

The 1999 science assessments included twenty-one assessment tasks related to the *living world* strand of the science curriculum.

Fifteen tasks were identical or had many common components for year 4 and year 8 students. One of these is a trend task (fully described with data for both 1995 and 1999), seven are released tasks (fully described with data for 1999 only), and seven are link tasks (to be used again in 2003 so only partially described here). Four other tasks, including one trend task and one link task, were attempted only by year 4 students. The remaining two tasks, both of which were trend tasks, were attempted only by year 8 students.

The task details and results for trend tasks are presented in the first section, followed by the task details and results for released tasks. The third section contains a little task information and the results for the link tasks. Within each of the three sections, tasks used with both year 4 and year 8 students are presented first, followed by tasks used only with year 4 students and then by tasks used only with year 8 students.

Comparing results for year 4 and year 8 students

Averaged across 87 task components used with both year 4 and year 8 students, 13 percent more year 8 than year 4 students produced correct responses. This indicates that, on average, students have made useful progress between year 4 and year 8 in the skills assessed by the tasks. Not surprisingly, students at both levels were less successful in providing explanations for living world phenomena than in demonstrating their knowledge of the phenomena or their ability and classify and identify observable features of living world objects.

Trend results: Comparing 1995 and 1999 results

Two trend tasks involving a total of five components were administered to year 4 students in both the 1995 and 1999 assessments. More 1999 than 1995 students succeeded on two components, while more 1995 than 1999 students succeeded on three components. Averaged across the five components, one percent more students succeeded in 1999 than in 1995. This difference clearly is not important.

Three trend tasks involving six task components were administered to year 8 students in both the 1995 and 1999 assessments. More 1999 than 1995 students succeeded on three components, more 1995 than 1999 students succeeded on two components, and there was no difference on the sixth component. Averaged across the six components, one percent more students succeeded in 1999 than 1995. Again, this difference is clearly not important.

Trend Task

Seed to Pine Tree

Approach: One to one

Level: Year 4 and year 8

Focus: Account for the growth of a pine tree of immense size and weight from a small seed.

Resources: Picture of pine tree, pine tree seed, pine cone.

Questions/instructions:

Show the picture of a pine tree, the pine cone, and the pine seed.

Here is a picture of a pine tree. It started growing from a very small seed like this one, many years ago. The seed would have come out of a pine cone. The seed weighs about 1 gram. The tree probably weighs about 3000 kilograms, or 3 tonnes. Something happened to a little seed like this so it could grow into a very big tree like this. Think about what could have happened.

1. Try to explain to me where the tree got all of its extra weight from since it started off as a tiny seed.

Prompt: How did a tiny seed weighing about 1 gram become a tree that weighs about 3 tonnes?

How did it get so much heavier?

Key elements of explanation:

First, root systems and leaves develop and proceed to absorb water, gases and nutrients from air and soil. Second, photosynthesis chemically combines these into growing mass of the tree.

	% responses	
	1999 ('95)	1999 ('95)
	year 4	year 8
clear, correct explanation	0 (0)	1 (1)
partial explanation	6 (8)	14 (20)
identifies basic source of materials only	71 (78)	68 (74)
any other response	23 (14)	17 (5)

Commentary:

Year 8 students scored only a little higher than year 4 students, and 1999 students scored slightly lower than 1995 students. Very few students gave full explanations.

Trend Task

Living World Questions, Year 4

Approach: Independent

Level: Year 4

Focus: Student knowledge in the areas covered by these multiple choice questions.

Resources: None

Questions/instructions:

1. The part of your garden that has lots of slaters is probably:

- | | % responses | |
|---------------------|-------------|------------|
| | 1999 ('95) | 1999 ('95) |
| | year 4 | year 4 |
| a. damp and sunny. | 19 (20) | |
| b. dry and sunny. | 19 (13) | |
| c. damp and dark. ✓ | 47 (48) | |
| d. dry and dark. | 15 (19) | |

2. What do birds have that insects never have?

- | | | |
|---------------|---------|--|
| a. wings | 17 (19) | |
| b. eyes | 2 (2) | |
| c. eggs | 6 (7) | |
| d. feathers ✓ | 75 (72) | |

3. Milk kept in a refrigerator stays fresh longer because the cold temperature

- | | % responses | |
|--|-------------|------------|
| | 1999 ('95) | 1999 ('95) |
| | year 4 | year 4 |
| a. makes the water in the milk freeze. | 28 (27) | |
| b. slows down the action of the bacteria. ✓ | 33 (26) | |
| c. helps the cream come to the top. | 11 (14) | |
| d. slows down the decay of the milk container. | 28 (33) | |

4. Which gas must an animal breathe to remain alive?

- | | | |
|-------------------|---------|--|
| a. carbon dioxide | 13 (14) | |
| b. hydrogen | 4 (4) | |
| c. nitrogen | 7 (5) | |
| d. oxygen ✓ | 76 (77) | |

Commentary:

The 1999 and 1995 students performed no differently on questions 1 and 4, but the 1999 students did a little better than the 1995 students on questions 2 and 3.

