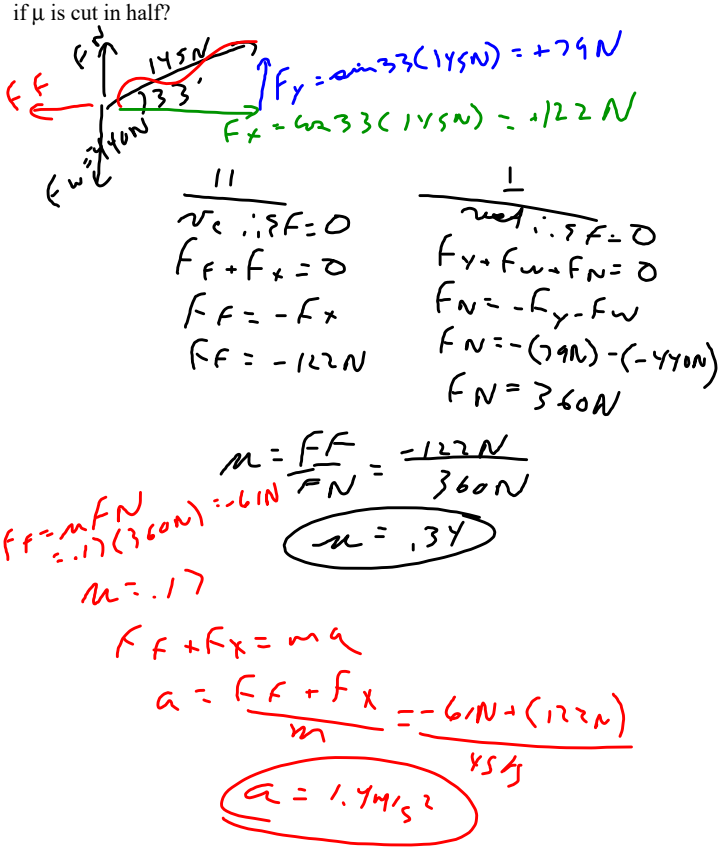

What is the acceleration of a 33 kg box down a 23^0 ramp if μ is 0.222?

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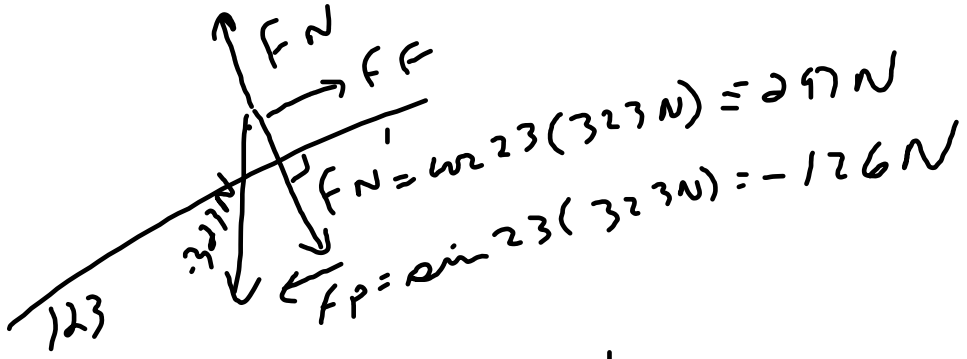

1
net $\therefore \Sigma F = 0$

$F_{N'} + F_N = 0$

$F_N = 297\,N$

$F_F = \mu F_N = .222(297N)$

$F_F = 66\,N$

11
accel. $\therefore \Sigma F = ma$

$F_F + F_P = ma$

$a = \frac{F_F + F_P}{m}$

$a = \frac{66N + (-126N)}{33kg} = -1.8\,m/s^2$

A 23 kg box falls off a 27 m high cliff. a) What velocity does it hit at? b) How long is it in the air? c) How much force does the ground apply to stop it if it sinks 2.2 cm in it?

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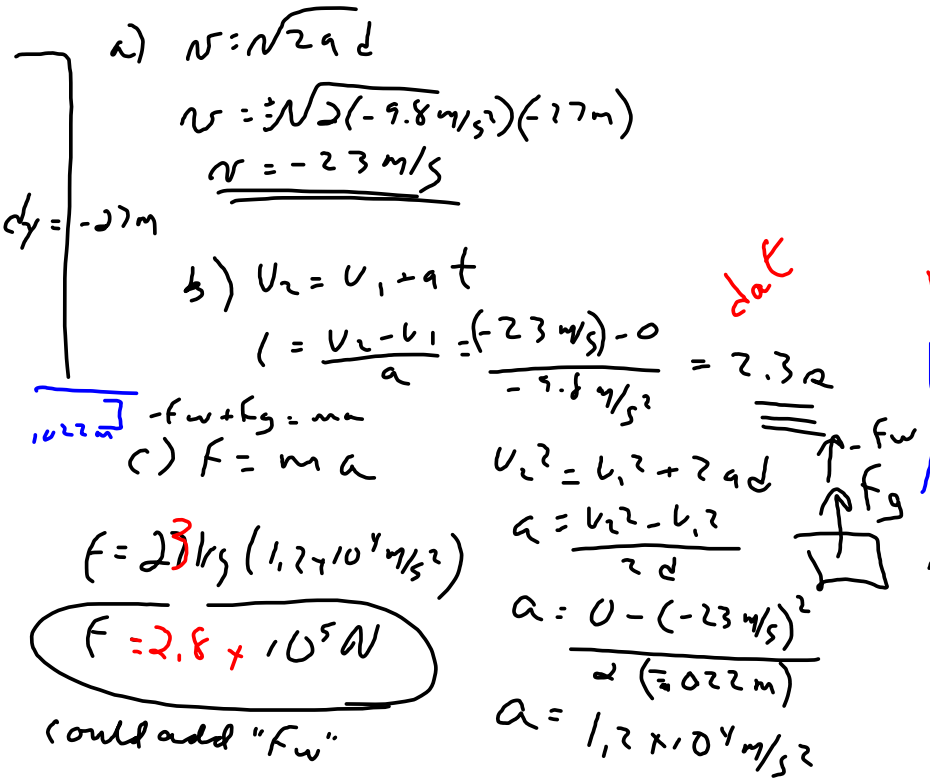


