



Name: \_\_\_\_\_

Date: \_\_\_\_\_ Period: \_\_\_\_\_

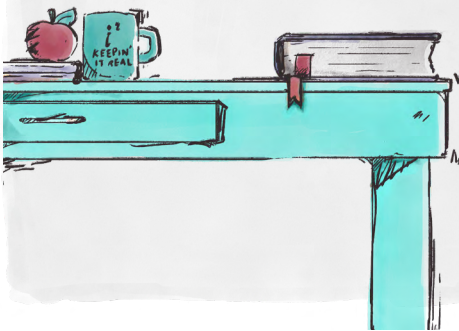
# FREE BODY DIAGRAMS 1

## QUALITATIVE

Draw a qualitative (no numbers) free body diagram to fit each of the following scenarios:

#1

A book is sitting stationary on a table.



#2

A baseball is thrown directly upwards. Draw a free body diagram of the forces acting on the ball after it has left the person's hand but as it is still moving upwards.



#3

A baseball is thrown directly upwards. Draw a free body diagram of the forces acting on the ball at the moment the baseball is at its highest point.



#4

A baseball is thrown directly upwards. Draw a free body diagram of the forces acting on the ball as it falls back towards earth.



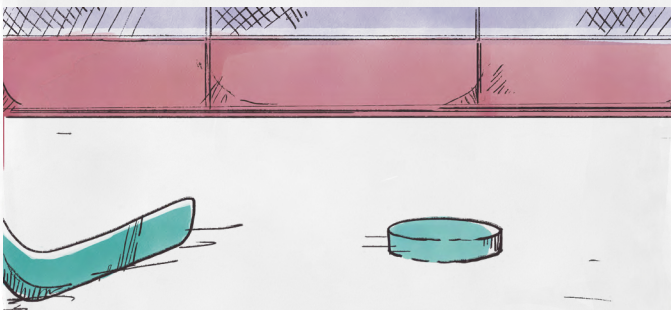
# FREE BODY DIAGRAMS 1

QUALITATIVE (continued...)



#5

A hockey puck slides at a constant speed to the right



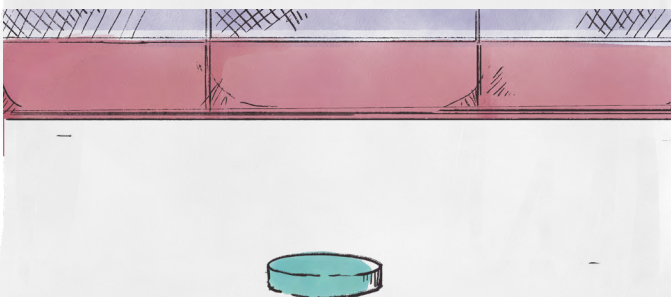
#6

A hockey puck slides at a constant speed to the left



#7

A hockey puck sits stationary on the ice.



#8

A sailboat is moving along at a constant speed, to the right.



#9

A sailboat is moving to the right, speeding up. (Assume there is a little bit of drag between the boat and the water.)



#10

A sailboat is moving to the left and speeding up. (Again assume there is a little bit of drag between the boat and the water.)



# FREE BODY DIAGRAMS 1

QUALITATIVE (continued...)



#11

A lightbulb is suspended from the ceiling by a cord.



#12

A chandelier is hanging from a ceiling, supported by a single rope.



#13

You slide across the floor in your socks, moving to the right but slowing down.



#14

A squirrel is sitting on a tree branch.

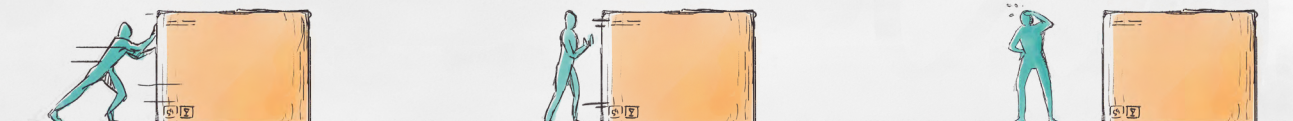


#15

You give a cardboard box a push, and it slides across the floor, slowly coming to a stop. Draw a free body diagram of the box:

a. As you're pushing it and it's speeding up

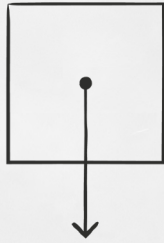
b. After you stop pushing it and it's slowing down





