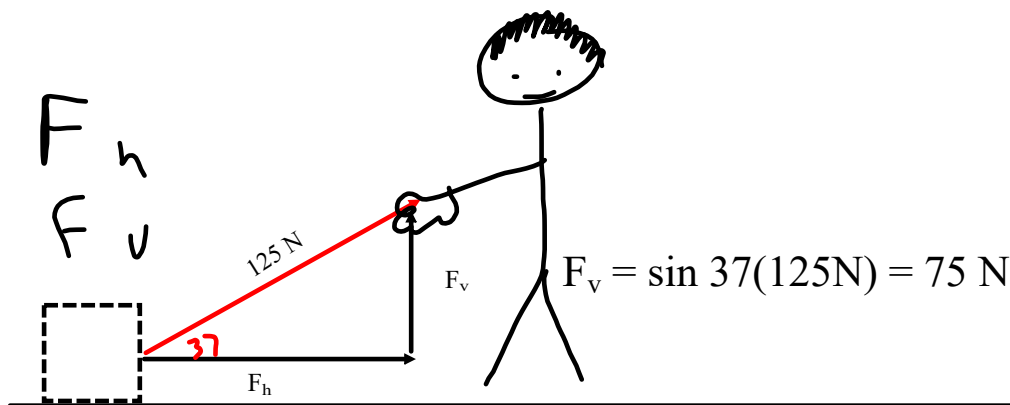


Vector Review

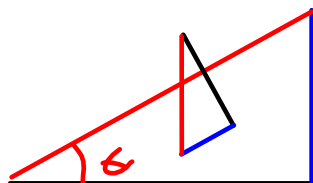
What is the horizontal and vertical components of a force of 125 N directed at 37° above the surface?

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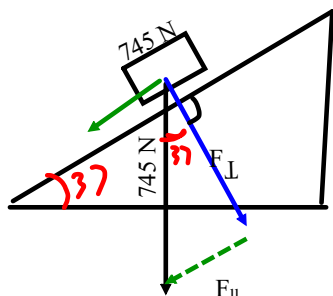
$$F_h = \cos 37(125 \text{ N}) = 100 \text{ N} \quad (1.0 \times 10^2 \text{ N})$$

$$F_a = 125 \text{ N at } 37^\circ$$

 θ 

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



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

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

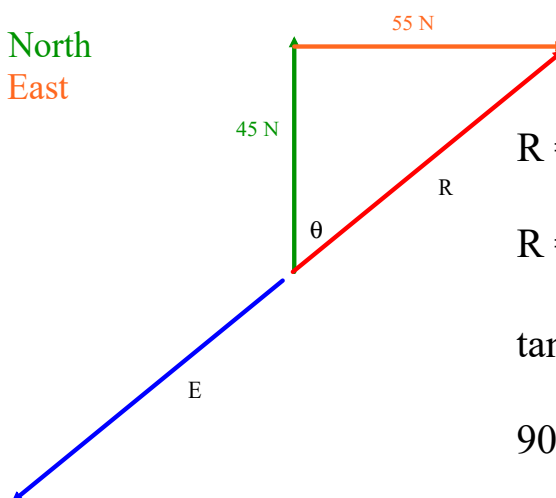
What is the equilibrant of two forces, one of 45 N due north and the other of 55 N due E?

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

$F_1 = 45 \text{ N North}$

$F_2 = 55 \text{ N East}$

$E = ?$



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

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

$$\tan \theta = 55 \text{ N} / 45 \text{ N} = 51^\circ$$

$$90 - 51 = 39^\circ$$

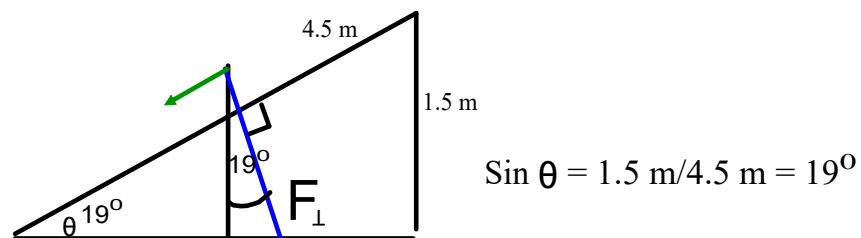
$$E = 71 \text{ N at } 219^\circ$$

$$39 + 180 = 219^\circ$$

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?

