

# ENGLAND

## Curriculum Links and Differentiation Ideas for the Principia Space Diary

Image: Passing over England at night,  
taken by Tim Peake, ESA/NASA



## CURRICULUM LINKS: ENGLAND

### Pre-launch Chapter: Astronauts Wanted

#### Activity 0.1: Astronaut Workout

KS1

Curriculum links:

Physical Education: Master basic movements, develop balance and coordination

Science: Working Scientifically; performing simple tests, making and recording simple data

SMSC: Team work

British Values: Mutual respect

Differentiation ideas:

- Why do we measure? How can we measure? Discuss ways they can measure time and length.
- Can they create their own astronaut workout? What other activities could test/measure strength, balance, and flexibility?

Lower Key Stage 2

Curriculum links:

Physical Education: Use running, jumping, throwing and catching in isolation and combination. Develop flexibility, strength, control and balance.

Science: Working Scientifically – making observations, recording data.

Maths: Measurement; units, recording data (statistics)

SMSC: Team work

British Values: Mutual respect

Differentiation ideas:

- Look at the instruments available for measurement; ruler, meter rule, tape measure. Which is best and why? Can we convert between m, cm and mm?
- Can students research and create their own astronaut workout?

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

**Physical Education:** Use running, jumping, throwing and catching in isolation and combination. Develop flexibility, strength, control and balance.

**Science:** Working scientifically – making observations, recording data

**Maths:** Measurement; units, recording data (statistics)

**SMSC:** Team work

**British Values:** Mutual respect

#### Differentiation ideas:

- Look at the instruments available for measurement; ruler, meter rule, tape measure. Which is best and why? Can we convert between m, cm and mm? Can you convert using decimals/percentages?
- Can they research and create their own astronaut workout?

## CURRICULUM LINKS: ENGLAND

### Activity 0.2: Your Body in Space

KS1

Curriculum links:

Science: Working scientifically – Asking simple questions

SMSC: Team work

British Values: Individual Liberty

Language and Literacy: Punctuation (differentiation idea)

Differentiation ideas:

- Pupils can explore the nature of a question (and importance of a question mark) to ask and generate their own questions.

Lower Key Stage 2

Curriculum links:

Science: Working scientifically – Asking simple questions

Science: Earth and Space, Skeleton/Muscles.

SMSC: Team work

British Values: Individual Liberty

Differentiation ideas:

- Can pupils research and come up with their own True or False Questions?
- Can pupils use texts and the internet to prove the science behind each question? What is the evidence for it being true or false?

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

Science: Working scientifically – Asking simple questions

Science: Earth and Space, Skeleton/Muscles

SMSC: Team work

British Values: Individual Liberty

#### Differentiation ideas:

- Can pupils research and come up with their own True or False Questions?
- Can pupils use texts and the internet to prove the science behind each question? What is the evidence for it being true or false? Pupils can present their ideas to the class. This could be turned into a game of 'ballderdash' with students having to select the correct piece of evidence against 1 true and 2 false ideas.

## CURRICULUM LINKS: ENGLAND

### Activity 0.3: Space Dinner

#### KS1

##### Curriculum links:

Science: Healthy eating, food groups

Mathematics: Fractions

SMSC: Making choices

British Values: Individual liberty, tolerance

##### Differentiation ideas:

- Set up the classroom as a shop, with different foods (for each group) in different parts. Students can 'shop' for items to include in their plate and draw what they choose.

#### Lower Key Stage 2

##### Curriculum links:

Science: Healthy eating, nutrition, food groups

Mathematics: Fractions, using models

Design & Technology: Principles of a healthy and varied diet

SMSC: Making choices

British Values: Individual liberty, tolerance

##### Differentiation ideas:

- Use the Eatwell plate <http://www.nhs.uk/Livewell/Goodfood/Pages/the-eatwell-guide.aspx> to choose and design a meal incorporating each food group. See extension activity notes and worksheets on learning portal.  
<http://principiaspacediary.org/wp-content/uploads/2016/12/Space-Diary-Extension-Eatwell-Plate.pdf>

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

Science: Healthy eating, nutrition, food groups

Mathematics: Fractions and percentages, using Models

Design & Technology: Principles of a healthy and varied diet

SMSC: Making choices

British Values: Individual liberty, tolerance

Literacy: Reading a variety of texts, select and retrieve information, using information

#### Differentiation ideas:

- Use the Eatwell plate <http://www.nhs.uk/Livewell/Goodfood/Pages/the-eatwell-guide.aspx> to choose and design a meal incorporating each food group. □ See extension activity notes and worksheets on learning portal.  
<http://principiaspacediary.org/wp-content/uploads/2016/12/Space-Diary-Extension-Eatwell-Plate.pdf>
- Can students link their meal to each of the seven food groups? Use the resources provided in the extension activities and add in challenge questions. Can students design a drink and a dessert or starter too?

## CURRICULUM LINKS: ENGLAND

### Activity 0.4: Design Your Spacesuit

#### KS1

Curriculum links:

Science: Materials

Art: Using a variety of media to draw, colour, paint.

Maths: Problem Solving, collecting data, presenting data as simple bar charts.

