1. Objective & Introduction

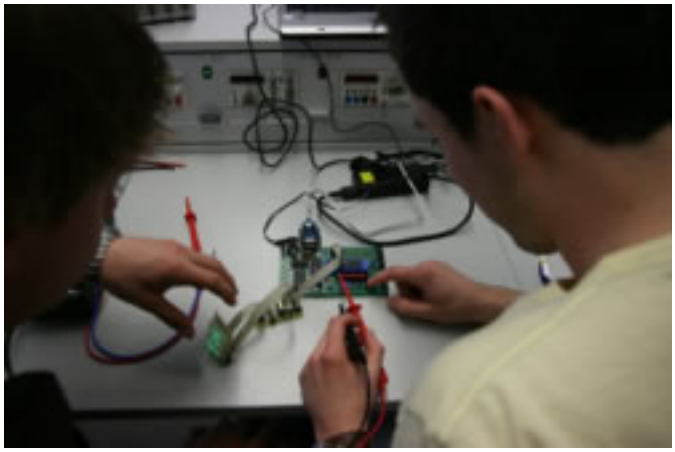
Today's lesson objective is: **Students will design questions that can be answered through scientific inquiry.**

We ask questions all the time, but are we really always asking the “best” questions? In our everyday lives it isn’t necessary for us to be aware of the types of questions we are asking, but in science, asking the proper question can mean the difference between an average answer and a great answer. In this lesson, we are going to look at the most effective way to design a scientific question.

Take a moment and think about this objective. What strategies will you use to ask scientific questions? Are they different than the strategies that you used to identify the questions?

Open your digital notebook and describe any strategies that you might use in this lesson. How will you think of scientific questions differently than you think of everyday questions?

2. Scientific Questions



Questions are essential in all subjects, but they are especially essential in science. Scientific questions are different because they must be answered by either a direct observation or by taking measurements with scientific tools. Questions that deal with opinions or moral values are not able to be measured or observed, so they are not considered scientific questions. We have to make sure we are asking a “good” question in order to be able to observe or experiment with the subject of our question.

Look at the question, “Which type of music is the best?” Is there a way to test this? Can you observe or measure if something is “the best”? No. Opinions cannot be measured, so it is not a good question.

How about, “Does music help plants grow taller?” Can we measure or observe this? Yes, we can actually measure the heights of the plants as they are growing. This will allow us to get a reliable answer, so this is a good scientific question.

Let’s look again at the qualities considered when testing the question: Can we measure or observe the answer? Can we run a reliable or valid experiment? Those are the two main qualities we need to look for when we develop a good scientific question.

Now it’s your turn.

Decide if the question is a good scientific question or not.

	Good Scientific Question	Not Good
Which ice cream flavor is the best?	○	○
Does adding salt to water make it boil faster?	○	○
Does getting chilled cause a cold?	○	○
Why is basketball better than soccer?	○	○
Which brand of tape is the strongest?	○	○

3. Narrowing your Questions

Once we have a good question, we can begin to make it a better one. The first thing we want to do is make sure it is as narrow and specific as possible. If the question is too broad, there will be too many possible answers. For example, let's say that you want to take a train from New York to Los Angeles but don't know how long the trip will be. You could ask the question, "How far is it from New York to Los Angeles?" However, that is a much broader question than, "How long would it take to get from New York to Los Angeles by high-speed train?"

The best way to narrow down your question is to break it up into smaller questions. Look back at our original question, "How far is New York to Los Angeles?" We could break this into smaller questions, such as, "How many miles are there from New York to Los Angeles?" "How long would it take to fly from New York to Los Angeles?" or even "How long would it take to get from New York to Los Angeles by high-speed train?" Once you have all the smaller questions, you can choose the one that best asks the question that you want answered. In this case, "How long would it take to get from New York to Los Angeles by high-speed train?" answers our question.

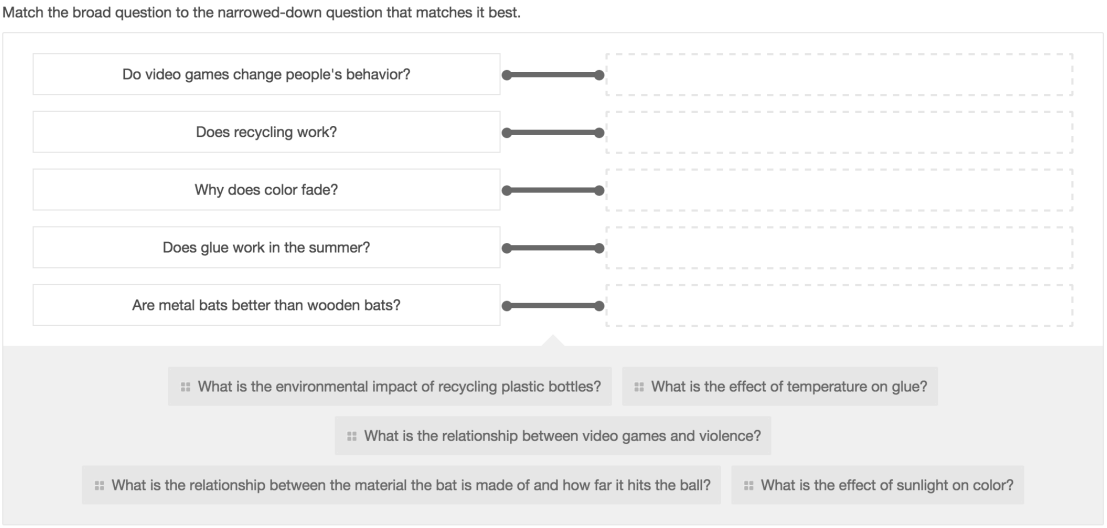
Let's practice another one.

Your original question was, “Does music help plants grow taller?” Which of the following reflects the best way for us to narrow this down?

1. What is the effect of rock music on the growth of roses?
2. Do plants like rock music better than pop music?

The best choice here is Question 1. Both the type of music you want to test and the type of flower you want to test are very specific.

Ok, now it’s your turn to try.



4. Using Questions to Set up Experiments

Now that our question is as specific as possible, we can refine it even further. We want to make sure our question is worded in a way that allows us to test it with an experiment or investigation. Some good phrases to start a scientific question are, “What factors cause…?” “What is the effect of…?” and “What is the relationship between…?” These type of questions set up experiments or research investigations easily for us.

Let’s look at two different questions, “What shape of train goes the fastest?” and “What is the relationship between the shape of a train and its speed?” They are both asking the same thing, but the second example states the question in a way that allows us to answer it with an experiment in which we can collect data.

Let’s try another example. Which is the better question, “Which soil helps tulips grow the best?” or “What is the effect of the soil on the growth of tulips?” Again, the second question is the better question because of the way that it is phrased. It allows us to design an experiment to test the tulip’s growth.

Now it’s your turn to try a few.

Choose the question that would allow us to design an experiment.

1.
2.
3.
4.
5.

5. Summary

Now that you know the proper way to develop a scientific question, you will be able to properly design your experiments and find the answers that you are looking for. Look back at the plan you made in your notebook and see if the ways you thought scientific questions would be different turned out to be accurate. If not, make some changes based on what you learned.

If you need to review, you can click the Reteach icon. If you are ready for the assessment, you can click on the assessment icon. Good luck!