Engineering Adventures

Engineering Journal

Hop to It:

Safe Removal of Invasive Species

Your Name:_____

reply | forward | archive | delete

from:	engineeringadventures@mos.org
to:	You
subject:	Engineering a Tower

11:11 AM

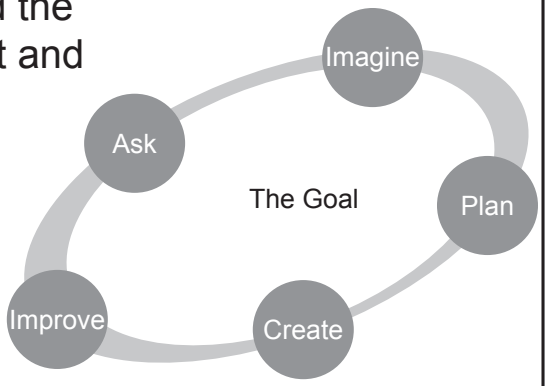
Hi everyone,

We're so excited to meet you! Our names are India and Jacob. We do a lot of traveling all over the world. We meet interesting people and see some amazing countries. Each place is unique, but we've found one thing in common. Everywhere we go in the world, we find problems that can be solved by engineers.

Engineers are problem solvers. They're people who design things that make our lives better, easier, and more fun! We heard you might be able to help us engineer solutions to some of the problems we find. That means you'll be engineers, too!

Today, we came across an engineering challenge we think you can help us solve. There are some animals living in a swamp along with lots of hungry alligators. The animals need to be at least 10 inches above the alligators to be out of their reach. India and I thought we could build a tall tower that the animals could stand on. Do you think you can engineer a tower to help?

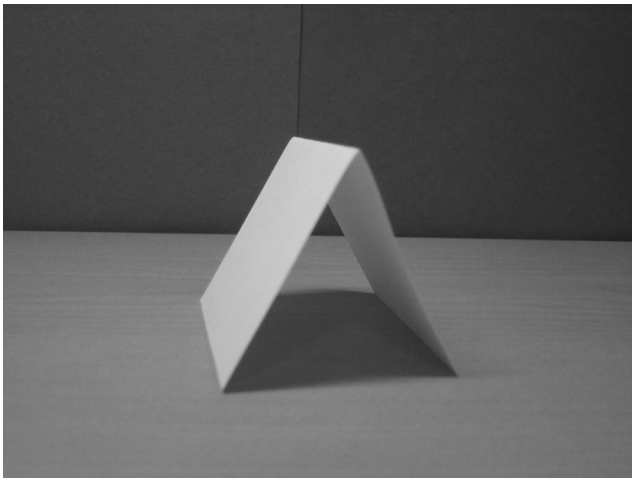
We sent you one tool that we usually find really helpful when we're trying to engineer a solution to a problem. It's called the Engineering Design Process. Take a look at it and see if it can help you!



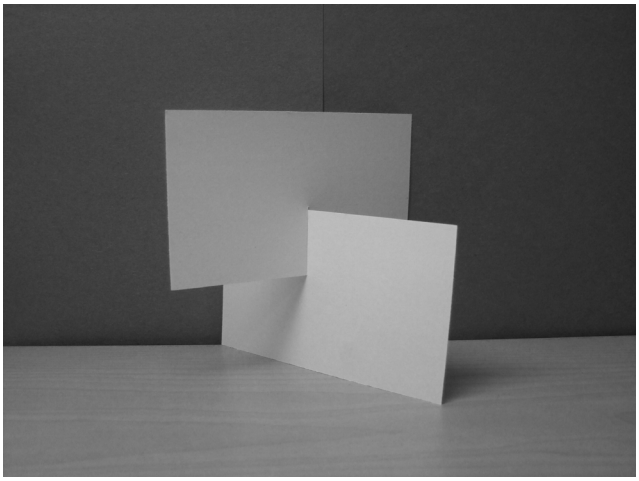
Good luck!
India and Jacob

Here are three ways to build with index cards.

Roll it!



Fold it!



