Mixing It Up with Bea the Bee

Learning objective: To understand that some materials can be separated after being mixed, while others form solutions that require specific techniques to separate.

Read the passage carefully and answer the questions using full sentences. Use your scientific knowledge to explain your reasoning.

Bea the honeybee is busy in her laboratory, exploring the fascinating world of mixtures. A mixture happens when two or more substances are combined but not chemically joined. If Bea mixes sand and pebbles, she has a simple mixture. Because the sand particles are smaller than the pebbles, she can easily separate them using a sieve. This is called filtration. However, things get trickier when Bea adds sugar to her nectar. The sugar seems to vanish because it dissolves, creating a solution. In a solution, the solid (solute) has mixed thoroughly with the liquid (solvent). Unlike the sand and pebbles, you cannot see the sugar anymore, and a sieve will not work because the particles are far too small. To get the sugar back, Bea must use evaporation. By heating the solution, the water turns into vapour and escapes into the air, leaving the sugar crystals behind as a solid residue. Whether it is a simple physical mixture or a complex solution, understanding these properties helps scientists like Bea organise and identify materials in the natural world around us.

Word bank: mixture · solution · dissolve · evaporation · filtration · solute · solvent · residue

1. Identify two methods mentioned in the text that can be used to separate mixtures. (2 marks)

2. What is the main difference between the sand and pebble mixture and the sugar and nectar solution? (2 marks)

3. Why does a sieve fail to separate a sugar solution? (2 marks)

4. Based on the text, what do you think happens to the water during the process of evaporation? (2 marks)

5. Do you think it is more useful for a scientist to be able to separate mixtures or to create them? Justify your answer. (3 marks)

Draw: Draw a diagram showing Bea the bee using a sieve to separate a mixture of sand and pebbles, and a separate beaker showing how evaporation leaves sugar crystals behind.

Extension challenge: Research and list three examples of mixtures you might find in your own kitchen at home, and explain how you would separate each one.