NEXT-TIME QUESTION

Gently push down on the pan of the scale and the display shows an increase in force. Likewise if you do the same on the rim of the beaker. But what if you immerse your fingertip in the water, without touching the beaker? Then the scale reading

a) doesn't change.

b) shows an increase.

c) shows a decrease.

thanx to Peter Hopkinson

Hewitt Drew it!

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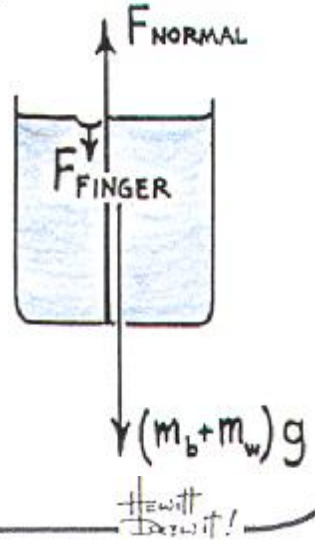
Answer: b. shows an increase

Consider the system of beaker and water, resting in equilibrium on the scale. Before your finger is introduced, the only downward force on the system is the weight of both beaker and water. The scale supplies an equal upward force, the normal force shown by the scale reading. Now add another downward force—that of your finger poking into the water. How big is this force? It is as big as the buoyant force on your finger—equal to the weight of water it displaces. This additional downward force on the system increases the normal force supplied by the scale. Hence the scale reading increases.

Your finger can't push water out of the way unless the water simlutaneously pushes back on your finger – Newton's third law. So the force your finger exerts on the water has the same magnitude as the buoyant force acting upward on your finger.



Hewitt Drew It!