

## 5.4: Journey through space

Meteorite hit

Build a launcher/transporter

A chance encounter

Can your crew do it?

## 5.5: Saving the kakapo

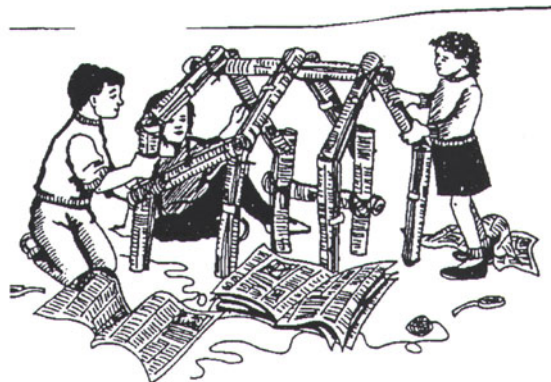
**Your school** has been selected to assist the Department of Conservation with its kakapo breeding programme.

Hiding within a hide

Egg recovery device

Kakapo courtship display

Injured female



## Event 1: Meteorite hit!

The New Zealand space mission has just pulled out of the atmosphere and is cruising away from Earth on its mission into deep space. The crew hears a thud! A meteorite has punctured the outer shield protecting them from the intense energy of the sun. A replacement cover must be improvised immediately! Even paper would do! It is too dangerous to ‘space-walk’ or even put so much as a hand outside, but fortunately an exit port is right alongside the damaged area. A protective screen, made from materials to hand, must be rigged up inside the cabin, pushed out the exit port and somehow increased in size outside the exit port to cover the widest possible area.

### Your Challenge

Using only the materials provided, construct a shield that can be pushed through the 40 cm diameter exit port, then increased in size to cover a continuous area. You will have 20 min for construction then up to a maximum of 45 seconds to demonstrate how well the device works.

You will be provided with:

- 30 sheets (may include half sheets) of newspaper
- 2 one metre lengths of dowel
- 20 m of white cotton string
- 15 m roll sellotape
- 2 round balloons in deflated state
- 1 aluminium can
- 50 cm bendable wire

***Demonstrating how well it works*** (this part of the event will be run in heats, six teams at a time).

Two judges will hold the ‘exit port’ at chest height. Although it may be the side of a spacecraft, it will look like a sheet of board with a 40 cm hole in it. On ‘go’ you may demonstrate how well your device works. To be safe, no body part may extend beyond the spacecraft wall.

Your performance will be judged on:

1. Engineering merit (Engineer judge who will view the structure before it is ‘deployed’)
  - An elegant and creative design, robustly and neatly constructed that looks as if it will definitely work ..... 4 points
  - A planned design, robustly constructed that looks as if it is likely to work..... 3 points
  - A structure that shows some evidence of a plan, which if luck is on their side, could work ..... 2 points
  - A structure has been made ..... 1 point

2. Extending the shield

- The device is pushed out completely safely, successfully and smoothly deployed within 20 seconds, to produce a neat-looking cover ..... 4 points
- The device is pushed out with only a minor breach to safety and deployed within 30 seconds. The mechanism basically worked ..... 3 points
- The device is pushed out from inside the spacecraft, and an increase in size was achieved ..... 2 points
- The device is pushed out through the exit port ..... 1 point

3. The size of shield

- A large completely continuous cover; smallest dimension 1.5 m ..... 4 points
- A cover with no more than 3 small holes; smallest dimension 1 m ..... 3 points
- A fairly continuous cover at least 1 square metre in area ..... 2 points
- A shield that provides some cover larger than the exit port ..... 1 point

## Event 2: Build a launcher/transporter (Bring it along)

All is not lost on your journey. The spacecraft is nearing the asteroid belt and a major surprise is that one particular asteroid has gravity and an atmosphere pretty much the same as that on Earth. Your team decides to study the conditions on that asteroid.

During visual observations of the asteroid, you are able to identify a crater as a suitable landing place for an 'unmanned' scientific payload with some very **delicate** instruments. The instruments are so small that they can fit into a 'film container' and weigh approximately 50 grams.