Living World Questions, Year 8

Trend Task

Approach: Independent

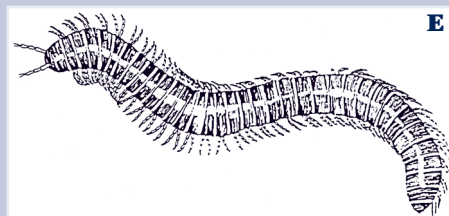
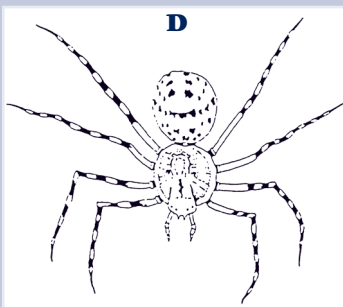
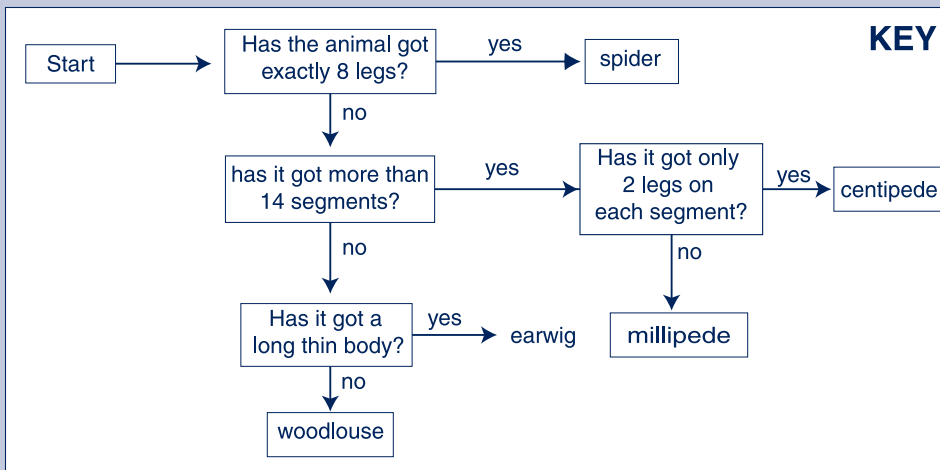
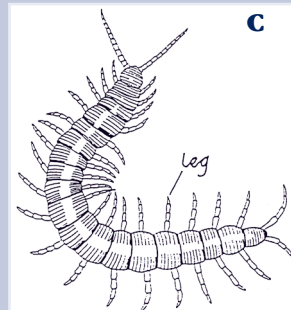
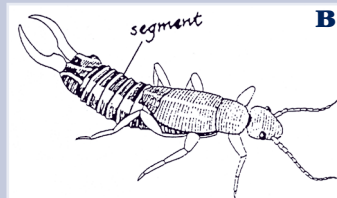
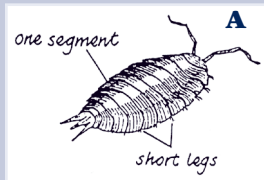
Level: Year 8

Focus: Student knowledge in the areas covered by these multiple choice questions.

Resources: Pictures of five animals.

Questions/instructions:

1. You have 5 pictures of animals. Look at each animal in turn. Follow the arrows on the key to find out its name.



Name of animal from following the key	
A	
B	
C	
D	
E	

2. Which gas must an animal breathe to remain alive?

- a. carbon dioxide 11 (11)
- b. hydrogen 3 (3)
- c. nitrogen 1 (1)
- d. oxygen 85 (85) ✓

% responses	
1999 ('95)	1999 ('95)
year 4	year 8

woodlouse	82
earwig	82
centipede	65
spider	93
millipede	62

Number correct:	
5	56 (51)
4	2 (1)
3	27 (27)
2	5 (10)
1	6 (7)
0	4 (4)

Commentary:

Performance on the animal key task improved slightly from 1995 to 1999. Students had greatest difficulty in distinguishing the centipede and the millipede. The percentage understanding the importance of oxygen for animal life was unchanged from 1995 to 1999.