SMSC: Making Choices, Independent Thinking Skills

British Values: Individual Liberty

Differentiation ideas:

- Children can use different materials and media to create their spacesuit. No expectation at this stage to label, although some more able pupils may like to use a text book or resource to look at names of different parts.

#### Lower Key Stage 2

Curriculum links:

Science: Working Scientifically – Asking questions, setting up simple investigations, making observations, recording and analyzing data

Science: Materials, The Body (Life Support Systems)

Mathematics: Recording, using and presenting data, problem solving

SMSC: Making Choices, Independent Thinking Skills

British Values: Individual liberty

Literacy: Reading a variety of texts, select and retrieve information, using information (if using Fact Sheet)

D&T: Using materials for purpose (If using materials investigation)

Differentiation ideas:

- Pupils can use different materials to create a spacesuit, thinking about suitability of materials. They can label main parts and look into survival and communication systems.
- Could research and create a fact file or book on spacesuit design. Link to new lightweight suits (Boeing 2017): <http://www.space.com/35456-boeing-unveils-starliner-spacesuits-photos.html>.



## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

Science: Working Scientifically – Asking questions, setting up simple investigations, making observations, recording and analyzing data

Science: Materials, The Body (Life Support Systems)

Mathematics: Recording, using and presenting data, problem solving

British Values: Individual liberty

Literacy: Reading a variety of texts, select and retrieve information, using information (if using Fact Sheet)

D&T: Using materials for purpose (If using materials investigation)

#### Differentiation ideas:

- Link to extension activity on learning portal,  
<http://principiaspacediary.org/wp-content/uploads/2016/12/Space-Diary-Extension-Space-Suit-Investigating-Materials.pdf>  
to plan and investigate the insulation ability of different materials. Pupils collect and analyse data.

## CURRICULUM LINKS: ENGLAND

### Chapter 1: Goodbye to Earth!

#### Activity 1.1: Time for Launch

##### KS1

###### Curriculum links:

Mathematics: Measures (time), notation (am and pm), basic addition and subtraction

Language and Literacy: Word Reading, comprehension

SMSC: Team work

###### Differentiation ideas:

- Show footage of the live launch to excite, engage and demonstrate the launch procedure  
[http://www.esa.int/spaceinvideos/Videos/2015/12/Principia\\_launch\\_highlights](http://www.esa.int/spaceinvideos/Videos/2015/12/Principia_launch_highlights)
- Have clocks available for pupils to show time, both in digital and analogue. To strengthen time reading skills, pupils can move short and long hands to shown time. An interactive clock face can be found here:  
<http://www.visnos.com/demos/clock>

##### Lower Key Stage 2

###### Curriculum links:

Mathematics: Measures (time), Conversion, analogue & digital, problem solving

Language and Literacy: Word Reading and comprehension, select and retrieve information

SMSC: Team work

###### Differentiation ideas:

- Show footage of the live launch to excite, engage and demonstrate the launch procedure  
[http://www.esa.int/spaceinvideos/Videos/2015/12/Principia\\_launch\\_highlights](http://www.esa.int/spaceinvideos/Videos/2015/12/Principia_launch_highlights)
- An interactive clock face can be found here: <http://www.visnos.com/demos/clock>
- An additional challenge could be provided by requiring the children to change the times to 24-hour clock. Some children may also benefit from recording all times both as analogue and digital time in order to consolidate their understanding.

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

Mathematics: Measures (time), conversion, analogue & digital, problem solving

Language and Literacy: Word reading and comprehension, select and retrieve information. (If using differentiation ideas: composition and transcription.)

SMSC: Team work

#### Differentiation ideas:

- Show footage of the live launch to excite, engage and demonstrate the launch procedure  
[http://www.esa.int/spaceinvideos/Videos/2015/12/Principia\\_launch\\_highlights](http://www.esa.int/spaceinvideos/Videos/2015/12/Principia_launch_highlights)
- An interactive clock face can be found here: <http://www.visnos.com/demos/clock>
- Additional challenge could be provided by requiring the children to change the times to 24-hour clock. Some children may also benefit from recording all times both as analogue and digital time in order to consolidate their understanding.
- Challenge more able students to re-write the launch procedure in a different form, perhaps as instructions or as a play-script.

## CURRICULUM LINKS: ENGLAND

### Activity 1.2: 8 Minutes to Space

#### KS1

##### Curriculum links:

Language and Literacy: Composition – Participate in modelled, shared, guided and independent writing for a variety of purposes and audiences

Language and Literacy: Transcription – Improving practise of handwriting

##### Differentiation ideas:

- Younger students could be encouraged to write descriptively using their senses, perhaps in a darkened room with rocket sounds playing. For those needing support with writing, they could tell story orally, or use images to support description to generate vocabulary.

#### Lower Key Stage 2

##### Curriculum links:

Language and Literacy: Composition – Selecting, planning and using appropriate style and form

Language and Literacy: Develop increasing competence in the use of grammar and punctuation to create clarity of meaning

##### Differentiation ideas:

- Students could experiment with different forms e.g. poetry, newspaper report, or perhaps change the tense or person.

#### Upper Key Stage 2

##### Curriculum links:

Language and Literacy: Composition – Selecting, planning and using appropriate style and form

Language and Literacy: Develop increasing competence in the use of grammar and punctuation to create clarity of meaning.

