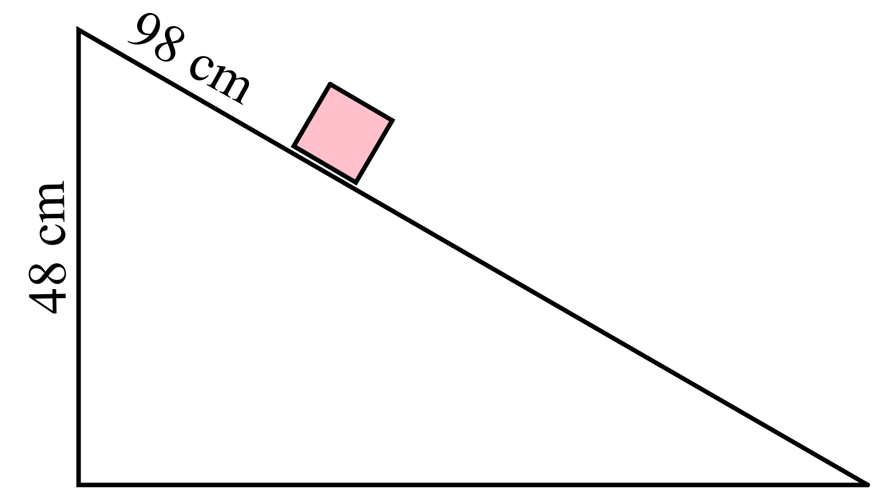
A box is on a frictionless ramp. What is the acceleration of the box down the ramp?

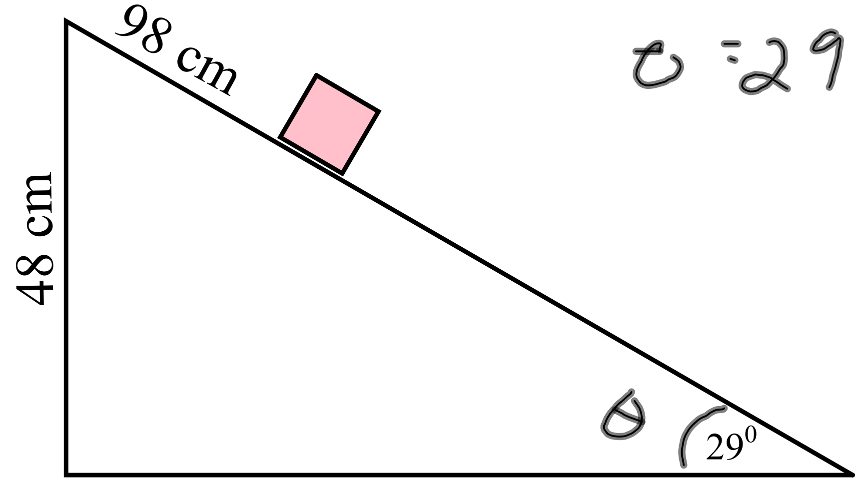


Nov 3-8:05 AM

Because you know the height and length of the ramp you also know its angle!

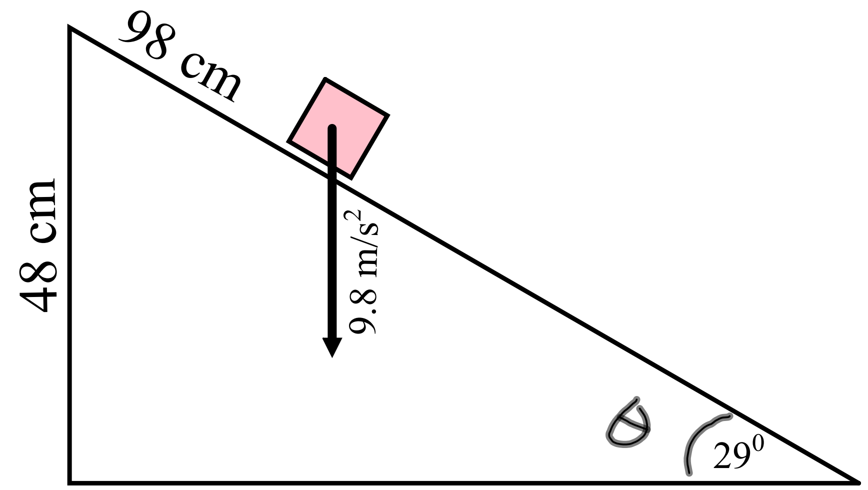
$$\sin\theta = \frac{48\,cm}{98\,cm}$$

$$\theta = 29^\circ$$



Nov 3-11:58 AM

You know acceleration due to gravity is 9.8 m/s^2 and acts straight down- we are showing it as an acceleration vector.



