STEM CLUBS

NUMBER 1 FOR STEM

STEM ON SCREEN: SUITABLE FOR STUDENTS AGED 7-9

Fact Finders

STEM Learning activity resources

SUBJECT LINKS:

Science, mathematics, design and technology, computing and essential skills.

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Fact Finders

STEM Learning activity resources

Introduction

This programme of activity is provided by STEM Learning, the largest provider of STEM education and careers support in the UK. It has been developed in partnership with Club leaders.

Fact Finders

The (fictional) show Fact Finders TV needs help from your STEM Club! The show explores common myths, crazy stories and possible pranks and is asking pupils to find out, 'Is it really true?' and 'How could it work?' Pupils will make their own models to test their ideas and draw conclusions so they can report back on what's fact and what's fiction.

Digital and Essential Skills

Throughout this booklet, activities highlight skills sets that can be enhanced by taking part. This enables pupils to further develop both digital literacy and competency in desirable key skills. These highlighted skills allow the pupils to focus on specific aspects to achieve notable progression. If other skills better suit your club members on a particular activity, then focus on that skill.

Key information

AGE RANGE: 7–9

SUBJECT LINKS: Science, mathematics, design and technology, computing and essential skills.

DURATION: Activities range from 15 to 60 minutes – 6 hours in total.

FLEXIBILITY: Complete the whole programme over a half term or choose individual activities to suit the needs of your Club.

RESOURCES: Each activity includes a list of the resources required and a comprehensive set of Club leader and pupil notes in the form of guides.

ESSENTIAL SKILLS: Age-appropriate essential skills have been identified which can be enhanced through these activities. Further information about digital and employability skills is available at the end of the booklet.

IMPACT MEASUREMENT: Each set of resources is designed to help evaluate and assess the progress of Club members. A free student assessment toolkit can be requested from: STEMclubs@stem.org.uk.

ACHIEVEMENT: Pupils can be rewarded for successfully completing activities by downloading free STEM Clubs certificates from https://www.stem.org.uk/stem-clubs/impact-and-recognition/stem-club-certificates. Pupils may be able to use these resources to work towards a CREST Award.

APPROPRIATE VENUES: Club leaders can run most activities in general spaces e.g. classrooms, halls, and outdoor areas.

SAFETY: Each activity includes details about health and safety considerations. Club Leaders should ensure that all equipment is handled with care, particularly sharp instruments. Advice and guidelines are available from CLEAPSS and SSERC. We recommend that practical activities are risk assessed before commencing and Club Leaders should follow their employer or organisation's policies.

OTHER ACTIVITIES: Discover other exciting STEM Club activities: https://www.stem.org.uk/stem-clubs/activity-sets#primary

FURTHER SUPPORT: Find lots of ideas, support, training and advice at: https://www.stem.org.uk/stem-clubs

Activities

STEM CLUBS

NUMBER 1 FOR STEM

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Fact Finders

1 Microwave Myth Busting

Objective

In this activity, pupils test the internet myth that microwaved water is bad for plants.
Pupils explore the effect that different types of water have on growing plants.

TOPIC LINKS

- Science: explore the requirements of plants for life and growth
- Mathematics: measure and compare lengths
- Computing: use of technology

ESSENTIAL SKILLS SUPPORTED

Listening, teamwork

Internet research, digital photography

TIME

45 minutes over 3 sessions, plus regular watering for a week

RESOURCES AND PREPARATION

- Two ready-grown plants per team
- Measuring jugs
- Water heated in a microwave oven and then cooled
- Sticky labels
- A digital camera for recording (optional)
- Observations sheet (optional)

HEALTH AND SAFETY:

The Club leader will need to microwave the water in advance and leave it to cool.

DELIVERY

Discussion

1. Discuss how people can be sure if information they read or watch is correct:
   - where can people can go to find things out?
   - have pupils ever found information that turned out to be wrong?
   - explain that not everything you read on the internet is true. Sometimes you need to carry out your own research to fact-check it
2. Explain that a television show called Fact Finders TV has asked the Club to investigate a website that claims that microwaved food and water is bad for living things.
   The website shows a plant that has been watered with microwaved water dying after just seven days while a similar plant watered with non-microwaved water survived.
3. Explain that this sounds like rubbish, but Fact Finders TV would like the pupils to put their viewers' minds at rest by checking it out.

Activity

4. Ask pupils:
   - how can they put this claim to the test? (Repeat the experiment shown on the website)
   - what will they need to do? (Water one plant with microwaved water and another with non-microwaved water for one week)
   - how will they make their tests as fair as possible? (Use two similar plants, put them in the same place, water them with the same amount of water, make the water the same temperature)
5. Pupils set their plants up ready to test, following the instructions on the pupil guide. They will need guidance on how much water their plants need.
6. Pupils develop a rota for watering the plants every day.

Through the week

7. If needed, pupils should water their plant each day and note down measurements and observations.

Results

8. After one week, ask pupils to compare the two plants and create a graph showing the measurements.

9. Ask pupils:

- are there any big differences between the two plants?
- is the claim true or false?
- why did the website get it wrong? (Perhaps one plant was already damaged and would have died anyway, maybe it wasn't a fair test or perhaps the person was not telling the truth)

10. Pupils present their findings to the rest of the club as if they are reporting to the Fact Finders TV show.

What's going on?

Water that has been heated in a microwave is no different to any other water. Experiments need to be repeated many times under carefully-controlled conditions. The experiment on the website did not do this. The website may have also touched up the images to make them appear more or less healthy.

TIPS

You can get inexpensive potted plants such as basil from the supermarket.

The water could be stored in two labelled plastic bottles: one for cooled microwaved water, and one for normal water.

Incorporating Digital Skills

Use a tablet or camera to record still or moving images of experiments. Take a photo every day at the same time and create a digital record of the plant's growth.

USEFUL LINKS

Read the article on snopes.com about this myth.

DIFFERENTIATION IDEAS

Support: if required, you can provide extra assistance with photography and observations, and use the recording sheet provided.

Challenge: the pupils could research how much water their plant needs, or use water that has been boiled in a kettle for a third plant, to see if any boiled water has an effect.

Pupils could use the Marvellous Machines activity to design a device to help them water their plants more easily.

EXTENSION IDEAS

1. Pupils could grow the plants from seeds, with several seeds for each type of water. They can monitor how big each plant has grown after a few weeks.
2. Pupils could also test whether they can grow plants with liquids other than water. For example, cola contains carbon dioxide—will it help a plant grow.
3. The pupils could film their findings as a short segment to be used in the Fact Finders TV show. Write a script which explains what they did and what they found out.

Idea!

Invite a STEM Ambassador to be an audience member of the Fact Finders show for students to practice presenting.

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

1 Microwave Myth Busting

Your challenge

A website says food and water cooked in the microwave are bad for living things. The TV show, Fact Finders, wants you to find out if this is true.

YOUR TASK **Observe what happens when you water two different plants with normal and microwaved water.**

THINGS TO THINK ABOUT

- how will you label the plants so that you know which is which?
- how will you make sure the plants have the same amount of sunlight and cool water?
- how do the plants change?
- was the website correct?