### Your Challenge

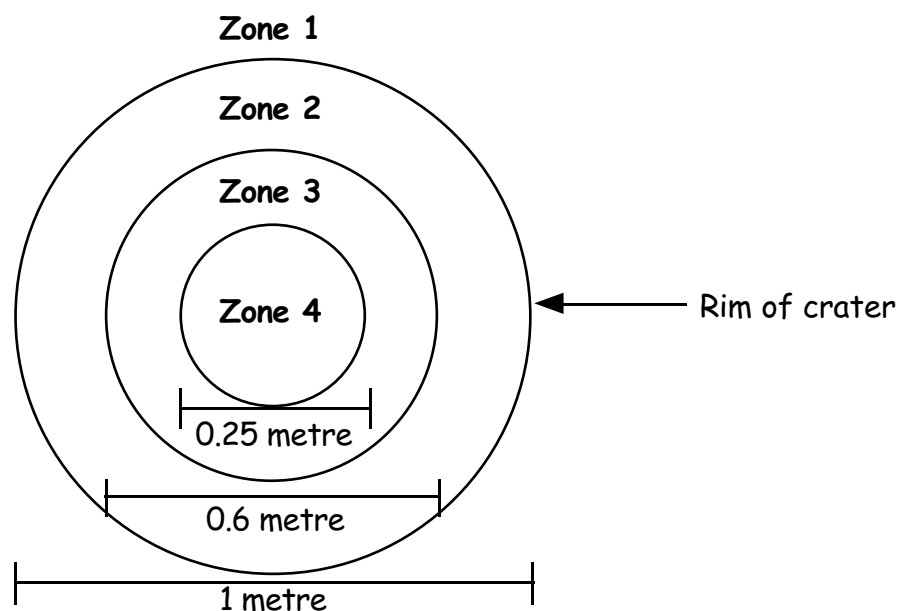
To build and bring a prototype model of a launcher/transporter. The model will:

- launch the 'payload of instruments' **clearly away from the spacecraft** to the crater's centre; and
- ensure that it **lands softly right side up** – *because of the delicate nature of the electrical instruments.*

### The Test

You will need to bring your launcher and transporter of the 'instruments'.

A 25 gram container (a film container with lid and plasticine to total 25 grams) of instruments will be given to you just before your heat to place in the transporter. You will be asked to launch the transporter for a **height 1.5 metres** towards the crater on the asteroid **3.0 metres away**. The measurements of the crater are as follows:



The criteria for judging this event:

1. The design

- Construction is from 100% recycled materials (glue excepted), design very creative, would be very convincing transporter launcher ..... 4 points
- Construction is from 90% recycled materials, design is fairly creative and it could be a transporter launcher ..... 3 points
- Construction is 75% recycled materials, it looks like a transporter launcher ..... 2 point
- Could be imagined as a transporter launcher ..... 1 point

2. Accuracy of launcher

- Lands in zone 4 – the centre of crater ..... 4 points
- Lands in zone 3 – one zone out from the centre of crater ..... 3 points
- Lands in zone 2 – inside rim of crater ..... 2 points
- Lands in zone 1 – outside the rim of crater ..... 1 point

3. Gentleness of landing by ‘transporter’.

- Lands softly, right side up with little damage to payload ..... 4 points
- Lands softly, but not right side up so there is possible damage to payload ..... 3 points
- Lands hard but right side up; there is some damage to the payload ..... 2 points
- Lands, all instruments completely damaged ..... 1 point

## Event 3: A chance encounter

The instrument payload has successfully landed on the asteroid. The instruments immediately perform their functions. A miniature camera starts scanning the area and a picture from the surface appears on your monitor in the spaceship. What an interesting creature/life form!

Command post on planet Earth sends instruction to your spaceship – gather as much information about the ‘alien life form’ as you can. BUT it appears that the ‘alien life form’ has hacked into our computer systems with a test to see if we are an intelligent life form. No doubt about it, we want to demonstrate that we are.

### The Task

To communicate with the ‘alien life form’. There are two parts to your communiqué:

#### Part A

Your team will be shown four (4) questions on a laptop which will demonstrate Earth’s knowledge about the solar system and its surrounding stars. Each question shown lasts for 15 seconds. Your answers will be recorded so that it can be sent back to the ‘alien life form’ via computer.

