

WORKSHEETS

TEACHER FILE WORKSHEET 1:

SUNNY

(Group is assumed to be 30 pupils)

Print out the pupil file

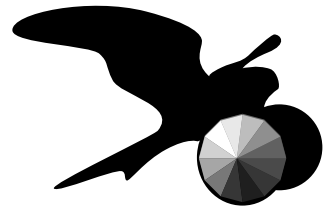
Assignment 1: Make an energy web

Story part 1: A young inventor

Assignment 2: Draw Sunny the electric car

Story part 2: The fortune-teller

Assignment 3: The solar tower



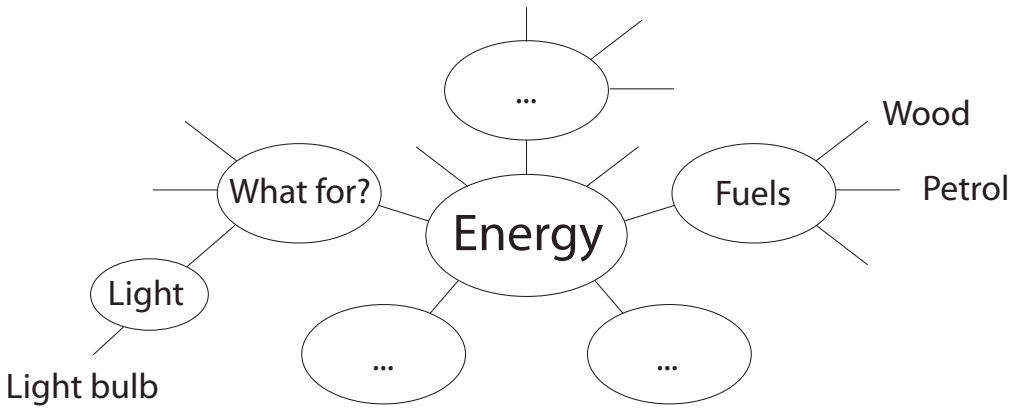
ADVENTURE PACK

THE INVENTORS

AND THE WHEEL OF THE SUN

ASSIGNMENT 1: MAKE AN ENERGY WEB (±15 MIN.)

Wordweb



What you need

- Blackboard or interactive whiteboard
- 1 piece of chalk or whiteboard pen
- 30 sheets of paper (preferably bigger than A4)
- 30 pencils or pens

Preparation

On the Internet look up what a mindmap/wordweb is if you don't already know.

Now read part 1 of the story to the group.

A YOUNG INVENTOR

Isaac is alone in the hut. Today it's his turn to stand watch.

To kill time he is reading a comic. He's right in the middle of an exciting story when he hears a droning noise that gets louder. He jumps up and looks through his binoculars. At the entrance to the abandoned industrial estate he sees a large car driving up with a large cloud of dust behind it. Isaac climbs down and as fast as he can runs towards the abandoned factory.

'Quick, hide all the inventions,' Isaac calls out, panting. 'There's a car coming.'

He slides the large steel door shut.

Isaac and his friends run all over the place. They hide their secret things. 'Go hide in the crate hut. Then I'll talk to the intruders,' Simon says bravely. Simon is twenty-four and a lot older than the rest. He's wearing a blue overall and strange glasses. There are black stripes on his face. Lubricant from his old delivery bike. Simon wipes his hands on a cleaning cloth. Then the door opens and squeaks. A man and a woman in black suits appear in the door.

'Who are you? And what are you doing here?' asks Simon.

The door opens a little further. There is someone else there too.

'Sorry Simon, we didn't mean to startle you.'

It is the kind voice of professor Smulders.

'Professor, I didn't see you there. I thought that these people had come to steal our inventions.'

The man in the nice suit smiles kindly. 'Steal's not the right word. But we are very curious about your inventions.'

The man shakes Simon's hand. Simon politely takes off his safety goggles. The goggles leave two smears behind on his face. It makes the man smile.

'My name is Smith,' he says. 'And this is my colleague Jones,' he adds, pointing to the woman. 'She is the director of a large shipping company with ships over all the world.'

In the meantime Mrs Jones looks curiously around the workshop. She walks to the delivery bike standing next to a pile of wooden crates and looks at it admiringly. She wants to sit on the saddle but Simon stops her.

'The bike's not finished yet. I was just working on it when you came in.'

'I'm sorry we're nosing around like this', Mr Smith continues.

'We've heard a lot about your special vehicle. Is that it?'

TIP

Point out to the pupils that they have to pay close attention since an assignment will follow about the electric car.

Simon shakes his head. Hesitating, he takes his guests to his car that is covered by a large sheet.

'Here it is.'