TIPS

Look carefully at the plants and complete a table at every session to see what changes take place. An example has been done for you.

Notes on what is happening	Drawing or photo
Plant 1 – microwave Height 8cm Notes 16 leaves Leaves green and healthy	
Plant 2 – normal Height 8.5cm Notes 18 leaves Leaves green and healthy	

REPORT

Can you present what you find out in a creative way to the Fact Finders TV show?

FUN FACTS

1. The first food ever cooked in a microwave was popcorn.
2. The first microwave oven was nearly 2m tall and weighed over 340kg. That's a little too large for your kitchen.
3. Never try to cook an egg in its shell in a microwave oven. Steam will build up inside and make it explode.

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Recording sheets

1 Microwave Myth Busting

Name:

Notes on what is happening		
Week:	**Date:**	**Time:**
Plant 1		
Drawing or photo		
Plant 2		
Drawing or photo		

Name:

Notes on what is happening		
Week:	**Date:**	**Time:**
Plant 1		
Drawing or photo		
Plant 2		
Drawing or photo		

Name:

Notes on what is happening		
Week:	**Date:**	**Time:**
Plant 1		
Drawing or photo		
Plant 2		
Drawing or photo		

STEM CLUBS

NUMBER 1 FOR STEM

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Fact Finders

2 The Gingerbread Man

Objective

In this activity, pupils look back at the story of The Gingerbread Man and test the story with science. Pupils try to decide if the Gingerbread Man would have been able to escape the fox and swim to safety. They also explore the properties of different materials in water and consider the best material for creating a waterproof outfit.

TOPIC LINKS

- Science: uses of everyday materials
- Design and technology: design, make, evaluate
- Mathematics: calculating speed and distance
- Computing: use of technology

ESSENTIAL SKILLS SUPPORTED

Staying positive, creativity

Data handling

TIME

45–60 minutes

RESOURCES AND PREPARATION

- Gingerbread men
- Small containers
- Selection of materials to test, such as bubble wrap, tinfoil, newspaper, fabric, cling film, etc.
- Water
- Stop clocks

DELIVERY

Discussion

1. Ask pupils if they remember the story of The Gingerbread Man. Ask them to think about the end of the story where he reaches a river that he cannot swim across.
   He accepts an offer of a lift from a fox and sadly gets eaten.
2. The gingerbread community has contacted Fact Finders TV to ask for help in finding materials that will help gingerbread men cross the river independently and avoid future tragedies.

Activity

3. Pupils test how long a gingerbread man could survive in water, following the instructions on the pupil guide, timing how long it takes for a gingerbread man to go soggy in water (agree at the outset at what point he'll be considered 'soggy', e.g. if he breaks apart when you poke him gently with a pencil).
4. Pupils test different materials to see which would make the best suit to help him survive longest in the water. Encourage them to think about how they can make their experiment a fair test (using the same amount of water, keeping the water the same temperature).

Results

5. Ask pupils:

- which is the best suit to keep the gingerbread man dry?
- what else could they do to improve their designs?

6. Pupils present their findings as if they were reporting back to the Fact Finders TV show.

What's going on?

Biscuits, such as gingerbread men, contain a lot of sugar. When dunked in water, the sugar starts to dissolve which softens them. Eventually they will break apart. Using materials that are waterproof will stop the water reaching the gingerbread, so the sugar doesn't dissolve and the biscuit doesn't go soft.

DIFFERENTIATION IDEAS

Support: if required, limit the range of materials used.

Challenge: rather than just wrap the gingerbread men in the materials, the pupils could try and make proper outfits for each one. When considering which materials are the most waterproof, they might also need to balance that with which materials are the most suitable for making an outfit from.

EXTENSION IDEAS

1. Would the time for a naked gingerbread man have been different if the water was warmer, or colder? What if he was trying to escape from a chocolate factory and it was a river of milk?
2. Could the suit pupils created help a gingerbread man to cross a river without help from a fox? If a gingerbread man could swim at a speed of 5cm/s, how far could he have swum with and without the suit in the time measured before he went soggy?

TIPS

Most supermarkets sell inexpensive tubs of gingerbread men so the pupils can test in bulk.

Incorporating Digital Skills

Use a Word document to create a table to enter data about the Gingerbread man with and without the suit. Use a spreadsheet to record results as a graph. Create a PowerPoint presentation that can be presented to the TV show containing the results of the experiments.

Idea!

Request a STEM Ambassador to talk about how materials affect their projects in chemistry or engineering.

USEFUL LINKS

- Animated Gingerbread Man story (Option 1)
- Animated Gingerbread Man story (Option 2)
- All about Neoprene

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

2 The Gingerbread Man

Your challenge

The gingerbread people have asked Fact Finders TV to help them find a way to safely swim across the river. This will make sure they won't need to ask foxes for a lift!

YOUR TASK **Think about how long it takes for a gingerbread man to go soggy in water. Use water and a timer to see how long it takes for the gingerbread man to break. You will need to write down what you discover. When you have done this, try to make a suit to keep the gingerbread man dry and try the experiment again.**

THINGS TO THINK ABOUT

- what will you make your suit out of, and how will you get it to fit?
- does wearing a suit keep the gingerbread man dry for longer?
- if you have tested more than one suit, which is the best?

TIPS

Make sure the amount and temperature of the water is the same for all your tests.

REPORT

Can you present what you find out in a creative way to the Fact Finders TV show?

FUN FACTS

1. Queen Elizabeth I had gingerbread figures made to look like important guests.
2. Some suits keep scuba divers totally dry. These are called dry suits. Other scuba suits trap a little water inside, which keeps the diver warm. These are called wetsuits.

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

2 The Gingerbread Man

Name:

	Time to dissolve
No Suit	
Suit	

Notes

STEM CLUBS

NUMBER 1 FOR STEM

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Fact Finders

3 Cola Hoaxes

Objective

In this activity, pupils test some of the myths surrounding cola drinks. Pupils undertake three explorations around the properties of cola drinks.

HEALTH AND SAFETY:

If you plan to do this as a demonstration rather than showing a video, make sure that you do it outside and that any bottles are pointed away from pupils.

Idea!

Invite a STEM Ambassador to talk about their job in the field of chemistry.

TOPIC LINKS

- Science: physical reactions/ chemical reactions
- Computing: use of technology

ESSENTIAL SKILLS SUPPORTED

Listening, creativity, teamwork

Internet research, data handling

TIME

50 minutes

RESOURCES AND PREPARATION

- Diet cola
- Plastic cups
- Sealable plastic bags
- Plastic tubing
- Mentos mints
- Plastic tub (such as an ice cream tub)
- Plastic cups
- Selection of dirty copper coins
- Selection of other edible liquids, such as ketchup, milk, lemonade, orange juice and water

DELIVERY

Introduction

1. Demonstrate or show a video of Cola and Mentos reacting.
2. Explain to pupils the science behind the reaction.

Diet cola and Mentos – the science

Even though the mint looks smooth, if you look at it very closely you can see tiny pits on the surface. Fizzy drinks like cola have lots of carbon dioxide dissolved inside to make the fizz. The carbon dioxide is looking for ways to escape, so is drawn to the pits in the mint and makes bubbles there. Because there are so many tiny pits, lots of bubbles form quickly and the cola foams up.

