A 88 N box is suspended by two wires, one at 33 degrees from the horizontal and the other at 44 degrees from the horizontal.

Find the tension on each cable?

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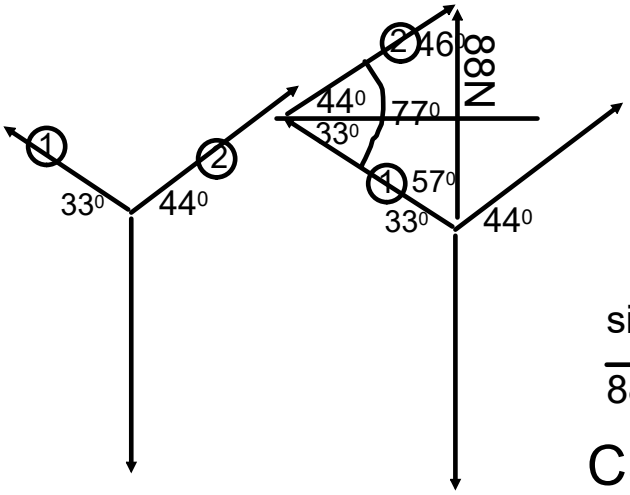


$$\frac{\sin 77}{88N} = \frac{\sin 46}{C_1} = \frac{\sin 57^0}{C_2}$$

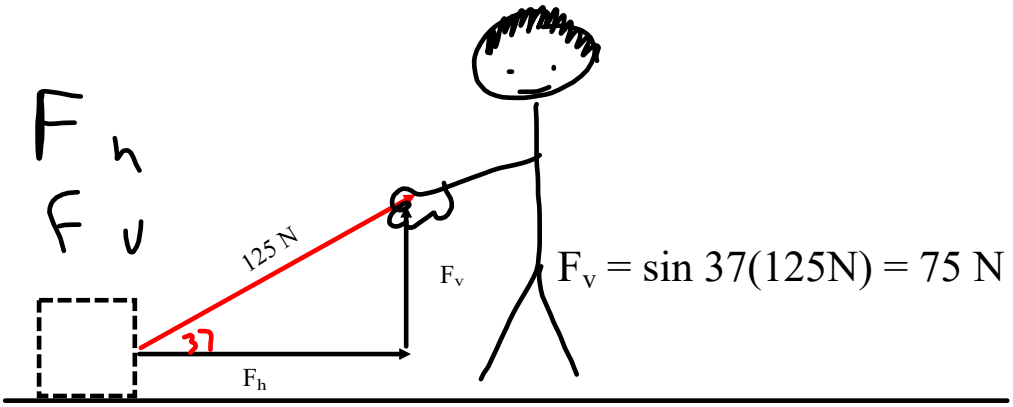
$C_1 = 65N$

$C_2 = 76\ N$

Vector Review

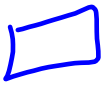
What is the horizontal and vertical components of a force of 125 N directed at 37^0 above the surface?

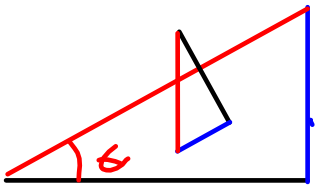
What is the horizontal and vertical components of a force of 125 N directed at 37^0 above the surface?

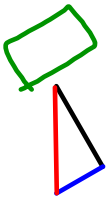


$F_h = \cos 37(125\ N) = 100\ N \quad (1.0 \times 10^2\ N)$

$F_a = 125\ N$ at 37°

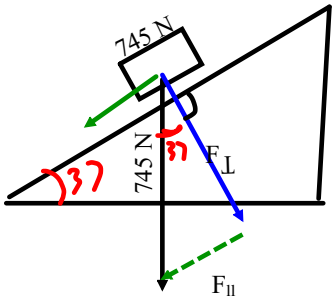






What are the parallel and perpendicular components of a 745 N box on a ramp that makes an angle of 37.0^0 with the ground?

What are the parallel and perpendicular components of a 745 N box on a ramp that makes an angle of 37.0^0 with the ground?