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



$$F_{\parallel}$$

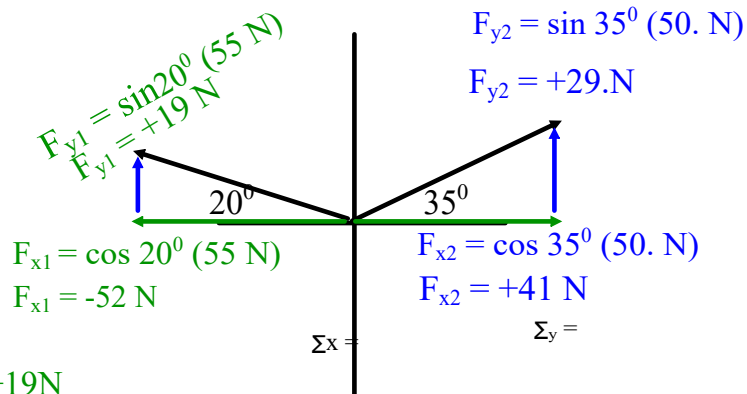
$$F_{\perp} = \sin 19^{\circ}(-34 \text{ N}) = -11 \text{ N}$$

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

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

$F_1 = 55 \text{ N at } 160^\circ$

$F_2 = 50. \text{ N at } 35^\circ$



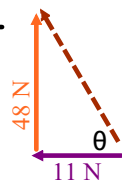
$F_{x1} = -52 \text{ N}$
 $F_{x2} = +41 \text{ N}$

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

$\Sigma x = -11 \text{ N}$

$\Sigma y = +48 \text{ N}$

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



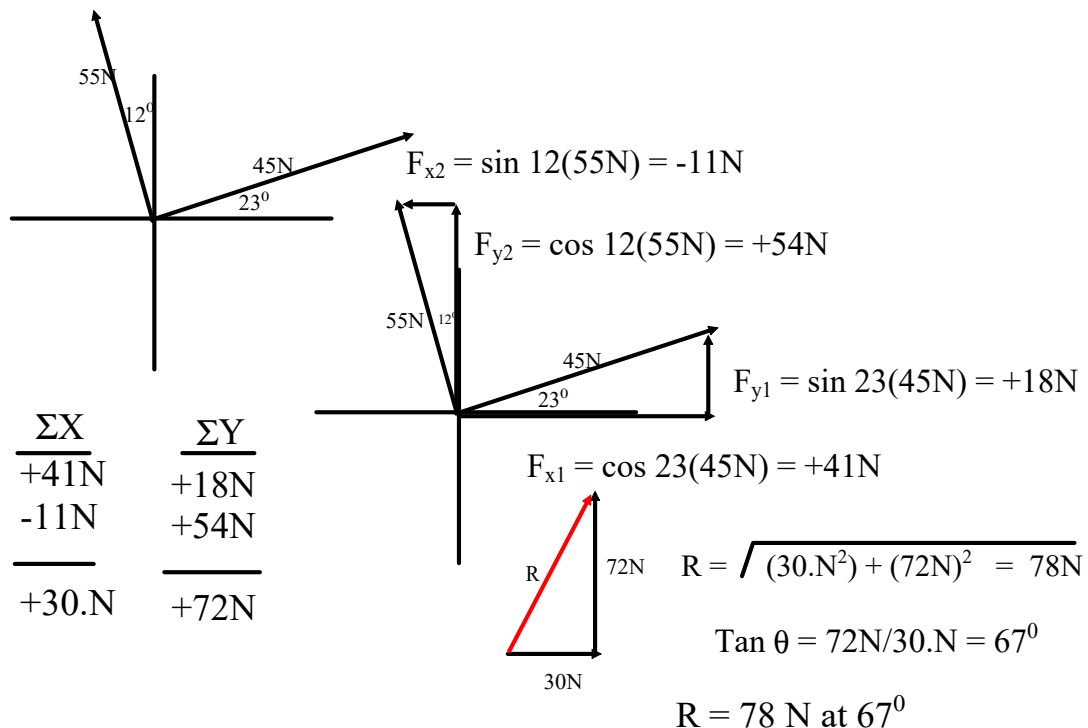
$\tan \theta = 48 \text{ N} / 11 \text{ N} = 77^\circ$

$180 - 77 = 103^\circ$

$v_r = 49 \text{ N at } 103^\circ$

What is the resultant of 45 N at 23° and 55 N at 102° .
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.