Make up a possible scenario to fit each of the following free body diagrams:

#16



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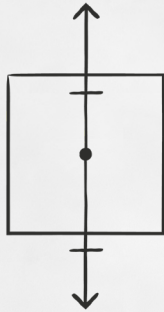
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#17



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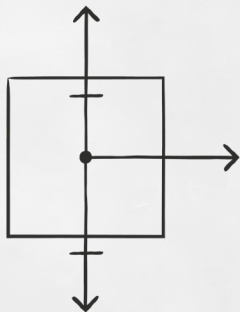
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#18



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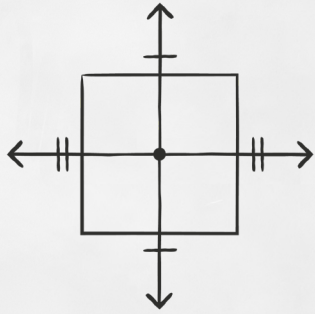
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#19



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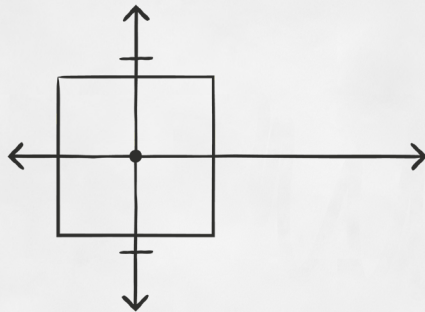
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#20