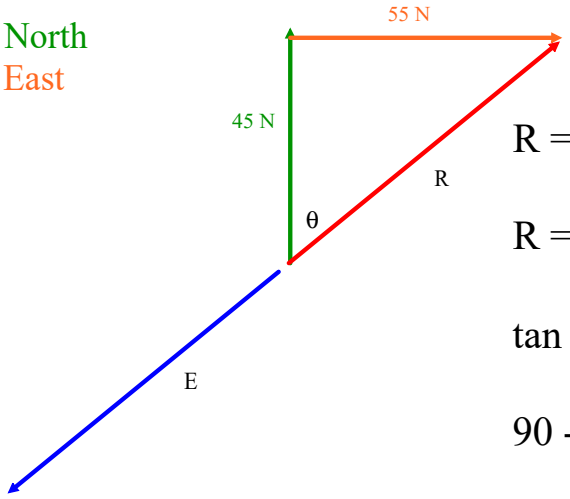
$F_\perp = \cos 37\ (745\ N) = 595\ N$

$F_{||} = \sin 37(745\ N) = 448\ N$

What is the equilibrant of two forces, one of 45 N due north and the other of 55 N due E?

What is the equilibrant of two forces, one of 45 N due north and the other of 55 N due E?

F1 = 45 N North
F2 = 55 N East
E = ?



$R = \sqrt{(45\ N)^2 + (55N)^2}$

$R = 71\ N \text{ at } 39^0$

$\tan \theta = 55N/45N = 51^0$

$90 - 51 = 39^0$

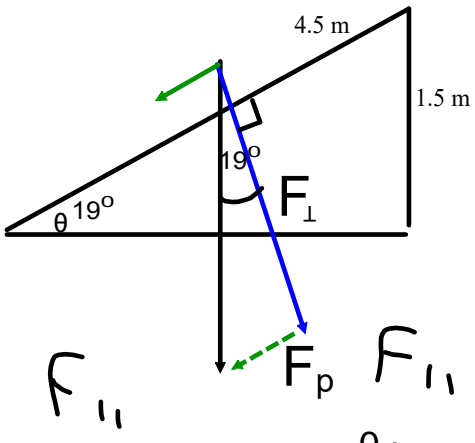
$E = 71\ N \text{ at } 219^0$

$39 + 180 = 219^0$

A 34 N box is on a 4.5 m ramp that's 1.5 m high. What is the parallel and perpendicular components of the box's weight?

A 34 N box is on a 4.5 m ramp that's 1.5 m high. What is the parallel and perpendicular components of the box's weight?

$F_{\perp} = \cos 19^0(-34\ N) = -32\ N$



Sin θ = 1.5 m/4.5 m = 19°

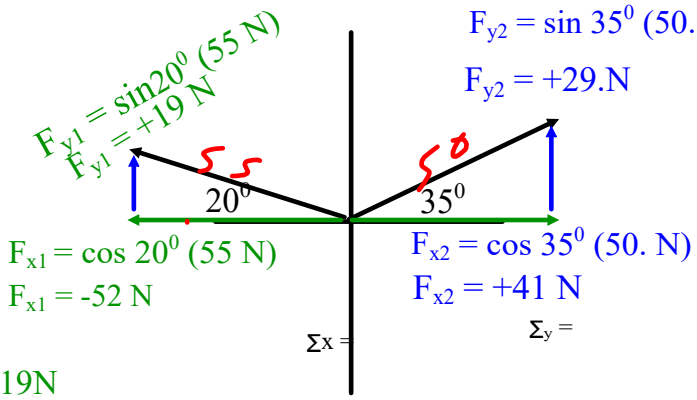
$F_p = \text{sine } 19^0(-34\ N) = -11\ N$

Two forces act on an object. What is the resultant if one force is 55 N at 160^0 and the second force is 50. N at 35^o

Two forces act on an object. What is the resultant if one force is 55 N at 160^0 and the second force is 50. N at 35^0