Language and Literacy: Use of technical terms – relative clauses, fronted adverbials, synonyms, visual language – to enhance the reader's enjoyment.

##### Differentiation ideas:

## CURRICULUM LINKS: ENGLAND

- More able or older students in KS2 could develop their writing in the style of a recount, setting the scene, using time connectives and writing in paragraphs. Encourage use of synonyms and subordinate/relative clauses.
- Mastery challenge: Lipograms – Can more able students re-write their piece without using a specific letter, or perhaps rewrite to give same information without using the letter 's'? e.g. 'As the rocket launched, I felt my body being pushed back into my chair. Was this really happening? Would I reach the ISS?' This would become: 'The engine fired, we were moving away from Earth. I felt my whole body being forced into my chair. Am I dreaming? Am I going to make it to the dock?'

## CURRICULUM LINKS: ENGLAND

### Activity 1.3: Fast-track Rendezvous

#### KS1

##### Curriculum links:

Mathematics: Shape and space, coordinates, problem solving, simple addition

Science: Forces and movement

Language and Literacy: Transcription (fine motor skills in joining dots)

SMSC: Team work

British Values: Mutual respect

##### Differentiation ideas:

- Children may need support in relating between Activity 1.1 and Activity 1.3. Photocopies or working in teams could support this. Perhaps using a blown up version of Activity 1.1 on a learning wall to serve as a support station for younger learners.

#### Lower Key Stage 2

##### Curriculum links:

Mathematics: Shape and space, problem solving (in relation to previous activities)

Science: Earth and space (orbits and gravity), forces

Foreign languages: Understanding words (e.g. rendezvous means meeting)

SMSC: Team work

British Values: Mutual respect

##### Differentiation ideas:

- Pupils could look at the difficulties and importance of teamwork in docking.  
<http://www.science-sparks.com/2016/02/01/space-station-activities-docking-with-the-iss/>

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

Mathematics: Shape and space, problem solving (in relation to previous activities)

Science: Earth and Space (orbits and gravity), forces

Foreign languages: Understanding words (e.g. rendezvous means meeting)

SMSC: Team work

British Values: Mutual respect

#### Differentiation ideas:

- Children could find out speeds at which ISS and Soyuz are orbiting Earth. They could also use this as an opportunity to look at space junk and debris in the way of the ISS. There is also a fun docking activity available through NASA and downloadable here: [https://er.jsc.nasa.gov/seh/docking\\_with\\_ISS.pdf](https://er.jsc.nasa.gov/seh/docking_with_ISS.pdf)

## CURRICULUM LINKS: ENGLAND

### Chapter 2: Space Chat

#### Activity 2.1: United in Space

##### KS1

###### Curriculum links:

Language and Literacy: Spoken language, composition and transcription

Geography: Locational knowledge, place knowledge, geographical skills

###### Differentiation ideas:

- Perhaps provide the class with a resource centre, consisting of flags and large text fact sheets of the remaining countries, including NASA (USA), CNSA (China) and Roscosmos (Russia). Allow pupils to answer orally if required, with the option of completing the fact files as a class activity, supported by adults.

##### Lower Key Stage 2

###### Curriculum links:

Geography: Locational knowledge, place knowledge, geographical skills

Mathematics: Coordinates

Language and Literacy: Composition and communication

Computing (if using internet for research): Importance of using computer networks safely and responsibly

Language and Literacy (If using books for research): Comprehension, select and retrieve information

###### Differentiation ideas:

- Choose resources before setting up, providing either a list of trusted websites (if online) or texts and books, for pupils to target their research. Have atlases available for pupils to use map-reading skills to locate places, perhaps reading coordinates. Give pupils the option to work in pairs or small teams to support and challenge each other.
- Extend by asking pupils to research a chosen astronaut (past or present) and encourage the girls to find out about female astronauts

<http://www.spaceflightinsider.com/space-flight-news/the-worlds-top-6-female-astronauts-inspiring-girls-young-women-to-reach-for-the-stars/>



## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

Geography: Locational knowledge, place knowledge, geographical skills

Mathematics: Coordinates

Language and Literacy: Composition and communication

Computing (if using internet for research): Importance of using computer networks safely and responsibly

Language and Literacy (If using books for research): Comprehension, select and retrieve information

#### Differentiation ideas:

- Choose resources before setting up, providing either a list of trusted websites (if online) or texts and books, for pupils to target their research. Have atlases available for pupils to use map-reading skills to locate places, perhaps reading coordinates. Give pupils the option to work in pairs or small teams to support and challenge each other.
- Extend by asking pupils to research a chosen astronaut (past or present) and encourage the girls to find out about female astronaut

<http://www.spaceflightinsider.com/space-flight-news/the-worlds-top-6-female-astronauts-inspiring-girls-young-women-to-reach-for-the-stars/>

#### Challenge Questions:

- Can you plot the locations of launch bases on a map?
- Can you discover what the different space agency acronyms/names mean?
- Can you write a speech that includes the achievements of space travel from an international perspective?
- Can you write a job description/advert for the next astronaut? Use persuasive language.

Activity 2.2: Breaking News!