Growing in the Mighty Forest

Approach: One to one

Level: Year 4 and year 8

Focus: Understanding the life cycle functions and parts of a forest tree (roots, leaves, trunk and bark).

Resources: 3 pictures: young tree in the native bush, mature tree, transverse slice of tree trunk.

Questions/instructions:

In this activity we will be thinking about the New Zealand bush. Here is a picture showing a young tree growing in the forest.

Show picture 1.



I want you to think about how the forest helps and protects a young tree as it grows.

Point to the young tree in the picture.

1. How might this tree have got there?

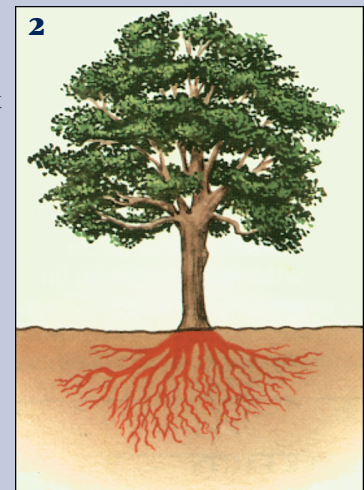
Prompt: What might have made it grow there?

		% responses	
		y4	y8
seed dispersal:	2 or more good ideas	5	17
	1 good idea	43	56
	"someone planted it"	38	17
2. How does the forest help the young tree to grow?	appropriate conditions for germination	11	10
	nutrients	9	20
	moisture	41	33
	protection/shelter	43	64
	cyclical nature of growth/decay	7	12



3. Now let's talk about the different parts of trees. Look carefully at this picture of a big tree to help you answer the questions.

Show student picture 2.



Point to the roots.

4. Here are the tree roots. How do the tree roots help the tree to live and grow?

		% responses	
		y4	y8
moisture		69	54
nutrients		24	35
stability/anchorage		25	20

Point to the leaves.

5. Now look at the leaves of the tree. How do the leaves help the tree live and grow?

moisture		13	19
"breathe" for tree		5	16
convert sunlight into a chemical energy (photosynthesis)		5	9

Give the student picture 3.

Look carefully at this picture of the tree trunk.

Point to the bark layer.

6. Try to explain to me the main jobs of the bark layer.

protection		62	85
carries moisture and nutrients up/down tree		3	3

Point to the rings in the trunk of the tree.

7. Try to explain to me what these rings might mean.

explains one ring per year and why rings occur (seasonal change)		4	2
only mentions one ring per year		74	70

Commentary:

There were quite small differences in responses from year 4 and year 8 students.

Flounder

Approach: One to one

Level: Year 4 and year 8

Focus: Observe a flounder and identify its features with adaptive significance to its habitat on the sandy bottom of the ocean.

Resources: Video of flounder in its habitat.

Questions/instructions

We're going to watch a video that shows shots of a flounder living on the sandy bottom of the sea. The flounder has some features that help it live in this environment. Watch the video carefully. After the video I want you to tell me about the features that help the flounder live in its environment.

Play video.



1. What is special about flounders that help them live in the sandy bottom of the sea? Tell me as many things as you can.

Prompt: How does that help them?

Colour effective camouflage — identifies:

	% responses	
	y4	y8
feature and explains value	16	24
feature only	24	39

Flat shape of body — identifies:

feature and explains value	15	39
feature only	22	25

Eyes on one side of body — identifies:

feature and explains value	4	18
feature only	10	14

Side fins — identifies:

features and explains value	6	8
feature only	10	12

Tail — identifies: feature and explains value

feature and explains value	11	9
feature only	7	5

Total score: 6-10 2 10

3-5 26 47

1-2 43 33

0 29 10



Commentary:

Only 57 percent of year 8 students and 28 percent of year 4 students obtained scores of 3 out of 10 or higher.

Animal Adaptation — Snail

Approach: Station

Level: Year 4 and year 8

Focus: Observe and describe the structural features of a snail that are considered to be adaptive features with survival value.

Resources: Picture of snail.

Questions/instructions:

Look carefully at the picture. Write about the parts of the snail that help it to survive. An example has been done for you.