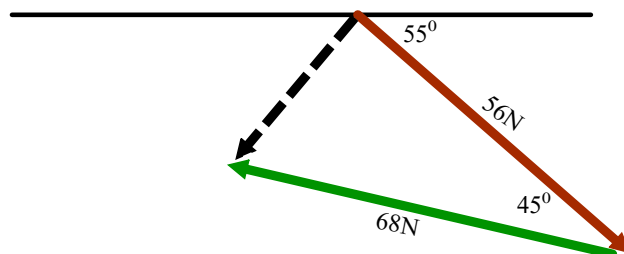
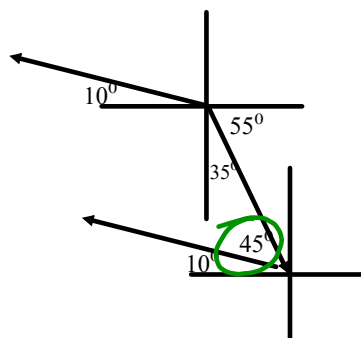
graphically

$$F_1 = 56\text{N at } 305^\circ$$

$$F_2 = 68\text{N at } 170^\circ$$

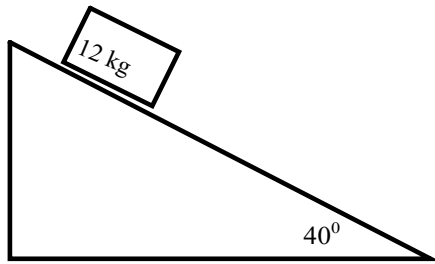
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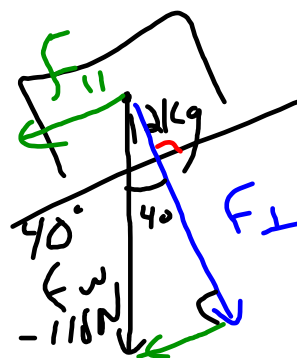