See useful links for more information.

Cola Hoax 1 - Mentos suit (20 mins)

1. Show the pupils an internet video where a man wearing a suit covered in mints falls into a tank of cola. This froths and foams violently. (See useful links.)
2. Explain that a scientist has written to the Fact Finders TV show saying she thinks the video was faked. She thinks that adding Mentos to cola in a tank wouldn't react as dramatically as adding Mentos directly to a freshly opened bottle of cola.
3. Ask the pupils to think about how they could set this up to test it in the classroom. They will need to do this on a small scale – there aren't enough Mentos for a full suit!
4. Ask pupils to follow the instructions on the pupil guide to replicate the reaction on a small scale.

TIP

to ensure a fair test, provide groups with the same amount of cola. Use Diet cola as it is less sticky to clean up afterwards.

Incorporating Digital Skills

Use a tablet or camera to record still or moving images of experiments.Create a digital report of the experiments using Word or PowerPoint to present to the TV show. Create a short video of the pupils presenting their findings.

What's going on?

To get the strongest reaction between diet cola and Mentos, the bottle needs to be freshly opened, and the mints dropped into the bottle. Pouring the cola into a tank will cause a lot of the carbon dioxide to escape. Especially as it takes time to empty lots of bottles into a large tank.

It's most likely that the dunk tank video was faked by running air tubes into the tank. You can see two thick pipes going into the tank if you watch the video.

EXTENSION IDEAS

- does leaving the cola in the tank for longer before adding the Mentos affect how many bubbles are produced?

Cola hoax 2 - exploding stomach (15 mins)

1. Explain that another internet myth is that if you drink cola and then eat mints, the two will react and cause your stomach to explode.
2. Fact Finders TV also wants to know if this is true. their insurance won't allow human testing, so can the pupils test this effect without harming anyone? Show pupils a video of the cola and mints mixing.
3. Ask the pupils to plan a test, using a sealable plastic sandwich bag to stand in for a human stomach, and a paper or plastic tube as the oesophagus. (The analogy may need further explanation.)
4. Pupils should pour some cola into a cup, then pour this down the tube. They should then crush the mints and drop them down the tube. What happens? (There will be some fizzing, but nothing that would cause a stomach to explode!)
5. If you have time, ask pupils to test what would happen if:

- they 'chew' the Mentos first and then add the cola
- they suck the mint instead of chewing it (ask them to dissolve it in warm water and then pour it in)

6. Discuss:

- how the pupils' observations compare to what they saw in the introduction
- how the real process of consuming Mentos and cola might differ from their model. (For example, in real life, there are also other substances involved, such as saliva and stomach acid)

What's going on?

A lot of the fizzy carbon dioxide is lost as you pour it into your cup and swallow the cola. It won't then react with the mints. Also in real life, the mints will be sucked and chewed before being swallowed, so they will lose the pits that cause the bubbling reaction.

Cola hoax 3 - cleaning pennies (15 mins)

1. It's said that cola is really good at cleaning dirty coins. Can pupils put this to the test?
2. Ask pupils to place one dirty penny in a bowl of cola, and another in a bowl of water. They should then leave them for 10 minutes and then observe what happens.
3. Encourage pupils to think about how to make it a fair test. For example, they should use pennies of a similar colour, and the same amount of liquid in each test.
4. What other foods can they find that are good for cleaning coins? Try things such as lemonade, vinegar, ketchup, orange juice and milk.

What's going on?

The oxygen in the air and the copper in the coins form a chemical called copper oxide which coats the coins and makes them look dirty. Cola is acidic. It contains phosphoric acid as well as carbonic acid. This is what helps clean the penny. The acids break the copper oxide free from the penny and reveal the shiny surface.

TIPS

Diet drinks are best to use for these experiments as they are less sticky and so easier to clean up.

Don't open the bottles of cola until right before you want to test the contents with Mentos mints to ensure no fizz is lost.

USEFUL LINKS

- Video of a man wearing a Mentos suit in a large tank of cola
- The science of Coke and Mentos
- Why do Coke and Mentos react?
- Coke myths on snopes.com

DIFFERENTIATION IDEAS

Challenge: Pupils can make a real Mentos suit for a plastic doll by gluing the mints on, or using double sided sticky tape. They can then drop the doll into the tub of cola to test this out as a more realistic recreation of the video.

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

3 Cola Hoaxes – Mentos Suit

Your challenge

An internet video shows a man wearing a suit of Mentos jumping into a tank filled with cola. It creates a huge explosion of bubbles! You need to find out if this could really work.

YOUR TASK **Watch what happens when a man is dropped into a tank filled with cola. Then design a test to see if you can get the same thing to happen. Use a smaller container of cola and only one mint!**

THINGS TO THINK ABOUT

- what happens during your test? Is it a similar result or different to the video? Why do you think this is?
- what other kinds of test can you do, for example which experiment will make the most fizz?
- do you think the effect in the video was real or faked? Why?

TIPS

Need ideas of what you can change in your tests?

- try crushing or dissolving your mints
- try adding mints first, or adding cola first

REPORT

Can you present what you find out in a creative way to the Fact Finders TV show?

FUN FACTS

1. Cold cola doesn't froth as much as warm cola. This is why cold drinks can fall down in a vending machine and not froth everywhere when you open it. If a warm can is dropped and opened, the result is much messier.

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

3 Cola Hoaxes – Mentos Suit

Name:

Notes

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

3 Cola Hoaxes – Exploding Stomach

Your challenge

Some people worry that drinking cola and then eating mints will make your stomach explode! Can this really be true? The TV Show, Fact Finders would like to know the answer.

YOUR TASK **Experiment to find out what happens when you add a mint to a bottle of cola. Find out if eating mints could make someone's stomach explode.**

THINGS TO THINK ABOUT

- what equipment could you use in place of a real stomach and mouth?
- what will you use to get the mint from the mouth to the stomach?
- would it be different if someone drinks cola first then eats a mint, compared to eating a mint first and then drinking cola?
- how is your test different from a real mint and stomach?

TIPS

- **don't forget the mint will have been 'chewed' before it reaches the stomach**
- **think about how you could change the experiment to test different things. For example, you could use more mints, or change a mint before it reaches the cola**
- **think about if there is a difference using a newly opened bottled and one that has been opened for a while**

REPORT

Can you present what you find out in a creative way to the Fact Finders TV show?

FUN FACTS

1. It's very unlikely that your stomach will explode from too much gas. The gas will be removed by burping or farting before exploding.
2. The average person will fart about 15–20 times a day, producing about 2l of gas.

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

3 Cola Hoaxes – Exploding Stomach

Name:

Notes

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

3 Cola Hoaxes – Cleaning Pennies

Your challenge

It's said that cola is really good at cleaning dirty coins. The TV show, Fact Finders, wants you to put this to the test. Can anything else clean a coin?

