

Skid  
part 3

Skid

S+H

Honda stationary  
(part 1)

Collision  
(part 2)

$m_H = 1450 \text{ kg}$

H

+

mass of  
occupants

(estimated)

Stop

$V_S = ?$

S

$m_S = 1200 \text{ kg}$

+ occupants

## Analysing the collision

Conservation of momentum

of the system

Total momentum, just before collision

= total momentum of the system  
just after the collision

'System' = honda + subaru

$$p = mv$$

Objects separate

$$m_1 v_{1i} + m_2 v_{2i} = m_1 v_{1f} + m_2 v_{2f}$$

Objects stick together

$$m_1 v_{1i} + m_2 v_{2i} = (m_1 + m_2) v_{1+2f} \quad *$$

$$\checkmark m_H v_{Hi} + \checkmark m_S v_{Si} = (\checkmark m_H + \checkmark m_S) \checkmark v_{H+Sf}$$

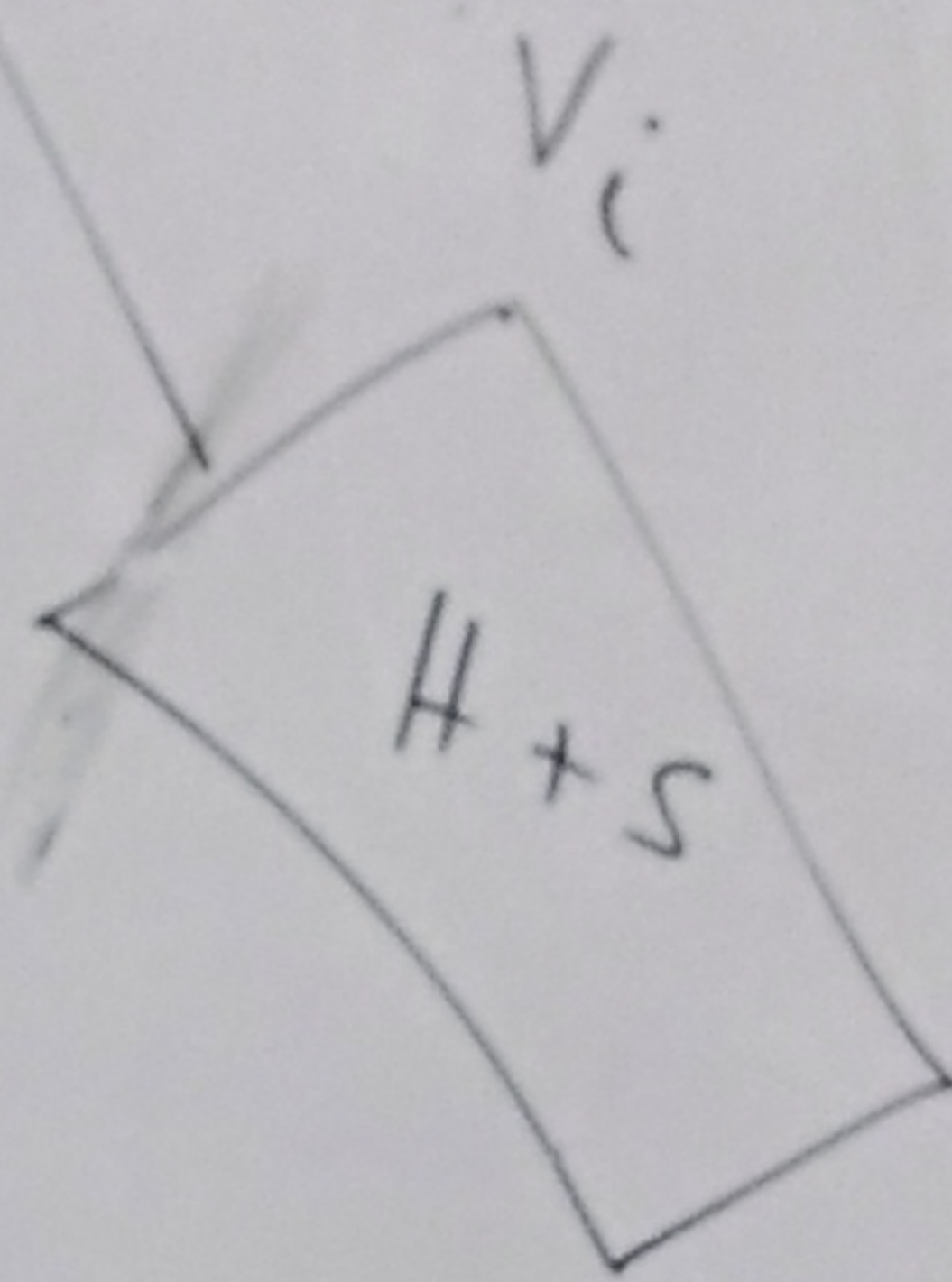
↑

$$V_f = 0$$

$$\Delta x = 12 \text{ m}$$

$$\mu_k = 0.60$$

coefficient of kinetic friction between tyres and road.