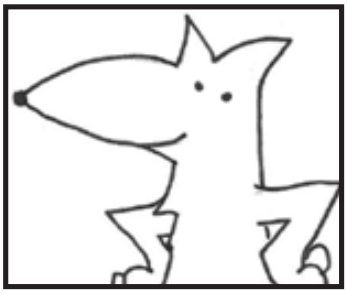
Will any of these ideas help your group build a tower? What other ideas do you have?

Talk with your group to figure it out!

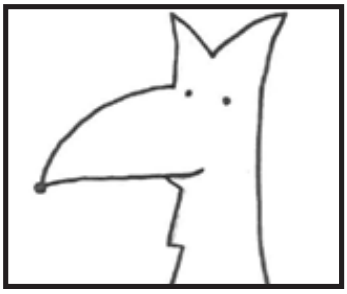
Heightened Emotions

Fearless
8 inches and up

Confident
6-8 inches

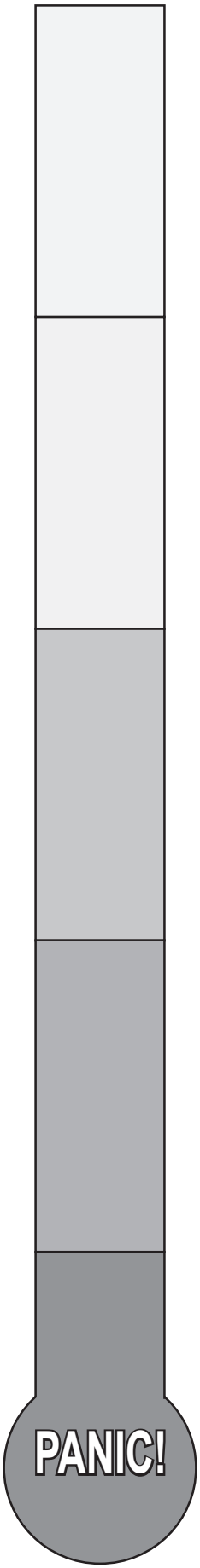


Calm
4-6 inches



Nervous
2-4 inches

Terrified
0-2 inches



Draw Your Tower

Use the space below to draw a picture of your tower.

Which parts of your tower design would you change if you could do it again?

For the Record

I think engineering is:

- ☐ Fun
- ☐ Exciting
- ☐ Difficult
- ☐ _____

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from:	engineeringadventures@mos.org
to:	You
subject:	What is Technology?

10:36 AM

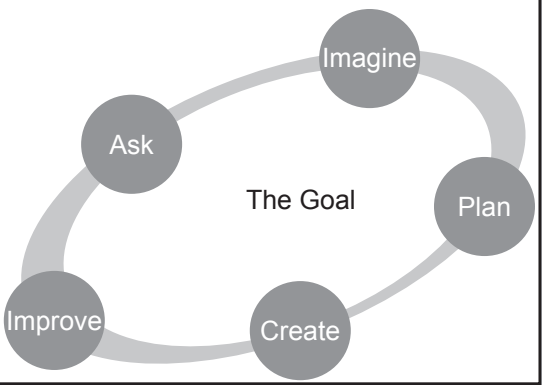
Hey Engineers,

You did a great job engineering a tower to protect the animals in the swamp! Now, you can help us engineer more technologies.

Do you think that the things engineers *create* to solve problems are called technologies? Most people think technologies have to be electronic, but this isn't true. A technology is actually anything engineered by a person that solves a problem.

Think about an airplane as an example. An airplane is a technology because people engineered it, and it solves the problem of traveling long distances quickly. But something as simple as a paper cup is also a technology. A person engineered it, and it helps people hold drinks without spilling them everywhere.

We have a detective challenge for you today. We sent you some objects, and we want you to figure out if these are technologies or not. Lots of times, engineers think about ways to *improve* technologies. Can you use the Engineering Design Process to *imagine* ways to make these technologies even better?



Talk to you soon,
India and Jacob

What is your group's object?

Is it a technology?