F_1 = 55 N at 160^0

F_2 = 50. N at 35^0



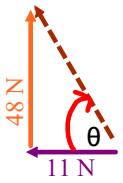
$F_{x1} = -52$ N
$F_{x2} = +41$ N

$\Sigma x = -11$ N

$F_{y1} = +19$N
$F_{y2} = +29$N

$\Sigma_y = +48$ N

$v_r = \sqrt{(11\ N)^2 + (48\ N)^2}$



$\tan \theta = 48\ N/11\ N = 77^0$

$180 - 77 = 103^o$

$v_r = 49$ N at 103^o

What is the resultant of 45 N at 23^0 and 55 N at 102^0. Use the sum of the "X"s and "Y"s to solve.

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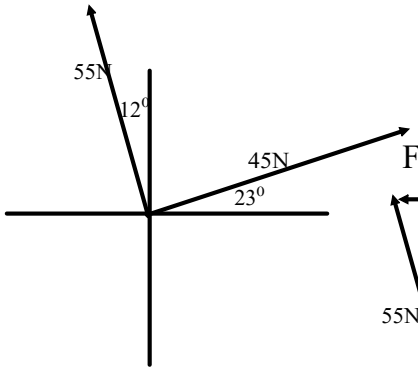
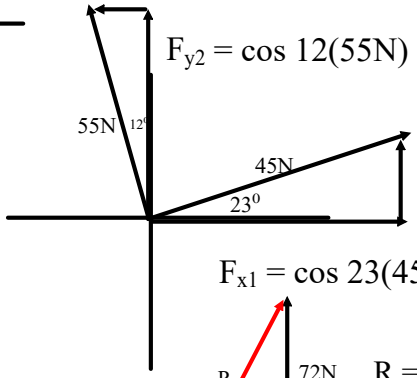
Use the sum of the "X"s and "Y"s to solve.



$F_{x2} = \sin 12(55N) = -11N$

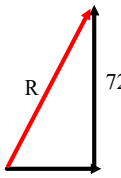


$F_{y2} = \cos 12(55N) = +54N$

$F_{y1} = \sin 23(45N) = +18N$

$F_{x1} = \cos 23(45N) = +41N$

ΣX	ΣY
+41N	+18N
-11N	+54N
+30.N	+72N



$R = \sqrt{(30.N^2) + (72N)^2} = 78N$

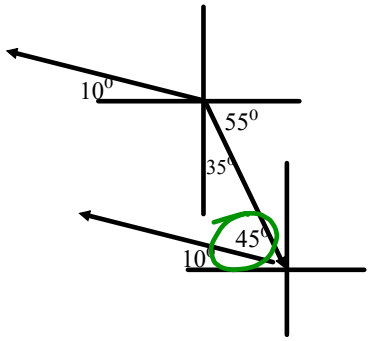
$\text{Tan}\ \theta = 72N/30.N = 67^0$

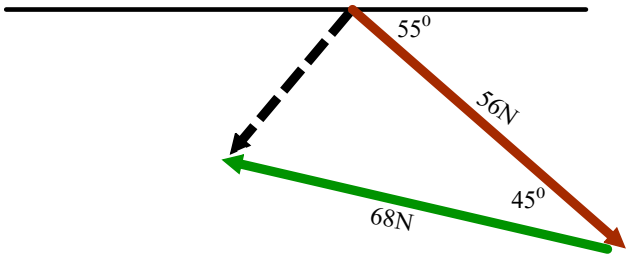
$R = 78\ N \text{ at } 67^0$

graphically

$F_1 = 56N \text{ at } 305^0$
$F_2 = 68N \text{ at } 170.^0$

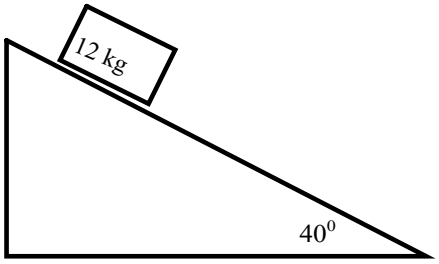
$F_1 = 56N$ at 305^0
$F_2 = 68N$ at $170.^0$