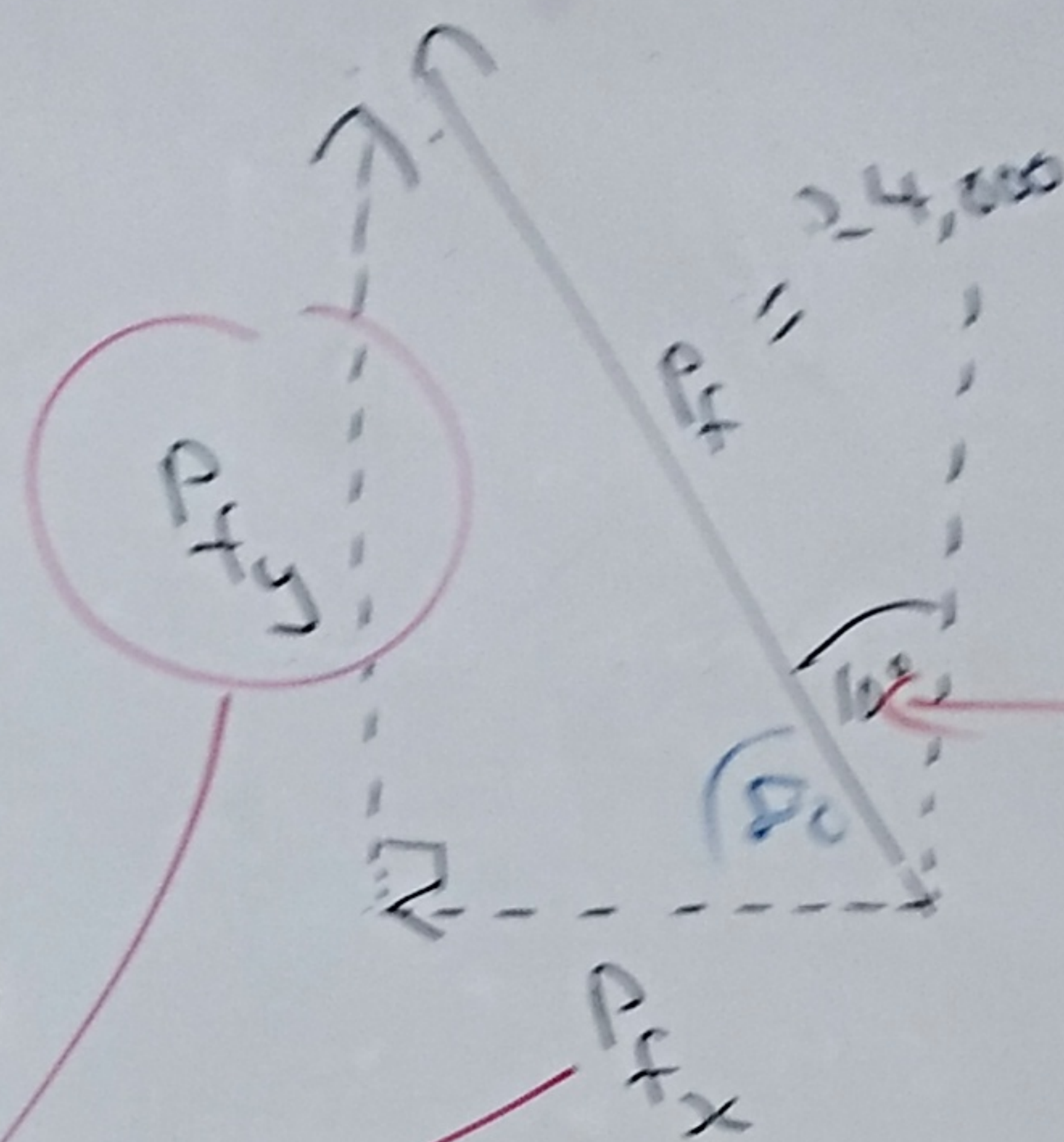


which is the same as  $V_{H+S_f}$  in mom equation

$$V_i = \sqrt{2 \times 0.60 \times 9.8 \times 12}$$

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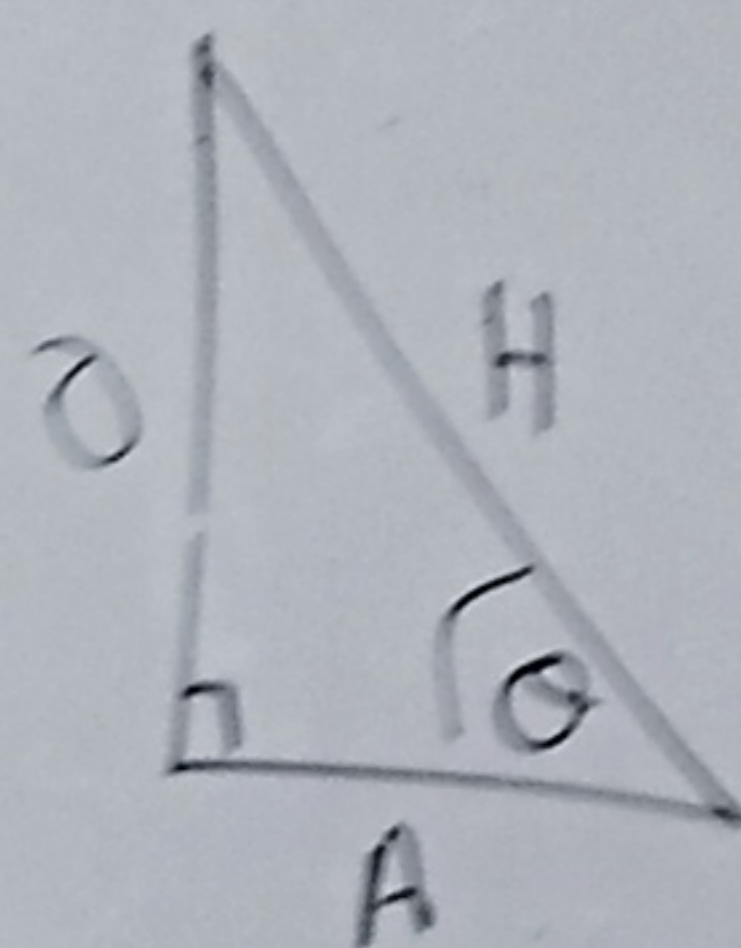
Method of  
components  
(break up  
the vector  
into x and  
y components)



made up angle

Use trig to solve for  $P_{fx}$  and  $P_{fy}$ .

SOHCAHTOA



The Principle of Conservation of Momentum holds for x and y components separately.

x-component

$$\cancel{m_H v_{Hix}} + \cancel{m_S v_{Six}} = 0$$

$$= (m_H + m_S) v_{H+Sfx}$$

we know this

✓  $p_{fx}$

y-component

$$\cancel{m_H v_{Hiy}} + m_S v_{Siy} = 0$$

$$= (m_H + m_S) v_{H+Sfy}$$

✓  $p_{fy}$