You pull a 25.0 kg box across a waxed floor with a "μ" 0.220 and a force of 125 N directed 30.0⁰ above the horizontal. What the acceleration?

Steps to solve:

1) Data (conversions)

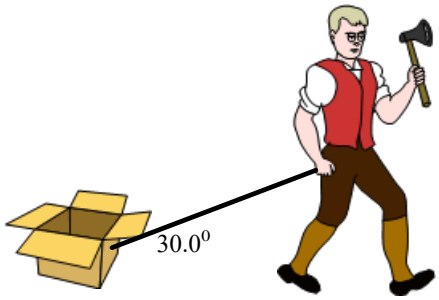
m_{box} = 25 kg

↳Fw = -245 N

f_a= 125 N at 30.0⁰

acceleration ?

μ = 0.220

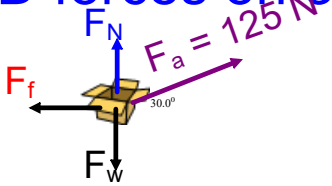


2) ID Plane of Motion?

horizontal

now only forces "II", "⊥"

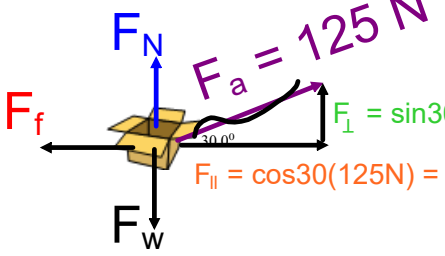
3) ID forces on object?



You pull a 25.0 kg box across a waxed floor with a μ 0.220 and a force of 125 N directed 30.0⁰ above the horizontal. What the acceleration?

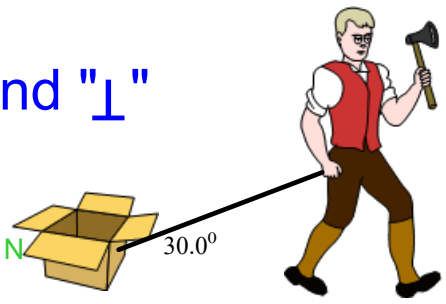
Steps to solve:

4) break all forces into "II" and "⊥"



$F_{\perp}$ = sin30(125N) = +62.5 N

F_{II} = cos30(125N) = +108 N



You pull a 25.0 kg box across a waxed floor with a μ 0.220 and a force of 125 N directed 30.0^0 above the horizontal. What the acceleration?

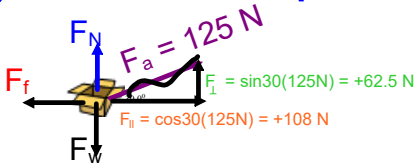
Steps to solve:

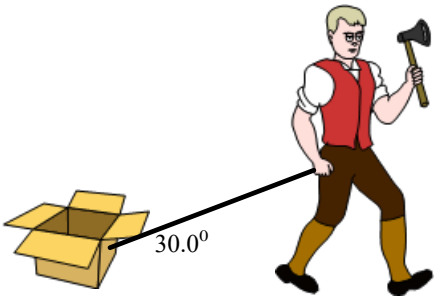
5) II,⊥ "tee square"

a) TM?

b) Law?

c) ΣF





II	⊥
TM? accel.	TM? rest
∴ 2nd Law	∴ 1st Law
$\Sigma F = ma$	$\Sigma F = 0$

You pull a 25.0 kg box across a waxed floor with a μ 0.220 and a force of 125 N directed 30.0^0 above the horizontal. What the acceleration?

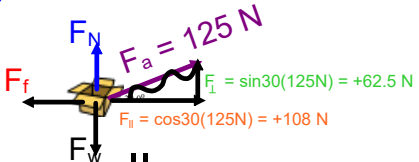
Steps to solve:

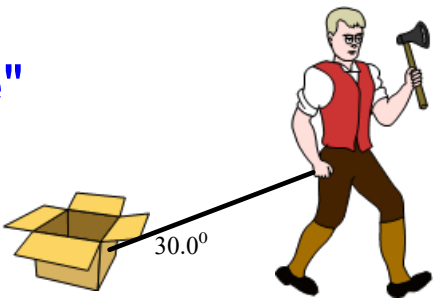
6) List forces in "tee square"

a) TM?

b) Law?

c) ΣF





II	⊥
TM? accel.	TM? rest
∴ 2nd Law	∴ 1st Law
$\Sigma F = ma$	$\Sigma F = 0$
$F_f + F_{II} = ma$	$F_w + F_N + F_\perp = 0$
$a = \frac{F_f + F_{II}}{m}$	$F_N = -F_\perp - F_w$
$a = \frac{(-42.6\text{ N}) + (+108\text{ N})}{25.0\text{ kg}}$	$F_N = -(+62.5\text{N}) - (-245\text{ N})$
$a = 2.6\text{ m/s}^2$	$F_N = +183\text{ N}$