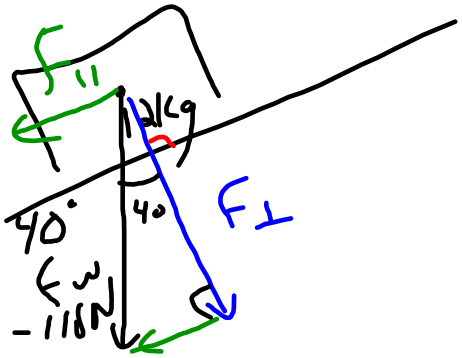


R = 48 N at 224^0

Find F_p and $F_\perp$



F_p
$F_\perp$

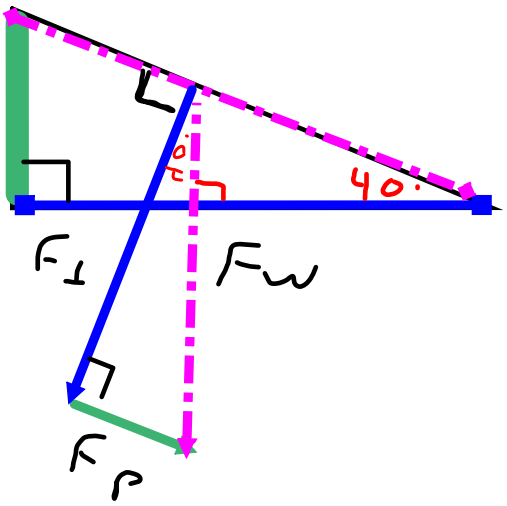


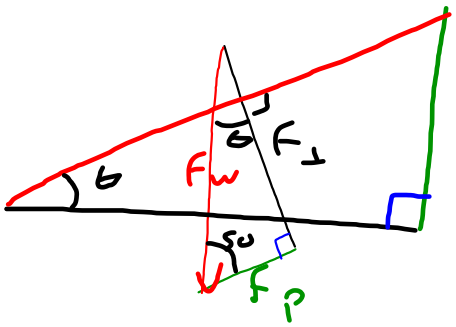
$F_p = \sin 40^0 (-118\ N)$
$F_p = -76.\ N$

$F_\perp = \cos 40^0 (-118\ N)$
$F_\perp = -90.\ N$

$F_w = mg$
$F_w = 12\ kg\ (-9.8\ m/s^2)$
$F_w = -118\ N$

"-" means into the ramp for $F_\perp$ and down the ramp for F_p





A boat can travel 7.7 m/s in water. Where should the boat head if it wants to end up 33^0 up stream and it encounters a current of 4.4 m/s?.....solve graphically.....

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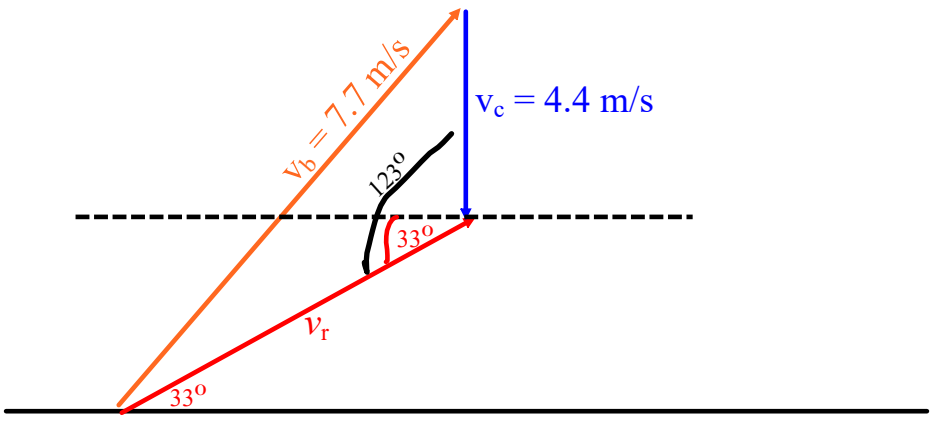

