ABRHS PHYSICS (CP) NAME: KEY

Net Force Concept Sheet

Key Concepts

A. What is meant by the phrase "Net Force?"

It is what's leftover after adding up all the individual forces acting on something.

B. Why is "Net Force" important?

$F_{net} = ma$ The Net Force on an object is what causes the object to accelerate.

C. Can your acceleration be in a different direction than the net force?

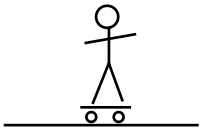
No! The net force causes the acceleration!

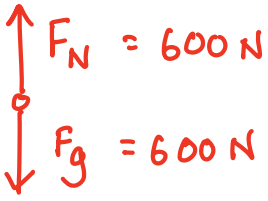
D. If you are not accelerating, what is the net force on you?

if $a = 0$, $F_{net} = 0$

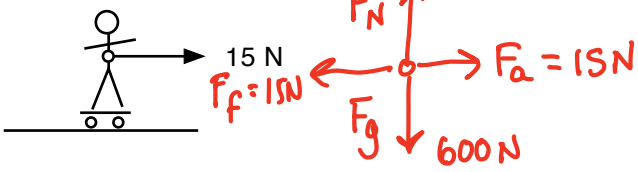
Questions

1. You weigh 600 N and are at rest on your skateboard. Show the free-body diagram, including labels and numbers.

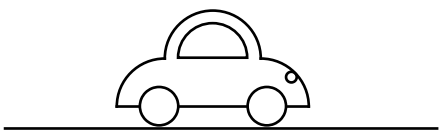


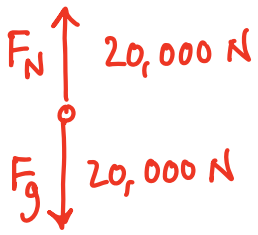


2. You still weigh 600 N, but now a friend is pulling you to the right with a force of 15 N and also at a constant speed. Show the free-body diagram, including labels and numbers.



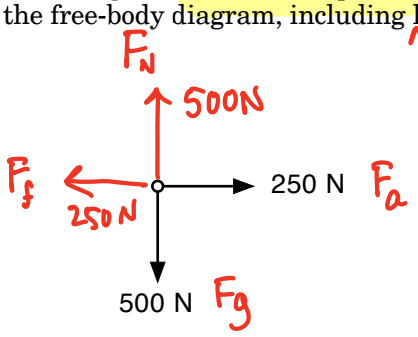
3. There is a normal force of 20,000 N acting on a car at rest. Show the free-body diagram, including labels and numbers.





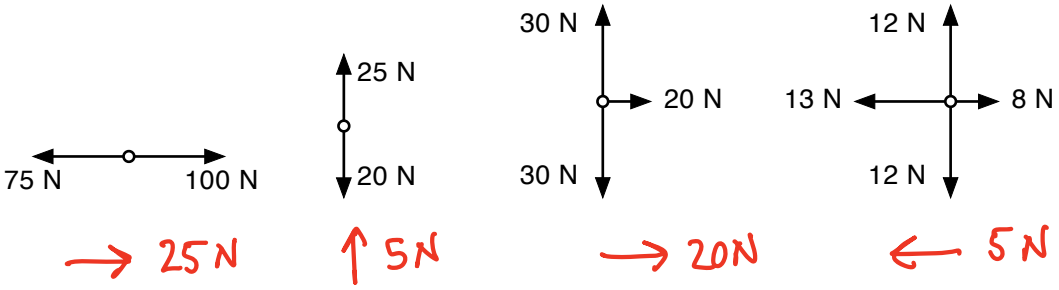
Net Force Concept Sheet

4. A person is being pulled to the right at a constant speed. Two of the forces are shown in the diagram. Complete the free-body diagram, including labels and numbers.



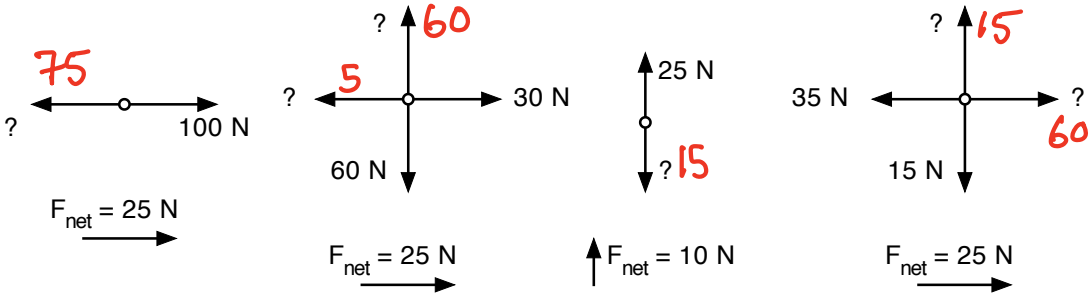
constant speed, so a = 0
so $F_{net} = 0$
So there must be a force to cancel the 250 N to the right.

