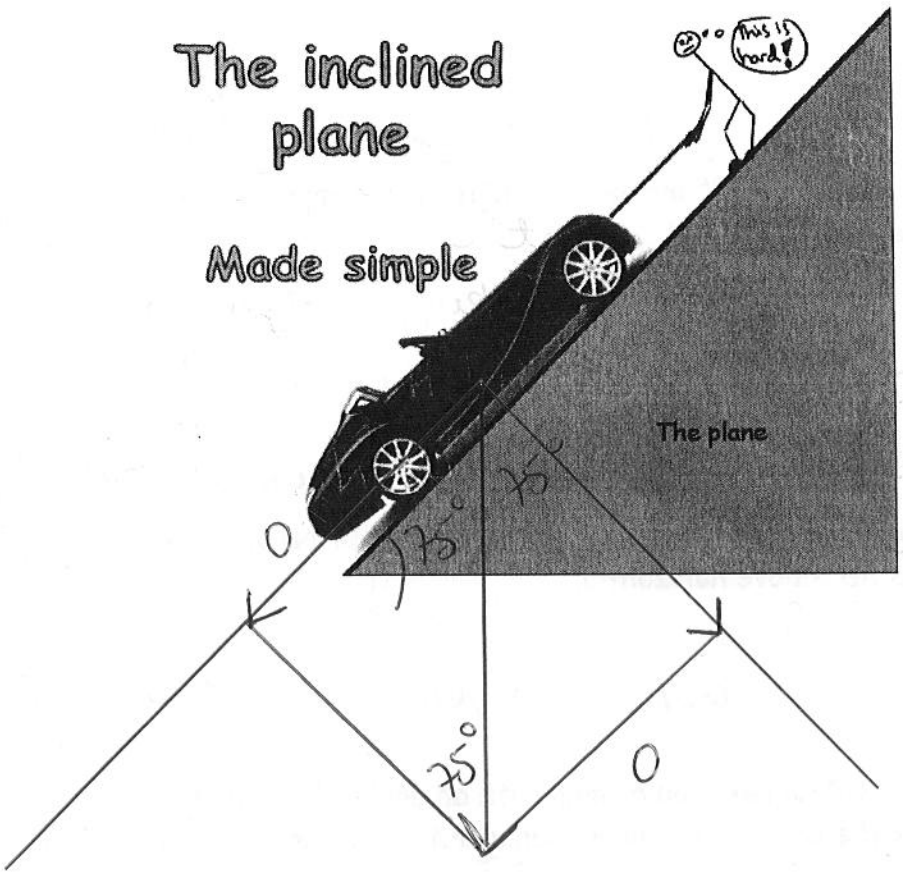
Problems Answer Key

1. What is the force necessary to pull a 790 kg roadster up a 75 ° ramp?



$F_g = mg$

$= (790\,kg)(9.8\,\frac{m}{s^2})$

$= 7742\,N$

$F_{eff} = H \sin\theta = 0$

$= (7742\,N)\sin 75°$

$= 7478\,N$

$F_g = 7742\,N$

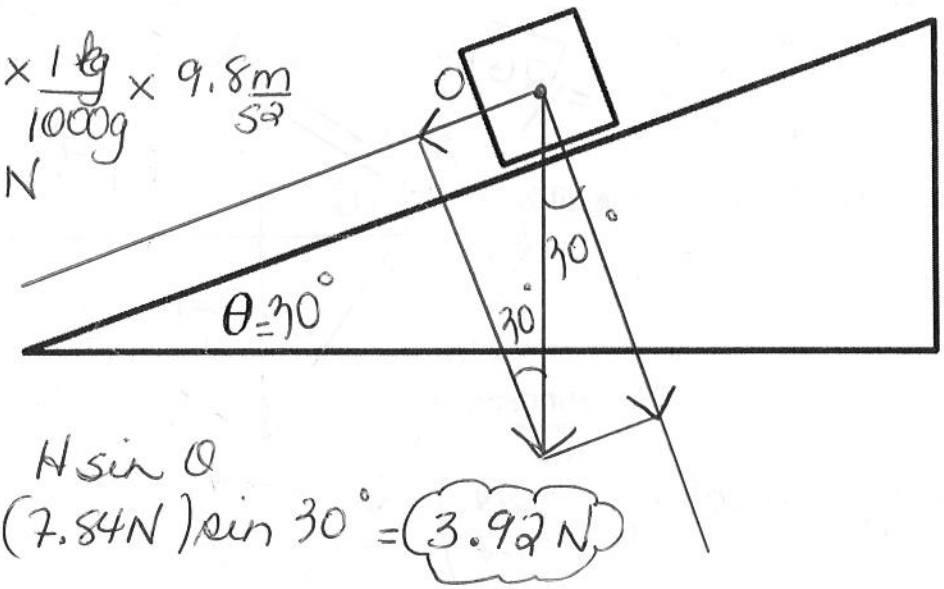
800g

2. What is the magnitude of the force that would pull a block down a ramp at an angle of 30. °.

$F_g = mg$

$= 800g \times \frac{1\,kg}{1000g} \times 9.8\,\frac{m}{s^2}$

$F_g = 7.84\,N$

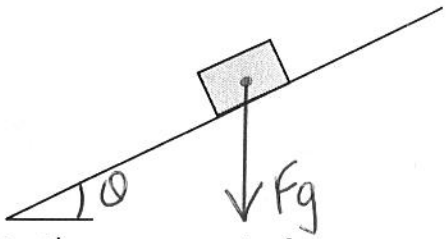


$F_{eff} = H \sin\theta$

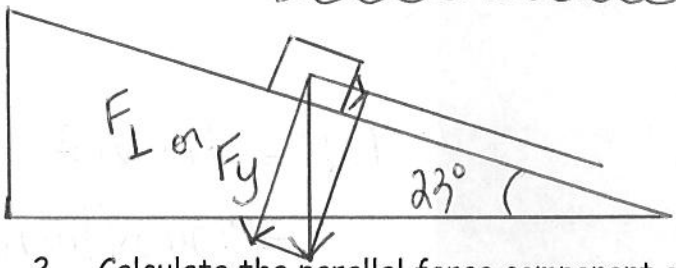
$= (7.84\,N)\sin 30° = 3.92\,N$

Worksheet: Inclined Planes

Complete the diagram, labeling vectors and angles:



1. A cart weighing 420 N rests on a 23° incline. Calculate the component of its weight that presses the cart to the hill.



not pulls it down!
looking for adjacent side