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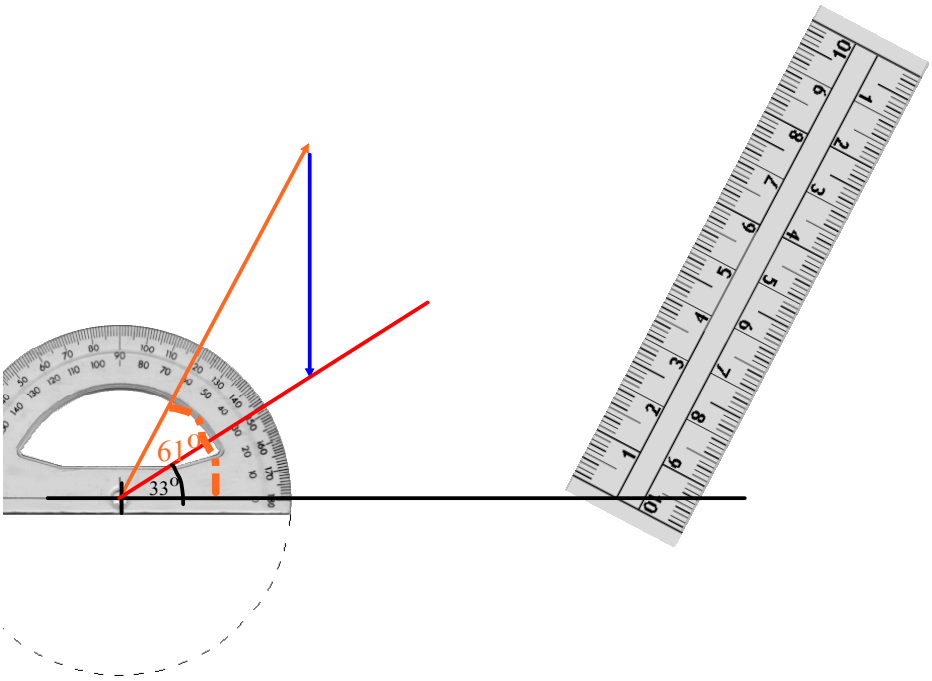
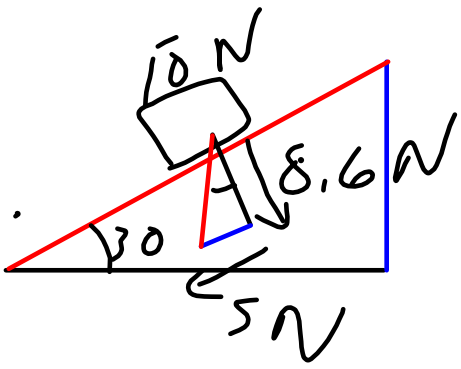
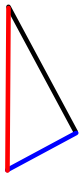






A boat can travel 6.6 m/s in still water.

Where should it head if it wants to end up 44^0 upstream and encounters a current of 3.3 m/s?

A boat can travel 6.6 m/s in still water.

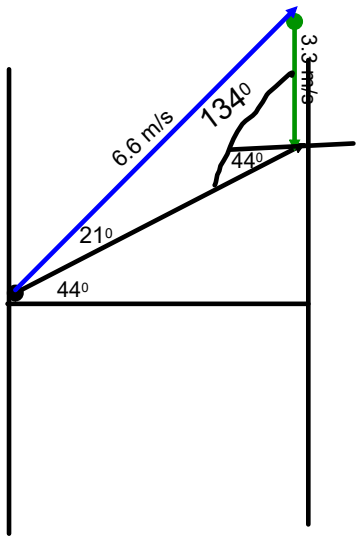
Where should it head if it wants to end up 44^0 upstream and encounters a current of 3.3 m/s?

