

Name: _____

Class Period: _____

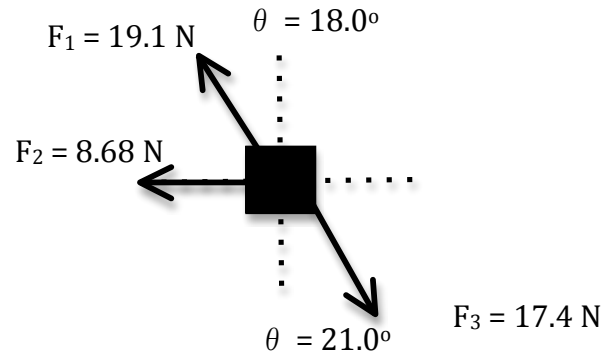
Honors Physics: Forces and Newton's Three Laws of Motion Review Problems

Conceptual Examples

1. What are two situations where an object is in equilibrium? (When the $\Sigma F = 0$, forces are balanced)
2. If the forces are not balanced and we are in non-equilibrium, the $\Sigma F = ?$
3. How do we calculate the force of gravity? $F_g = ?$
4. The force of gravity on a 2.00 kg rock is twice as much as a 1.00 kg rock. Why does the heavier rock not fall faster than the lighter one?
5. What is the difference between the acceleration of gravity and the force of gravity?
6. What is the difference between weight and mass?

Mathematical Examples:

7. Use the image provided to calculate the ΣF_x and ΣF_y . Then calculate the magnitude and angle of the net resultant force.



8. How much force is required to stop a 1,150.0 kg car in 8.000s if it is traveling at 90.00 km/h?
9. A 95.0 kg crate of _____ is being dragged horizontally across the floor by a force of 325 N directed upwards by 25.0° . While a force of kinetic friction ($F_{fk} = 199 \text{ N}$) opposes the motion, the crate is accelerating to the right.
Equilibrium or Non-equilibrium ΣF_x : _____
Equilibrium or Non-equilibrium ΣF_y : _____
 - A. Draw the FBD
 - B. Write a statement for ΣF_x and ΣF_y
 - C. What is the acceleration of the crate?

10. A box is sliding with an initial velocity of 4.00 m/s on an initially frictionless surface when it hits a rough patch on the floor that **does** have friction. The box slides horizontally across the floor (which has a coefficient of kinetic friction = 0.200). How far does the box slide before coming to a stop?

(*Hint, this one is a little tricky. I promise that you are given enough information to solve this one. But don't be too fast to plug in numbers for some of your variables, you may find that they go away on their own.)

Equilibrium or Non-equilibrium ΣF_x : _____

Equilibrium or Non-equilibrium ΣF_y : _____

11. A 55.0 kg cat is sliding down a metal slide. The slide has an angle of 35.0° with respect to the horizontal. The cat accelerates down the slide at a rate of 0.500 m/s².

Equilibrium or Non-equilibrium ΣF_x : _____

Equilibrium or Non-equilibrium ΣF_y : _____

- Draw a FBD and an 'adjusted' FBD
- Calculate the components of gravity and write a statement for the ΣF_x and ΣF_y
- What is the value of the normal force
- What is the coefficient of kinetic friction (μ_k) between the cat and the slide?

Numerical Answers:

7. $\Sigma F_x = -8.34 \text{ N}$
 $\Sigma F_y = 2.00 \text{ N}$
 $F_{\text{net}} = 8.58 \text{ N at } 167^\circ$

10. $x = 4.08 \text{ m}$

8. $F = -3594 \text{ N}$

11. A) FBD

B) $F_{gx} = 309 \text{ N}$

$F_{gy} = -441 \text{ N}$

C) $F_N = 441 \text{ N}$

D) $\mu_k = 0.638$

9. A) FBD
 B) $\Sigma F_x = 295 + 0 + (-199) + 0$
 $\Sigma F_y = 137 + F_N + 0 + (-931)$
 C) $a = 1.01 \text{ m/s}^2$