

Teaching and learning activities using Ratio and proportion ITP

Familiarise yourself with how to use Ratio and proportion ITP, using the



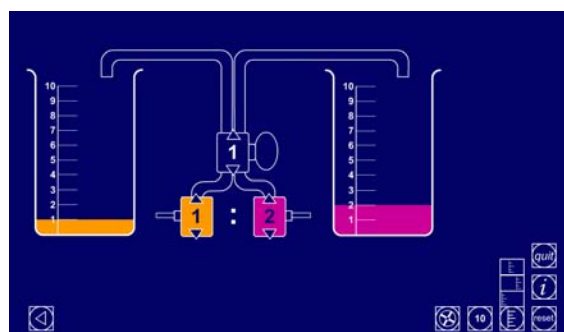
Scaling ratios

- Show the scales on the two measuring cylinders by clicking on the scale button and then selecting the bottom two options.
- Set the pink counter to two using the arrow key, then click on the oval stopcock handle.

Ask the children to watch what happens.

Q: How would you describe this picture?

Take feedback, focusing on comparing the quantities of orange and pink liquid in the measuring cylinders.



Explain that you are going to click on the handle again.

Q: What do you think the picture will look like after this?

Take suggestions, then check whether children's predictions are correct.

Explain that the ratio shown by the counters is 1 : 2. This tells you that for every one unit of orange liquid poured into the left container, there are two units of pink liquid poured into the right container.

Record the following: orange : pink

1 : 2


2 : 4

Ask children to talk to a partner about what the next example in this sequence will be and why. Ask a pair to explain their reasoning to the class. Check by opening the stopcock once more. Repeat until one of the containers is full. Ask a child to add each example to the recorded sequence.

Q: What patterns can you see in the sequence of ratios?

Take feedback. Encourage children to comment on the patterns within each column and within each row. Stress that the quantity of pink liquid is always double the quantity of orange liquid because the ratio of orange to pink liquid is one to two.


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- Reset the ITP using the 'Reset' button.
- Change the maximum measure on the jugs to 20, using the  button.
- Use the arrow keys on the counters to set the ratio of orange to pink liquid as 2 : 3 and repeat the activity.

If children have access to computers they could use the ITP in pairs to scale up given ratios such as 3 : 1, 2 : 5, 4 : 3.

Extension challenge: Ask children to use the ITP to create a given picture using a given number of clicks on the stopcock. For example, challenge children to create a picture where there are 15 units of orange liquid to 12 units of pink liquid, using three stopcock clicks.

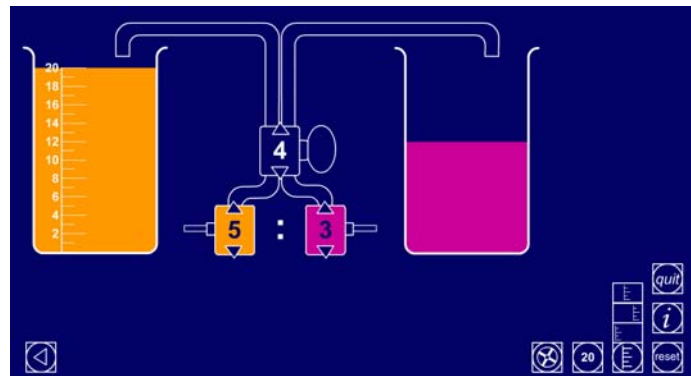
Using ratios to find amounts

- Reset the ITP.
- Set the maximum measure on the jugs to 20, using the  button.
- Show the scales on the left measuring cylinder only, by clicking on the scale button and then selecting the bottom option.
- Set the orange : pink ratio to 5 : 3.
- Set the counter by the stopcock to four.



Explain to the children that each click on the stopcock is now the same as clicking four times on the stopcock previously.

Ask children to watch as the liquid pours into the measuring cylinders.



Q: There are 20 units of orange liquid. The ratio of orange liquid : pink liquid is 5 : 3. How much pink liquid is there?

Ask children to talk with a partner about how they could find out.

Ask several pairs to describe their strategies for working out how much pink liquid there is. Stress that, since the ratio is 5 : 3 and the scale factor is four, there are 5×4 units, that is 20 units of orange liquid, and there will be 3×4 units, that is 12 units of pink liquid.

Repeat for other examples, changing the ratio and the scale factor. Make sure that you sometimes show the scale on the right-hand cylinder and hide it on the left-hand cylinder.

Exploring proportion

- Reset the ITP.
- Bring up the lower measuring cylinder by clicking on the button and choosing the large cylinder.
- Set the ratio of orange to pink liquid as 2 : 3 and leave the scale factor as one.
- Click on the stopcock to pour the liquid into the top cylinders.

Q: How much orange liquid and pink liquid is in the measuring jugs?

Explain that when you click on the two lower stopcocks, the liquids will pour into the bottom measuring cylinder.

Look at the result.

Q: How much orange liquid is there? How much pink liquid is there? How much liquid is in the bottom cylinder all together?

Establish that the two units of orange and three units of pink have combined to make five units of liquid altogether.

Q: Two units out of the five units of liquid are orange. How can this be written as a fraction?

Establish that two out of five can be written as $\frac{2}{5}$. Explain that $\frac{2}{5}$ of the liquid is orange. One way to describe this is to say that the proportion of the liquid that is orange is $\frac{2}{5}$.

Q: What proportion of the liquid is pink?

Repeat the activity using different ratios of orange : pink. Ask children to predict the proportion of the whole amount of liquid that will be orange or pink, before actually combining the two colours.

Extension challenge: Children work in pairs at a computer. Ask them to set a ratio so that when the orange and pink liquids are combined, they form given proportions of the entire quantity. For example, ask children to identify a ratio that will lead to a mixture where $\frac{3}{4}$ of the mixture is pink.