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# ANSWER KEY

## FREE BODY DIAGRAMS 1 (QUALITATIVE)

### Note:

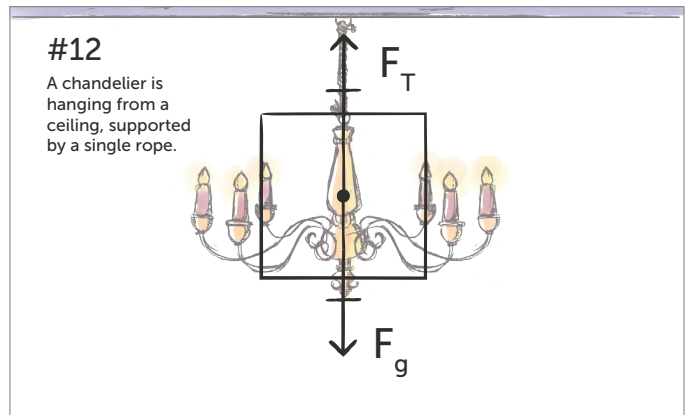
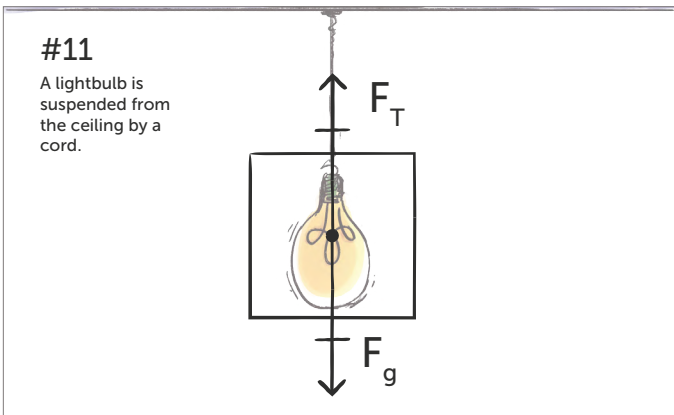
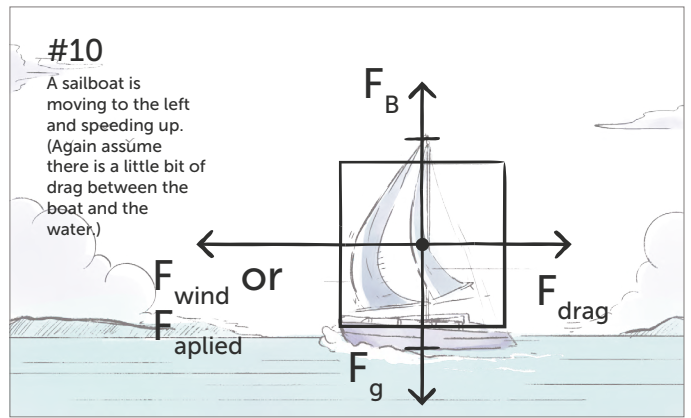
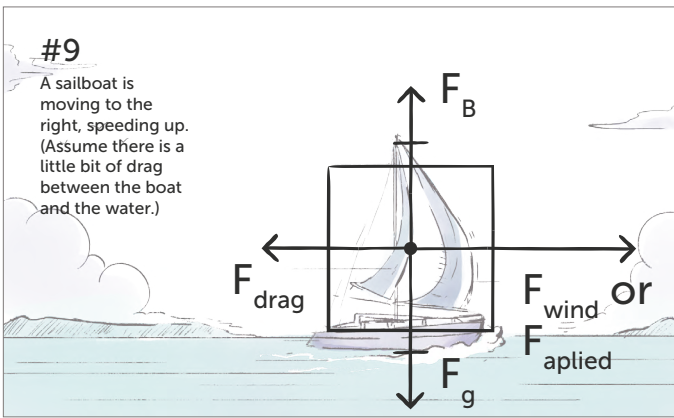
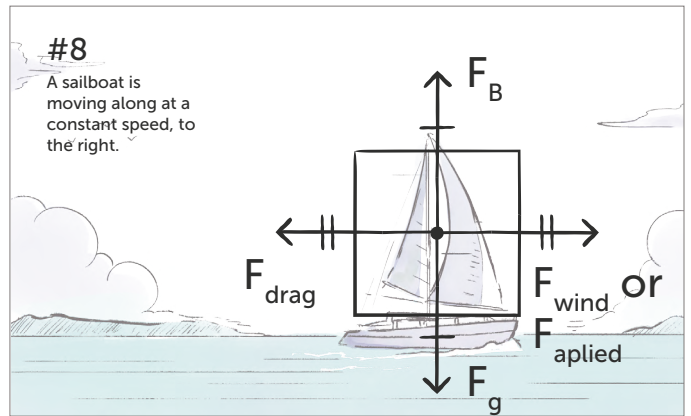
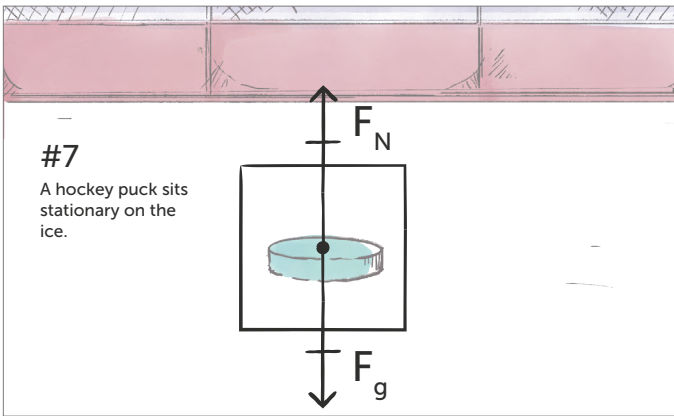
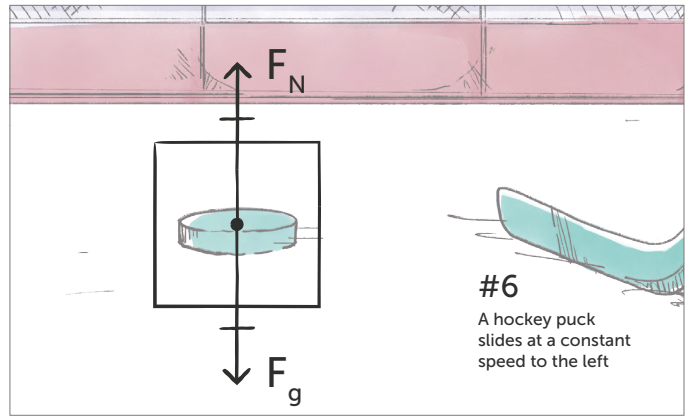
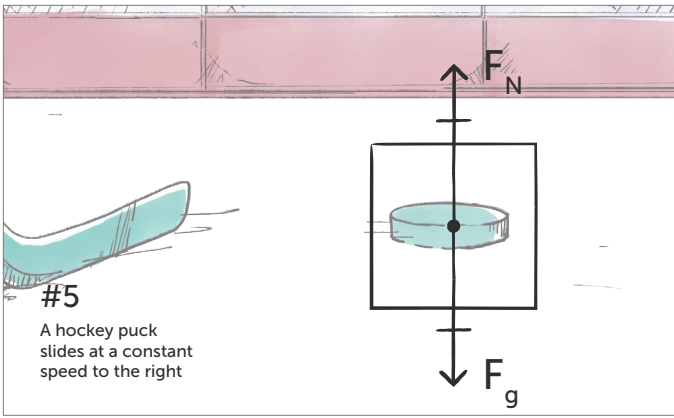
- $F_N$  Normal Force
- $F_g$  Force of gravity (weight)
- $F_T$  Tension Force
- $F_f$  Force of friction
- $F_B$  Force of buoyancy