Your performance will be judged on the:

#### 1. *Intelligence* demonstrated in your answers

- Completely accurate astronomical intelligence shown ..... 4 points
- At least three questions receive knowledgeable intelligent answers ..... 3 points
- 2 or 3 questions reasonably intelligently answered ..... 2 points
- Demonstrated some intelligence about solar system objects ..... 1 point

#### Part B

Your team will have to decide on a message that can be presented to the ‘alien life form’. Your presentation, the actions can be seen by them on the mini – monitor in the payload and the sound can be picked via a computer link.

These ‘aliens’ appear to be life forms which use few words. Therefore the presentation should (a) communicate in as few words as possible that (b) your spacecraft is not hostile and tells them something about human life forms on planet Earth. You have only 20 seconds to present it as after that the spacecraft will no longer be in line with the satellite dish on the payload.

The criteria for the presentation will be judged on:

#### 1. As few words as possible (three judges)

- Language is succinct, factual, minimum of words ..... 2 points
- Language is fairly succinct ..... 1 point
- Pretty waffly ..... 0 points

2. Performance to aliens ('Alien life form' judges with flash cards)

- We can see they are definitely friendly and we now know the essence of humanness ..... 6 points
- We can see they are friendly and we definitely know some interesting things about humans ..... 5 points
- They are friendly and we know one clear thing about humans ..... 4 points
- They seem friendly and seem to be trying to communicate with us ..... 3 points
- They seem to be trying to communicate about themselves ..... 2 points
- They seem to be living and could be deranged..... 1 point

## Mystery Challenge Revealed

### Event 4: Can your crew do it?

Disaster!!! Your spacecraft has been damaged by a meteorite strike and crash-landed on the asteroid. Air supply is low. We hope a rescue mission can be organized. Meanwhile an emergency one person evacuation vehicle is available and Earth station has ordered that ONE person who has seen the aliens should use it to return to Earth. That's not such a privilege as it sounds because the emergency vehicle leaks! The occupant needs to wear a space-suit, but those were damaged beyond repair.

#### Your Challenges

##### Task 1

Construct an airtight space suit on one member of your team. The helmet must be removable. You have a maximum of 20 minutes.

Materials available:

- 1 plastic rubbish bag
- 1 plastic bottle
- 15 m masking tape
- pieces of cardboard
- 10 sheets newspaper
- 2 plastic shopping bags
- 1 A4 sheet clear plastic

##### Task 2

The team member in the suit, holding but not wearing their helmet, must be lifted over a hazardous obstacle and pushed into the shaft leading to the emergency vehicle. Once there, he/she must crawl down the shaft into the vehicle.

Earth Station will open the emergency space vehicle on 'go!' and it will close automatically when the person is seated in the emergency space vehicle wearing their helmet.

Your performance will be judged on:

1. Quality of the suit (Judged when seated in the space vehicle by 'spacesuit couturier judges')
  - Suit has no holes, looks robust, and appears fairly airtight. Helmet fits closely ... 4 points
  - Suit has minor holes but if the person repaired them the suit could look sealed . 3 points
  - Suit covers the person, nearly ..... 2 points
  - Suit covers at least half the person ..... 1 point
  - Suit covers less than half the person..... 0 points

2. Safety of transfer of the person (Safety judges)

- All hazards avoided and person handled firmly, gently, securely ..... 4 points
- One minor slip, but otherwise safely transferred firmly and gently ..... 3 points
- Person transferred reasonably safely ..... 2 points
- Person made it into the shaft ..... 1 point

3. Time to transfer (Time keepers)

- From 'go' to seated in the space vehicle in less than 40 seconds ..... 4 points
- From 'go' to seated in the space vehicle in less than 50 seconds ..... 3 points
- From 'go' to seated in the space vehicle in less than 65 seconds ..... 2 points
- From 'go' to seated in the space vehicle in less than 90 seconds ..... 1 point

## Saving the kakapo – Event 1: Hiding within a hide

As part of the kakapo breeding programme the Department requires some more information on the kakapo's nesting habits. It believes that something is bothering the kakapo as it builds its nest.