YOUR TASK **Run some tests to see if cola really is good at cleaning dirty coins. Try different types of liquid to see if they can clean the coins.**

THINGS TO THINK ABOUT

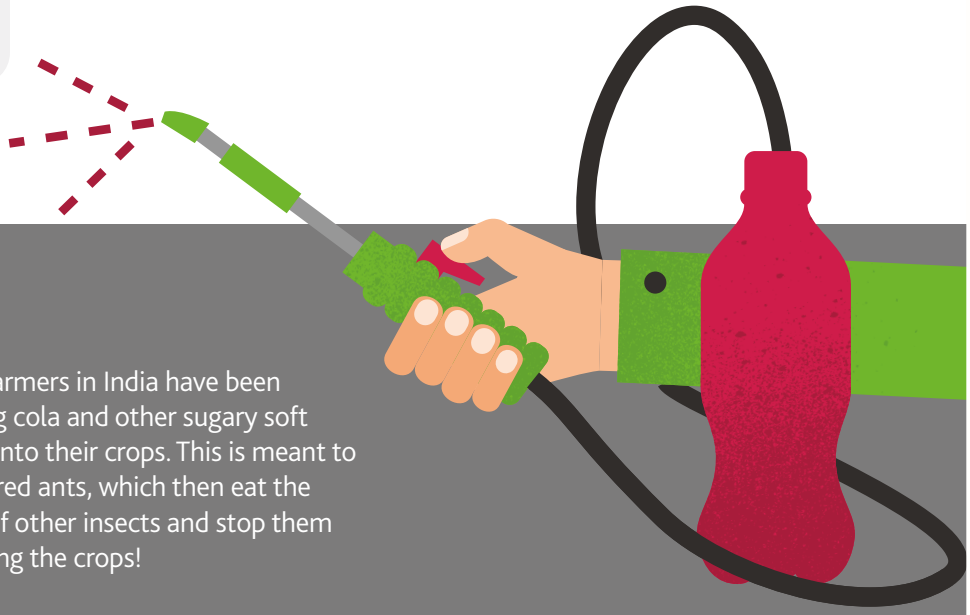
- make your test fair – you will need to leave the coin in all the liquids for the same amount of time.
- how long will you leave the coins in liquid for?
- which was the best liquid at cleaning? What do you think makes it a good cleaner?

TIPS

- **use the same amount of liquids and containers in each test and try to find coins that are as dirty as each other**
- **fill in a table like the one below, so that you can work out which is the best liquid**

REPORT

Can you present what you find out in a creative way to the Fact Finders TV show?



FUN FACTS

1. Some farmers in India have been spraying cola and other sugary soft drinks onto their crops. This is meant to attract red ants, which then eat the larvae of other insects and stop them damaging the crops!

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

3 Cola Hoaxes – Cleaning Pennies

Name:

Liquid name	How long did the coin soak?	How clean was the coin at the end?

Notes

STEM CLUBS

NUMBER 1 FOR STEM

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Fact Finders

4 Solar Cookers

Objective

In this activity, pupils investigate whether you can create a cooker powered by the sun.

HEALTH AND SAFETY:

Do not leave boxes unattended in direct sunlight. Do not look directly into the sun, and do not reflect the sun into eyes. Club leaders should do a full risk assessment before carrying out this activity.

TOPIC LINKS

- Science: how light is reflected from surfaces

ESSENTIAL SKILLS SUPPORTED

Problem solving, teamwork, leadership

TIME

60 minutes

RESOURCES AND PREPARATION

- Shoe boxes or pizza boxes with hinged lid
- Rulers
- Foil
- Cling film or clear plastic sheets
- Tape and glue
- Black paper
- Scissors
- Pencils, wooden skewers or sticks
- Squares of chocolate or marshmallows
- Thermometers (optional)

DELIVERY

Discussion

Briefly discuss solar power with pupils and in what contexts it can be used.

Activity

1. Tell pupils that Fact Finders TV has contacted them about a story of a cooker that can be powered by the sun. They need to try to build one and see if it's real or a myth.
2. Creation of the cooker is fairly tricky: some pupils may be able to assemble it alone, others may need help, or in some cases the Club leader may prepare to assemble in advance. Use a ruler to draw a rectangle border about 2cm in from the edge of the box top.
3. Carefully cut along each line, except where the box hinge is. Fold the flap up.
4. Use the foil to line the inside of the box and the flap. Tape or glue the foil in place, and try to keep it smooth.
5. With the flap of the box up, you now have an opening on the lid. Cover this with cling film and tape in place, ensuring there are no holes.
6. Place the black paper in the bottom of the box. (Pupils can glue or tape it down if desired.)
7. Tape the pencil or wooden stick in place to prop open the foil-covered flap.
8. Arrange the box so the sun reflects off the flap and into the box. Place a square of chocolate or marshmallow inside. Alternatively, use thermometers to measure whether the temperature inside the box increases. (If weather does not permit, you can use a torch or laser pointer to test the angle and reflection, and pupils can take their boxes home to try on a sunnier day.)

Idea!

Request a STEM Ambassador to explain renewable and non-renewable energy sources.

Results

9 Ask pupils to think about why their solar cooker is designed that way.

- what does the black paper do? (It helps absorb the heat)
- why does the inside of the box need foil and not just the flap? (The sunlight reflects back up from inside the box as well)
- why does the cling film need to be attached with no holes or openings? (The plastic traps the heat inside)

10 What will they tell Fact Finders TV? Are solar cookers possible? (Yes, although they work best on sunny days with little wind!)

What's going on?

As well as the visible light you can see, sunlight also contains infra-red light. When infra-red light hits an object, it generates heat energy. The reflective surface reflects a lot of infra-red light onto the food and makes it get hotter.

TIP

This activity is weather-dependent and should ideally be carried out on a sunny day.

DIFFERENTIATION IDEAS

Support: pupils may need help with cutting and arranging their boxes.

Challenge: ask pupils how they could modify their designs to make their cooker even more effective. For example, could they add insulation (e.g. polystyrene lining covered in foil or newspaper), change the angle of the flap, use a different sized box, etc.?

EXTENSION IDEAS

1. discuss how and when solar cookers could be useful in real life. For example, in hot countries, or for people who don't have easy access to electricity.
2. find out about solar furnaces – these can get so hot they can melt metal, just using thousands of mirrors and the heat of the sun.

USEFUL LINKS

The benefits of solar cooking

How to make a solar oven

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

4 Solar Cookers

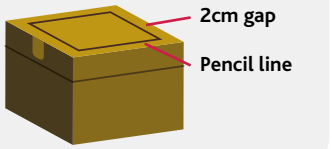
Your challenge

The TV show, Fact Finders has contacted you about a cooker than can only be powered by the sun. Can you find out if this is really possible?

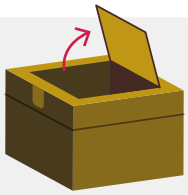
YOUR TASK **See if you can build your own cooker to test if this is true or a myth. Could you use it to melt chocolate?**

Your Club leader will help you assemble a cooker. Here is what you need to do:

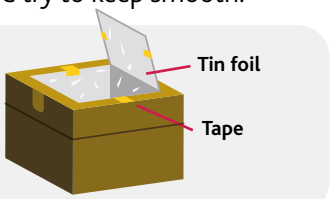
1. Use a ruler to draw a rectangle border about 2cm in from the edge of the box top.