Smith and Jones hold their breath while Simon pulls the sheet off the car.

'So, did I exaggerate?' says professor Smulders with a wide smile.

'Fabulous, what a great car. Or should I call it a motorbike?' asks Mr Smith.

'The car's name is Sunny', Simon explains.

Full of admiration they look at Simon's silver car. Simon explains how Sunny works.

'Look, at the front Sunny has two wheels so it sits firmly on the road. At the rear it only has one wheel.'

'And as we can see, Sunny does not have an exhaust pipe, the professor remarks.

Simon nods. 'It's an electric car. So no dirty exhaust fumes.'

'And no petrol tank', observes Mr Smith. 'Where are the batteries for the electric motor?'

'In the front wheels', Simon replies. 'I call them solar wheels. You charge the batteries in the wheels with solar energy.'

Mr Smith looks doubtful. 'Solar energy? Is that practical? If the sun's not shining, you can't charge the car. Did you think of that?'

Mrs Jones nods. 'I can hear myself saying it: Sorry, important client, I'm late because the sun's not shining.'

Mrs Jones laughs loudly at her own joke. Simon feels the hairs on his neck standing up on end.

Mr Smith steps forward. 'It's good that you invented a car that is powered by green energy. But you do have to think about where you'll get that energy from.'

Professor Smulders tries to help Simon and suddenly thinks of something. 'Remember the lion tamer? Years ago? He was looking for the ultimate energy source. That would be something for Simon's car.'

Mr Smith thinks for a moment. 'Wait a minute, it's starting to come back to me.

The man from the circus. Yes he was very interesting. Yes, the ultimate energy source and this car. Naturally that would be fantastic.'

Mr Smith is enthusiastic. He stands next to Simon and lays his hand on Simon's shoulder. 'You have to find the lion tamer. Together, the ultimate energy source and your car can make a lot of money. I'd invest in that. What about you, Mrs Jones?'

Mrs Jones nods.

Simon is overwhelmed and hesitates. 'But where do I find the lion tamer?' 'Think for a moment young man!' Mrs Jones exclaims in irritation, 'You're an inventor, aren't you?!'

When the professor and his guests leave, Simon remains behind surprised. Has the professor done him a favour or saddled him with a major problem? 'You have to go on a journey', Simon hears someone call out. It's Isaac's voice; he climbs out of the crate hut with his friends.

'I'd almost forgotten you', says Simon.

'Did you hear what they said? They want me to go look for the lion tamer. But I've got no idea where to look', says Simon.

'At the circus of course', says Isaac. 'Lion tamers live at the circus.'

Simon hesitates. 'How will I get there?'

Isaac points to the electric car and smiles. 'I think Sunny's ready for an adventure. What are you waiting for?'

Simon laughs at his small friend's determination. 'You're right, Isaac. I'll take Sunny. I'll show that Jones that you can go far with solar energy.'

ASSIGNMENT 2: DRAW SUNNY THE ELECTRIC CAR (±25 MIN.)

Simon has built an electric car that is powered by solar energy. Can you draw and colour Sunny? Draw it three times. Once looking from the front, once looking from above and once looking from the side. What is important for an electric car? Think about materials, how to charge Sunny, its shape, etc. Don't forget to draw where Sunny's batteries are.

When you're ready, look at the designs of the other people in your group. Which designs do you think are good? Why?

TIP *Have the pupils divide the page in three with a ruler.*

What you need

- 30 sheets of paper (use the back of your wordweb)
- 30 pencils
- Colouring pencils and/or pens

Preparation

None

TIP *Continue the Inventors worksheet at another time if you notice that the pupils' concentration is flagging.*

Continuation of Inventor's experiment 1: Sunny

Read part 2 of the story to the group.

THE FORTUNE-TELLER

Aisha strokes Petronella's neck. There are other ponies and animals in the meadow. There is a lama and camels. Aisha is crazy about animals. She dreams of a large circus show with animals. Not so strange if you consider that Aisha lives at the circus. Her mum is a fortune-teller and her oldest uncle is the ringmaster. But things are not going well for the circus. There are not enough visitors.

'I hope there will still be a circus soon so we can give a show together', Aisha says to the pony. 'Things used to be much better. When Uncle George was still with us.'

The little white pony whinnies.

'When Uncle George comes back, everything will be the way it was.'

Just then Aisha sees a silver car stop at the big top. The car has two front wheels and one rear wheel. The driver takes off his helmet. With a poster under his arm, the young man wonders around looking for something. He approaches an acrobat who is practising outside. Aisha sees him unroll the poster but cannot see what it says from where she is.