KS1

Curriculum links:

Language and Literacy: Reading – Read, explore, understand and make use of a wide range of traditional and digital texts; explore and begin to understand how texts are structured in a range of genres

Language and Literacy: Writing – Participate in modelled, shared, guided and independent writing for a variety of purposes and audiences; composition and transcription

Differentiation ideas:

- For younger or less able pupils there are opportunities for modelled and shared writing or paired work.

Lower Key Stage 2

Curriculum links:

Language and Literacy: Reading – Read, explore, understand and make use of a wide range of traditional and digital texts; consider, interpret and discuss texts, exploring the ways in which language can be manipulated in order to affect the reader or engage attention; begin to be aware of how different media present information, ideas and events in different ways

Language and Literacy: Writing – Participate in modelled, shared, guided and independent writing for a variety of purposes and audiences (KS1) selecting, planning and using appropriate style and form; develop increasing competence in the use of grammar and punctuation to create clarity of meaning; composition and transcription

Differentiation ideas:

- Pupils could role-play astronauts onboard the ISS, using images, sounds and clips to provide a sensory stimulus. They could then take it in turns, or work as a class, to interview the astronauts. This could be used to generate rich vocabulary and interview quotes to be used by class in their writing. Perhaps create a class success criteria to guide writing.

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

**Language and Literacy: Reading** – Read, explore, understand and make use of a wide range of traditional and digital texts; consider, interpret and discuss texts, exploring the ways in which language can be manipulated in order to affect the reader or engage attention; begin to be aware of how different media present information, ideas and events in different ways.

**Language and Literacy: Writing** – Participate in modelled, shared, guided and independent writing for a variety of purposes and audiences (KS1) selecting, planning and using appropriate style and form; develop increasing competence in the use of grammar and punctuation to create clarity of meaning; composition and transcription.

#### Differentiation ideas:

- More able or older pupils in KS2 could develop their writing in the style of a newspaper report, paying attention to the features of this text-type such as headlines, photos with captions, attention-grabbing phrases and language and time connectives. They could also use role-play to capture 'interviews' with the astronaut, using speech and appropriate punctuation in their report.

Activity 2.3: Earth to Principia

KS1

Curriculum links:

**Mathematics:** Addition and Subtraction (To find the letter 'A' you need to add 3 to give you the coded letter.)

**Computing:** Decoding, solve problems through decomposition

Differentiation ideas:

- Use a simpler code or provide further letters on the activity sheet to make the code easier to solve. Perhaps go through some examples as a class. Additional adult working with small group if appropriate. Can your more able spot the pattern? Ask students to describe the pattern, explaining their answer with examples.

Lower Key Stage 2

Curriculum links:

**Mathematics:** Addition and Subtraction (To find the letter 'A' you need to add 3 to give you the coded letter.)

**Computing:** Decoding, solve problems through decomposition.

**History:** A significant turning point in British history (Cracking the Enigma code) (optional)

Differentiation ideas:

- Explore different instances of code writing over history such as during World War 2. Allow pupils to research different examples of coding, perhaps in teams. Examples could include: Enigma code, Morse code, Rot1, transposition, Caesar shift cipher. Pupils could find out about each type, giving examples and explaining how to use it or part of its history.

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

**Mathematics:** Addition and subtraction (To find the letter 'A' you need to add 3 to give you the coded letter.); algebra (Y6 only)

**Computing:** Decoding, solve problems through decomposition

**History:** A significant turning point in British history (Cracking the Enigma code) (optional)

#### Differentiation ideas:

- Explore different instances of code writing over history such as during World War 2. Allow pupils to research different examples of coding, perhaps in teams. Examples could include; Enigma code, Morse code, Rot1, transposition, Caesar shift cipher. Pupils could find out about each type, giving examples and explaining how to use it or part of its history.
- For most able: Provide fewer letters in the code to crack or change the code so that there is still a letter correspondence but it is more difficult to solve (perhaps use symbols instead of letters).
- Can students create and write their own code? Get them to swap and challenge to find the answer. Perhaps encourage some to write the solution or pattern using algebra.

## CURRICULUM LINKS: ENGLAND

### Chapter 3: I Spy...

#### Activity 3.1: Your New Home

##### KS1

Curriculum links:

Mathematics: Shape and space

Literacy and Language: Spoken language (if explaining), composition and transcription

If model making:

Art: Working with different media

Design & Technology: Design; Make – construct and select from a wide range of materials

Differentiation ideas:

- Encourage the pupils to find out more about the ISS. Can they describe it using adjectives? Can they print and describe a photograph? Use this link for more information and images about the ISS:  
[http://www.esa.int/Our\\_Activities/Human\\_Spaceflight/International\\_Space\\_Station/About\\_the\\_International\\_Space\\_Station](http://www.esa.int/Our_Activities/Human_Spaceflight/International_Space_Station/About_the_International_Space_Station)
- To get students working hands-on, encourage them to use interlocking plastic building blocks/shapes to make an ISS part (3D shape) and/or model of a familiar house. Discuss similarities and differences.

##### Lower Key Stage 2

Curriculum links:

Mathematics: Shape and Space, problem solving

Literacy and Language: Spoken language (if explaining), composition and transcription. Select and retrieve information.