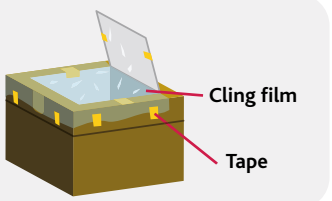
2. Do not cut the line where the box hinge is, but cut the other three. Fold the flap up.



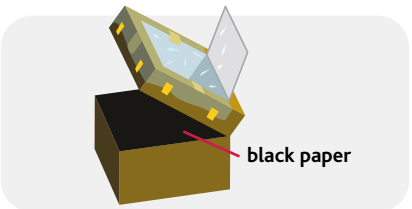
3. Cover the inner side of the flap with aluminum foil so that it will reflect rays from the sun. Tape or glue the foil to the flap and try to keep smooth.



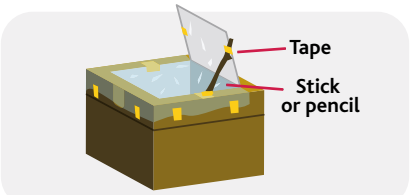
4. Lift the cover up. Cover the hole in the lid with cling film. Tape the cling film in place.



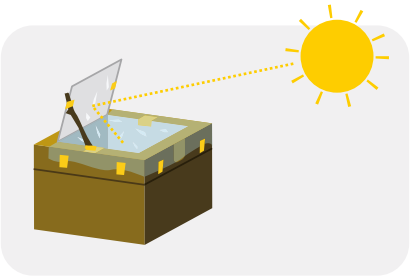
5. Line the bottom of the box with black construction paper - black absorbs heat.



6. Tape the pencil or wooden stick in place to prop open the foil-covered flap.



7. Set up the box so the sun reflects off the flap and into the box.



You have now made a solar cooker!

TIPS

Do not look directly into the sun and do not use the tin foil to reflect the sun into eyes as this can harm your eyes. Do not leave your cooker on its own in the sun in case it starts a fire.

STEM ON SCREEN FACT FINDERS SOLAR COOKERS

THINGS TO THINK ABOUT

- if you make your solar cooker when it isn't sunny, how can you test if the light reflects correctly?
- does putting a square of chocolate or marshmallow inside the cooker get it to melt faster than it would without the box?

Notes

REPORT

What would you report back to the Fact Finders TV show? Could this solar cooker actually work?

FUN FACTS

1. Solar furnaces use thousands of mirrors to focus the sunlight onto a single point. They can be used to generate electricity, and get hot enough to melt steel!
2. The Greek scientist Archimedes designed a system for setting fire to enemy ships using a system of large mirrors. Sadly, it probably wouldn't have worked.
3. A skyscraper in London, known as the Walkie Talkie, is shaped like a curved mirror. When it was first built, it reflected light onto the street, melting parts of cars! Screens have now been added to stop it reflecting sunlight so well.

STEM CLUBS

NUMBER 1 FOR STEM

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Fact Finders

5 Friction Fables

Objective

In this activity, pupils find out how strong friction can really be using the pages of a book.

HEALTH AND SAFETY:
Make sure pupils have plenty of room to manoeuvre and avoid knocking into each other or other obstacles. Club leaders should do a full risk assessment before carrying out this activity.

TOPIC LINKS

- Science: forces: how things move on different surfaces; notice that some forces need contact between two objects

ESSENTIAL SKILLS SUPPORTED

Teamwork, listening, problem solving

TIME

30 minutes

RESOURCES AND PREPARATION

- Sticky note pads
- Spiral-bound notepads
- Bulldog clips
- Large books such as telephone directories or store catalogues

Idea!

Request a STEM Ambassador to demonstrate how they use maths skills in their job.

USEFUL LINKS

Video showing how phone books can lift a car

DELIVERY

Discussion

1. Explain to pupils the detail of how friction works. Highlight when friction might be useful – such as in car brakes or underneath their shoes.
2. Explain to them that the Fact Finders TV show has been in touch again. There's an internet video that shows two books that have had their pages interleaved together. Apparently, the friction between the pages makes it impossible to pull the books apart. (See useful links.)
3. They want the pupils to put this to the test and see if it's true or a hoax.

Activity

4. Can the pupils plan a small-scale test first using sticky note pads, before trying it with real books? If they attach bulldog clips to the spines of the pads they could use string to have a mini 'tug of war'.

Results

5. Make a note of what happens.

What's going on?

Friction takes place over each face of each note, on both sides. This means there is a very large surface area of paper rubbing against each other, and friction is very high indeed.

TIP

This works best if the books are interleaved as much as possible to increase the surface area. Try and interleave every page.

DIFFERENTIATION IDEAS

Support: if required, provide partially-interleaved books for pupils to complete.

Challenge: pupils could use force meters to measure the force on the books.

EXTENSION IDEAS

1. Pupils could suspend the books and hang weights from the bottom to see how much weight they could take. Use large bulldog clips on the spines to attach string for hanging.
2. Maths extension: can the pupils calculate the area of a single sticky note? They may not have studied this in school yet, but could work it out with guidance. First ask them to measure the length and width, and then multiply the two numbers together.

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

5 Friction Fables

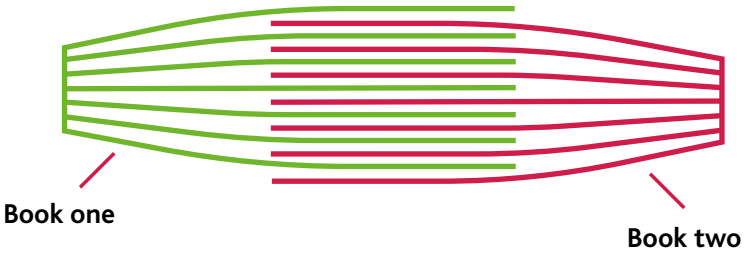
Your challenge

It is said that when the leaves of two books are mixed together, a force called friction stops you being able to separate the books. You need to test this out to see if it is true.

YOUR TASK **The TV show, Fact Finders, wants you to test whether it is possible to pull apart two books that have had their pages mixed together. How will you do this?**

THINGS TO THINK ABOUT

- can you copy the picture below with two books?
- how easy is it to pull the books apart? Why do you think this is?
- does it matter what size the books are?
- can you try the experiment with different size books?



REPORT

Can you present what you find out in a creative way to the Fact Finders TV show?

FUN FACTS

1. the Mythbusters TV show finally managed to pull apart two phone books by using two army tanks.

2. you may have seen movies where an earthquake causes the ground to open up. This is a myth because in most earthquakes, parts of the ground are sliding past each other, creating friction, not pulling apart. If the ground opened up, there wouldn't be any friction, and without friction, earthquakes wouldn't happen.

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

5 Friction Fables

Name:

Notes

STEM CLUBS

NUMBER 1 FOR STEM

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Fact Finders

6 Up and Away

TIP

You can get already-inflated helium balloons at party supply stores.

Objective

In this activity, pupils investigate whether it's really possible to make a house fly with helium balloons. Pupils explore how much weight a single helium balloon can lift, and whether enough balloons could lift a whole house.