$$R = 48\text{ N at } 224^\circ$$

Find F_p and F_{\perp}



F_p
 F_{\perp}



$$F_p = \sin 40^\circ (-118 \text{ N})$$

$$F_p = -76. \text{ N}$$

$$F_{\perp} = \cos 40^\circ (-118 \text{ N})$$

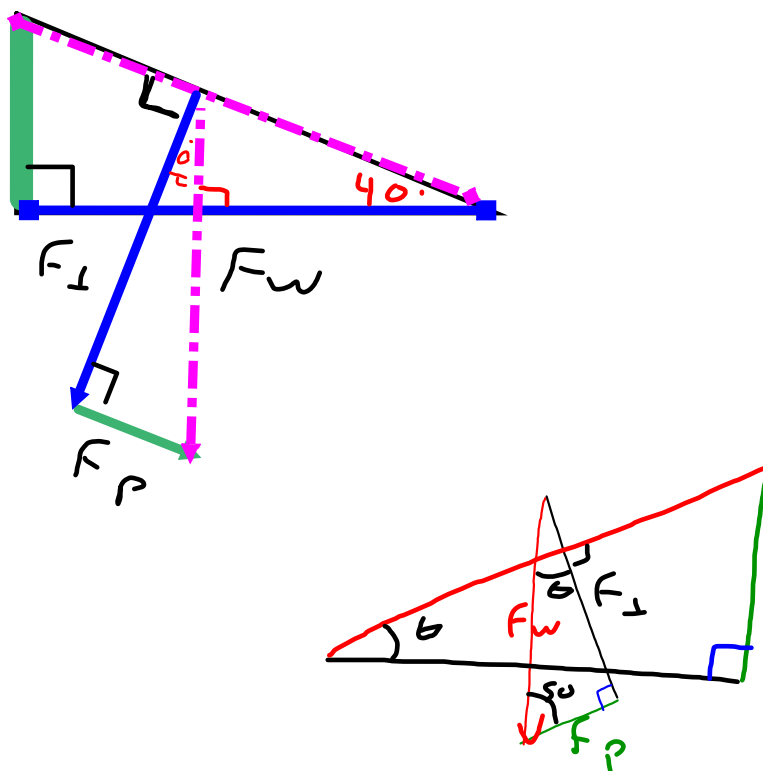
$$F_{\perp} = -90. \text{ N}$$

$$F_w = mg$$

$$F_w = 12 \text{ kg } (-9.8 \text{ m/s}^2)$$

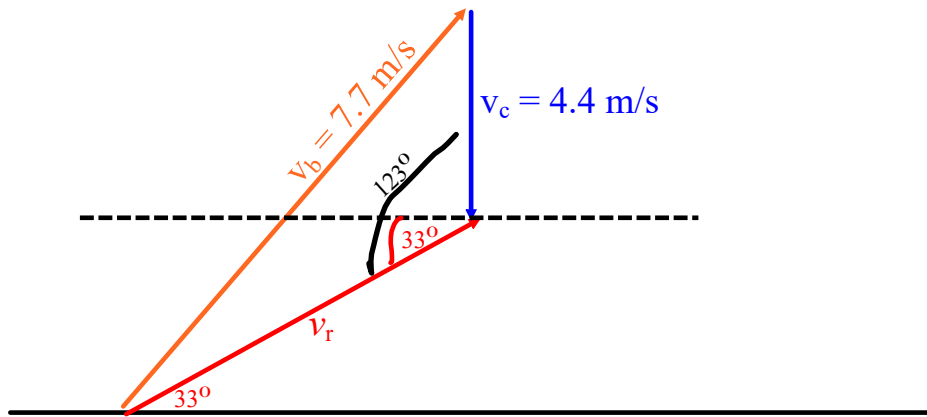
$$F_w = -118 \text{ N}$$

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

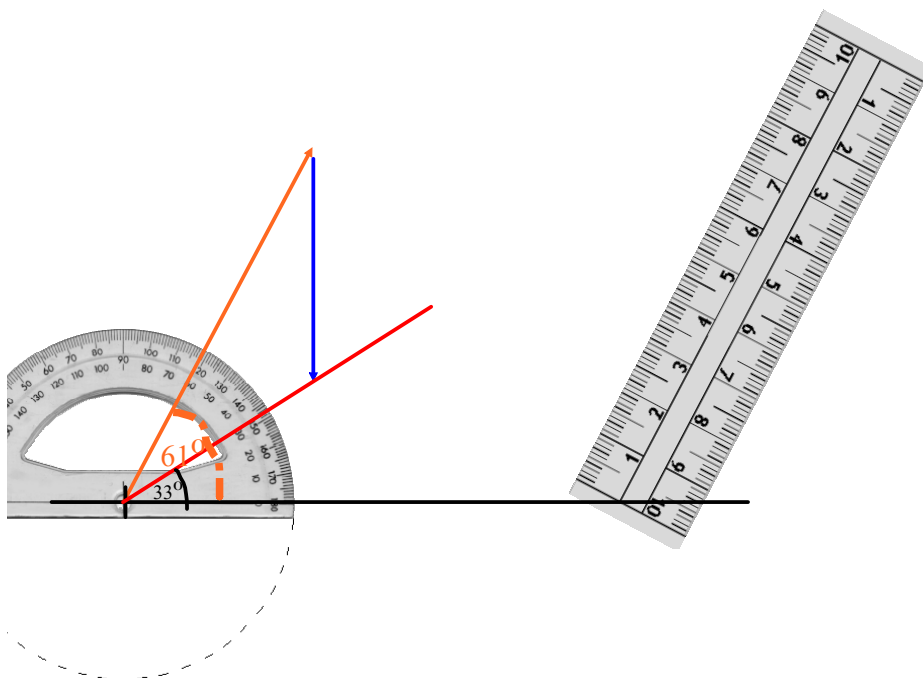


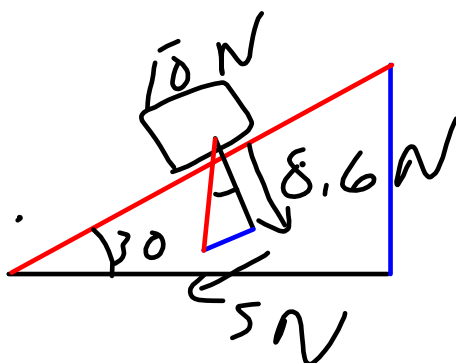
A boat can travel 7.7 m/s in water. Where should the boat head if it wants to end up 33° up stream and it encounters a current of 4.4 m/s ?.....solve graphically.....