$v_b = 6.6$ m/s

$\theta = ?$

$v_r =$ _____m/s at 440 us

$v_s = 3.3$ m/s



$$\frac{\sin 134}{6.6 \text{ m/s}} = \frac{\sin \theta}{3.3 \text{ m/s}}$$

$\theta = 21^0$ therefore, $\theta = 65^0$

A plane heads 233° at 333 km/hr and encounters a wind blowing at 110^0 at 125 km/hr. What is the resulting velocity of the plane?

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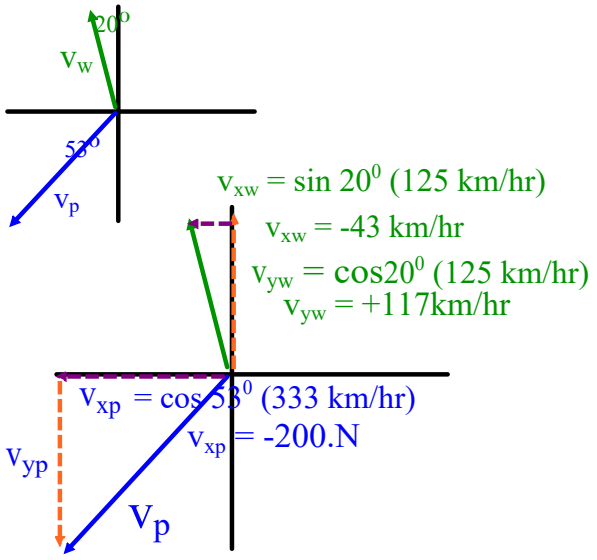
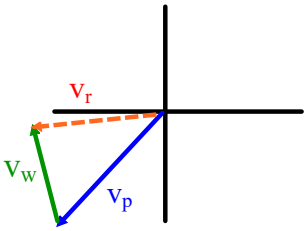


$v_{yp} = \sin 53^0 (333 \text{ km/hr}) = -266\text{km/hr}$



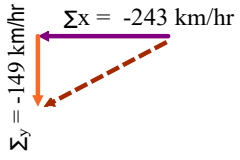
$\Sigma x =$ $\Sigma_y =$

$v_{xw} = -43$ km/hr $v_{yw} = +117N$

$v_{xp} = -200.N$ $v_{yp} = -266N$

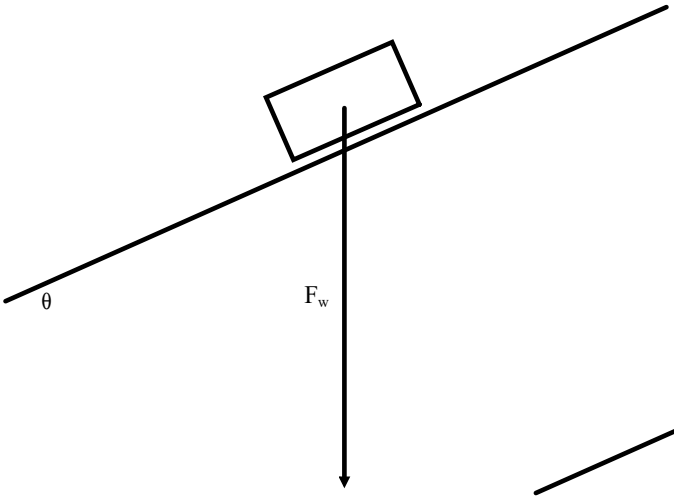
$\Sigma x = -243$ km/hr $\Sigma_y = -149$ km/hr

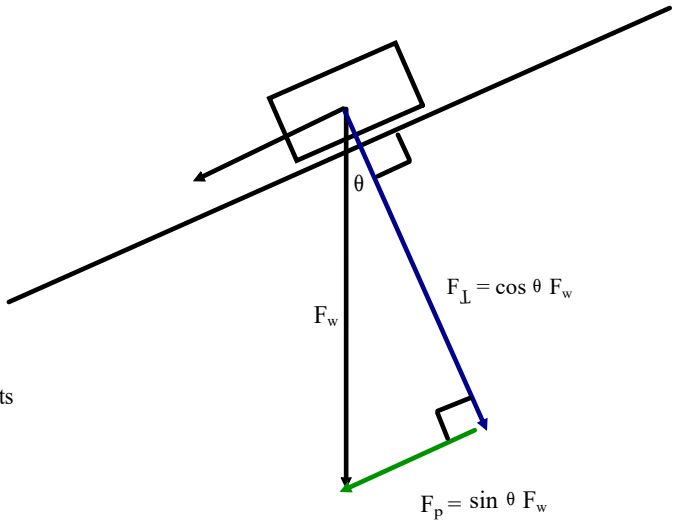
$v_r = \sqrt{(243 \text{ km/hr})^2 + (149 \text{ km/hr})^2}$