Differentiation ideas:

- Encourage the pupils to find out about the ISS. Can they create a guide or a fact file to the ISS?  
[http://www.esa.int/Our\\_Activities/Human\\_Spaceflight/International\\_Space\\_Station/About\\_the\\_International\\_Space\\_Station](http://www.esa.int/Our_Activities/Human_Spaceflight/International_Space_Station/About_the_International_Space_Station)
- Create a puzzle of the ISS by downloading the components here from the learning portal (<http://www.principiaspacediary.org/iss.pdf>). Complete the puzzle, describing the parts and how/why they are made in that way, as well as the purpose e.g. living/working.

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

Mathematics: Shape and space, problem solving

Literacy and Language: Spoken Language (if explaining), composition and transcription

#### If model making:

Art: Working with different media

Design & Technology: Design – create models; Make – construct and select from a wide range of materials. Evaluate.

Science: Materials, earth and space, energy

SMSC: Team work

#### Differentiation ideas:

- Encourage the pupils to find out about the ISS. Can they create a guide or a fact file to the ISS?  
[http://www.esa.int/Our\\_Activities/Human\\_Spaceflight/International\\_Space\\_Station/About\\_the\\_International\\_Space\\_Station](http://www.esa.int/Our_Activities/Human_Spaceflight/International_Space_Station/About_the_International_Space_Station)
- Create a diagram/model of their own ISS design/copying the current ISS. Describe individual components, how and why they are made in that way, how it will be powered etc. There is more information for this junk modelling activity in the 'Engaging girls in STEM' booklet, downloadable on the learning portal.

## CURRICULUM LINKS: ENGLAND

### Activity 3.2: Draw Your Own ISS

#### KS1

Curriculum links:

Language, Literacy and Reading: Transcription; Composition; Comprehension

Maths: Number fluency; Shape, space and measure

Geography

Computing

If model making:

Art: Working with different media

Design & Technology: Design – create models; Make – construct and select from a wide range of materials, evaluate

Science: Working Scientifically; Everyday materials; Uses of everyday materials

SMSC: Team work

Differentiation ideas:

- Make a junk model of your ISS – discuss the different places where the astronauts live and work. This could be done as a small group activity encouraging discussion and collaboration; children may then present their space station to their peers. It could also be an enhanced provision opportunity, allowing the children to creatively develop their own ideas about how an ISS would work.

#### Lower Key Stage 2

Curriculum links:

Language, Literacy and Reading: Transcription; Composition; Comprehension

Maths: Number Fluency; Shape, Space and Measure

Geography

Computing

If model making:

Art: Working with different media



## CURRICULUM LINKS: ENGLAND

Design & Technology: Design – create models; Make – construct and select from a wide range of materials, evaluate  
Science: Materials; Working scientifically  
SMSC: Team work

Differentiation ideas:

- Collaborate in small groups to make a part for a class ISS. Research in further detail to find out the specific features of the component and how the astronauts would work/live/use that space for their research. Build it to fit onto the whole-class model.

### Upper Key Stage 2

Curriculum links:

Language, Literacy and Reading: Transcription; Comprehension; Composition

Maths: Number fluency; Shape, space and measure

Geography

If researching and presenting:

Design & Technology: Design – create models; Make – construct and select from a wide range of materials, evaluate

Language and Literacy: Composition and communication

Science: Working scientifically – ask questions, using evidence; Properties and changes of materials

Computing (if using internet for research): Importance of using computer networks safely and responsibly

Language and Literacy (If using books for research): Comprehension, select and retrieve information

Differentiation ideas:

- Use this as an opportunity for pupils to evaluate and improve their model from Activity 3.1.
- Generate Questions: In small groups or as a class and ask pupils what they are curious about in relation to the ISS. Able students can use resources to research answers. Provide the opportunity to ask and answer their own questions, just as real scientists do. Visit [https://www.nasa.gov/centers/johnson/pdf/569954main\\_astronaut%20FAQ.pdf](https://www.nasa.gov/centers/johnson/pdf/569954main_astronaut%20FAQ.pdf) to see students questions answered by NASA astronauts to trigger questions – good for a stimulus. Perhaps as a card sort to match Q&A.

Activity 3.3: Looking at the Earth from Space

KS1

Curriculum links:

Geography: Locational knowledge and physical geography, geographical skills (if map reading)

Language and Literacy: Composition and transcription

Differentiation ideas:

- Use Geoguessr <https://geoguessr.com/> to excite and engage. Can students guess the location from the hints and clues?
- What would be the biggest differences between how school looks from our perspective and from space?
- Where or what would you like to take a picture of from space?
- Modelled and shared writing.

Lower Key Stage 2

Curriculum links:

Geography: Weather systems and grid references, locational and place knowledge, geographical skills

Science: Earth and space

Language and Literacy: Composition and transcription

Computing: Using computing networks (online atlases etc)

Differentiation ideas:

- Use Geoguessr <https://geoguessr.com/> to excite and engage. Can students guess the location from the hints and clues?
- Watch some footage of weather from the ISS and show your Space Apprentices local, national and international weather reports. What are the different types of weather you can see in the footage and the reports? Where is it hotter and colder than in your city or region? Which places have similar weather? Make a classroom poster to track the weather for a week or month. How does the actual temperature and weather compare with the forecast?
- Literacy/Drama: Can the children make and write their own play scripts for a weather forecast.