Did a person engineer it?

☐ Yes ☐ No

Does it help you solve a problem?

☐ Yes ☐ No

Bonus: What problem does your object solve?

If you answered YES to both questions, it is a technology!

You are an engineer. Write or draw how you would make this technology better.

If you could engineer a brand new technology, what would it be? What would it do?

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from:	engineeringadventures@mos.org
to:	You
subject:	We Need Your Help!

11:49 AM

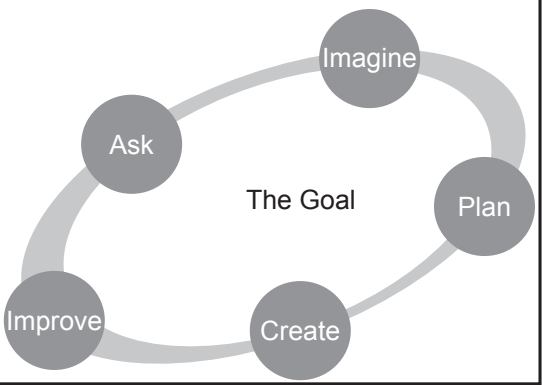
Hey Engineers!

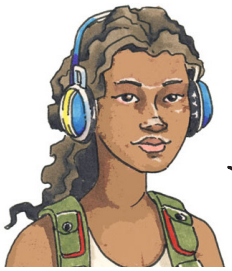
We're on vacation, and we really need your help! Right now, we're in New Zealand. We just arrived here from Australia. It turns out that sometime while we were in Australia, a cane toad snuck into our backpack. It escaped, and now it's on the loose here in New Zealand!

This is really bad news! Cane toads are called an invasive species because they don't belong in this part of the world. They've caused a lot of problems for the animals and people in Australia. If we don't engineer a trap to catch the cane toad, they could become an invasive species here in New Zealand, too! We know we can use the Engineering Design Process to help us. The first step is to *ask* some good questions about cane toads. We've sent you a video to help you understand some of the problems cane toads have caused in Australia.

We've also sent you designs of a few traps we made. So far, none of them have worked very well. Can you help us *imagine* ways to make them better?

India and Jacob

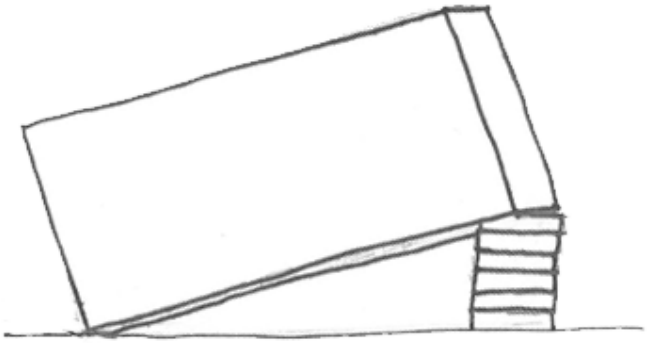




Hi guys,
Here are the designs for some of the traps we made. None of them have worked yet, so we know we need some help engineering better ones. Do you think you can help us?

Trap 1: Box Trap

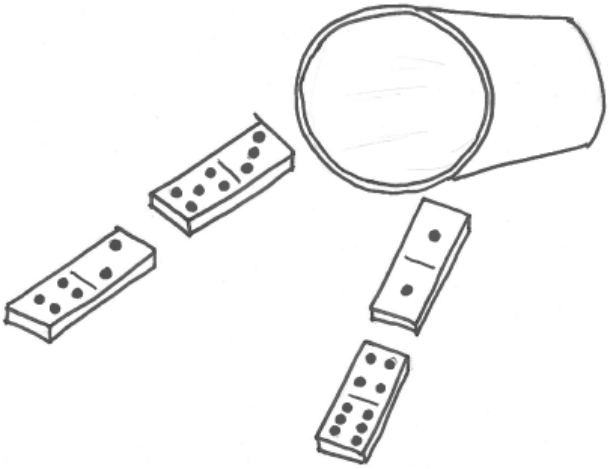
The box will fall on the cane toad when it knocks into the dominoes. But what if the toad does not hit the dominoes?



