

College of Industrial Technology
King Mongkut's University of Technology North Bangkok



Final Examination of Semester 1

Subject: 392131 Physics I

Date: 11 December 2014

Year: 2014

Section: 15 - 16

Time: 10.00 – 12.00

Name: _____ ID: _____ Class: _____

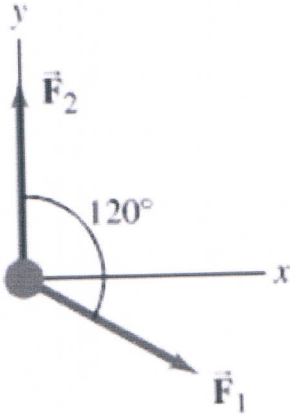
Instructions:

1. Cheating will result in failure of all classes registered for the current semester. Students who are caught cheating will also be denied registering for the following semester.
2. No documents are allowed to be taken inside the examination room.
3. Textbooks are not allowed.
4. Express your answer in English. Other languages will be discarded.
5. A scientific calculator is allowed.
6. The examination has 6 pages (including this page), 11 questions and a total score of 45 points.
7. Write all your answers on this exam sheet.

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1. The two forces \vec{F}_1 and \vec{F}_2 act on a 27.0 kg object on a frictionless tabletop. If $F_1 = 10.2$ N and $F_2 = 16.0$ N find (4 points)

- a) the net force on the object.
b) its acceleration.



2. A 5.0 kg rock and a 3.0×10^{-4} kg pebble are held near the surface of the earth. (3 points)
- a) Determine the magnitude of the gravitation force exerted on each by the earth.
b) Calculate the magnitude of the acceleration of each object when released.

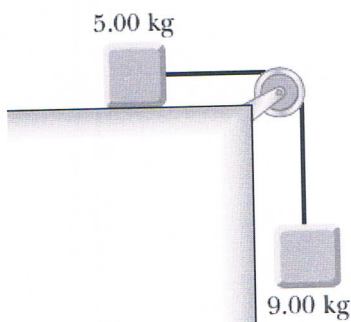
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3. A 75 kg man standing on a scale in an elevator notes that as the elevator rises, the scale reads 820 N. What is the acceleration of the elevator? (2 points)

4. The largest-caliber anti-aircraft gun operated by the German air force during World War II was the 12.8-cm Flak 40. This weapon fired a 25.8-kg shell with a muzzle speed of 880 m/s. What propulsive force was necessary to attain the muzzle speed within the 6.00-m barrel? (Assume the shell moves horizontally with constant acceleration and neglect friction.) (4 points)

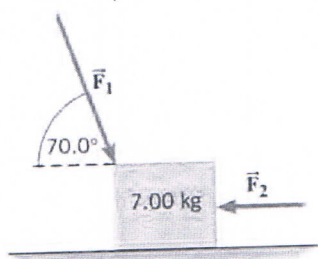
5. A 5.00-kg object placed on a frictionless, horizontal table is connected to a string that passes over a pulley and then is fastened to a hanging 9.00-kg object. (6 points)

- a) Draw free-body diagrams of both objects.
b) Find the acceleration of the two objects and the tension in the string.

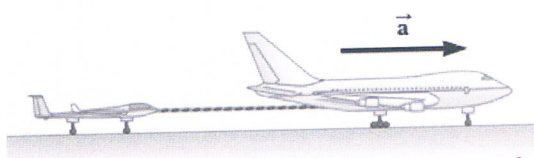


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6. Two Forces, \vec{F}_1 and \vec{F}_2 , act on the 7-kg block on the frictionless floor. The magnitudes of the forces are $\vec{F}_1 = 59 \text{ N}$ and $\vec{F}_2 = 33 \text{ N}$. What is the horizontal acceleration (magnitude and direction) of the block? (4 points)



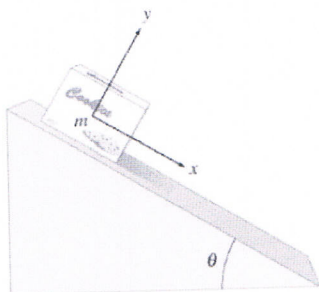
7. A 278 kg glider is being pulled by a 1,925 kg airplane along a horizontal runway with an acceleration of $a = 2.25 \text{ m/s}^2$ to the right. Find (4 points)



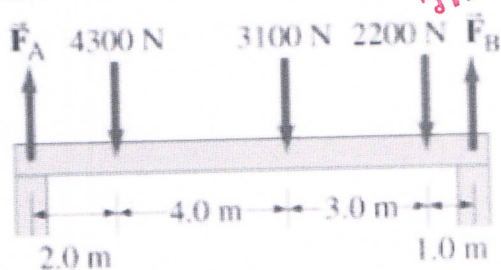
- (a) the thrust provided by the airplane's propellers.
(b) the magnitude of the tension in the cable connecting the airplane and glider.

8. A 20.0-kg sled is being pulled across a horizontal surface at a constant velocity. The pulling force has a magnitude of 80.0 N and is directed at an angle of 30.00 above the horizontal. Determine the coefficient of kinetic friction. (4 points)

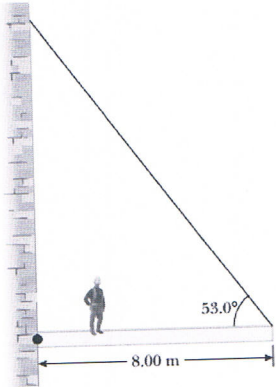
9. An 18.0 kg box is released on a 37.0° incline and accelerates down the incline at 0.270 m/s^2 . Find the friction force impeding its motion. How large is the coefficient of kinetic friction? (4 points)



10. Calculate F_A and F_B for the beam. The downward forces represent the weights of machinery on the beam. Assume the beam is uniform and has a mass of 200 kg. (4 points)



11. A uniform horizontal beam with a length of 8.00 m and a weight of 200 N is attached to a wall by a pin connection. Its far end is supported by a cable that makes an angle of 53.0° with the beam. If a 600-N person stands 2.00 m from the wall, find the tension in the cable and the horizontal and vertical forces exerted by the hinge on the beam. (6 points)



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