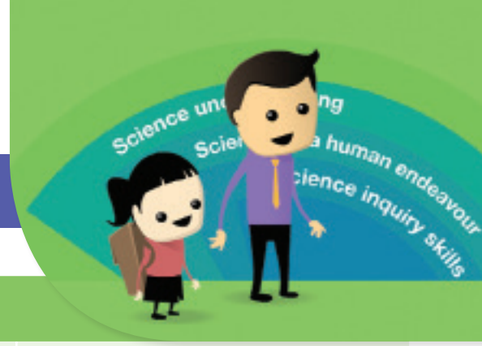
The BitL tool – science years 7–8



Science: Years 7–8

What do you observe?

What are the observable differences?

What changes over time and/or geographically?

Use of equipment to aid observations in order to group and classify. Link form to function both microscopic and macroscopic and notice observations that change over time and geographically. Make observations from secondary sources when necessary.

What patterns and relationships can you see?

How have changes in science knowledge over time changed the way we see the world?

What are your questions?

Classify according to prior knowledge. Consider different time and geographical scales.

Describe matter and energy flows through systems. Consider structure and function relationships and how components within a system relate to each other.

Integrate ideas from different disciplines.

Describe exceptions.

Ask a variety of investigable scientific questions.

What do you predict will happen?

Make predictions based on scientific knowledge.

What investigations could you design?

How can you use collaboration?

Where do you find connections across the disciplines?

Which variables will you control?

Plan and carry out a safe and fair test using accurate measurements and controlling variables.

How can you review and communicate?

Can you use a model to help describe, simplify, clarify or provide an explanation of the working structure or relationship within an object, system or idea?

Reflect on quality of data and suggest improvements to the methodology.

Communicate using appropriate scientific language and text types.

Refer to evidence to support conclusions.

Use models to develop explanations of relationships.

Include accuracy and fairness when evaluating claims.

So what? What next?

We can but should we?

How might we respond? What action might be needed?

Where might you see applications of this new knowledge and/or understanding?

Respond to issues and social problems from a scientifically informed position.

Pose evidence based arguments and perform peer critical reviews. Discuss possibilities for the future.

Discuss ethical issues and social significance of a scientific idea or event.

Pedagogical questions:

- What do you see/hear/smell/taste/feel?
- What features and/or properties are the same?
- What features and/or properties are different?
- How do these features and/or properties change over time and/or geographically?
- What changes when you shift your perspective?
- What equipment might help to make observations? (camera)
- What equipment can extend your senses? (hand lens, microscope, thermometer, scales, ruler, stopwatch)
- What do you notice about this data/information?
- What is interesting/unexpected?

Pedagogical questions:

- What patterns and/or relationships are there (in the data)? Are there any exceptions?
- How do these patterns or relationships compare over time and/or geographically?
- Are they always the same?
- Is there anything unusual?
- What do you think is happening and why?
- How could you generalise?
- What is the time scale over which these changes occur?
- How might another discipline contribute to this?
- What are your questions?
- Is your question investigable?
- How has science changed the way we see the world over time?

Pedagogical questions:

- If we changed…, how might that affect…? What science idea might help you explain this?
- What science will help you predict what might happen if…?
- What do you already know or what have you observed that led to your prediction?
- How does flow of energy and matter help you to think about this?
- What other predictions might be plausible?
- Scientists currently think…; how does this relate to your idea…?

Pedagogical questions:

- How might you test your predictions?
- Which variable (independent) will you manipulate? Why?
- Which variable (dependent) will you measure? Why?
- Which variables will you keep constant? Why?
- What might a scientist do to find out about that?
- What equipment do you need and/or have?
- What equipment will you choose that will improve the accuracy in the data you collect?
- What safety aspects do you have to think about?
- How can you organise your data?

Pedagogical questions:

- How can you represent the data and your explanations in a way that enables sharing with others?
- What tools (list, table, graph, drawing) might you use to share this information and/or help you identify trends?
- How does a science generalisation explain your data?
- How can you use the evidence gathered to explain a science generalisation?
- How fair was your test/investigation? How could it be improved? How could you improve the quality of the data collected?
- How might someone else explain or interpret this same phenomenon?
- How could you improve your investigation?

Pedagogical questions:

- Who might need to know this? Why?
- Which of your decisions might this understanding influence? How?
- What other science might help us understand this and/or make this decision?
- What else could you/would you need to investigate?
- How do we know this? Which sources give you the most confidence that the information is accurate?

Example: Year 7 – *Physical Sciences*

Change to an object's motion is caused by unbalanced forces acting on the object.

What happens when you stop quickly on your bike or your skateboard hits a rock?

What happens when a balloon is blown up and then released?

What happens when the marble rolls down the ruler?

What equipment might help you to make observations?

What do you notice about vehicle stopping distance data? (secondary data)

How do the forces change if you stop suddenly on your bike or if a skateboard hits a rock?

What makes the balloon move?

What causes the marble to move or change movement? How might this be different if the marble was on the moon?

Are there any exceptions?

Why are the stopping distances different?

What questions have you about forces and movement?

What might happen to passengers with and without seatbelts if a car stopped suddenly? What science ideas can help you explain this?

How could you change the way the balloon moves? Predict what might happen? Why?

What else might affect stopping distances? Why?

What will you investigate about forces and movement?

How will you investigate? What will you change/measure/control?

What equipment will give you the most accurate and fair test?

How could the fairness be improved?

What are the safety issues?

Are there digital or other technologies which may aid your investigation?

How can you represent the data and your explanations about forces and movement in a way that you can communicate the patterns and trends with others?

How do Newton's laws of motion explain your data?

How can you use the evidence gathered to explain Newton's laws of motion?

How fair was your test/investigation? How could it be improved?

Who might be interested in this? Why?

Who might be interested in forces and change in motion? Why?

How might this inform decisions around road safety?

What else could you investigate about forces and motion?

Who owned the information about car stopping distances?
Why might they have published it?

Whose point of view should also be considered?