My improvement ideas:

Trap 2: Cup Trap

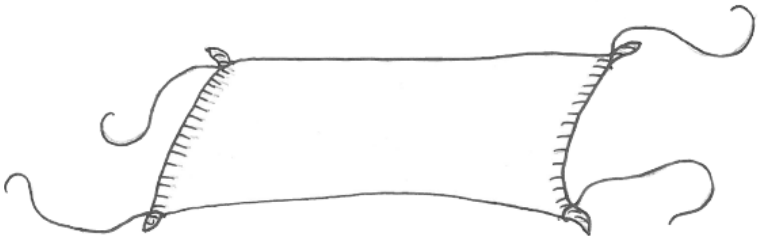
The dominoes lead the toad into the cup. But we do not have a cover for the cup that works.



My improvement ideas:

Trap 3: Net Trap

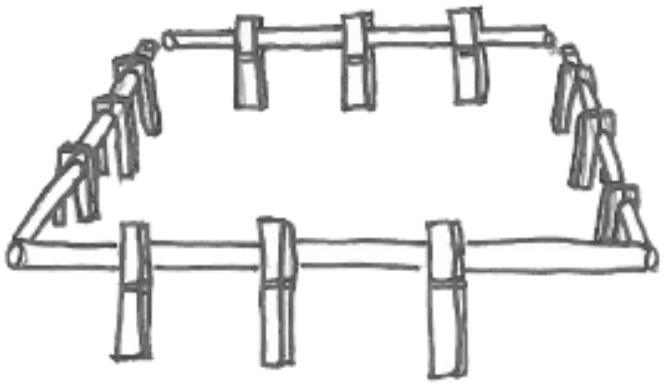
The towel is used like a net. When the toad jumps in, we can pull the strings to make a bag that holds the toad. But the strings are hard to pull all at once.



My improvement ideas:

Trap 4: Pen Trap

The clothespins and straws make a pen that would hold the toad. But it is not big enough and the toad could jump right out.



My improvement ideas:

After these traps did not work so well, we came up with some questions you might want to think about as you're building the traps. We think they will help you engineer better traps!

Once the cane toad is inside, can it jump back out?

Is the trap easy to use?

Are there ways to *improve* these traps so they work?

reply | forward | archive | delete

from	engineeringadventures@mos.org
to:	You
subject:	Engineering a Better Trap

12:09 PM

Hi everyone,

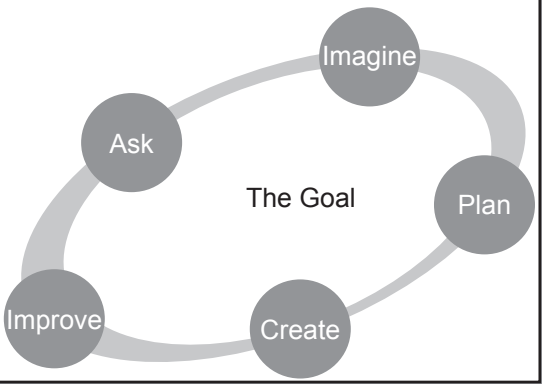
We're ready to start engineering a better trap to catch the cane toad. The ideas you had for *improving* our first designs were great. India and I are sure you'll be able to engineer a trap that works.

We've already started using the *ask* step of the Engineering Design Process to help us solve the problem. We *asked* some good questions about the problems cane toads can cause. Now, we need to *imagine* some ways to trap the toad and make a *plan*. Then we can *create* and test our trap designs. If they don't work quite right the first time, we can always *improve* them.

Cane toads can shoot poison up to 3 feet away, so we should make sure our trap is easy to activate when the cane toad is at least 4 feet away. Can you use what you know about technology, engineering, and the Engineering Design Process to help us design a trap that's 4 feet long? We sent you a special wind-up toad toy to help you test the cane toad traps you engineer.

We can't wait to see what you come up with!