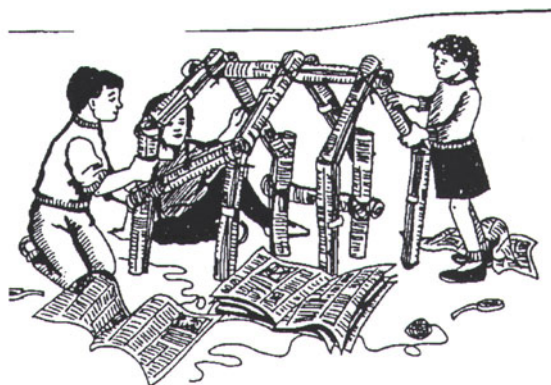
The Department wants your school to observe the habits of these endangered birds but know that the kakapo do not respond naturally if they can see humans.

### Task

You must construct an enclosed free-standing structure to hide your team while you observe the kakapo. It must include a viewing window and accommodate as many of your team as possible totally within the structure.

You will be supplied with:

- 30 sheets of newspaper
- 2 m string
- 5 paper clips
- 50 cm bendable wire
- 10 m cello tape
- 2 one metre lengths of dowel
- 3 black bin liners



Your performance will be judged on:

#### 1. People holding capacity

- 7–10 people completely enclosed within the structure ..... 4 points
- 4–6 people completely enclosed within the structure ..... 3 points
- 2–3 people completely enclosed within the structure ..... 2 points
- At least 1 person people completely enclosed within the structure ..... 1 point

#### 2. Invisibility of viewers

- Completely invisible to cavorting kakapo ..... 4 points
- Mostly invisible to cavorting kakapo ..... 3 points
- Fairly visible to even the most short-sighted kakapo ..... 2 points
- Kakapo is observing you without hindrance ..... 1 point

#### 3. Engineering and design merit

- The forest will fall down before it is damaged ..... 4 points
- Likely to withstand damage by partying kakapo ..... 3 points
- Could be damaged by a group of small cavorting kakapo ..... 2 points
- Likely to be damaged by even the smallest kakapo ..... 1 point

You must complete your structure in 20 minutes.

## Event 2: An egg recovery device (bring it along)

In anticipation of eggs being laid in the nest, the Department of Conservation would like to remove one egg to ensure that at least one chick survives during this year's breeding season. Research has shown that human presence within a 2-metre radius of the nest can be detected by the kakapo. The parents will not return to the nest if human scent is detected.

### Your Challenge

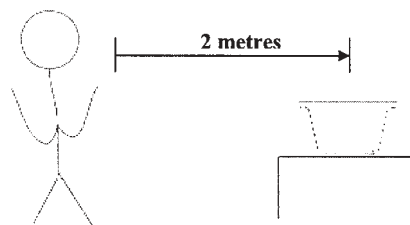
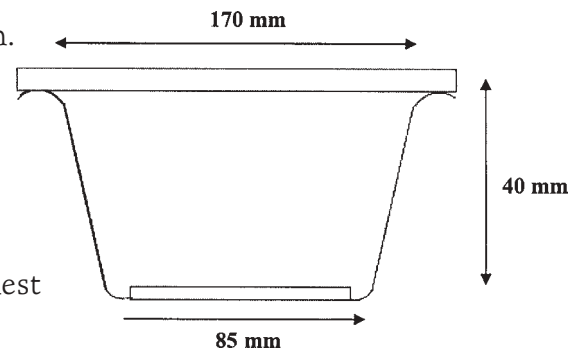
You must construct a device for retrieving a kakapo egg (size 7) from the nest and replacing it with a fake egg (size 7).

Important features to take note of in your construction.

a. the nest

- size is similar to a plastic dessert bowl (Pams)
- will be approximately 1 metre off the ground

b. team members must be at least 2 metres from the nest



Your performance will be judged on:

1. Recyclable materials

- Device is made from 100% recycled materials ..... 4 points
- Device is made from 90% recycled materials ..... 3 points
- Device is made from 50% recycled materials ..... 2 points
- Possibly some recycled material evident ..... 1 point

2. Timeliness

- Can retrieve and replace eggs within 1 minute ..... 4 points
- Can retrieve and replace eggs within 2 minutes ..... 3 points
- Can retrieve the egg ..... 2 points
- Made some attempt to disturb the nest ..... 1 point

3. Egg integrity

- Egg retrieved and placebo replaced with no damage to either ..... 4 points
- Egg retrieved and placebo replaced with some damage to the placebo ..... 3 points
- Egg retrieved and placebo replaced with some damage to both ..... 2 points
- Scrambled egg and distressed kakapo ..... 1 point

## Event 3: Kakapo courtship display

A pair of kakapo were placed on predator-free Tuna Island. After two years DOC has noticed that the male has not exhibited any courtship behaviours, hence no offspring have been produced. The female continues to be uninterested in the male. DOC believes this problem can be solved with your assistance. The male kakapo needs some help in understanding his role in making sure that the kakapo species survives.

