FPS - Free Body Diagrams - Active Reading

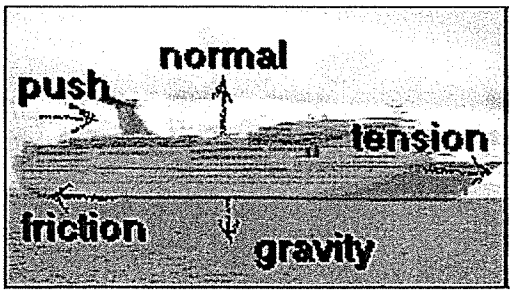
Name Teacher Period

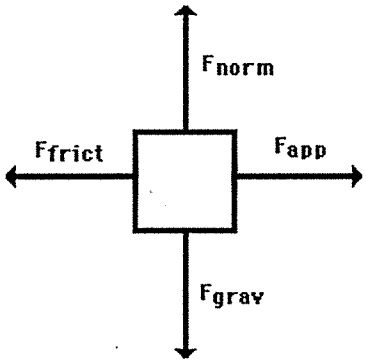
I can...
Interpret free-body diagrams. *Solve for net force and determine direction and magnitude.* *Construct a Free-body diagram from a scenario description.*

Complete the active reading by highlighting, underlining, coding, or making notes. Then, answer questions about the reading and apply the reading to the free-body diagram problems.

Reading Section

What are free-body diagrams? These are simplified representations of an object (the body) in a problem, and they include **force vectors** (represented by arrows) acting on the object. This body is free because the diagram will show it without its surroundings; the body is 'free' of its environment. This eliminates unnecessary information which might be given in a problem.





What are the forces involved in a free-body diagrams?

Gravity – in these diagrams we will call the force due to gravity the **gravitational force**. We know that the acceleration due to gravity (if on Earth) is approximately $g = 9.8 m/s^2$. The force of gravity, by Newton's Second Law is the product of the object's mass and the acceleration due to gravity (F=ma).

Normal – The normal force one which prevents objects from 'falling' into whatever it is they are sitting upon. It is always perpendicular to the surface with

Questions on the reading

Try these on your own, first. Then, check your answers with a partner.

1. Why do we call these diagrams "free body" diagrams?

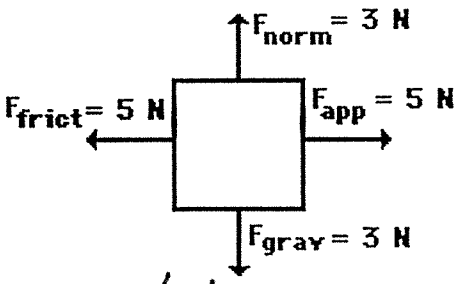
   w/o its surroundings

2. List and explain each of the 5 forces in free body diagrams.

   Gravity
   Normal
   Friction
   Applied
   Tension

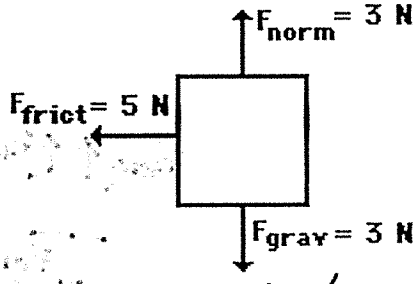
3. Find the net force of the following free-body diagrams. Then, write if they are **balanced or unbalanced.**

Situation A



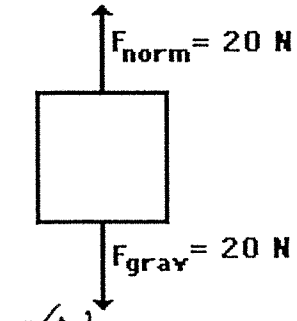
ØN balanced

Situation B



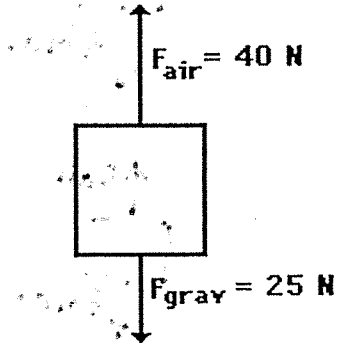
5N ← unbalanced

Situation C



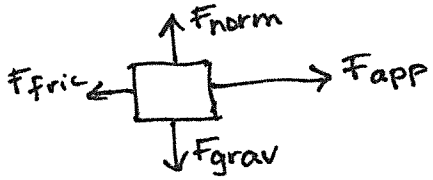
ØN balanced

Situation D

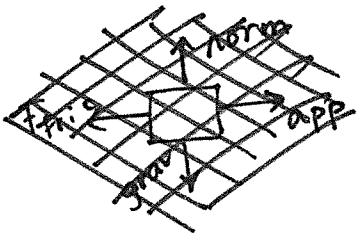


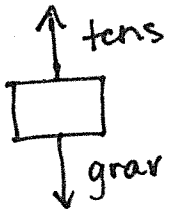
15N ↑ unbalanced

e) A rightward force is applied to a book in order to move it across a desk with a rightward acceleration. Consider frictional forces.

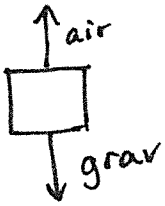


f) A college student rests a backpack upon his shoulder. The pack is suspended motionless by one strap from one shoulder.

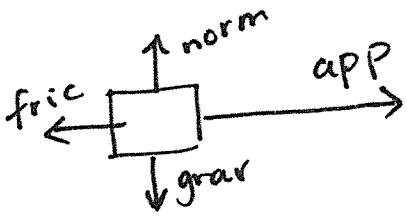




g) A skydiver is descending with a constant velocity. Consider air resistance.



h) A force is applied to the right to drag a sled across loosely-packed snow with a rightward acceleration.



i) A football is moving upwards towards its peak after having been booted by the punter.

j) A car is coasting to the right and slowing down.