Little Ronnie runs in to the physics room at 22 km/hr and trips and fall and slides to rest in 1.4 m. What is μ if little Ronnie is 65 kg?

Little Ronnie runs in to the physics room at 22 km/hr and trips and fall and slides to rest in 1.4 m. What is μ?

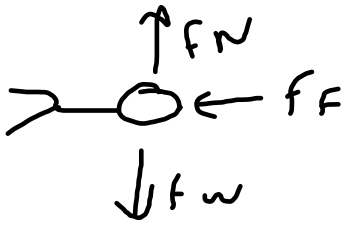
$v_1 = 22\ km/h \rightarrow 6.1\ m/s$

$v_2 = 0$

$d = 1.4\ m$

$a = \frac{v_2^2 - v_1^2}{2d}$

$a = \frac{0 - (6.1\ m/s)^2}{2(1.4\ m)} = -13\ m/s^2$



$F_f = ma$

$F_f = 65\ kg(-13\ m/s^2) = 845\ N$

$\mu = \frac{F_f}{F_N} = \frac{845\ N}{65\ kg(9.8\ m/s^2)} = 1.3$

What centripetal force is needed for a 55 kg person to run in a 3.3 m radius circle at 22 rpm's? What is μ?

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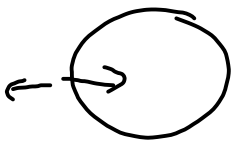
$f = 22 \frac{rev}{min}\left[\frac{2\pi(3.3m)}{rev}\right]\frac{1min}{60s} = 7.6 m/s$

$\hookrightarrow .37 rev/s$

$F_c = \frac{mv^2}{r} = \frac{55kg(7.6m/s)^2}{3.3m} = 960N$



$F_c = m4\pi^2 r f^2$

$F_c = 55kg(4)\pi^2(3.3m)(.37 rev/s)^2 = 986N$

$F_c = F_F$

$F_c = \mu F_N$

$\mu = \frac{F_c}{F_N} = \frac{960N}{55kg(9.8m/s^2)} = 1.8$

a = (7.6 m/s)²/3.3 m

= 17.5 m/s²

$\mu = \frac{F_c}{F_N} = (17.5 m/s^2)/g =$

A 1.2 kg ball is kicked by an average force of 112 N over a distance of 55 cm. How far does the ball go if it leaves the foot at 22^0?

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$m = 1.2\ kg$
$F = 112\ N$
$d_k = .55m$
$d_x = ?$
$\theta = 22°$

$a = \frac{\sum F}{m} = \frac{112\ N}{1.2\ kg} = 93\ m/s^2$

$v_2 = \sqrt{2(93\ m/s^2)(.55m)} = 10.\ m/s$

$10.\ m/s \rightarrow$ $22°$ $\uparrow v_y = 3.7\ m/s$

$v_x = 9.3\ m/s$

Y

g

v_1

$t = \frac{-3.7\ m/s - (3.7\ m/s)}{g} = .76\ s$

X

$d_x = v_x t = 9.3\ m/s\ (.76s)$

$d_x = 7.0$

A 35 g bullet has 102 N of force applied to it in an 88 cm barrel. a) What velocity did it leave the barrel at? b) How high would it go if it were shot straight up? c) How far did it go if it was shot horizontally from 1.3 m off the ground?

A 35 g bullet has 102 N of force applied to it in an 88 cm barrel. a) What velocity did it leave the barrel at? b) How high would it go if it were shot straight up? c) How far did it go if it was shot horizontally from 1.3 m off the ground?

$m = .035 kg$

$F = 102 N$

$d = .88 m$

a) $a = \frac{F}{m} = \frac{102}{.035 kg} = 2900 m/s^2$

$v_2 = \sqrt{2(2900 m/s^2).88 m}$

$v_2 = 72 m/s$

b) $d_y = \frac{v_2^2 - v_1^2}{2a} = \frac{0 - (72 m/s)^2}{2g}$

$d_y = 260 m$

$d_y = 1.3 m$ $t = \sqrt{\frac{2d}{a}} = \sqrt{\frac{2(1.3 m)}{g}} = .52 s$

$d_x = v_x t = 72 m/s (.52 s) = 37 m$