The acrobat shakes his head and points to a white caravan that says 'ringmaster'. That's Uncle Dirk's caravan. Aisha quickly runs to the caravan and hides. She hears the young man knock on the door.

'Come in', calls Dirk.

Aisha peeks through the window. The young man introduces himself.

'My name's Simon. I'm an inventor and I've made a car. An electric car', he says proudly.

'That's nice. And how can I help you?' Uncle Dirk replies.

Aisha holds her breath so she can hear what the young man - who is called Simon - is saying.

'I'm looking for the ultimate energy source for my car.'

Simon unrolls the poster. Now Aisha can see the picture properly.

'Uncle George', she says softly.

The poster is of a man with two very large lions. The lions look dangerous and are baring their sharp teeth. It looks frightening.

Simon points to the poster.

'I heard that the lion tamer of this circus is also looking for the ultimate energy source.'

Suddenly it is quiet in the caravan. For just a moment. The calm before the storm since Aisha knows all too well how Uncle Dirk will react.

'I don't want to hear that coward's name! Get out of here and go bother someone else', Uncle Dirk shouts out in anger.

Frightened, Simon stumbles outside. The boy is lying there. Stretched out on the ground with the poster crinkled up under his arm. A blade of grass is tickling his nose. He blows it away and then feels something against his leg. Aisha sees Simon turn around in anger and then jump out of his skin. 'Help!'

The young man looks into the eyes of an enormous elephant that is sniffing his leg. It is a gigantic beast. Aisha sees how scared the boy is, but apparently he's also smart, because he quickly rolls under a caravan.

'Pssst.'

Simon looks around in surprise. 'Where did that noise come from?'

'Over here, here I am', whispers Aisha, who is scared that Uncle Dirk will hear her.

Aisha gestures for Simon to follow her. Simon crawls out from under the caravan on the other side, away from the dangerous elephant. Aisha takes him to a dark tent. In the middle of the tent is a table with a ball on it that has a bit of light coming out of it. Simon jumps when he looks at the table. Something is moving under the ball. A large constrictor slides across the table. A woman who looks like a gypsy picks up the snake and slides it into a wooden box.

'This is my mum. She's the circus fortune-teller.' says Aisha.'

Aisha's mother nods kindly at Simon.

'Hi, my name's Simon', says Simon. 'I'm looking for George the lion tamer.'

'Simon unrolls the poster. But when the fortune-teller sees the picture she grabs it out of his hands.

'Be careful about what you say here about George', the fortune-teller hisses, looking around scared. 'There are people here who really hate George.'

Simon nods. 'I noticed.'

'Sit down and I'll explain it to you.'

In the light of the crystal ball, the fortune-teller tells Simon the story of the lion tamer.

'The circus has existed for generations. It passes from father to son and from mother to daughter. The knife thrower's son learns his trade from his father. And the acrobat inherits her flexibility from her mother. That's how it's always been. But when the lion tamer wanted to teach his son his trade, there was a problem. There was gossip. His son - his name is George - was said to be scared. Dead scared of the big lions.'

The fortune-teller dreams for a while in the light of her crystal ball. She is remembering her cousin. She will never forget how one day the lions almost got him. The fortune-teller shudders a little and goes on with her story.

'George was scared of lions but crazy about stories. When his father wasn't watching he would have his nose in a book. In each city that the circus went to, he went to the library.

George grew up. He no longer read adventure stories but books about science and technology. The light in his caravan would be on until deep in the night. One day we found a note in his caravan.

It said 'Don't wait for me... I'm not coming back.'

We've heard nothing from George since. The lions were sold to the zoo.'

The fortune-teller sighs. 'And what's a circus without lions?'

She wipes away a tear.

'But what brings you here Simon? Why are you looking for George?'

Simon explains why he is looking for George the lion tamer.

'I'm a bit like him. I'm crazy about technology too. I invented my own car.'

Aisha jumps up enthusiastically and describes Simon's car. 'It's a mega cool car with three wheels.'

Simon laughs shyly and goes on with his story. 'My car is called Sunny and there are people who want to buy Sunny. But first I have to find energy. It's an electric car, you understand? I heard that the lion tamer is looking for the ultimate energy source. Maybe he's found it. That's why I'm looking for him. Do you have any idea where I could find him?'

The fortune-teller looks in her crystal ball and starts talking in a deep voice. 'I see deserts and mountains with large reservoirs. I see windmills and rivers flowing into the sea.'

The fortune-teller looks surprised. 'I see an egg.'

'Mum, come on. Simon still doesn't know where to look.'

Aisha looks at Simon very seriously. 'I'm going to tell you a secret.'

Aisha's mother starts. 'Is that wise, girl? We barely know him.'

'Mum, this has gone on long enough. If we don't do something now, the circus will be finished. Simon can help us. Trust me.'