TOPIC LINKS

- Science: forces
- Mathematics: measuring and solving practical problems for mass/weight
- Computing (extension): design, write and debug programs that accomplish specific goals

ESSENTIAL SKILLS SUPPORTED

Listening, problem solving, teamwork

Data handling

TIME

60 minutes

RESOURCES AND PREPARATION

- Helium balloons (at least one per group)
- Small weights
- Small basket or container to hold weights (optional)
- String
- Digital scales

USEFUL LINKS

Article about a man who flew 25 km over Africa suspended from 100 helium balloons!

DELIVERY

Discussion

1. Discuss the Pixar movie UP in which Carl Fredricksen ties thousands of balloons to his house and floats away. Ask the pupils to think about whether this would really be possible.

Activity

2. In groups, ask them to plan some simple ways that this could be tested in the classroom.
3. Ask them to test how much weight a single balloon could carry. Depending on the weights you have, pupils could tie them directly to the balloon, or you may need a type of container to hold them. If you use a container, make sure pupils weigh this too!

Results

4. Using their observation, can they work out how many balloons would it take to lift 1kg?
5. If pupils know their own weight, you can ask them to calculate how many balloons they'd need to lift themselves off the ground.
6. If a typical house weighs 55,000kg, how many balloons would they need to lift it?

What's going on?

Helium is less dense than air. This means it floats on air, in the same way that polystyrene floats on water because it is less dense.

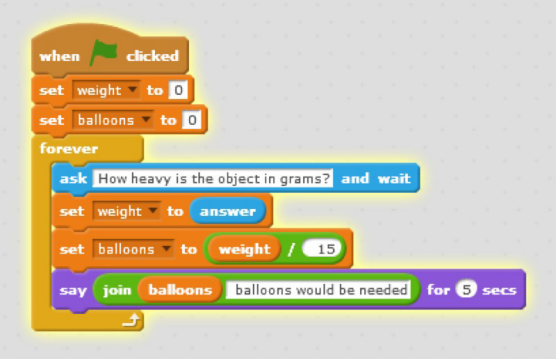
DIFFERENTIATION IDEAS

Support: Pupils might need help to calculate how many balloons are needed to lift a house. A partially completed spreadsheet could be used where they enter the weight one balloon can carry and it calculates the number of balloons needed.

Challenge: Pupils could be given a range of different items – a car, an elephant, etc., and be asked to work out how many balloons are needed to lift each one.

EXTENSION IDEAS

1. Work out how many balloons would be needed to lift a person. Design a basket that a person could use to take off, control their height and land safely.
2. Calculate how expensive it would be to fly a house if 100 balloons costs £5 and enough helium for 50 balloons costs £30.
3. Can the pupils code a program in Scratch that asks for the weight of an object and calculates how many balloons would be needed to lift it? The program might look like this, if a balloon could lift 15g. Link to live example: scratch.mit.edu/projects/196117430/



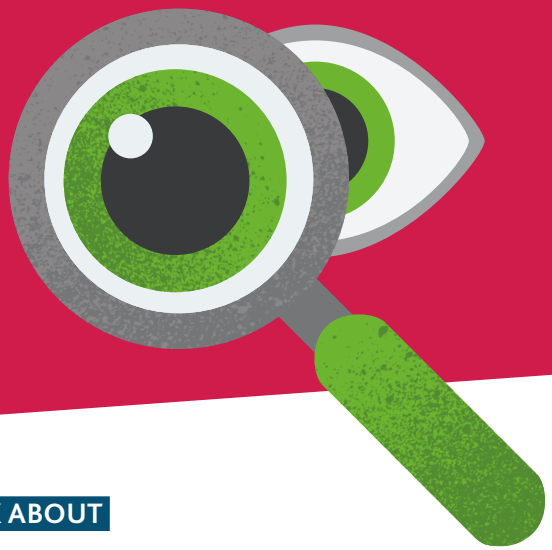
Idea!

Invite a STEM Ambassador to talk about how they use coding in their job, set up a Q&A session with the students.

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

6 Up and Away



Your challenge

In the movie UP, balloons lift a house into the air. You need to find out if this is possible in real life.

YOUR TASK **With or without your Club leader's help, design an experiment to test how many balloons you would need in real life to lift a house into the air.**

TIPS

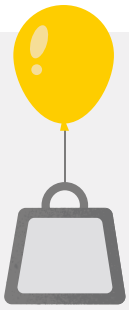
Record your answers as this will help you with all your working out!

THINGS TO THINK ABOUT

- start by attaching a small weight to a balloon and keep adding more until the balloon will not lift

1 balloon can lift

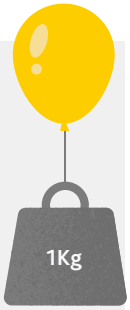
_____ kg



We need

_____

balloons to lift 1kg



We need

_____

balloons to lift our weight

We need

_____

balloons to lift a house

We need

_____

balloons to lift (somethign else)

Notes

REPORT

What will you tell the Fact Finders TV show? Can you really lift a house with balloons?

FUN FACTS

1. The world record for a flight with helium balloons is 13 hrs 36 mins 57 seconds. It happened in 2010 when a man named Jonathan Trappe flew 109 miles over North Carolina, USA.

2. National Geographic Channel actually managed to float a 2,000kg house using 300 giant helium-filled balloons.

STEM CLUBS

NUMBER 1 FOR STEM

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Fact Finders

7 Marvellous Machines

Objective

In this activity, pupils explore simple machines and make a chain of several Heath Robinson-style machines, each setting off the next.

TOPIC LINKS

- Science: forces, uses of everyday materials
- Design and technology: design, make, evaluate, technical knowledge

ESSENTIAL SKILLS SUPPORTED

Creativity, problem solving, aiming high

TIME

60 minutes

RESOURCES AND PREPARATION

- Dominoes
- Sssorted plastic pots, bottles, tubs
- Cardboard tubes
- Plastic tubing
- Springs
- Rulers
- String, scissors, glue, sellotape
- Pulleys
- Marbles
- Balloons
- Books of various sizes
- Plastic wheels
- Lego
- Toy cars
- Additional resources as appropriate
- Drawing pins, blue of white tack
- Sheets of card

DELIVERY

Discussion

1. Discuss the crazy machines the pupils may have seen in films such as Wallace and Gromit and Home Alone or books like Rosie Revere, Engineer. Have any played the board game Mouse Trap? These are sometimes called Heath Robinson or Rube Goldberg machines.

Activity

2. Could they set up their own sequence of machines for Fact Finders TV that starts with a domino and ends with a balloon being popped or a light switch being turned on? Each stage should set off the next machine in the sequence.
3. Plan a sequence that could be carried out with simple resources. Pupils should test and modify their designs as needed.

EXTENSION IDEAS

1. Is it possible to make a domino knock over a huge book? It's claimed that if you start with a small domino and get slightly bigger each time, the chain reaction can knock over something really heavy in only a few steps. Is this really true? Try this with some dominoes of increasing size, then some books. Can the pupils knock down a large encyclopaedia, for example.
2. Draw some crazy machines that would be great to see invented one day – for instance a machine for doing household chores without leaving the sofa, or a machine that would wake someone up and get them dressed in the morning.

TIPS

1. Each group could work on their own machine and link up with others in the Club.
2. Start simple. Dominoes could knock a marble down cardboard tubes, which hits a toy car which knocks another car attached to a rolled-up banner off the table.