CAH! $H\cos\theta = \frac{A}{H}\cdot H$

$420N\cos 23° = A = F_y = 387N$

2. Calculate the parallel force component of the weight (6.1×10^5 N) of a car resting on a hill which is 35° above horizontal.

$F_{eff} = F_g \sin\theta = 6.1\times10^5 N \sin 35° = 3.50\times10^5 N$

3. A crate having a mass of 114 kg rests on a ramp with an angle of incline of 15.2°. What force does the crate exert perpendicular to the ramp?

$F_g = mg = (114kg)(9.8\frac{m}{s^2}) = 1117.2N$

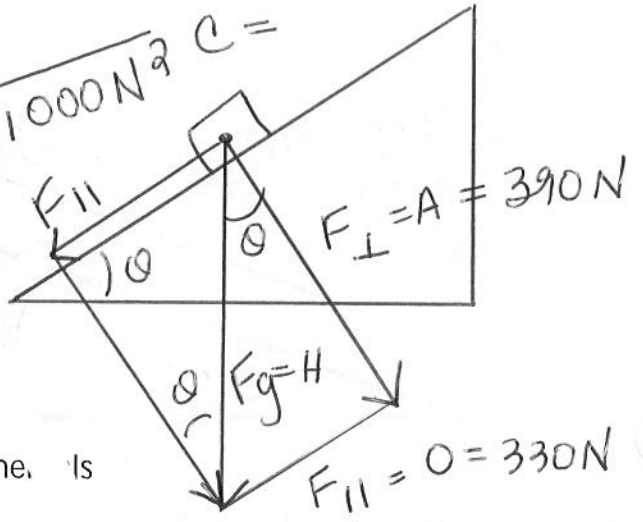
$F_\perp = H\cos\theta = (1117.2N)\cos 15.2° = 1078N$

4. What is the weight of a box that exerts a parallel force component of 330 N and a perpendicular component of 390 N?

$a^2 + b^2 = c^2$

$(330N)^2 + (390N)^2 = c^2$

$108900N^2 + 152100N^2 = c^2 = 261000N^2$ $c = 510.88N$



What is the angle of incline of the hill?

$\tan\theta = \frac{O}{A}$

$\theta = \arctan\frac{O}{A} = \arctan\left(\frac{330N}{390N}\right) = 40.7°$