Jacob



Draw a picture of the trap you engineered. Circle any parts you want to *improve* next time.

Test Results

How much space is there between where you activate your trap and where the toad gets caught?

☐ 4 feet or more ☐ Less than 4 feet

Trial 1	Trial 2
☐ Caught the cane toad 	☐ Caught the cane toad 
☐ Did not catch the cane toad 	☐ Did not catch the cane toad 

reply | forward | archive | delete

from	engineeringadventures@mos.org
to:	You
subject:	Time is Almost Up!

2:45 PM

Hey everyone,

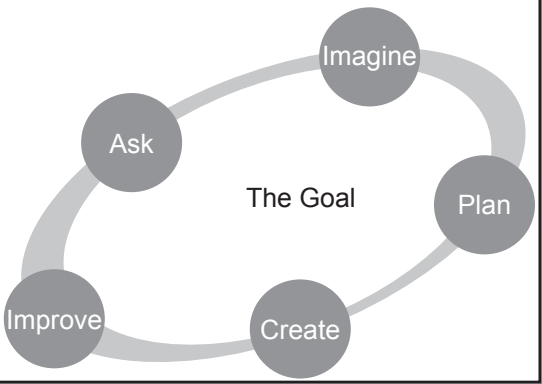
The technologies you engineered to trap the cane toad are looking great. We are leaving early tomorrow morning to go back home, and we need to have the traps ready to go so we can catch the cane toad before we leave!

We need the final traps to be the best they can be. Remember that you need to be able to activate the traps from at least 4 feet away from where the toad will be caught. Share your ideas with each other and try to *improve* your traps even more! Use the steps of the Engineering Design Process to help you. This is what engineers do all the time.

If you have time, think about some ways to camouflage your trap—make it blend in to what's around it so the cane toad will not see it. You could also think about putting some bait inside to attract the toad.

We're counting on you . . . and so are New Zealand's native animals!

India



Test Results

How much space is there between where you activate your trap and where the toad gets caught?

☐ 4 feet or more ☐ Less than 4 feet

Trial 1	Trial 2
☐ Caught the cane toad 	☐ Caught the cane toad 
☐ Did not catch the cane toad 	☐ Did not catch the cane toad 

Below is a picture of our improved trap.

reply | forward | archive | delete

from:	engineeringadventures@mos.org
to:	You
subject:	One More Thing . . .

9:25 AM

Hi everyone,

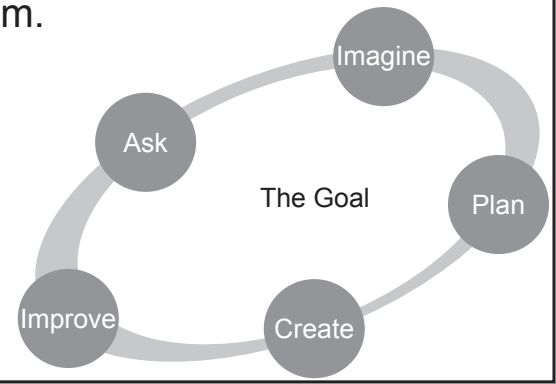
Good news! With all your hard work, your creativity, and the Engineering Design Process, we caught the cane toad!

Cane toads are still a big problem in Australia, though. In fact, the problem there is getting worse every day. Luckily, there is more we can do to help. When we were in Australia, we saw lots of Public Service Announcements, or PSAs. A PSA is like a commercial, except instead of advertising something, you give information. In one of the Australian PSAs, a park ranger gave some great information about cane toads and what to do if you see one. We think you should make PSAs about the cane toad traps you engineered!

Think about it. At first, you probably didn't know very much about cane toads, but now you are all experts. You have even engineered technologies to trap them! Do you think you could teach other people about cane toads and how to engineer technologies to trap them?

Do your best! Be sure to tell everyone how you used the Engineering Design Process to help you solve this problem.

We'll be in touch,
India and Jacob



Plan your PSA with your group.

How does your trap work? What are some improvements you made to your trap?