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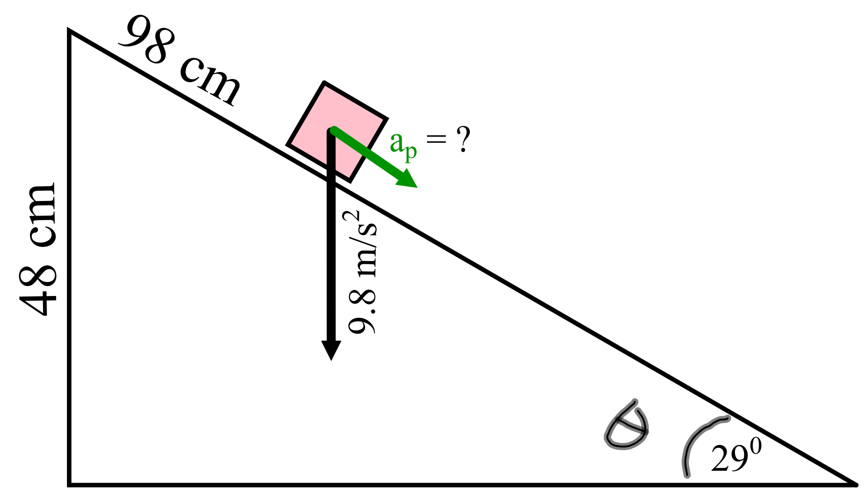
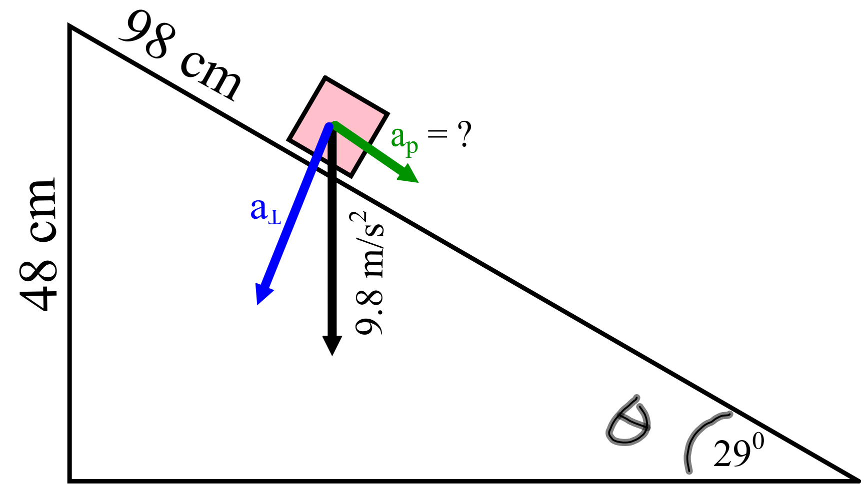
Acceleration down the ramp is parallel to the surface of the ramp is represented by ap



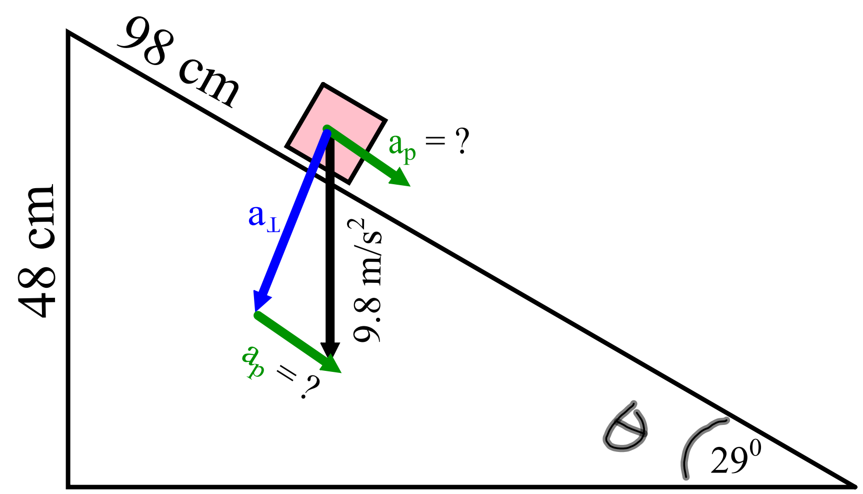
Nov 3-11:57 AM

You can add the perpendicular component ($a_{\perp}$)of the acceleration due to gravity and you how have two components of 9.8 m/s^2 that are at right angles- yea!