Idea!

Invite a STEM Ambassador to talk about the exciting machines they get to work with in their sector.

DIFFERENTIATION IDEAS

Support: if required, pupils could be given ideas for a sequence or some partially-built machines to include.

Challenge: more able pupils could try and include more steps. Extend this activity over more sessions.

USEFUL LINKS

- (YouTube) Music video inspired by Heath Robinson machines
- Article with video about how a sequence of dominoes could topple a building
- Ideas for creating Heath Robinson machines
- Rosie Revere, Engineer

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

7 Marvellous Machines

Your challenge

We've all seen some wild and crazy machines in films and on TV, like the ones made by Wallace and Gromit. The TV show, Fact Finders, wants to find out if a pupil can really build a machine to do the job for them.

YOUR TASK

Design and test a machine that will do a cool job.

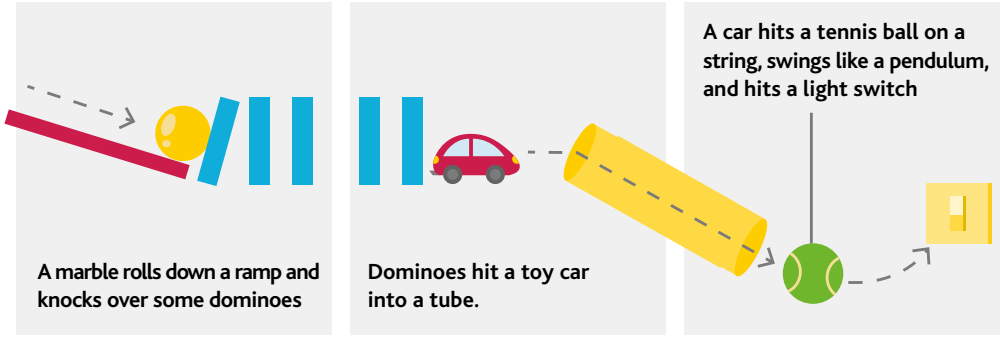
THINGS TO THINK ABOUT

- what materials has your Club leader provided? How could you use them to set up at least three small actions?

TIPS

- Make sure you think of a SIMPLE job for your machine to do! Ideas include popping a balloon or turning on a switch
- Design your machine on paper first
- Test each part before you put them together to make sure they work
- If anything doesn't work, make some changes and try again. Keep going until it all works

EXAMPLE



REPORT

If you can, film your machine at work and show it to the rest of your group and the Fact Finders TV show.

FUN FACTS

1. If each domino is one and a half times bigger than the last one, in less than 30 steps you could knock over a domino as large as the Empire State Building.

2. The artist and inventor Leonardo da Vinci invented many amazing machines that were way ahead of their time. These included an early flying machine. Sadly, the materials available at the time would have made this too heavy to fly.

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

7 Marvellous Machines

Name:

Notes

STEM CLUBS

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Fact Finders

8 Let Down Your Hair

Incorporating Digital Skills

When recording data use a spreadsheet and present the results as a graph in the TV report?

Objective

In this activity, pupils test the strength of strings and find methods to increase the amount of weight they can hold for Fact Finders TV. They will calculate how much string they would need to support their own weight, and decide if it would be possible for hair to support a person's weight like in the story of Rapunzel.

TOPIC LINKS

- Design and technology: design, make, evaluate, technical knowledge
- Maths: measuring and solving practical problems for mass/weight
- Computing: use of technology

ESSENTIAL SKILLS SUPPORTED

Listening, problem solving, teamwork

Data handling

TIME

60 minutes

RESOURCES AND PREPARATION

- Thread to represent hair: inexpensive wig/clip on ponytail, cotton strands, sewing thread, wool yarn, etc
- Range of weights
- G clamps + wood offcuts to clamp hair to the table
- Pillows/cushions or a gym mat
- Strong canvas bag (optional)
- Doll (optional)
- Pulleys, strings, and K'Nex (or similar) – (optional)

HEALTH AND SAFETY:

Be careful when adding weights to the bottom of the thread. Make sure feet are out of the way. Place some pillows/ cushions or a gym mat underneath to catch weights when they fall.

Idea!

Request a STEM Ambassador to talk about how they must test hypotheses in their job.

DELIVERY

Discussion

1. See what pupils remember about the story of Rapunzel. The prince climbs up her hair to reach her up in the tower. Explain that the TV show, Fact Finders, wants them to find out if this is complete fantasy, or if there's any science to support it. They are going to design a test to find out if someone's hair could really be strong enough to support the weight of a person.

Activity

2. First, pupils test the strength of a single hair. Pupils attach a single 'hair' (either from an inexpensive wig, sewing thread, cotton strands, etc.) to the desk.
   - you could use G-clamps and some offcuts of wood, and clamp the hair between the wood and the table
   - alternatively, try taping the strings to a piece of dowling and then wrapping them around a few times
   - you could also tie them around a doorknob, but this may limit the number of groups who can test their strings at once
3. pupils should then add weights to it until it breaks, and record their results.
   - if your weights have hooks, pupils can simply make a loop at the bottom of the thread
   - otherwise, they can tie a canvas bag to the strands, and add the weights to the bag

Results

4. If possible, repeat and record the average amount of weight a strand can support.
5. Are there ways they can make the 'hair' hold even more weight? What happens if they use several strands at once, plait them together, add knots, or twist them to create a rope? (Make sure groups are using the same number of strands.)
6. Which group can create the strongest 'hair'?
7. Can pupils calculate how many of their strands or ropes they would need to support their own weight?

What's going on?

Ropes are strong because they are made of lots of thin threads plaited together into strands, and then usually three strands plaited together. Very strong ropes, such as those used in ships, may even be made from three or more multi strand roped twisted together.

DIFFERENTIATION IDEAS

Support: use the same type of 'hair' across all groups to focus on strengthening their strands rather than comparing results.

Challenge: have pupils test a range of different types of string, and create a table that compares the results.

EXTENSION IDEAS

1. once the prince got to the tower, he and Rapunzel would have to get down somehow. Can pupils build a mechanism that safely lowers them to the ground? (Use K'Nex, pulleys, etc., to lower a doll from the table to the ground)

STUDENT GUIDE: SUITABLE FOR AGE 7-9

Fact Finders

8 Let Down Your Hair

Your challenge

You might be too old for fairy tales, but the TV show, Fact Finders, wants you to find out if one of the stories could be based on fact. In the story of Rapunzel, the prince climbs up her hair to rescue her – but could this happen in real life?

YOUR TASK **Experiment to see how strong hair really is.**

THINGS TO THINK ABOUT

- how will you attach the hair to the table?
- which weights will you use?
- what can you do to make the strands stronger, such as using more strands or with some other ideas?
- how many strands or ropes would you need to hold your own weight?

REPORT

What would you tell Fact Finders TV? Could the prince really have climbed up Rapunzel's hair?

TIP

Start with one hair and test it a few times with weights to see when it breaks. Using a table, such as that below, will help you keep track and find an average number.

FUN FACTS

1. The most common hair colour in the world is black. Red is the rarest.
2. Hair can grow anywhere on the body except for the palms of your hands, soles of your feet, eyelids, and lips.
3. Average hair grows about 15cm per year.

