

Questions for science learners of all ages:

Crosscutting concepts are a way of linking the different domains of science. Asking learners to engage with these concepts will help deepen their understanding of all science domains. This will also further develop a coherent and scientifically based view of the world. Use the questions here to engage the learners in your life in conversations about the phenomena in their world.	Patterns: • What are some similarities and differences among the things you are investigating? • What patterns do you observe? • What ways could you group these*? Describe the characteristics you are using to create the groups.
Cause and effect: • What causes the patterns you observe? • How do you know that this* caused that*? • What do you predict would be the effect if that* happens? • What evidence supports the claim that this* causes that*?	Scale, Proportion, and Quantity: • What can we measure to investigate this*? Why is that* a good measure? • What could you observe if you could speed up what is happening? Slow down what is happening? • What could you observe if you could make this* bigger? Make this* smaller?
Systems and System Models: • What are the key parts of this* system (it could be a natural or designed object)? • Describe how the different parts of this* system are connected. • What can the parts of this* system do together that the individual parts cannot do alone? • How do you think this* would respond to changing that*? • If you could control this* in the system would it stop that*? Why or why not?	Energy and Matter: Flows, Cycles and Conservation: • What kinds of stuff is this* made of? • Describe how stuff in this* system moves through the system. Does the stuff stay the same or change? • What kinds of energy are involved in this* system? • How much energy is needed to make that* happen?
Structure and Function: • Describe the function of this*. Describe the shape of this*. • Why does the shape of this* matter for its function? • What properties of the structure might allow it to have certain behaviors?	Stability and Change: • How do you know if this* system is stable? • How might this* system be affected by that*? • What might cause this* system to become unstable or imbalanced? • How is/was this* system affected in the long term by gradual changes?

*These, this and that have been used as placeholders to allow the questions to be adapted to the phenomenon being explored.

Adapted from: <http://stemteachingtools.org/brief/41>

More about the crosscutting concepts: <https://www.nap.edu/read/18290/chapter/13>