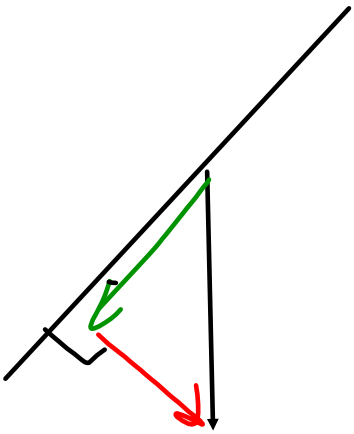
$v_r = 285$ km/hr at 211^0

Angled surface

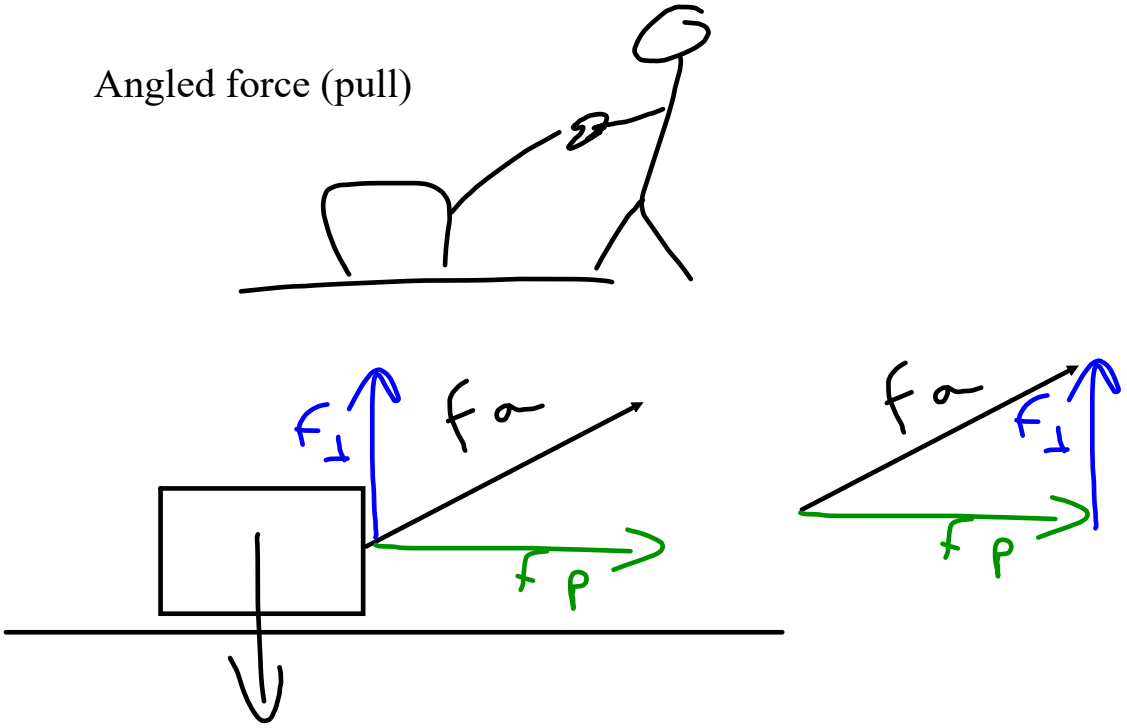




Break F_w into it's parallel and perpendicular components



Angled force (pull)



Angled force (push)

Resolve F_a into its component parts (parallel and perpendicular)