What steps of the Engineering Design Process did you use to help you design your trap?

What is the most important reason why people should help try to catch cane toads?

What do you want to engineer next?

_____

_____

Draw your technology here:

What materials do you want to use?

_____

_____

_____

_____

_____

_____

_____

_____

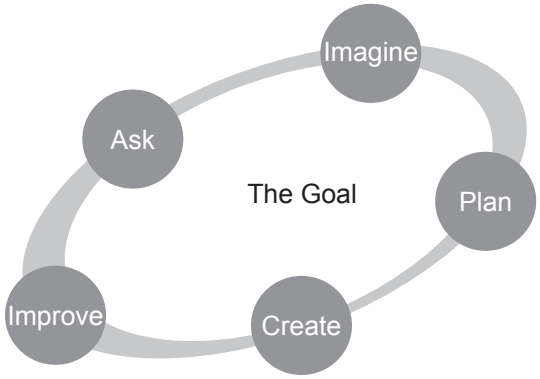
_____

My engineering checklist:

- ☐ Find friends to work with.
- ☐ ***Ask*** questions about how to start.
- ☐ ***Imagine*** lots of ideas.
- ☐ Make a ***plan***.
- ☐ ***Create*** and test the plan.
- ☐ ***Improve*** until you think it is ready.

Use the next page to keep track of your work!

How is your engineering project going? Keep track of what you do on this page.

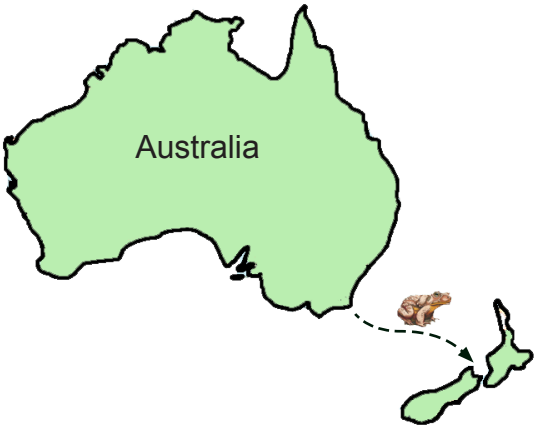


Cane Toad Problems

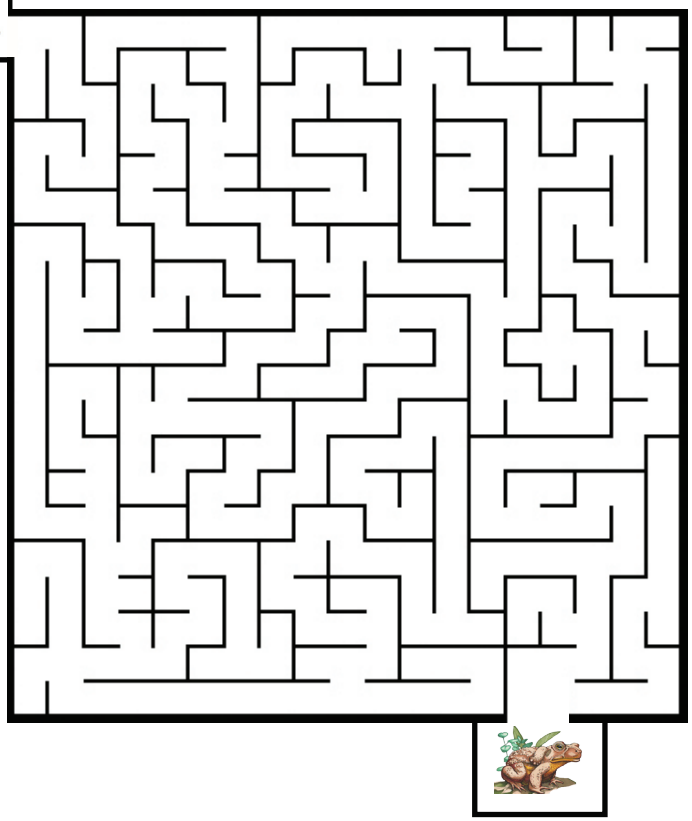
Why is it dangerous for animals to eat cane toads?

