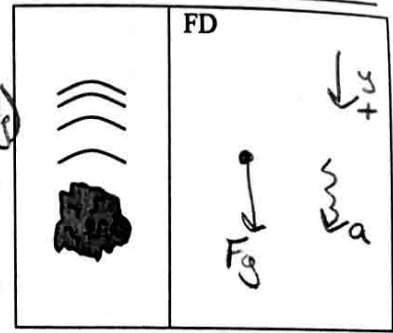


A: The Falling Rock

Consider the situation shown to the right of a falling rock.

1. Reason. At this moment in time, what is interacting with the rock?

The earth is interacting with the rock (gravity)



The Air Resistance Rule: For our purposes, we will always assume there is no air resistance (F_{air}) unless it is mentioned in the problem or the situation does not make sense without it.

2. Represent. Draw the FD for the rock while it is falling. Show your choice of sign convention.
 3. Represent. Write an expression for the net force in the y -direction.

$$F_{net,y} = F_g$$

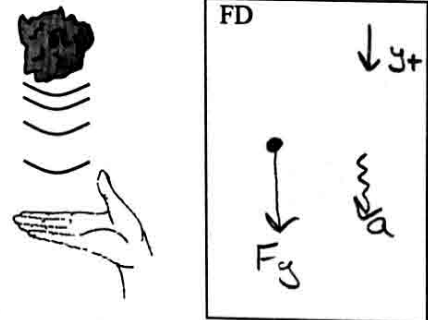
B: The Rock Toss

A rock is tossed straight upwards. It is released from the hand and is still travelling upwards.

1. Reason. What is the rock interacting with at this moment in time?

Earth (gravity)

2. Represent. Draw a FD for the rock while it is moving upwards. Include a wiggly acceleration vector.



3. Represent. Write an expression for the net force in the y -direction.

$$F_{net,y} = F_g$$

4. Reason. Isaac says, "How can something be travelling upwards when the only force acting on it is downwards? There must be an upwards force acting on the rock." Do you agree or disagree? Explain.

Moving up and slowing down. It takes time for the velocity to change.

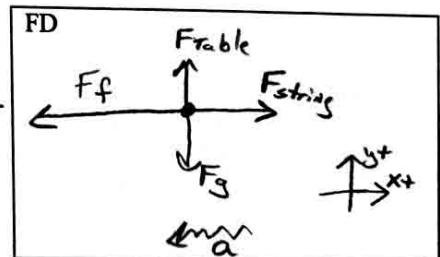
5. Reason. Examine the two force diagrams for the two situations above. Explain what we cannot tell from a force diagram.

We cannot tell the direction of motion from a FD.

C. The Slowing Rock

A rock is being pulled by a string along a rough surface. It is gradually slowing down.

1. Represent. Draw a FD for the rock. Include an acceleration vector. Write an expression for net force in the x - and y -directions.



2. Reason. Compare the magnitudes of the forces in the horizontal and vertical directions. Explain your reasoning.

*\vec{a}_x is direction of F_f (unbalanced)
 $\vec{a}_y = 0$ (Balanced)*

$$F_{net,x} = F_{string} - F_f$$

$$F_f > F_{string}$$

$$F_{net,y} = F_{table} - F_g$$

$$F_{table} = F_g$$