Snail

The shell's brown colour helps the snail hide from its enemies.

	% responses	
	y4	y8
shell protects soft parts inside from predators	28	35
shell keeps body moist	2	2
body can withdraw totally into shell	16	25
body uses slime to allow snail to slide easily and safely	31	44
slime closes entrance to shell for temperature control	2	2
eyes used to see (light and dark)	51	58
tentacles used to touch, smell and taste	28	45
mouth used to eat	16	16
Number of valid responses:		
	4-5	6 14
	2-3	48 58
	0-1	46 28

Commentary:

This was one of two tasks in the 1999 assessment that were more disliked than liked by year 8 students. Many students struggled to identify more than two adaptive features.

Animal Adaptation — Praying Mantis

Approach: Station

Level: Year 4 and year 8

Focus: Observe and describe the structural features of a praying mantis that are considered to be adaptive features with survival value.

Resources: Picture of a praying mantis

Questions/instructions:

Look carefully at the picture. Write about the parts of the praying mantis that help it to survive. An example has been done for you.

Praying Mantis

The green colour of the praying mantis helps it to hide in the grass or on leaves.

	% responses	
	y4	y8
strong legs for hopping, walking, attacking	21	27
long front legs, able to reach out to catch prey	19	28
grappling hooks on forelegs to aid climbing	13	20
wide apart bulbous compound eyes to give maximum vision	13	18
biting jaws to eat other insects — not plants	6	10
wings to fly	37	53
antennae/feelers to feel/sense	32	46
Number of valid responses:		
	4-5	5 10
	2-3	38 56
	0-1	57 34

Commentary:

Like the last task this was one of the two tasks in the 1999 assessments that was more disliked than liked by the year 8 students. A majority of year 4 students identified less than two adaptive features, as did one third of year 8 students.

Kai Moana

Approach: Station

Level: Year 4 and year 8

Focus: Demonstrate knowledge of the identification and specific coastal habitat of 10 seafoods (kai moana).

Resources: Picture of coastal scene, sticker with names of seafoods.

Questions/instructions:

Kai moana means seafood. Different seafoods are found in different places. You have a seaside map and 10 pictures of sea foods.

1. Stick each picture on the map to show where it would usually be found.



Here are 10 pictures of kai moana and a list of their names.

2. Write the number for each seafood beside its name. The first one is done for you.

Paua	<input type="text" value="1"/>
Kina	<input type="text" value="8"/>
Oyster	<input type="text" value="6"/>
Crayfish	<input type="text" value="9"/>
Crab	<input type="text" value="4"/>
Snapper	<input type="text" value="10"/>
Mussel	<input type="text" value="2"/>
Eel	<input type="text" value="7"/>
Cockle	<input type="text" value="5"/>
Flounder	<input type="text" value="3"/>



		% responses	
		y4	y8
Paua	clings to rocks in deep sea	21	41
Kina	identified picture 8	59	83
	rocky areas, low tide pools near shore	20	40
Oyster	identified picture 6	57	94
	upper tidal rocky area	19	44
Crayfish	identified picture 9	94	98
	deep water, near rocks	32	53
Crab	identified picture 4	97	98
	exposed beaches, low tide areas	64	74
Snapper	identified picture 10	66	87
	deep sea	48	70
Mussel	identified picture 2	76	89
	rocky areas, deep water beds	21	39
Eel	identified picture 7	96	100
	fresh water, streams, rivers	42	71
Cockle/pipi	identified picture 5	50	71
	beachs near low tide level	54	60
Flounder	identified picture 3	66	87
	shallow tidal flats, estuaries	26	37

Commentary:

Few students had difficulty identifying the eel, crab, and crayfish pictures correctly. Paua and cockles were hardest. Crab, snapper, eel and cockle were most frequently placed correctly in the coastal picture. At year 8 level, Māori students scored higher than non-Māori students.

Birds

Approach: Station

Level: Year 4 and year 8

Focus: Recognise from prior knowledge a selection of birds, define the term “native bird,” and identify those that fit in this category.

Resources: Pictures numbered 1–8.

