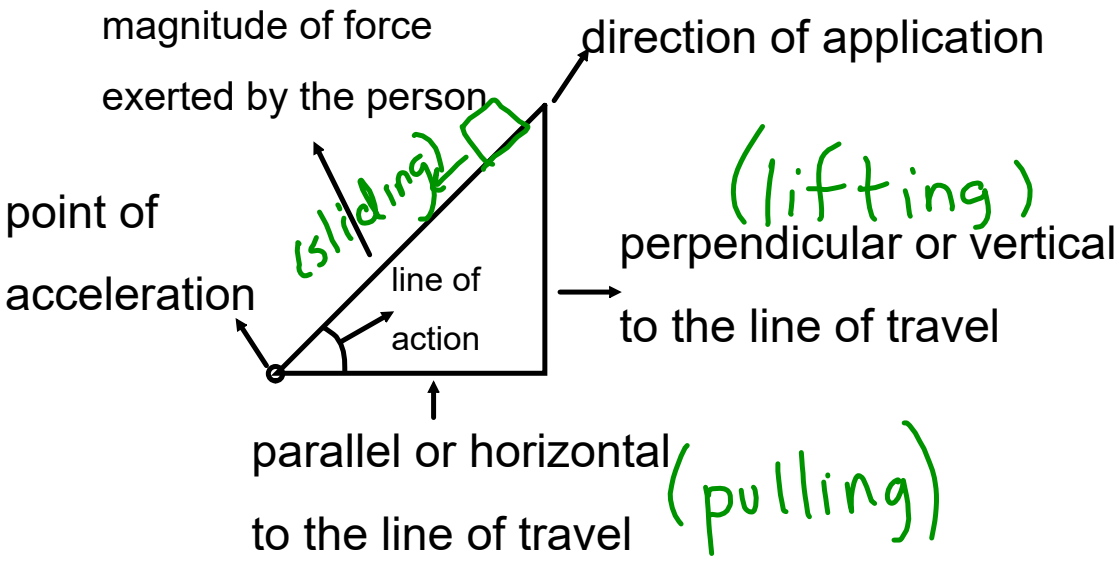
Effective Force Notes

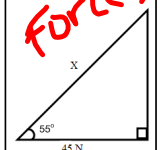
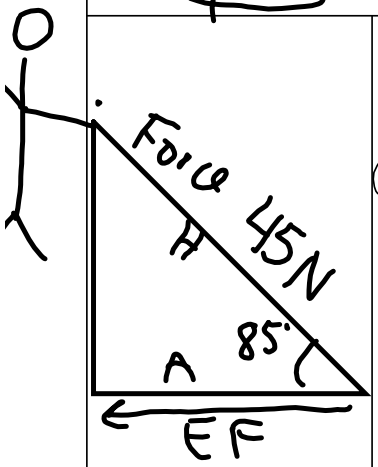
def: *direction* in which the movement of an object or person is moving.



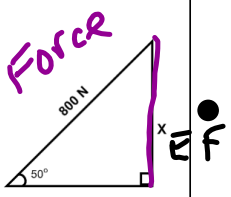
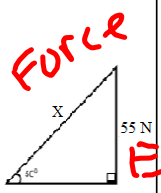
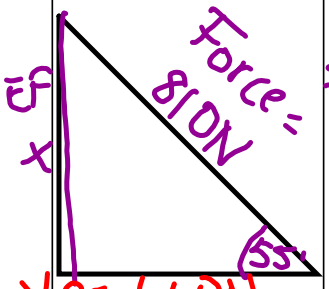
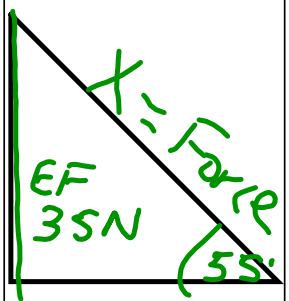
- Any time a weight is given in kg, it must be converted to N, therefore you x by 9.8 N/kg
- There are 4 types of questions which can be asked, trigonometry is used to solve for the unknown. **Cos and Sin used, never Tan.**
- Force and effective force are not the same thing. Force is the effort being put, NOT the direction

