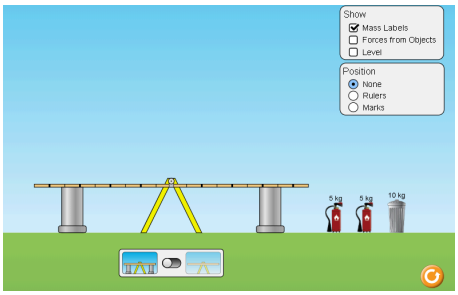
Name: ____/42

Virtual Lab "Balancing Act"

Learning Goals: You will be able to:

1. Describe the factors that determine whether two objects will balance each other
2. Predict how changing the position of a mass on the balance will affect the motion of the balance
3. Use a balance to the find the masses of unknown objects

Part 1: "Intro"



Develop your understanding: Explore the ***Intro*** mode of the simulation to develop your own ideas about what determines how objects balance each other.

1. Make two **same mass** objects balance in at least two different ways. Then, answer the following questions:
    a. Place a screenshot or brief description of each here:
    I placed one fire extinguisher on the left and one on the right in the same exact spot making it weigh equally.
    The second way I leveled it is by just moving the fire extinguishers to a different spot on the scale however, they still need to be at the same exact measurements to be leveled equally.

    b. What objects did you choose?
    I chose the fire extinguishers

    c. Explain why it makes sense that there is more than one way to make the objects balance.
    You can make these balances more than one way by just moving them around on the scale as long as they are in similar spots on the scale to make it level equally. Ex. if one fire extinguisher is one 1, then the other fire extinguisher needs to be on the 1 measurement as well.

2. Make two **different mass** objects balance in at least two different ways. Then, answer the following questions:
    a. Place a screenshot or brief description of the balanced objects here.

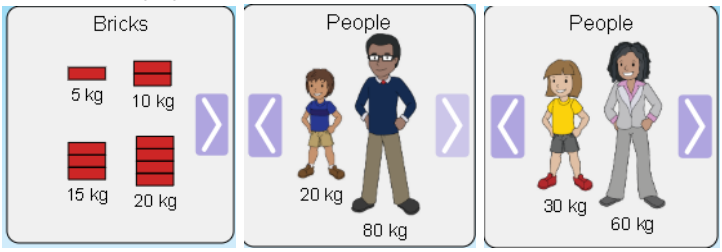
To balance the same mass objects for the first one, I put 1 fire extinguisher at the 1.5 on the ruler on the far left and on the other side I put the trash can at 0.75, closer to the middle on the right which made it balance.
The second one I placed 2 fire extinguishers on the right and then placed the trash can on the left making sure they were in the same spots making it leveled correctly.

b. Which objects did you choose?
I used the trash can and the fire extinguishers

c. Explain why it makes sense that there is more than one way to make the objects balance.
You can move the weights around on the scale at different points to make it leveled out. Like how I answered the first question in a.) I moved the weight around with only one fire extinguisher and using the trash can that weighs way more than the fire extinguisher.

Part 2: "Balance Lab"

Test your understanding: Open the ***Balance Lab*** screen, use some different objects and masses to apply your ideas.



3. Make two **same mass** objects balance in at least two different ways. Then, answer the following questions:
   a. Place a screenshot or brief description of each here:
   I used the kid (20kg) and the bricks that weighed 20kg as well and put them on the scale in the same exact spot like I explained with the fire extinguishers they need to be in the same exact position as the other object to weigh equally.
   The other way is by moving both the child and bricks to the end of the scale and they both weighed equally due to being in the same positions at both ends of the scale.

   b. Which objects did you choose?
   I used the kid (20kg) and the bricks that weighed 20kg as well

   c. How did your explanations and tool use ideas from #1 help you?
   They helped me by knowing that even though both of the objects weigh the same, the objects still need to be in the same exact position or it won't level correctly and one side will be tilted.

4. Make two **different mass** objects balance in at least two different ways. Then, answer the following questions:
    a. Place a screenshot or brief description of each here:
    I used the woman (60kg) and the man (80kg) . I put the man towards the end of the scale and the woman at the very end of the scale and it made them level out evenly. Another way is by moving both of them closer to each other on the scale which still made them evenly leveled with each other.