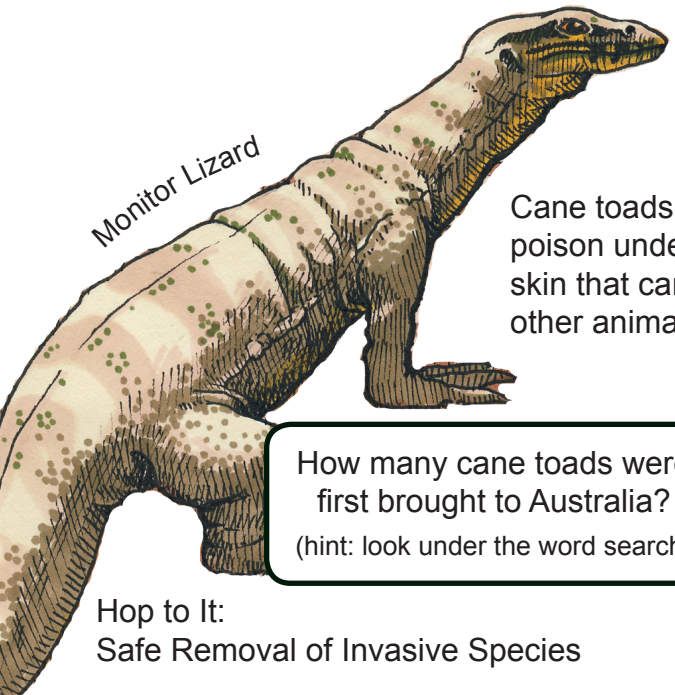
(Hint: Look next to the monitor lizard!)

Color the Cane Toad!



Help India and Jacob get through the maze to catch the toad





Cane toads have poison under their skin that can kill other animals.

How many cane toads were first brought to Australia?

(hint: look under the word search)

Cane Toad Problems

Cane Toad Word Search

Find the names of 9 animals harmed by the cane toad invasion:

Word Bank

CROCODILE
DOGS
FROGS
GOANNAS
LIZARD
PEOPLE
QUOLL
SNAKES
BIRDS

S	N	A	K	E	S	Q	O	C	F	D	H	A	J	F	N	D	H	N	S
D	R	X	H	P	F	U	R	X	O	O	X	B	C	X	R	P	B	E	T
W	W	C	F	B	V	O	Z	G	T	I	S	L	F	A	E	O	Q	Z	G
D	Y	B	D	G	C	L	S	R	C	S	U	F	Z	H	L	U	G	G	R
O	K	N	M	O	I	L	M	I	I	J	A	I	D	G	P	G	W	S	D
Z	X	K	D	B	Z	V	E	O	H	S	L	N	L	D	O	N	K	I	X
J	V	I	O	V	Y	H	W	C	V	Y	J	R	N	A	E	N	F	K	I
O	L	Q	W	W	B	I	R	D	S	W	O	I	R	A	P	I	G	B	L
E	N	P	O	R	X	M	E	C	X	U	K	E	T	H	O	C	D	I	Q
R	O	T	I	N	O	M	B	F	I	B	Y	I	U	R	J	G	O	U	P

Cane toads were brought to Australia in 1935. Some math using those numbers tells us how many were brought.

1 + 9 = ☐

5 - 3 = ☐

Add the two answers in the boxes plus 90 to find the number of cane toads brought to Australia in 1935.

☐ **+** ☐ **+ 90 =** ☐

Now there are millions!

Quoll

Did you know that some scientists are working to make quolls immune to cane toad poison?