Type 1- pulling questions

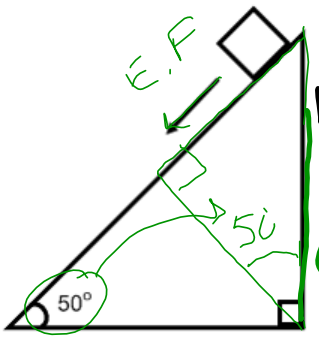
CAH (COS)

Looking for effective force, force is given	Looking for force, effective force is given
cos55 = ?/40  • finding the horizontal line of travel • cos always used	 • Looking for hypotenuse • cos always used
What is the effective force when a man pulls a box with a force of 45 N at an 85° angle?	What is the force used when the effective force of pulling a bag is 45 N with a 65 angle?
 	cos85 = x/45 3.922 N 3.9N
 	C = A/H cos65 = 45/x 45/cos65 = x 106.479 110N

Type 2 - Lifting an object SOH

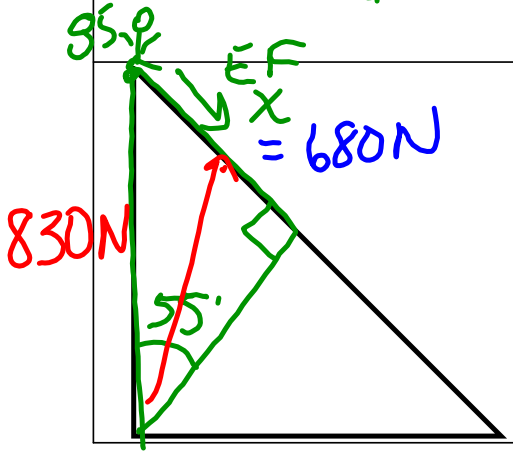
Looking for effective force, force is given	Looking for force, effective force is given
 • finding perpendic-ular to line of travel. • sin always used • multiple weight by 9.8 N/kg	 • Looking for hypotenuse • sin always used
Could a man lift his son off the ground if he is using 810 N of force at a 55°angle and the boy weighs 65 kg?	What is the force used by a man when he lifted a bag with an effective force of 35 N at a 55° angle?
 SOH $\sin = \frac{O}{H}$ $\sin 55 = \frac{x}{810}$ $x = 660N$ $65kg \times 9.8N/kg$ $640N$	 $S = \frac{O}{H}$ $\sin 55 = \frac{35N}{X}$ $\frac{35N}{\sin 55}$ $= 42.72$ $= 43N$

Type 3- Sliding questions



- Finding magnitude of effective force
- **Use slide - split - sin**
- Weight of person put on **hypotenuse. (force of gravity perp. to the line of travel)**

What is the magnitude of the effective force if a man weighing 85 kg slides down a hill at a 55° angle?

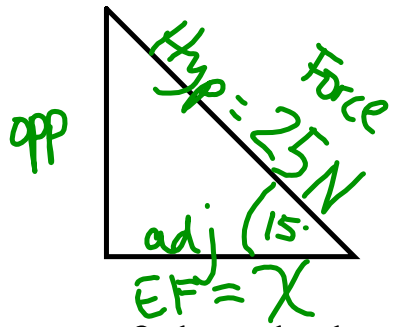


85kg x 9.8N/kg
= 833N = 830N

sin55 = x / 830N = 679.896
= 680N

Combination question of pulling and lifting

A- What is the effective force when a boy pulls a sled with a force of 25 N at a 15° angle?