7) Solve for your variable

In this case you need to find F_f to be able to calculate "a" in the parallel and you need to find F_N in the perpendicular to find F_f

$F_f = \mu F_N$
$F_f = 0.220(+183\text{N})$
$F_f = -42.6\text{ N}$

sample: A 35.0 kg box is pulled downward by a 166 N force that acts at an angle of 35.0^0. What is the acceleration if μ is 0.333? (the box starts out moving)

sample: A 35.0 kg box is pulled downward by a 166 N force that acts at an angle of 35.0^0. What is the acceleration of μ is 0.333? (the box starts out moving)

1)

$m = 35.0$ kg

$\downarrow$ -343 N

$F_a = 166$ N at 35.0^0 dw

$\mu = 0.333$

$a = ?$

sample: A 35.0 kg box is pulled downward by a 166 N force that acts at an angle of 35.0^0. What is the acceleration of μ is 0.333? (the box starts out moving)

m = 35.0 kg

-343 N

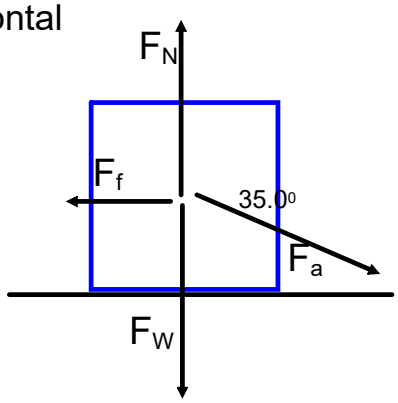
F_a = 166 N at 35.0^0 dw

$\mu = 0.333$

a =?

2) horizontal

3)



sample: A 35.0 kg box is pulled downward by a 166 N force that acts at an angle of 35.0^0. What is the acceleration of μ is 0.333? (the box starts out moving)

m = 35.0 kg

-343 N

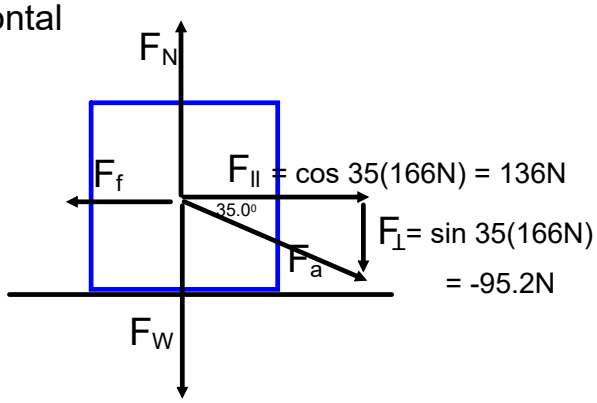
F_a = 166 N at 35.0^0 dw

$\mu = 0.333$

a =?

2) horizontal

3)



sample: A 35.0 kg box is pulled downward by a 166 N force that acts at an angle of 35.0^0. What is the acceleration of μ is 0.333? (the box starts out moving)

m = 35.0 kg

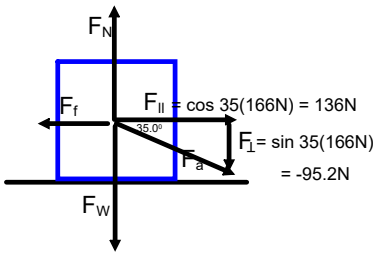
↳ -343 N

F_a = 166 N at 35.0^0 dw

$\mu = 0.333$

a =?

3)



4)

$\parallel$	$\perp$
TM? accel.	TM? rest
∴ 2nd Law	∴ 1st Law
$\Sigma F = ma$	$\Sigma F = 0$

sample: A 35.0 kg box is pulled downward by a 166 N force that acts at an angle of 35.0^0. What is the acceleration of μ is 0.333? (the box starts out moving)

m = 35.0 kg

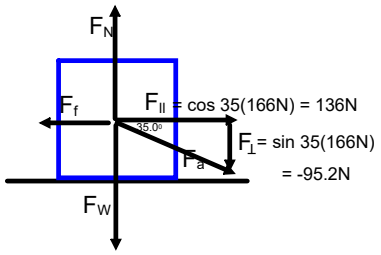
↳ -343 N

F_a = 166 N at 35.0^0 dw

$\mu = 0.333$

a =?

3)



4)

$\parallel$	$\perp$	
TM? accel.	TM? rest	$F_f = \mu F_N$
∴ 2nd Law	∴ 1st Law	F_f = 0.333(+438N)
$\Sigma F = ma$	$\Sigma F = 0$	F_f = -146 N

5)

$F_f + F_{||} = ma$	$F_w + F_N + F_\perp = 0$
$a = \frac{F_f + F_{||}}{m}$	$F_N = -F_\perp - F_w$
$a = \frac{(-146) + (+136\ N)}{35.0kg}$	F_N = -(-95.2N) -(-343 N)
a = -.29 m/s^2 (slowing down)	F_N = +438 N