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

Geography: Weather systems and grid references, locational and place knowledge, geographical skills

Science: Earth and space

Language and Literacy: Composition and transcription

Computing: Using computing networks (online atlases etc)

#### Differentiation ideas:

- Use Geoguessr <https://geoguessr.com/> to excite and engage. Can students guess the location from the hints and clues?

#### Questions to stretch and challenge:

- Can you find examples of similar weather systems at different places on Earth?
- How does the physical geography influence the way the system impacts that place?
- What are the biggest differences between weather systems at the equator compared to closer to the poles?
- What evidence can you find of things humans have built to deal with the common weather conditions of where they live?
- Literacy/Drama: Can the children make and write their own play scripts for a weather forecast. Ask pupils to use evidence and maps to support their performance. Relate to features of a playscript.

## CURRICULUM LINKS: ENGLAND

### Activity 3.4: The Solar System

#### KS1

##### Curriculum links:

Language and Literacy: Reading comprehension, writing summaries, extended writing (optional)

Science: Materials and seasonal changes

##### If model making:

Design & Technology: Design and make

##### Differentiation ideas:

- Match the given description to the planet.
- Use the simplified summaries for young Space Apprentices.

Resources available from the Curved House Kids Blog <http://curvedhousekids.com/exploring-our-solar-system/>

#### Lower Key Stage 2

##### Curriculum links:

Language and Literacy: Reading comprehension, writing summaries, extended writing (optional)

Science: Materials and seasonal changes, earth and space

Computing: Search technologies, using the internet responsibly and safely

##### If model making:

Design & Technology: Design and make

##### Differentiation ideas:

- Internet research to further develop the details and facts students can include on the activity sheet (a version of the activity sheet could be made with key fact subheadings for the children to complete such as size of planet and number of moons).

Resources available from the Curved House Kids Blog <http://curvedhousekids.com/exploring-our-solar-system/>

## CURRICULUM LINKS: ENGLAND

### Model Making:

- Ask pupils to make a model of the solar system. For downloadable ideas visit the 'Engaging girls in STEM' booklet from the learning portal.

### Upper Key Stage 2

#### Curriculum links:

Language and Literacy: Reading comprehension, writing summaries, extended writing (optional)

Science: Materials, earth and space

Computing: Search technologies, using the internet responsibly and safely

#### If model making:

Design & Technology: Design and make

#### Differentiation ideas:

- Write a planetary fact file. Resources available from the Curved House Kids Blog <http://curvedhousekids.com/exploring-our-solar-system/> Ask students to consider including the dwarf planets Ceres and Pluto, and both the asteroid and Kuiper belt?

### Model Making:

- Create a scale model of the Solar System. This resource is downloadable from the 'Engaging Girls in STEM' booklet, available on the Learning Portal. To develop evaluative skills and challenge understanding of peer review in science, challenge more able students to evaluate and review each other's models, relating to difficulties in scale and size, providing constructive feedback (e.g. What went well/Even better if/Next steps) then give students time to respond and act on feedback.

## CURRICULUM LINKS: ENGLAND

### Chapter 4: Space for Science

#### Activity 4.1: Space Gardening

##### KS1

###### Curriculum links:

Science: Living things and their habitats – Plants: parts, names and survival

Design & Technology: Cooking – Understanding where food comes from

###### If growing seeds or plants:

Science: Working Scientifically – Making observations, recording data

###### Differentiation ideas:

- Bring in and show students some of the plants that can be grown in space. What meals do you know that include these ingredients? If you have access to space outdoors, pupils could plant their own 'Space Vegetable Patch'. This could lead to longitudinal study and observations.

##### Lower Key Stage 2

###### Curriculum links:

Science: Living things and their habitats – Plants: parts, nutrition and growth; environments

###### If growing seeds or plants:

Science: Working Scientifically – Setting up simple investigations, making observations, recording and presenting data

Mathematics: Measurement, statistics (data)

###### Differentiation ideas:

- Can you write a three-course menu for a space feast, using only foods that can be grown in space? Perhaps go back to Activity 1.3 (Space Dinner) and adapt your vegetables to only space grown plants.
- For more able students, link this activity with learning around plants. Challenge students to plan and investigate the factors that affect plant growth. Discuss variables (light, water, soil, leaves, air, space, temperature etc) and then give small groups a

## CURRICULUM LINKS: ENGLAND

variable to change. Discuss fair testing. Plant and change variable e.g. do not water, put in dark, remove leaves. Compare to control and record data over a number of weeks.

### Upper Key Stage 2

#### Curriculum links:

Science: Living things and their habitats – Plants: parts, nutrition and growth; environments

#### If growing seeds or plants:

Science: Working scientifically – Setting up simple investigations; making observations, recording and presenting data

Mathematics: Measurement, statistics (data)

#### Differentiation ideas:

- A greenhouse in space [http://www.esa.int/Our\\_Activities/Human\\_Spaceflight/MagIStra/A\\_greenhouse\\_in\\_space](http://www.esa.int/Our_Activities/Human_Spaceflight/MagIStra/A_greenhouse_in_space)
- Link this activity with learning around plants. Challenge students to plan and investigate the factors that affect plant growth. Discuss variables (light, water, soil, leaves, air, space, temperature etc) and then give small groups a variable to change. Discuss fair testing. Plant and change variable e.g. do not water, put in dark, remove leaves. Compare to control and record data over a number of weeks.