Questions/instructions:

1. Look at the bird pictures. Match the birds in the pictures with their names on the chart. Write the number of the bird beside its name.

bird names	number	✓native birds
fantail (pīwakawaka)	4	
thrush (tiutiu, koroheka)	6	
shag (kawau)	2	
sparrow (tiu)	3	
waxeye (tauhou)	8	
pukeko (pūkeko)	5	
woodpigeon (kererū)	1	
kingfisher (kōtare)	7	

% responses
y4 y8

80 94
30 45
46 63
43 63
36 50
62 80
42 64
51 68

2. Some of these birds are native to New Zealand.

What do we mean by “native” birds?

not introduced to NZ 2 19

found only in NZ 14 28

3. Tick the birds that you think are native to New Zealand.

Put your ticks in the “native birds” column.

Results not recorded here.



Commentary:

With the exception of the fantail and the pukeko, students struggled to match the bird names and pictures. The meaning of “native” proved challenging for NEMP staff and markers, as well as students, with the most common misconception being that native birds were originally or currently found only in New Zealand.

Spiders

Approach: Station

Level: Year 4 and year 8

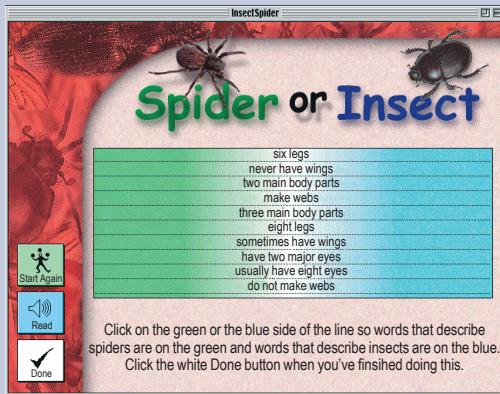
Focus: Knowledge of differences between spiders and insects.

Resources: Computer, mouse, headphones, mousepad, Hypercard® programme.

Questions/instructions:

This activity is done on the computer. The computer should show the home page. If it doesn't tell the teacher.

Click the button that says "Spiders". The computer will tell you what to do.



	SPIDER	INSECT	% responses	
			y4	y8
		six legs	67	81
	never have wings		76	88
	two main body parts		61	72
	make webs		93	98
		three main body parts	64	73
	eight legs		85	92
		sometimes have wings	83	94
		have two major eyes	67	77
	usually have eight eyes		80	85
		do not make webs	88	95
	Number correct:		10	23
			8-9	39
			6-7	21
			3-5	14
			0-2	3
			4	2

Commentary:

Students performed well on this task with about 20 percent more year 8 than year 4 students getting a perfect score. The weakest area of knowledge concerned the number of body parts for insects and spiders.

Dinosaurs

Approach: One to one

Level: Year 4

Focus: Looking at a model of a triceratops, comment on its living environment, food sources, means of protection, and reasons for eventual extinction.

Resources: Plastic triceratops model.

Questions/instructions:

Here is a model of a dinosaur. Scientists call this dinosaur a triceratops.



These animals lived on Earth a very long time ago. You can pick the model up and have a good look at it while I ask you some questions.

Give student model of dinosaur.

1. Think about the place where the triceratops lived. How might the place where they lived a long time ago be different from what it is like now?

Prompt: Is there anything else you can tell me? **not marked**

% responses

2. How do you think the triceratops got its food? *Prompt: Anything else?*

y4

eating plants

53

3. All animals have to protect themselves in the environments where they live.

What would the triceratops need to protect itself from? *Prompt: Anything else?*

carnivorous predators

78

other suitable response

(eg. disease, starvation, dehydration)

2

4. How do you think the triceratops protected itself? *Prompt: Anything else?*

horns

91

charging, using its weight

23

other valid response (eg. strong tail)

63

5. There are no longer any triceratops living on Earth. What do you think happened to them? *Prompt: What caused them to die out or become extinct?*

sudden change of climate or habitat; or crash of space object

42

Commentary:

About half of the year 4 students know that triceratops were plant eaters. High proportions identified major predators and means of protection, but fewer could explain reasons for their extinction.

Animal Families

Approach: Team

Level: Year 4

Focus: Recognise common characteristics of mammals.

Revise, apply and justify a simple classification for a small sample of animals.

Resources: 3 sets of cards: SET 1— dog, horse, baby; SET 2— birds and insects (8 cards); SET 3— mouse, spider, seal, weta.

Questions/instructions

In this activity I want everyone to help and everyone to work as a member of the team.

Give students SET 1 cards. [Group 1]



Here are three cards that show a dog, a horse and a baby. Sometimes scientists group these animals together. Why do you think these animals belong together? Talk about the reasons amongst yourselves.

Allow time.

Now tell me your reasons and I will write them down on the answer sheet.