**#1**  
A book is sitting stationary on a table.

**#2**  
A baseball is thrown directly upwards. Draw a free body diagram of the forces acting on the ball after it has left the person's hand but as it is still moving upwards.

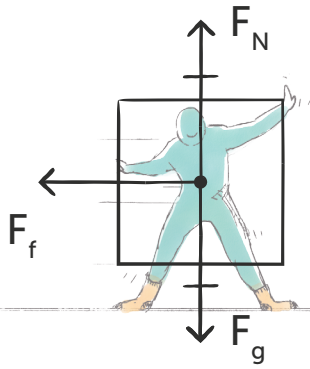
**#3**  
A baseball is thrown directly upwards. Draw a free body diagram of the forces acting on the ball at the moment the baseball is at its highest point.

**#4**  
A baseball is thrown directly upwards. Draw a free body diagram of the forces acting on the ball as it falls back towards earth.



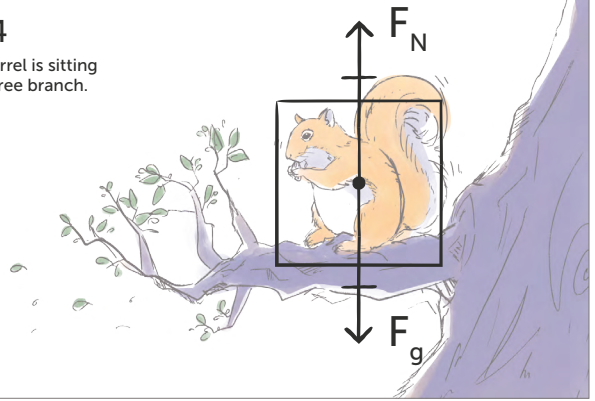
### #13

You slide across the floor in your socks, moving to the right but slowing down.



### #14

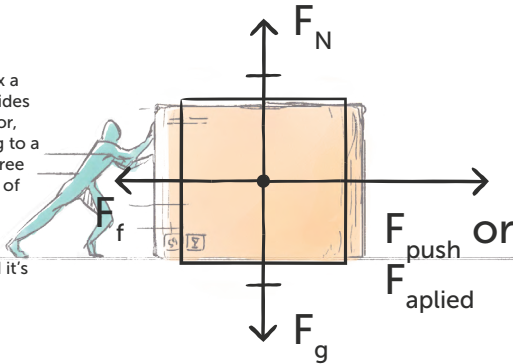
A squirrel is sitting on a tree branch.