For a moment the fortune-teller hesitates. 'Ok, do it. Show him the secret.'

Aisha opens the wooden box where her mother put the snake.

She speaks to the snake in a soothing voice and takes out a few postcards.

'These are George's postcards', she whispers.

'He sent us them by post.'

Simon takes a good look at the cards. One of them has a coal mine. And there is one card with a picture of windmills. But the third card is really special. Simon raises his eyebrows. It has a picture of beautifully set table.

In the middle of the table is an eggcup with an egg in it.

'Is this perhaps the egg that you saw in your crystal ball?'

The fortune-teller laughs, shamefaced. 'Well, she says.

'It's right though, isn't it?'

The adventure can begin. Simon now knows where to look. And from now on he has company because Aisha is coming with him. Nothing or no one is going to stop her. Together with Simon she is going to find George.

And everything will be fine when George is back. The circus will be saved from ruin, at least if George is no longer afraid of lions.

When Simon and Aisha leave the tent, they are startled by a man who is waiting for them outside. He is a dark figure in a black leather jacket. He leans nonchalantly against an old motorbike. He holds a large knife. 'So you're looking for that coward?' he asks in a threatening voice. 'Take very good care young man. We're a really close family and we don't tolerate outsiders.'

He skilfully throws the large knife to the ground.

Toink, it lands exactly between Simon's shoes. Then he gets on his motorbike and rides off.

'Who's that?' Simon asks Aisha.

'That's Uncle Goucho, the knife thrower. He's always in a bad mood.'

What you need

- | | |
|---|--|
| <input type="checkbox"/> 8 plastic bottles (made of thin plastic) | <input type="checkbox"/> 8 pens |
| <input type="checkbox"/> 8 sheets of black A5 paper | <input type="checkbox"/> 8 pairs of scissors |
| <input type="checkbox"/> 8 pieces of sturdy aluminium (4 x 4 cm) | <input type="checkbox"/> 8 rulers |
| <input type="checkbox"/> 16 pins | <input type="checkbox"/> 8 biros |
| <input type="checkbox"/> 8 pieces of clay of 2.5 x 0.5 x 0.5 cm | <input type="checkbox"/> 1 Stanley knife |
| <input type="checkbox"/> 8 rolls of sellotape | |

Preparation

Collect 8 bottles made of thin plastic (e.g. by asking the pupils to bring them from home).

Make a cut in each bottle 4 cm from the bottom with a Stanley knife so that the pupils can start cutting from there (see the drawing on the worksheet).

Cut the strips of aluminium into squares of 4 x 4 cm (you now have 10 of them, that means there are 2 spares).

Cut the clay into at least 8 pieces of 2.5 x 0.5 x 0.5 cm.

With the group gather the things you need that are not provided such as scissors and pens.

TIP

Windmill on a needle: it is difficult to balance the little windmill on the needle. That is why you make a good dent with the biro. Lay the windmill flat on a pile of paper and press the point of the biro exactly into the middle of the windmill. Turn the biro around a few times (whilst pressing down).

Questions

– Explain how the solar tower works.

The paper against the plastic bottle absorbs the heat energy of the sun.

This heats the air in the plastic bottle which rises. The moving air turns the windmill.

– Why is there a hole in the bottom of the solar tower?

When the air rises it flows out of the top of the bottle. New, cold air comes in through the hole in the bottom of the bottle. This creates a flow of air or a draught that can keep the windmill turning.

– Imagine how we could convert the movement of the windmill into electricity.

TIP

Consider the power for the light on your bike.

If the windmill of the solar tower is bigger, you can attach a dynamo to it.

The energy source of the solar tower is the sun. This will not run out (soon) and is not harmful to life on Earth. That is why we call the energy from the solar tower renewable energy.

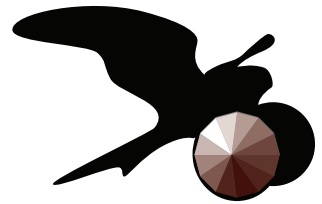
– Does the solar tower provide renewable energy? Can you explain why?

The energy source of the solar tower is the sun. This will not run out (soon) and is not harmful to life on Earth. That is why we call the energy from the solar tower renewable energy.

– Take another look at your energy web. Add what you have learned about energy from the assignments. If you have time, you can make a drawing of the solar tower outside somewhere. Can you think of a good place?

Tidy away all your things! Keep the solar tower for next time.

There is an animation film of the solar tower on the website of the inventors www.deuitvinders.com.



COLOFON

Colophon

Issue 2014 Foundation Inventors | www.theinventors.eu

Concept and realization

Atelier Vrijdag

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