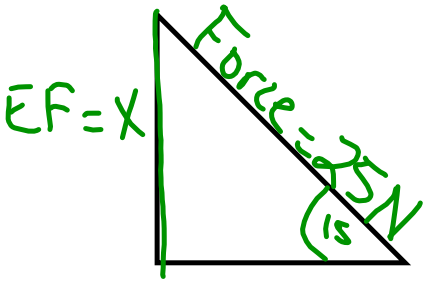
X (CAH) (SOH)

CAH C=A H

$\cos 15 = \frac{x}{25} = 24.148$

24N

B- If the sled weighed 1.5 kg, could it be lifted off the ground?



$\sin 15 = \frac{x}{25N}$ $x = 6.47$ $x = 6.5N$

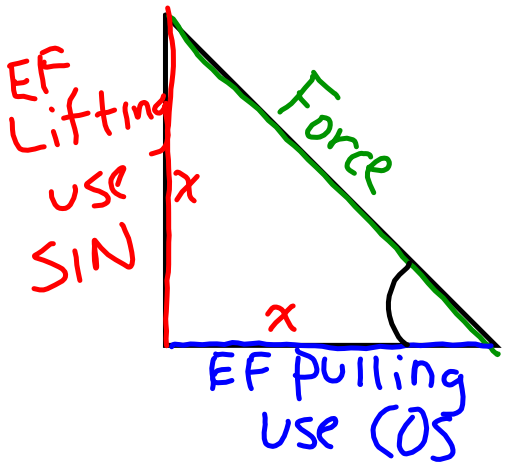
$1.5 \times 9.8\ N/kg = 14.7 = 15N$

No because 15N is ↑ 6.5N

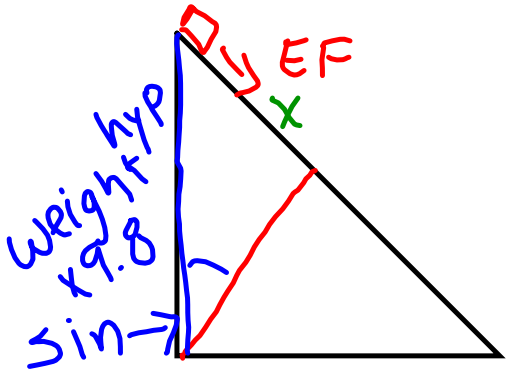
Recap

pulling and lifting

COS SIN

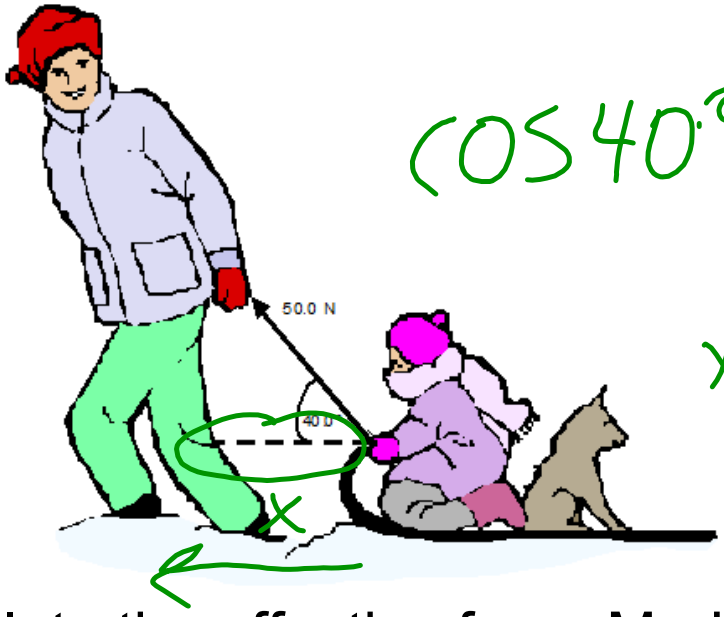


Sliding SIN



Past exam question

1. Mr. Logan is pulling his son James on a sled at a constant velocity. Mr. Logan is exerting a force of 50.0 N at an angle of 40.0° to the horizontal as shown in Figure 3.



$\cos 40^\circ = \frac{x}{50.0\,N}$

$x = 38.3\,N$

Calculate the effective force Mr. Logan is doing.