


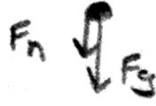


1. A child throws a very bouncy ball which hits a wall and then the ceiling. Draw a FD for the ball while it is (a) in contact with the wall and (b) in contact with the ceiling.

<p>Sketch</p> 	<p>FD</p> 	<p>Sketch</p> 	<p>FD</p> 
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2. A 0.5 kg book is at rest on top of your friend's outstretched hand.

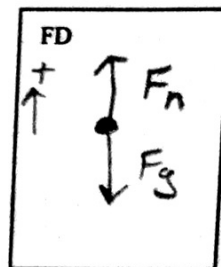
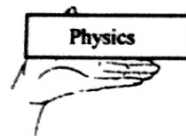
- a) Draw a FD for the book.
b) Determine the size of the normal force.

$$F_{net} = F_n - F_g$$

$$0 = F_n - F_g$$

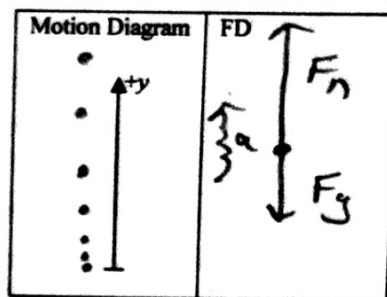
$$F_n = F_g$$

$$F_n = 0.5 \text{ kg} (9.8 \text{ N/kg}) = 4.9 \text{ N}$$



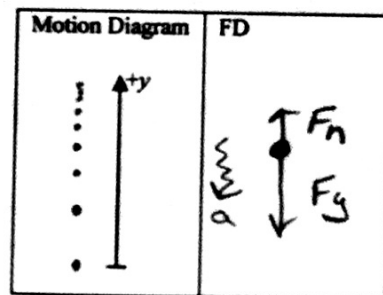
- c) Your friend's hand is moving upwards and speeding up. Draw a motion diagram and force diagram for this situation. How have the forces on the book changed?

F_n has increased. There must be a net force upwards. This has come about due to the increased normal.



- d) Your friend's hand is still moving upwards but is now slowing down. How have the forces on the book changed? Explain.

F_g remains constant.
 F_n has decreased to leave a net force downwards.



- e) The net force is 3.0 N [upwards]. Determine the size of the normal force acting on the book.

$$\uparrow + \quad F_{net} = F_n - F_g$$

$$3 = F_n - 4.9$$

$$F_n = 7.9 \text{ N up.}$$

3. Your friend places the same book on a table and leans on top of it, pushing down with 12 N of force. Draw a FD for this situation. How has the upwards normal force of the table on the book changed? What is the size of this normal force?

F_n must increase to give $F_{net} = 0$.

$$F_{net} = F_n - F_g - 12$$

$$0 = F_n - 4.9 - 12$$

$$F_n = 16.9 \text{ N up.}$$