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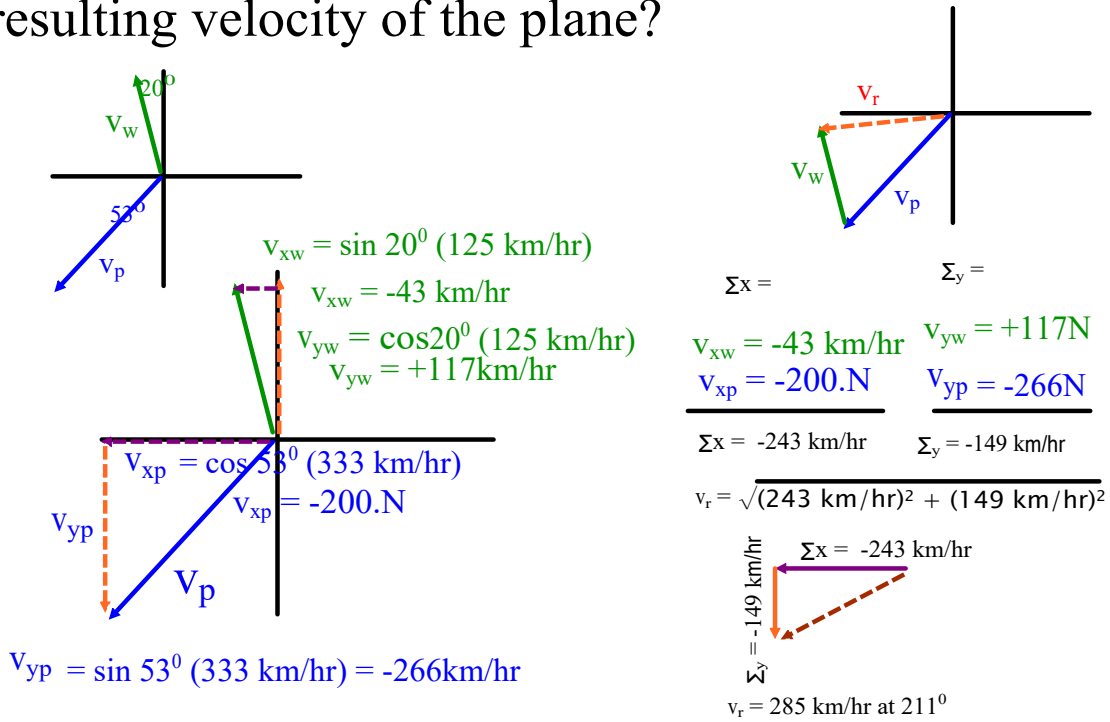
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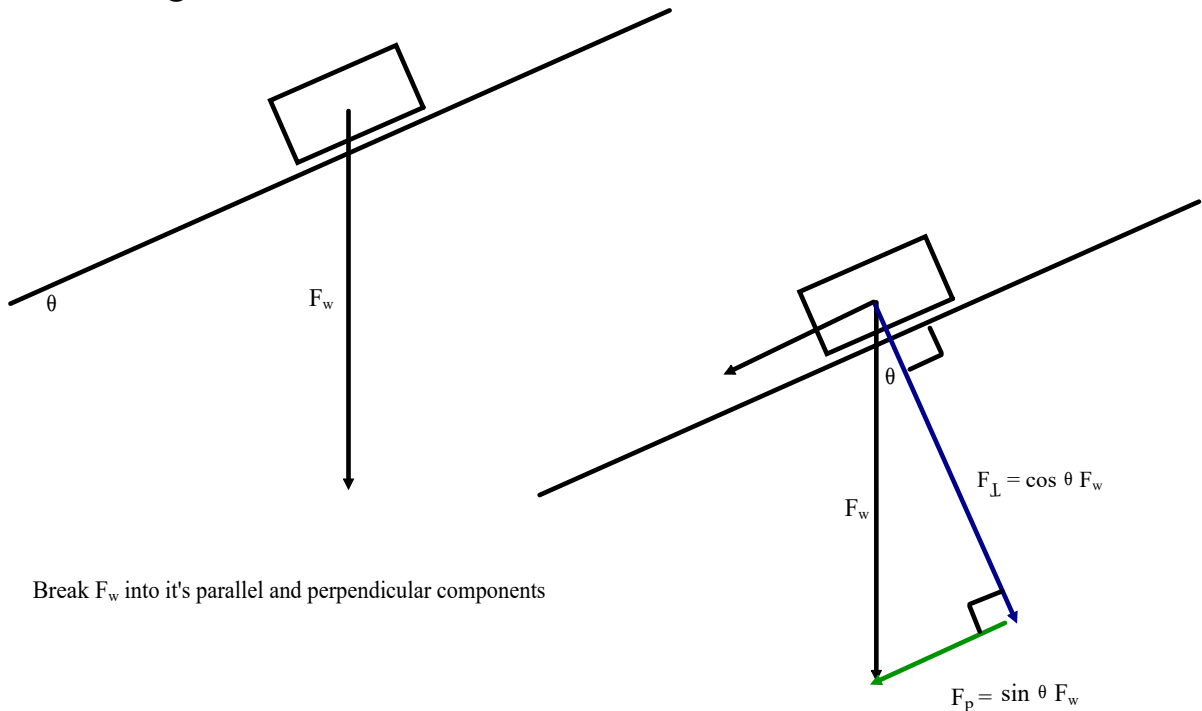