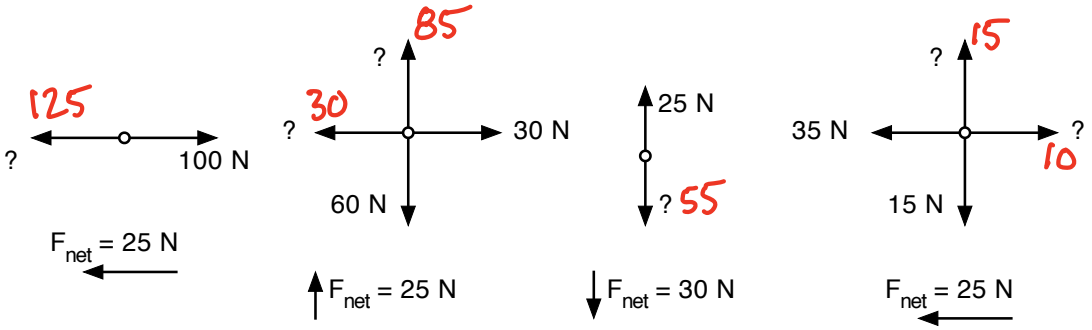
6. For each of the following free-body diagrams, what is the net force? Give both the magnitude and the direction.



→ 25N ↑ 5N → 20N ← 5N

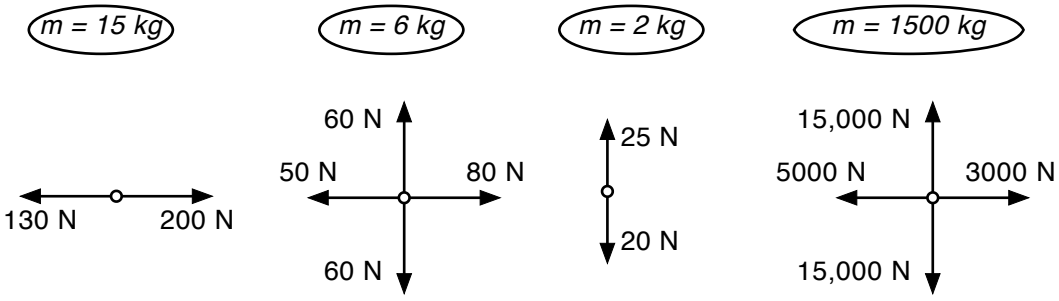
7. For each of the following free-body diagrams, what is/are the missing force(s) if the net force is as shown?





Net Force Concept Sheet

8. For each of the following free-body diagrams, what is the acceleration of the mass? Give both the magnitude and the direction.



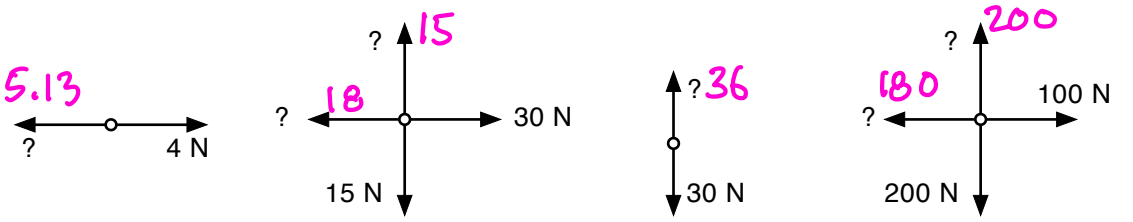
F_{net} → 70 N → 30N ↑ 5 N ← 2000N

$F_{net} = ma$

$70 = 15a$ $30 = 6a$ $5 = 2a$ $2000 = 1500a$

$a = 4.7\ m/s^2$ $a = 5\ m/s^2$ $a = 2.5\ m/s^2$ $a = 1.33\ m/s^2$

9. For each of the following free-body diagrams, what is/are the missing force(s) if the acceleration and mass are as shown?



m = 1.5 kg, a = 0.75 m/s² ← 1.13 N

m = 1.5 kg, a = 8 m/s² → 12 N

6N ↑ m = 3 kg, a = 2 m/s²

m = 20 kg, a = 4 m/s² ← 80N

$F_{net} = ma$

$F_{net} = (1.5)(.75)$ $= (1.5)(8)$ $= (2)(3)$ $= (20)(4)$

$F_{net} = 1.13\ N$ $= 12\ N$ $= 6\ N$ $= 80N$

Do these first