% responses
y4

identifies all as mammals	53
identifies all as warm blooded	14
weaker classification, such as all have legs	24

Leave SET 1 cards on the table. Give students SET 2 cards. [They will sort SET 2 into 2 groups: Group 2 and Group 3]

Now I am going to give you another eight cards. I want you to group these cards into two animal families. Decide together on the animals you will put in each group. When you have finished I want you to tell me what is special about each group.

Allow time.



Now tell me what is special about each of the groups of animals.

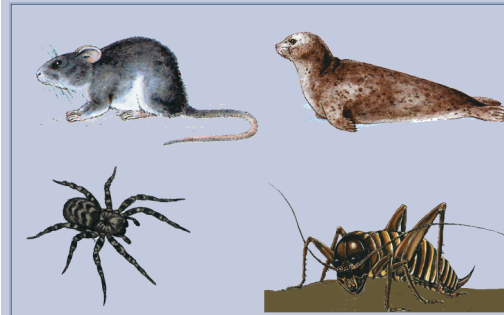
% responses
y4

grouped 4 insects and 4 birds	84
weaker classification, such as wings and no wings	11
Justification: strong	44
moderate	24
weak	24

You now have three groups on the table. I am going to give you four more cards.

Give students SET 3 cards.

I want you to decide together which group each card should go in. If you think it doesn't belong in any group just put it aside. Remember you need to think carefully about your reasons for putting the animals into groups.



Allow time.

Tell me where you have put the four cards.

Why did you put the **mouse** in that group?

correctly placed, well argued	40
correctly placed, poorly argued	39

Why did you put the **seal** in that group?

correctly placed, well argued	35
correctly placed, poorly argued	23

Why did you put the **spider** in that group?

correctly placed, well argued	19
correctly placed, poorly argued	3

Why did you put the **weta** in that group?

correctly placed, well argued	55
correctly placed, poorly argued	37

Commentary:

The year 4 student teams were quite successful in grouping or placing the creatures, but less successful in justifying their choices. The spider was often incorrectly added to the insects group.

Link Tasks 1-4

LINK TASK 1

Approach: Team*Level:* Year 4 and year 8*Focus:* Classification*Resources:* Set of pictures.

		% responses	
		y4	y8
Question	1	47	56
	2	52	70
	3	37	55
	4	42	58
	5	31	50
	6	42	57
	7	24	34
	8	37	53

LINK TASK 2

Approach: One to one*Level:* Year 4 and year 8*Focus:* Explanation of plant features.*Resources:* 3 pictures, other objects.

		% responses	
		y4	y8
Total score:	10-14	1	11
	8-9	5	13
	6-7	12	25
	4-5	29	26
	2-3	35	18
	0-1	18	7

LINK TASK 3

Approach: Station*Level:* Year 4 and year 8*Focus:* Insect features*Resources:* Laptop computer, Hypercard® programme.

		% responses	
		y4	y8
Total score:	19-20	9	16
	17-18	17	21
	15-16	26	29
	13-14	18	18
	11-12	21	12
	0-9	9	4

LINK TASK 4

Approach: Station*Level:* Year 4 and year 8*Focus:* Animal adaptation*Resources:* Picture

		% responses	
		y4	y8
Total score:	4-5	9	30
	3	22	31
	2	34	24
	1	25	11
	0	10	4

Link Tasks 5-8

LINK TASK 5

Approach: One to one
Level: Year 4 and year 8
Focus: Animal adaptation
Resources: 4 pictures

	% responses	
	y4	y8
Total score: 10-11	4	13
8-9	25	46
6-7	32	23
4-5	21	11
2-3	13	5
0-1	5	2

LINK TASK 6

Approach: One to one
Level: Year 4 and year 8
Focus: Animal features
Resources: 3 pictures

	% responses	
	y4	y8
Total score: 8-14	6	22
6-7	24	41
4-5	38	25
2-3	23	10
0-1	9	2

LINK TASK 7

Approach: Station
Level: Year 4 and year 8
Focus: Plants
Resources: 8 pictures

	% responses	
	y4	y8
Total score: 7-8	11	37
5-6	28	30
3-4	32	23
0-2	29	10

LINK TASK 8

Approach: One to one
Level: Year 4
Focus: Insects
Resources: Set of stickers.

	% responses	
	y4	y8
Total score: 8-9	45	
6-7	29	
4-5	21	
2-3	5	
0-1	0	