A plane heads 233° at 333 km/hr and encounters a wind blowing at 110° at 125 km/hr . What is the resulting velocity of the plane?

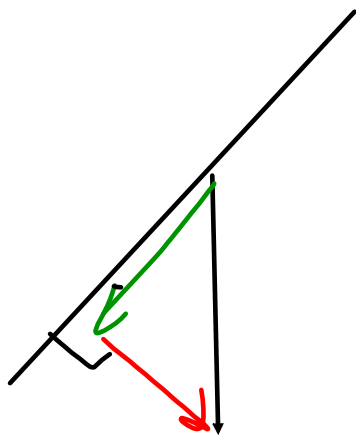
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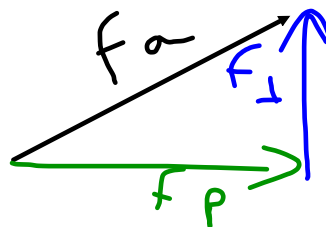
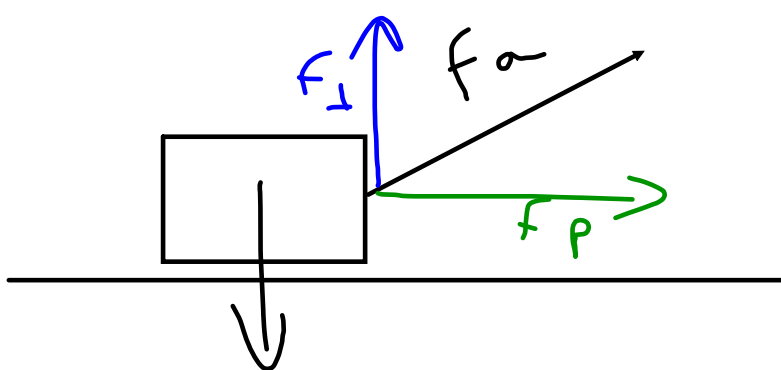
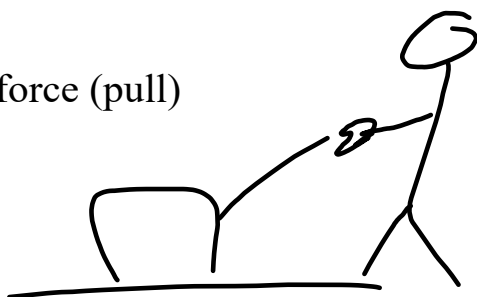
Angled surface



Break F_w into its parallel and perpendicular components



Angled force (pull)



Angled force (push)

Resolve F_a into its component parts (parallel and perpendicular)