Activity 4.2: Make a Splash in Space

KS1

Curriculum links:

Science: Animals, including humans; materials

Mathematics: Shape and space

If making water cycle:

Science: Working Scientifically – Making observations, representing observations using images

Differentiation ideas:

- The stages of the life cycle could be printed onto cards. Children could use these to support their dramatisation of the process. Children could also use these to help sequence the journey of the water droplet.
- Make a class or team water cycle in a bag, and attach to a window.  
<http://www.glasgowsciencecentre.org/science-bites/water-cycle-in-a-bag.html> Pupils could take photographs of, or record observations.

Lower Key Stage 2

Curriculum links:

Science: Materials – States of matter, evaporation and condensation (changes of state)

Geography: The Water Cycle

If making water cycle:

Science: Working Scientifically – Making observations

Differentiation ideas:

- Pupils can make their own (or team) water cycle and record observations over a few days. This works best when placed near a window. Resources and guidelines downloadable from:  
<http://www.science-sparks.com/2012/07/30/make-a-mini-water-cycle/>. Ask pupils to annotate their water cycle, using facts found from the resources available in teacher notes.



## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

Science: Materials – States of matter, evaporation and condensation (changes of state)

Geography: The Water Cycle

#### If making water cycle:

Science: Working scientifically – Making observations

#### If writing:

Language and Literacy: Composition – use of different forms, extending vocabulary

#### Differentiation ideas:

- Pupils can make their own (or team) water cycle and record observations over a few days. This works best when placed near a window. Resources and guidelines downloadable from:  
<http://www.science-sparks.com/2012/07/30/make-a-mini-water-cycle/>
- To stretch and challenge ask pupils to write a diary entry in the life of a water droplet. Perhaps play with the form, e.g. challenging students to write this as a poem or a cartoon.

## CURRICULUM LINKS: ENGLAND

### Activity 4.3: Experimentally Yours

#### KS1

##### Curriculum links:

**Science: Working Scientifically** – Asking simple questions and recognising that they can be answered in different ways; using their observations and ideas to suggest answers to questions.

**Language and Literacy: Writing** – composition and transcription

##### Differentiation ideas:

- Encourage class to come up with ideas that could be investigated. Plan the experiment as a class. For support and ideas use teacher notes. Get pupils to discuss how we could find out the answer to the questions.

#### Lower Key Stage 2

##### Curriculum links:

**Science: Working Scientifically** – Asking relevant questions and using different types of scientific enquiries to answer them; setting up Simple investigations; making observations; recording and presenting data; oral/written explanations

**Mathematics: Measurements, statistics (data)**

**Language and Literacy: Writing** – composition and transcription; writing a recount of the (imaginary) investigation

##### Differentiation ideas:

- Guide the pupils through the steps of an experiment and introduce the concept of 'fair testing'. How will they control their variables? Introduce the concept of variables. For support, visit [http://www.sciencekidsathome.com/science\\_fair/index.html](http://www.sciencekidsathome.com/science_fair/index.html)

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### Upper Key Stage 2

#### Curriculum links:

**Science:** Working Scientifically – Asking relevant questions and using different types of scientific enquiries to answer them; setting up simple investigations; making observations; recording and presenting data; oral/written explanations; planning different types of scientific enquiries to answer questions, including recognising variables where necessary; repeat readings.

**Mathematics:** Measurements; statistics (data)

**Language and Literacy:** Writing – Composition and transcription; writing a recount of the (imaginary) investigation

#### Differentiation ideas:

- More able children should be encouraged to think of experiments that could take place on Earth and on the ISS and they should then consider how the results may be different depending on where the experiment is done. Pupils could plan an experiment, taking account of 'fair testing'. What are some of the factors that limit what experiments can be done in space (cost, ethics, size of equipment, risk factors for the crew members, training, sample return, difficulties of analysing results)? For support in planning, visit [http://www.sciencekidsathome.com/science\\_fair/index.html](http://www.sciencekidsathome.com/science_fair/index.html).
- For more able classes, or to strengthen understanding of working scientifically, use this as an opportunity for students to design and carry out their own investigations. Can they explain the difference between independent, dependent and control variables?

## CURRICULUM LINKS: ENGLAND

### Chapter 5: To Boldly Go

#### Activity 5.1: Making History

##### KS1

###### Curriculum links:

**History:** Changes within living memory, the lives of significant individuals in the past who have contributed to national and international achievements.

**Mathematics:** Number fluency (ordering, larger or smaller)

**Computing:** Search technologies, using the internet (optional)

**Language and Literacy:** Composition; extended writing (optional)

###### Differentiation ideas:

- Put important dates to students on the timeline to see the development of space exploration in the context of their own lives.
- Invite an older family member into school to talk to the children about what they remember about the history of space exploration. Students can ask them questions about their thoughts and feelings at the time. This could lead to a piece of writing or a class poem, focusing on use of a type of word, e.g. adjective, noun.

##### Lower Key Stage 2

###### Curriculum links:

**History:** Continue to develop a chronologically secure knowledge and understanding of British, local and world history

**Computing:** Use search technologies effectively, appreciate how results are selected and ranked and be discerning in evaluating digital content

**Language and Literacy:** Composition; extended writing

**Mathematics:** Number fluency (ordering)

###### Differentiation ideas:

- Order the dates from the timeline first before writing them on. Use the extension notes to add to the timeline.