### #15a

You give a cardboard box a push, and it slides across the floor, slowly coming to a stop. Draw a free body diagram of the box:

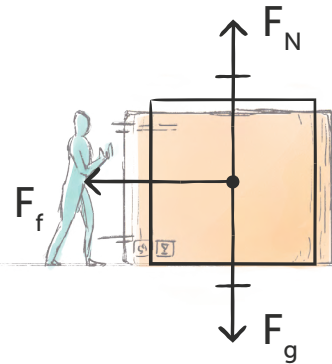
a. As you're pushing it and it's speeding up



### #15b

You give a cardboard box a push, and it slides across the floor, slowly coming to a stop. Draw a free body diagram of the box:

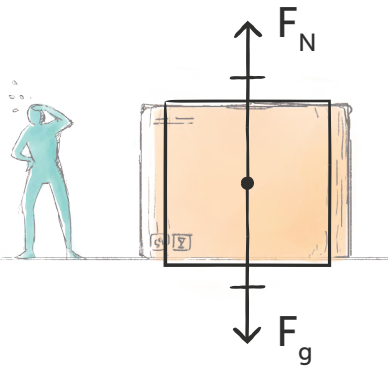
b. After you stop pushing it and it's slowing down



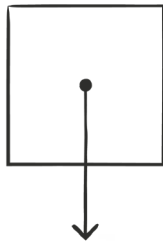
### #15c

You give a cardboard box a push, and it slides across the floor, slowly coming to a stop. Draw a free body diagram of the box:

c. After it has come to a stop



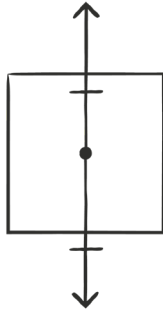
### #16



Any answer where there is an object in freefall (flying through the air with only gravity acting on it) is correct. (A cannonball flying through the air, a stone dropped off a cliff, etc.) Incorrect answers would have some other force (ie. a plane, a bird flapping its wings, a kite pulled by the wind, a rocket that is currently blasting off.)

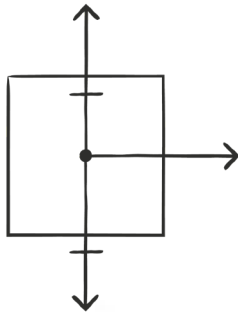


#17



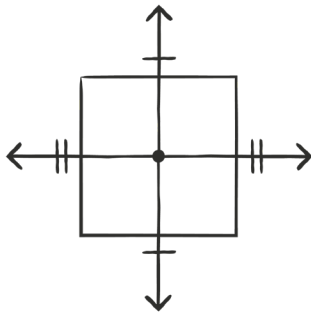
This diagram could represent any situation where there is a downwards force balanced by an upwards force. (For example, a cup sitting on a table, a car sitting in a driveway.) This would also include objects travelling at a constant speed. (For example a puck travelling across a frictionless air hockey table.)

#18



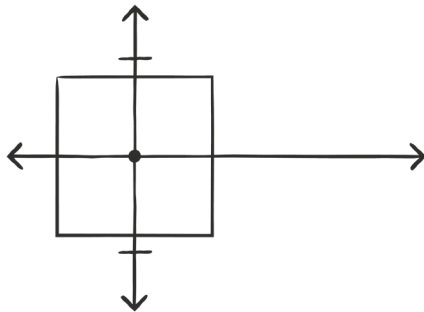
This diagram could represent an situation where the vertical forces acting on an object are balanced (for example, any object resting on a surface where its weight is balanced out by the normal force), and there is a single unbalanced horizontal force to the right. This could be an object moving to the right and speeding up, or moving to the left and slowing down. Examples include: something sliding to the left and being slowed down by friction, or something sliding to the right being pushed so that it speeds up.

#19



This diagram represents an object where all the forces are balanced, so it needs to be either stationary or moving at a constant speed in any direction. One possible example would be someone riding their bike on a flat surface.

#20



This diagram represents an object where the vertical forces are balanced, but the force to the right is greater, meaning the object will be moving right and speeding up or moving left and slowing down. One possible answer might be: You are pushing a box across a flat surface. You are pushing hard enough that you are causing the box to speed up to the right. (There is a frictional force, but you are exceeding it.)