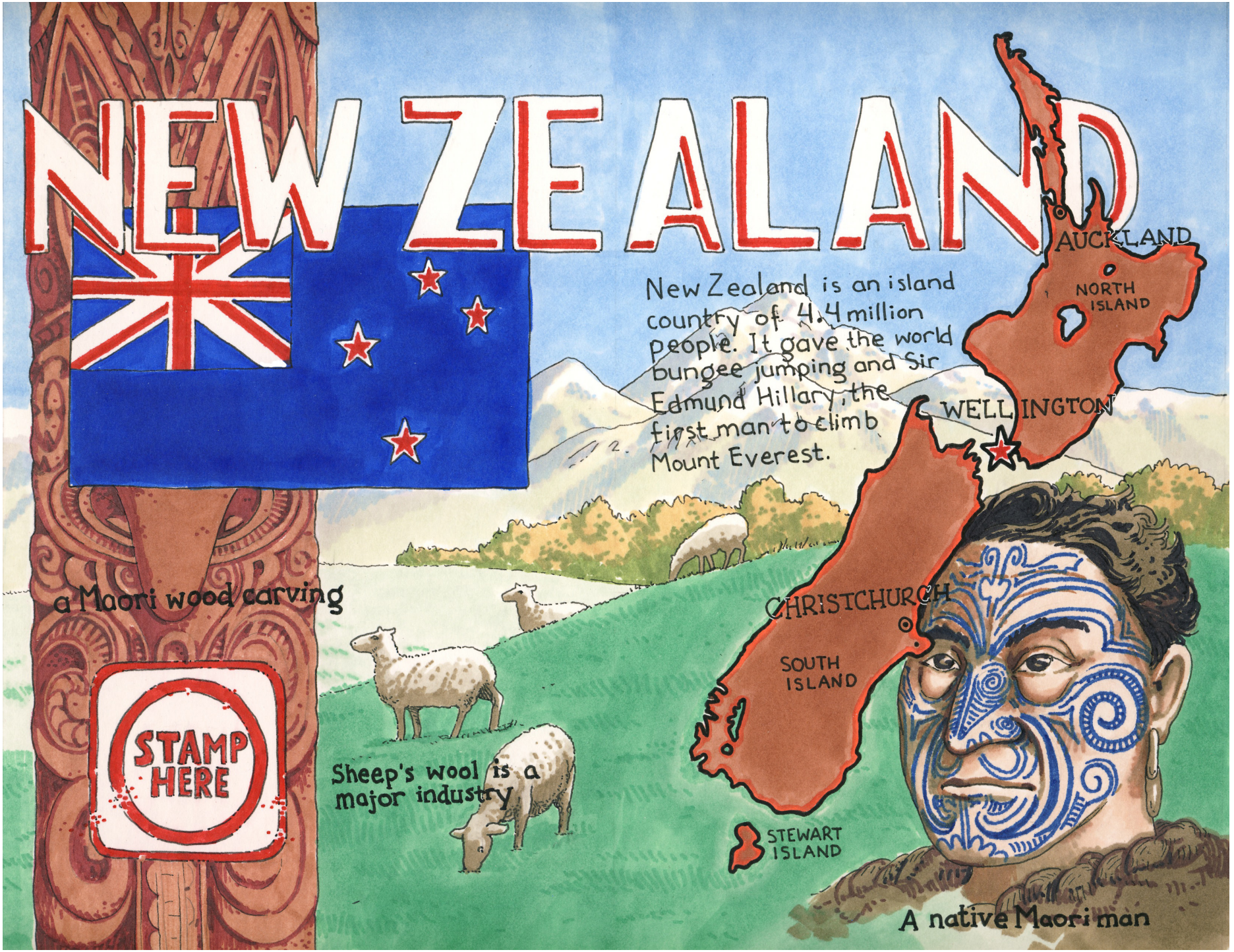
Draw your own Wanted poster for the cane toad!

WANTED

Cane toads are WANTED for causing these problems:

1.

2.


NEW ZEALAND
New Zealand is an island country of 4.4 million people. It gave the world bungee jumping and Sir Edmund Hillary, the first man to climb Mount Everest.
AUCKLAND
NORTH ISLAND
WELLINGTON
CHRISTCHURCH
SOUTH ISLAND
STEWART ISLAND
a Maori wood carving
STAMP HERE
Sheep's wool is a major industry
A native Maori man