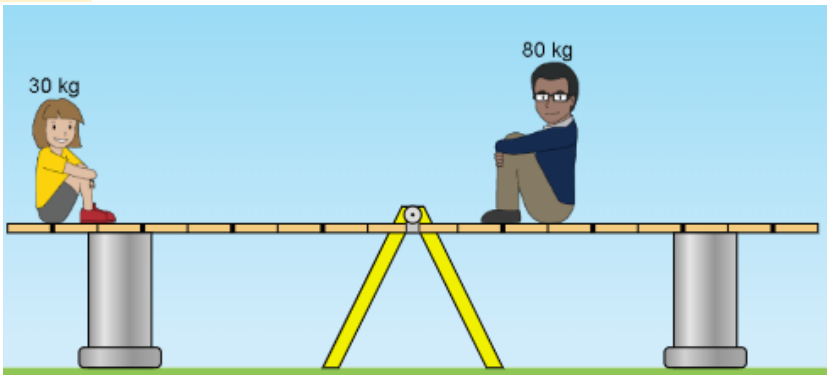
    b. Which objects did you choose?
    I used the woman (60kg) and the man (80kg)
    c. How did your explanations and tool use ideas from #2 help you?
    They helped me by thinking more about more possible ways I could level them just by moving the objects around to help me find a solution.

Expand your understanding: Use the ***Balance Lab*** screen, to meet these challenges.

5. Balancing a single mass on one side with two other masses. Do this with two experiments.
    a. Place a screenshot or brief description of each here:
    I used the little boy (20kg) and the woman (60kg) on the right and the man (80kg) on the left. to make them level with each other I had to spread both the little boy and the woman out to make it level with the man on the scale.
    The second way I made it level out is by putting the man at the front along with the woman as well on different sides of the scale and I put the little boy (on the side with the woman) at the very end of the scale which also made them even.

    b. Which objects did you choose? Why?
    I used the little boy (20kg) and the woman (60kg) on the right and the man (80kg) because to equal the man which is 80kg, I had to add 20kg to the 60kg to make it even weight.

6. Consider this situation **without** using the simulation. Then, answer the questions below:



    a. Predict what will happen when the supports are removed and explain your reasoning.
    I think the man is going to make the scale tilt slightly due to him weighing more.

b. Predict what will happen if the 80 kg adult was further from the pivot (more right) and explain your reasoning.
I believe that the 80kg man would make the scale on his side go down even further because he weighs way more than the 30kg child.

c. Predict what will happen if the 30 kg child was closer to the pivot (more right) and explain your reasoning.
I think the child moving it closer to the pivot would make it close to being leveled out, however I do still think there will be a tilt because of the weight difference.

d. Test your predictions in the Balance Lab. Make notes about any ideas you have that need to be changed.
I tested my predictions and I was way off. For the first one it turns out that the first prediction was them already being leveled out equally. For the second one I was sort of correct, but I didn't think it would tilt down all the way to the ground and for the third prediction, it still didn't make a difference due to all the heavy weight being put down from the last prediction.

7. Select three mystery objects and determine each mass. Record the masses below (a-c)

a. Mystery mass 1:
C is 15kg
b. Mystery mass 2:
A is 20kg
c. Mystery mass 3:
F is 50kg

Teacher Resource Questions:

1. What did you see as the greatest strength of the teacher resources provided?

The greatest strength of the teacher resources provided is that it is well explained on how the simulation works and even prompts you how to work the simulations and how this helps teach our students on balancing objects between different weighted objects or even the same objects as well.

2. What science knowledge would you need to have as a teacher that was not provided in the teacher resources?

When I was doing the simulation levels in Balancing act I felt like you would need some knowledge on where to put a different weighed mass on one end to make it even to a different weighed mass to make it balanced (I'm not sure if that made sense but I can't describe it) Personally, I thought it wasn't really clear on that aspect (unless it didn't click for me, haha.)

Reflection:

I honestly do like the simulation and it shows things more clearly to the students like how you could add mystery weights that are different weighted masses, you can weigh people like adults and children and try to balance the two. There are so many other strengths from this simulation that you couldn't physically in the classroom. I do like the idea of this, however the only weakness that I see is for my students. I feel like I could substitute this simulation with even our own balance scale and have each group get their own and have it physically in front of them and be engaged with the lesson instead of all of them staring at one screen and trying to solve these questions together. Though I have noticed more schools since covid are letting students have their own laptops and doing work from there, I still feel having it physically in front of them and not a screen and computer doing all the work isn't beneficial for the students when it comes to learning science.