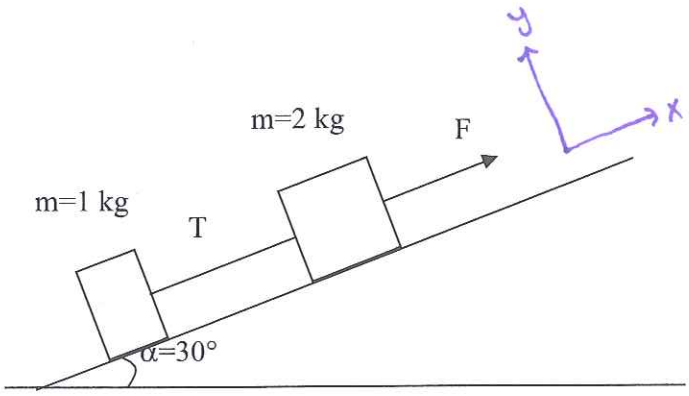
PHYS 101: General Physics **KOÇ UNIVERSITY** **Spring Semester 2016**
College of Arts and Sciences
Section 1 **Quiz 4** **04 March 2016**

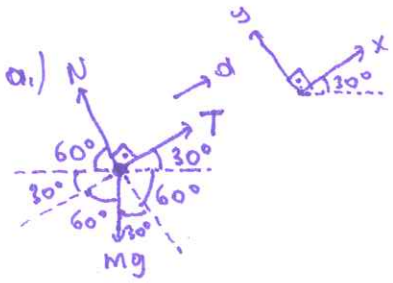
Closed book. No calculators are to be used for this quiz.
Quiz duration: 15 minutes
First Name: **Last name:** **Student ID:** **Signature:**



Two boxes sit on a frictionless surface inclined by 30° with horizontal. An applied force F gives an acceleration to the boxes with a magnitude of 2 m/sec² along the inclined plane. (Take g=10 m/sec², $\cos 30 = \sqrt{3}/2$, $\sin 30 = 1/2$).

a) What is the tension in the massless rope that connects the two boxes?
b) What is the magnitude of the applied force F?

a.)



Free body diagram for 1 kg box.

$\Sigma F_x = ma$

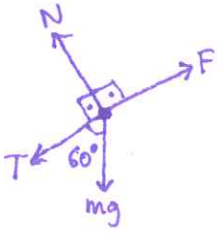
$T - mg\cos 60° = ma$

$T = ma + mg\cos 60°$

$= (1\,kg)(2\,m/s^2) + (1kg)(10\,m/s^2)\frac{1}{2}$

$= 7\,N$

b.)



Free body diagram of 2 kg box.

$\Sigma F_x = ma$

$F - T - mg\cos 60° = ma$

$F - 7N - (2kg)(10\,m/s^2)\frac{1}{2} = (2kg)(2\,m/s^2)$

$F - 7N - 10N = 4N$

$F = 21\,N$

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Section 2 **Quiz 4** **04 March 2016**

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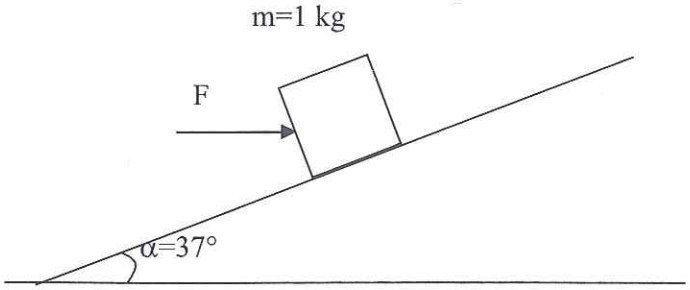
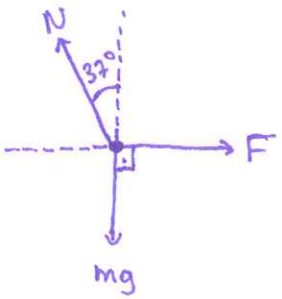


A 1 kg box is sitting on a frictionless surface inclined by 37° with horizontal. An applied force in the horizontal direction keeps the box stationary on the horizontal surface. What is the magnitude of the normal force applied from the surface to the box ? (Take g=10 m/sec^2, $\cos 37 = 4/5$, $\sin 37 = 3/5$).



$$\Sigma F_y = 0$$

$$N\cos 37° - mg = 0$$

$$N = \frac{mg}{\cos 37°} = \frac{(1\,kg)(10\,m/s^2)}{4/5} = 12.5\,N$$

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Section 3 **Quiz 4** **04 March 2016**

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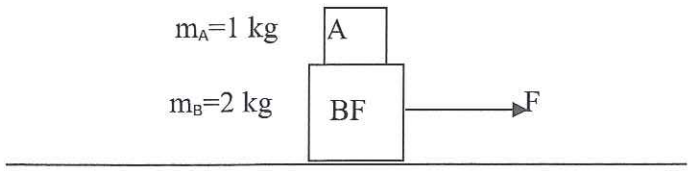
Quiz duration: 15 minutes
First Name: **Last name:** **Student ID:** **Signature:**

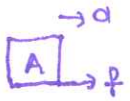


Horizontal frictionless table

Consider the boxes A and B that are standing on a horizontal frictionless table. There is friction between the two boxes. An applied force F gives an acceleration to the boxes with a magnitude of 2 m/sec² along the table. If the two boxes MOVE TOGETHER:

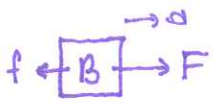
a) What is the magnitude of the friction force between the boxes ?
b) What is the magnitude of the applied force F ?

a.)



$f = m_A a \Rightarrow f = (1\,kg)(2\,m/s^2) = 2\,N$

b.)



$F - f = m_B a \Rightarrow F - 2N = (2\,kg)(2\,m/s^2) = 4N$

$F = 6N$