### The Challenge

You will need to dress up (appropriate costume required) one team member as the female kakapo and another team member as the male kakapo. The male kakapo must have a **'hand held' beak** that works (functions) as part of his costume (offering delicacies to the female is one aspect of courtship).

The male kakapo will perform a 20 second courtship display strutting his stuff and booming his intentions in a **tasteful and romantic manner** to the suitable coy but impressed female. The rest of the team will provide a suitable atmosphere for the courtship display.

You will be provided with the following materials:

- 1 green and 1 black plastic bin liner
- 5 sheets of newspaper
- 1 black vivid marker
- 1 sheet of green crepe paper
- 1 small soda drink bottle
- corrugated card board
- a roll of cello tape
- 5 m of string
- 1 sheet of blue crepe paper

(Use a pair of scissors for costume construction.)

You will be judged by:

#### 1. Appearance

- Remarkable and stunning resemblance to male and female kakapo ..... 4 points
- Close similarity to a pair of kakapo ..... 3 points
- May be taken for kakapo by an aging short-sighted kakapo ..... 2 points
- Some features recognisable as birds ..... 1 point

#### 2. Courtship dance

- Very realistic courtship display from both including booming ..... 4 points
- Enthusiastic booming and display reminiscent of courtship ..... 3 points
- Some enthusiasm and booming shown, some birdlike behaviours ..... 2 points
- A display occurred ..... 1 point

#### 3. Atmosphere

- A romantic forest atmosphere created ..... 4 points
- Some atmosphere created to support courtship ..... 3 points
- Activity and atmosphere could distract courtship ..... 2 points
- Courtship not likely due to noise and mayhem ..... 1 point

## Event 4: injured female

It appears that the male kakapo has been successful with its courtship. Well done teams. The female has laid some eggs and has been sitting on the nest. But there is another problem on Tuna Island. Tuna island is no longer 'predator-free'. Somehow a stoat has reached the island and has injured the left leg of the female kakapo in an attack. She is still sitting on the nest and the male kakapo has been feeding her. The stoat knows the location of the nest and will be back to have a snack. The nest and female must be removed to safety.

First, construct the portable nest.

Build a nest so that your female kakapo (from Event 3) can sit on it so that the nest and the female can be safely lifted and removed to another location over some obstacles.

(You have 10 minutes construction time.)

### The Challenge (to be carried out in heats)

A member of the team must lure the guarding male kakapo away from the nest BEFORE the nest can be removed. This entire process will be timed.

To achieve this, a team member will place on the ground three (3) delectables that the male kakapo must pick up and hold in his beak till he crosses a line. At the point when the male kakapo crosses the line, the rest of the team members are to may pick up the injured female sitting on the nest and move both over the obstacles to its new nesting place. During the removal no team member can touch the nest or the female. When the nest is positioned in its new place the clock will stop.

You will be provided with the following materials:

- banana box
- 3 poles
- newspaper
- corrugated cardboard
- 3 m twine

You will be judged by:

#### 1. Time taken

- Entire process in less than 40 seconds ..... 4 points
- Entire process between 40 and 50 seconds ..... 3 points
- Entire process between 50 and 60 seconds ..... 2 points
- Entire process under 70 seconds ..... 1 point

#### 2. Male kakapo

- Keeps all three delectables in his beak as he crosses the 'removal line' ..... 4 points
- Keeps two delectables in his beak as he crosses the 'removal line' ..... 3 points
- Attempts to pick up delectables and keeps one in his beak as he crosses the 'removal line' ..... 2 points
- Attempts to pick up delectables and crosses the 'removal line' ..... 1 point

3. Female kakapo and nest

- Female on nest carried smoothly and arrives safely at new location without human contact ..... 4 points
- Female on nest arrives safely at new location mostly the same ..... 3 points
- Female and nest arrive though rather disturbed and the nest mostly the same .... 2 points
- Female arrives ..... 1 point