Nov 3-4:20 PM

Move a_p down to the head of $a_{\perp}$ and you now have a vector diagram instead of a point diagram and similar triangles.



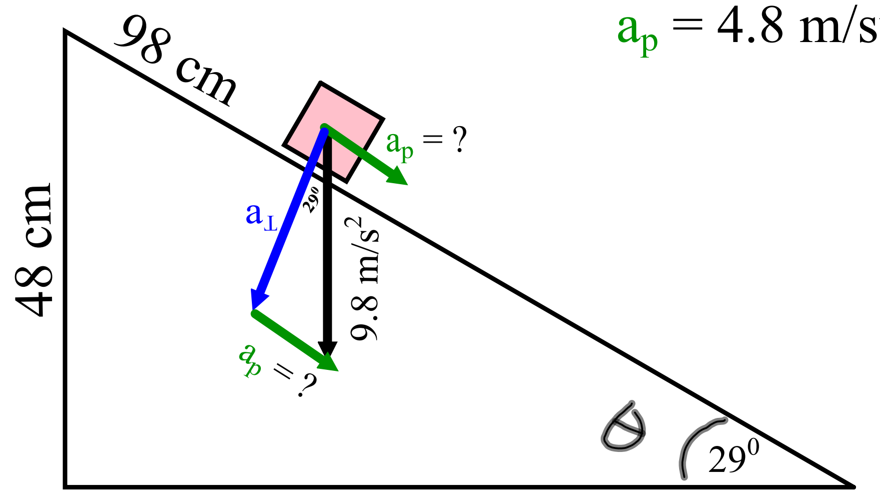
Nov 3-4:22 PM

You now know the angle between the components of gravity and can solve for a_p

$\sin 29^0 = a_p/9.8\ m/s^2$

$a_p = \sin 29^0(9.8\ m/s^2)$

$a_p = 4.8\ m/s^2$



Nov 3-4:23 PM

What velocity does the box hit the bottom of the ramp at if it starts at the top? ...*remember, the ramp is frictionless!*

$v_2 = ?$

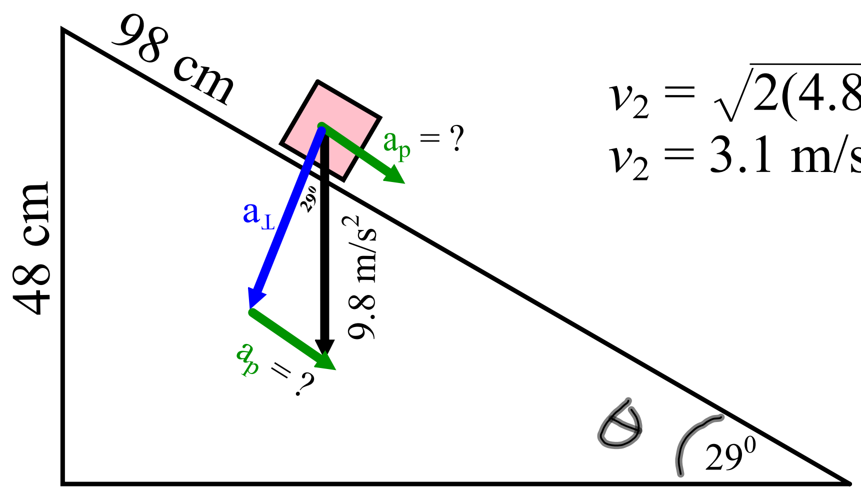
$a_p = 4.8\ m/s^2$

$v_1 = 0$

$d = 98\ cm$

$v_2 = \sqrt{2(4.8\ m/s^2).98m}$

$v_2 = 3.1\ m/s$



Nov 3-4:27 PM