

University Physics 1A

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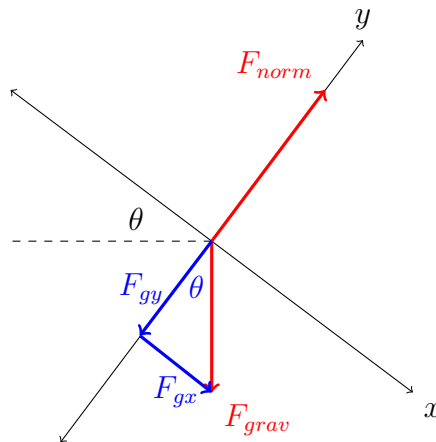
Dynamics

The weight of an object is equation to the force of gravity on the object. Therefore:

$$W = F_{grav} = mg$$

Example

You (mass m) are skiing on a hill inclined at θ to the horizontal where there is no friction. Find the normal force and your acceleration in terms of m , θ , and constants. Look at limiting cases to see if the answer makes sense, and explain your findings.



	x	y
F_{norm}	0	F_{norm}
$F_{gravity}$	$mg \sin \theta$	$-mg \cos \theta$

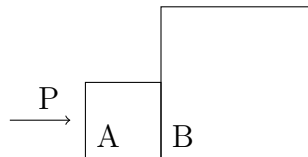
$$F_x = 0 - mg \sin \theta = ma_x$$

$$a_x = \frac{mg \sin \theta}{m} = g \sin \theta$$

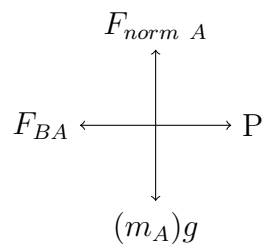
$$F_y = F_{norm} - mg \cos \theta = 0$$

$$F_{norm} = mg \cos \theta$$

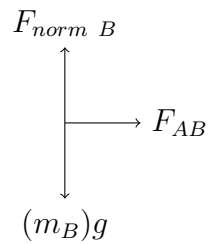
Pushing Objects



Forces on Box A:



Forces on Box B:



Box A	x	y
gravity	0	$(-m_A)g$
norm	0	$F_{norm\ A}$
push	P	0
Box B	$-F_{BA}$	0
Box B	x	y
gravity	0	$(-m_B)g$
norm	0	$F_{norm\ B}$
Box A	F_{AB}	0

$$\begin{aligned}
-F_{BA} + P &= m_A a_x \\
F_{norm\ A} - m_A g &= m_A a_y = 0 \\
F_{norm\ A} &= m_A g \\
F_{AB} &= m_B a_x \\
F_{norm\ B} - m_B g &= m_B a_y = 0 \\
F_{norm\ B} &= m_B g
\end{aligned}$$

By Newton's Third Law:

$$\begin{aligned}
-m_B a_x + P &= m_A a_x \\
P &= a_x (m_A + m_B)
\end{aligned}$$

Reminders and Homework

Complete the homework on TheExpertTA and WebAssign.

Remember to bring the Activities Manual

You can find all my notes at <http://omgimanerd.tech/notes>. If you have any questions, comments, or concerns, please contact me at alvin@omgimanerd.tech