

Big Science

Competition

 pen & paper

Year 8 Paper

INSTRUCTIONS

1. Do not open this booklet until told to do so by your teacher.
2. Use only B or 2B pencil.
3. Answers must be recorded on the answer sheet provided.
4. Calculators may be used.
5. Diagrams are not necessarily drawn to scale.

SAMPLE QUESTIONS ONLY

ANSWERS INCLUDED ON PAGE 4



**AUSTRALIAN * SCIENCE
INNOVATIONS**

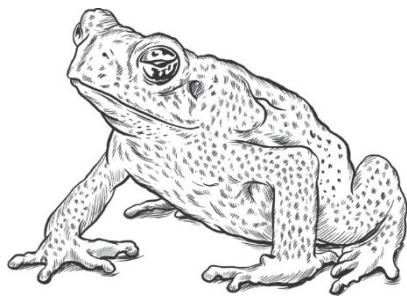
UNEXPECTED CONSEQUENCES

Cane Toads (*Rhinella marina*) are a major feral pest in Australia. They were introduced from South America to eat cane beetles damaging sugar crops.

An Australian study looked at the changes that occur when Cane Toads first arrive in a habitat.

The five year study found:

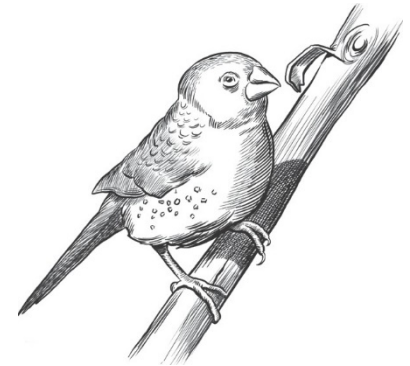
- the number of large predatory lizards halved
- the survival rate of Crimson Finch chicks almost doubled.



Cane Toad
(insect-eating toad)



Water Monitor
(predatory lizard)



Crimson Finch
(seed-eating bird)

1. How is the increased survival of the finch chicks best explained?
 - A. The adult birds used the toads as a source of food for the chicks.
 - B. The toads disturbed insects that finches could eat.
 - C. The scientists conducting the study were protecting the finches.
 - D. Fewer chicks were being eaten by the lizards.

2. What is the most likely impact on the study habitat of the increased survival of finch chicks?
 - A. The Crimson Finch will become extinct because of a lack of food.
 - B. The Crimson Finch will become a pest species like the Cane Toad.
 - C. There will be no impact on the habitat because food webs do not change.
 - D. Some plant species may become less common as more seeds are eaten.

MILLIONS OF DAM BALLS

Water levels in reservoirs in California, USA, are at record low levels.

As a result, a city has covered one of its reservoirs with millions of black plastic balls.

3. What benefits are there in covering the surface of a water reservoir with black plastic balls?

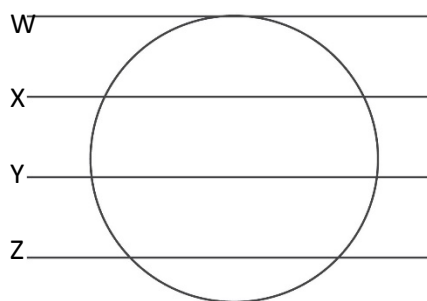
Select the column that provides a correct response for each benefit.

Is this a benefit from using the black plastic balls?	A	B	C	D
reduces evaporation	no	yes	yes	yes
raises the water level	no	no	yes	no
reduces the growth of algae	yes	yes	yes	no

4. What is the consequence of using black balls instead of white balls to cover the reservoir?

- A. Black balls can cover more of the surface.
- B. Black balls can reflect more heat.
- C. Black balls can absorb more light.
- D. Black balls float higher in the water.

5. The plastic balls are designed to cover as much surface area as possible. This has been done by making the plastic balls float at a specific depth.



The lines on the diagram show four possible depths at which the plastic balls could float.

The lines represent the surface of the water.

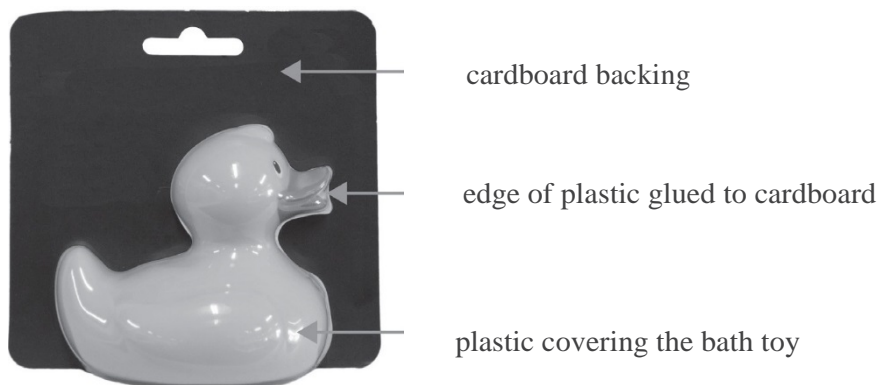
At which depth would the balls cover the most surface area?

- A. W
- B. X
- C. Y
- D. Z

PLASTIC DUCKS

In 2006 nearly 30,000 plastic bath toys fell from a ship in the North Pacific Ocean. The toys were contained in plastic pack, with a cardboard backing. After a few hours the cardboard separated from the pack. This left the toys floating in the ocean.

Note: the black cardboard is glued to the edge of the plastic covering the duck.



6. Eventually some of the plastic toys filled with water. However, even when full of water they floated on the surface of the sea.

What does this observation tell us about this plastic?

- A. The plastic must contain air bubbles.
- B. The plastic was not a natural material.
- C. The plastic has a lower density than sea water.
- D. The plastic contains chemicals that react in sea water.

In scientific studies the results of a test can be positive or negative.

- A positive test shows that something is present.
- A negative test shows that something is absent.

However, mistakes can be made in tests that affect the result.

- A false positive is one where the result of the test is positive, but it really should be negative.
- A false negative is one where the result of the test is negative, but it really should be positive.

7. In 2007 a plastic bath toy was found on a beach in Devon in the UK. Some people claimed this was one of the toys that had been lost in the North Pacific Ocean. However, it was soon discovered that the toy was not from the cargo lost in that ocean.

How would the finding of the toy on the beach in Devon be best classified?

- A. positive
- B. negative
- C. false negative
- D. false positive

ANSWERS

Question	Unit	Correct answer	Strand 1	Strand 2	AC ref 1	AC ref 1	Descriptor
1	Unexpected Consequences 1	D	SIS	BS	AC SIS132	AC SSU112	Uses scientific knowledge of food chains to explain the result of a study.
2	Unexpected Consequences 2	D	SIS	BS	AC SIS124	AC SSU112	Makes a prediction based on scientific knowledge of food chains.
3	Millions of Dam Balls 1	B	SHE	ESS	AC SHE120	AC SSU116	Identifies how an invention addresses a contemporary issue.
4	Millions of Dam Balls 2	C	SIS	CS	AC SIS132	AC SSU008	Uses scientific knowledge of heat and light to explain the design of a product.
5	Millions of Dam Balls 3	C	SIS	CS	AC SIS132	AC SSU117	Uses scientific knowledge of materials to explain the design of a product.
6	Plastic Ducks 1	C	SIS	PS	AC SIS132	AC SSU117	Uses scientific knowledge of forces and density to explain an observation.
7	Plastic Ducks 2	D	SIS		AC SIS131		Reflects on the quality of data collected as part of a study.