Chapter 4: Resources

Challenge 4.2: Can you increase the output of a power station?

Experiment worksheet answers (pages 64–65 and 186)

Processing, analysing and evaluating

1 Describe what happened to your pinwheel when it was placed in the steam flow.

The pinwheel spins when placed in the water vapour (steam) flow.

2 What else would you need to add to make your ‘power station’ generate electricity?

In order to generate electricity, a generator would need to be added.

3 What is the fuel in your power station?

The fuel in this power station is water vapour (steam) and wind.

4 Will your power station run out of fuel?

Yes, the power station will run out of fuel when all water has been converted to water vapour.

Communicating

What do you know about the action of a power station?

Power stations burn coal, which produces heat that is used to boil water and create water vapour. This vapour causes a turbine to spin. The movement of the turbine is converted into electrical energy by a generator.

Challenge 4.3: Can you increase the power of solar cells?

Experiment worksheet answers (pages 66–67 and 188)

Processing, analysing and evaluating

1 What are the best conditions for generating electricity from a solar cell?

The best conditions for generating electricity from a solar cell are outside, in sunny conditions and using multiple cells.

2 Why do you think a house with a solar energy installation will have six, eight or more solar cells on its roof?

A house with solar energy would have six or more cells to produce a suitable amount of photovoltaic energy.

3 Why should solar panels on a house roof be cleaned regularly?

Solar panels should be cleaned regularly to ensure they can collect the sunlight effectively. Dirty solar panels reflect sunlight rather than collect it to produce energy.

Communicating

What do you know about the amount of electricity produced by solar cells?

The amount of electricity produced by solar cells is higher when they are located outside and consist of multiple cells. More energy can be collected when the conditions are sunny.

Experiment 4.4A: What if a muffin were mined in different ways?

Experiment worksheet answers (pages 68–69 and 189)

Discussion

1 Which method recovered the most ore?

The method that recovered the most ore will depend on where the chocolate chips were located. It is likely that the open cut mining will actually recover more.

2 Which method was faster?

Open cut mining will be the fastest method.

3 Which method was easier?

Open cut mining will be the easiest method.

4 Which method would allow the environment to be rehabilitated more easily?

Underground mining would allow the environment to be rehabilitated more easily as it doesn’t disturb as much of the environment.

Experiment 4.4B: What if a metal were obtained from a mineral?

Experiment worksheet answers (pages 68–69 and 190)

Discussion

1 Examine something else made of copper, such as an old 1 or 2 cent coin or a copper water pipe. Does the coating on the rods look like pure copper?

The coating should look similar to that of a 2 cent piece.

2 Where did the copper coating come from?

The copper coating came from the copper in the copper sulfate.

3 What do you think the electricity did in this experiment?

The electricity caused the copper in the copper sulfate to ‘jump’ onto the electrical leads. Copper sulfate reacts with more reactive metals than copper and the copper component is deposited on the surface of the other metal.

Conclusion

How successful were you in obtaining pure copper from copper sulfate?

Student answers will vary.

Experiment 4.5: What if different soils were exposed to water?

Experiment worksheet answers (pages 70–71 and 191)

Discussion

1 Which soil drained the fastest?

The sand should drain the fastest.

2 Which soil stopped the most water from flowing?

The clay soil should stop the water from flowing.

3 Which soil absorbed water best?

Student answers will vary according to the type of soil used and the hydrophobic properties of the soil. Some soils that have been dried for some time will repel water and therefore the water will drain through quickly.

4 Why were the water-holding abilities different?

Soils are a mixture of different components that have different water-holding abilities. The amount of water held in soil will vary according to the different quantities of each component.

5 How accurate was your prediction? Explain why you think this was so.

Student answers will vary.

6 What qualities does a good soil need to have for plants to grow well in it?

Good soil needs to be able to retain water for plants to absorb through their roots.

Conclusion

Compare the water-holding ability of the four soils.

Student answers will vary.

Challenge 4.6: Resources for your future

Experiment worksheet answers (pages 72–73 and 192)

Communicating

Present your report to the class as a speech and short multimedia presentation.

Student responses will vary, but should display each of the following specified by the task:

• a summary of the topic

• an understanding of the cause of resource depletion

• an explanation of the effects of resource depletion

• at least one long-term and one short-term solution

• an understanding of how public education is important

• a suggested solution to resource depletion.