Fact Finders

8 Let down your hair

Name:

	Hair type	Test 1	Test 2	Test 3	Average
	Example: 1 hair	90 grams	102 grams	98 grams	94 grams
1					
2					
3					
4					

Notes

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Fact Finders

9 Get a CREST SuperStar Award

By completing 8 activities in this resource pack, your STEM club members could get a CREST SuperStar Award.

ABOUT CREST

CREST is a scheme that inspires young people to take on the role of scientists and engineers. CREST helps young people become independent and reflective learners. With no set timetable, projects can start whenever you want, and take as long as you need.

HOW TO GET YOUR CREST SUPERSTAR AWARD

1. Learn more about CREST Awards by visiting https://www.crestawards.org/ or contact the CREST team on crest@britishscienceassociation.org for advice and support.
2. Sign-up for a free account - https://apply.crestawards.org/
3. Select 8 activities from this pack and deliver them. The CREST Primary Getting Started guide has all the details!
   Download it from: https://primarylibrary.crestawards.org/getting-started-guide-primary/62140323
4. Have each student complete a CREST SuperStar Passport to monitor their progress
5. Log in to your CREST account to submit the student project, pay the entry fee and request certificates and iron-on badges. These will be posted to your delivery address.

TAKING THEIR WORK FURTHER

If members want to take activities further, they can work towards a CREST Discovery Award. CREST Discovery Awards require around 5h of work and offer an introduction to real project work and give students the freedom to run their own investigations. They can be completed in one day, with students working together in self-managed groups. Select one or two activities that have open investigation potential and encourage extended research and scientific investigation. Projects should be made suitable for CREST Discovery Days. The CREST Discovery Getting Started guide has all the details!
Download it from: https://discoverylibrary.crestawards.org/getting-started-guide-discovery/62140325

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Extreme Elements

10 The Skills Builder Framework

Skills Builder FRAMEWORK

The Activities and Employability Skills

Each activity within this resource pack has identified the essential employability skills it supports and develops in students.

These skills have been mapped to the essential skills identified by the Skills Builder Framework, which breaks down eight essential skills into 16 teachable and measurable steps. Club leaders and teachers can use the activities to promote good practice and enhance each student's individual learning curve. Helping to promote transferable skills key to their education and future employment.

ABOUT THE SKILLS BUILDER PARTNERSHIP

The Skills Builder Partnership brings together educators, employers and skills-building organisations around a common approach to building eight essential skills. Their programmes include training and resources, supporting schools and colleges to embed a rigorous approach to building skills and achieve the Gatsby Benchmarks. As an individual teacher or Club leader, you can freely access a suite of online teaching tools and resources, designed by their team of teachers to build essential skills. The suite includes learning activities, supporting videos, classroom resources, assessment tools and the Skills Builder Framework, which you can use in STEM clubs and classroom teaching.

THE SKILLS BUILDER FRAMEWORK

The Skills Builder Framework breaks down eight essential skills into 16 teachable and measurable steps, providing a common set of expectations and a roadmap for progression. Step 0 is for the least experienced learners and Step 15 represents a highly skilled adult. The Framework can be used by teachers and Club leaders to talk to students about their skill strengths and areas for development and is a useful tool for framing conversations about careers and employability. Focusing student learning through the Framework, enables students to recognise their own essential skill levels and work to master them over time. The Framework can provide a language for students to articulate this progress to helping to develop employability skills and prepare students for future careers.

Skills Builder also provide multiple online assessment tools, including a student self-assessment, student-by-student teacher assessment and class- level formative assessment through the Skills Builder Hub. This means that programmes can be differentiated and focused to meet individual needs.

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Extreme Elements

10 The Skills Builder Framework

EIGHT ESSENTIAL SKILLS

The eight essential skills broadly break down into four domains we know both teachers and employers value.

Communication

1. Listening – ability to listen and understand information.
2. Speaking - vocal communication of information or ideas.

Creative Problem solving

3. Problem Solving – ability to find a solution to a complex situation or challenge.
4. Creativity – use of imagination and the generation of new ideas.

Self-Management

5. Staying Positive – ability to use tactics to overcome setbacks and achieve goals.
6. Aiming High – ability to set clear, tangible goals and devise a robust route to achieving them.

Inter-personal

7. Leadership – supporting, encouraging and motivating others to achieve a shared goal.
8. Teamwork – working cooperatively with others towards achieving a shared goal.

You can find out more about essential skills and the Framework on the Skills Builder website, https://www.skillsbuilder.org/framework and you can access resources on the Skills Builder Hub https://www.skillsbuilder.org/hub

You can find additional support and information on careers and employability skills on the STEM Learning Careers pages, https://www.stem.org.uk/ stem-careers. You can also download the free Skills Builder toolkit from the STEM Learning website https://www.stem.org.uk/rxfum6

STEM ON SCREEN: SUITABLE FOR AGE 7-9

Fact Finders

10 Digital Skills

UNDERSTANDING DIGITAL SKILLS

Digital Skills are the product of digital literacy that we are all emersed in, especially within educational settings. The rapid use of digital technologies over the last 10-15 years have impacted the way we live our lives within a modern technological society.

Within this STEM Club activity, they are vast opportunities to utilize Digital Skills, which will have been taught already within the schools curricula. It's important that the use of digital skills is not meant to replace traditional methods; but enhance and further develop your students STEM learning future.

Digital skills can be grouped, recognised and celebrated.

Cross Curricula Baseline Digital Skills	Computing curriculum baseline digital literacy	Computing curriculum specific skill	D&T/Engineering specific digital skills	Science specific digital skills	Maths specific digital skills
Communication tools	Safe technology use	Digital media	Digital design (CAD)	Modelling and simulation	Modelling
Presentation	Evaluative skills	Programming	Programmable embedded systems	Sensor-enabled data collection	Data analysis / data science
Word processing and DTP	Moral, ethical and lawful behaviour	Applied knowledge of systems and networks	Digital manufacturing (CAM)	Data analysis, inference and communication	Calculation
Data handling		Modelling and simulation		Digitally enabled explanation	Graphing
Devices, tools and applications		Software development			Dynamic geometry
Productivity and task management		Data manipulation			
		Cyber security			

EXAMPLES OF USE

When conducting experiments, recording results in Excel makes it easier to present those results in a graph. This is a good example of Cross Curricula Baseline Digital Skills. Within a design and making opportunity, it would be fantastic to develop this design using 3D Computer Aided Design (CAD) and outputting on Computer Assisted manufacturing (CAM) and Rapid Prototyping (RP) such as 3D Printing. This is obviously D&T/Engineering specific digital skills.

Within the guides opportunities are signposted, these aren't the extensive list. You may find alternative Digital Skill provision. Remember you know your pupils and what equipment and skillsets staff are equipped with. This could be a great opportunity to investigate staff CPD.

Worksheet

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STEM CLUBS

NUMBER 1 FOR STEM

STEM Clubs Programme, led by STEM Learning

Achieving world-leading STEM education for all young people across the UK.

For more information on the programmes and publications available from STEM Learning, visit our website **www.stem.org.uk**