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- Perhaps the class could create their own timeline, including events from class and family history. Use this app to guide and support <http://www.readwritethink.org/classroom-resources/student-interactives/timeline-30007.html> or <http://www.spacekids.co.uk/spacehistory/> or [http://www.ducksters.com/science/physics/space\\_exploration\\_timeline.php](http://www.ducksters.com/science/physics/space_exploration_timeline.php) for resources and dates.

### Upper Key Stage 2

Curriculum links:

Science: Earth in space; forces

History: Continue to develop a chronologically secure knowledge and understanding of British, local and world history

Mathematics: Number fluency (ordering)

If researching:

Computing: Use search technologies effectively, appreciate how results are selected and ranked and be discerning in evaluating digital content

Language and Literacy: Composition; extended writing

Differentiation ideas:

- Provide the important dates, but not the facts, for the older KS2 children to research what happened when for themselves.
- Create a cross-curricular link between science, history and English and write a diary entry or letter in role as a significant figure in the history of space exploration. (What was it like for Neil Armstrong to walk on the Moon or for Helen Sharman to visit the Russian Space Station Mir?) Use videos to stimulate and engage, perhaps using to generate rich vocabulary for the class to use.
  - o 1969 moon landing: <https://www.youtube.com/watch?v=cwZb2mqld0A>
  - o Helen Sharman interview: <https://www.youtube.com/watch?v=vPOTOWgiTb8>
  - o Tim Peake's first press conference from the ISS:  
[http://www.esa.int/spaceinvideos/Videos/2015/12/Tim\\_s\\_first\\_talk\\_with\\_media\\_from\\_space](http://www.esa.int/spaceinvideos/Videos/2015/12/Tim_s_first_talk_with_media_from_space)
- For mixed ability groups, create a large scale timeline to display.

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### Activity 5.2: Space Habitat

#### KS1

Curriculum links:

Science: Habitats

Design & Technology: Living spaces

Computing: Using search technologies, apps

Differentiation ideas:

Use ICT: Students might also enjoy using cartoon or drawing apps to help them imagine their city of the future, using programmes such as Startopia (<https://www.mobygames.com/game/startopia>) and the Kerbal Space Programme (<https://kerbalspaceprogram.com/en/>).

#### Lower Key Stage 2

Curriculum links:

Science: Habitats, changing environments; humans: what do we need to survive

Design & Technology: Living spaces

Art: Imagined futures

History: Settlement

If writing:

Language and Literacy: Composition; vocabulary, form, audience, writing for purpose

Differentiation ideas:

- Message from Buzz: Read the letter Buzz Aldrin wrote to aspiring space settlers: <http://buzzaldrin.com/space-vision/generation-mars/>. Can you write him a response?

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

Science: Habitats, changing environments; humans: what do we need to survive

Design & Technology: Living spaces

Art: Imagined futures

History: Settlement

#### If writing:

Language and Literacy: Composition: vocabulary, form, audience, writing for purpose; persuasive language

#### Differentiation ideas:

- For more able students: Can you turn your picture of your space city into an advert, convincing people to settle there?

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### Activity 5.3: Robots in Space

#### KS1

Curriculum links:

Science: Earth in space, electricity

Design & Technology: Design and make

If designing a robot:

Language and Literacy: Spoken language; communication; composition and transcription.

Differentiation ideas:

- Design a robot for a particular purpose. Before designing, discuss as a class what it will need to do.

#### Lower Key Stage 2

Curriculum links:

Science: Earth in space, electricity and electrical circuits

Computing: Programming, coding

Design & Technology: Technical knowledge, design process

If writing:

Language and Literacy: Writing instructions; spoken language; communication

Differentiation ideas:

- Write an instruction book for the newly designed robot.



## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

Science: Earth in space, electricity and electrical circuits, energy

Computing: Programming; coding

Design & Technology: Technical knowledge, design process

#### If writing:

Language and Literacy: Writing instructions and explanation; spoken language; communication

#### Differentiation ideas:

- Write an explanation to explain how the robot works. Use all the features of the text type. Generate class success criteria of features of the text type and use this to facilitate writing.
- In mixed ability groups: Use cross-curricular design and technology and science skills to build the robot. Try to include some of the functions the real robot would have.
- Research: Find out about different robots in space, research and create fact file. See teaching notes for links. For general links about space robotics, visit:
  - [http://www.esa.int/esaKIDSen/SEMOPWDE2E\\_LifeinSpace\\_0.html](http://www.esa.int/esaKIDSen/SEMOPWDE2E_LifeinSpace_0.html)
  - <https://www.nasa.gov/audience/foreducators/robotics/home/index.html>
  - [https://www.nasa.gov/mission\\_pages/station/research/news/invention\\_of\\_the\\_year](https://www.nasa.gov/mission_pages/station/research/news/invention_of_the_year)

## CURRICULUM LINKS: ENGLAND

### Chapter 6: Mission Finale

#### Activity 6.1: Re-entry

##### KS1

###### Curriculum links:

Science: The world around us; materials.

Language and Literacy: Spoken language; communicating ideas

Mathematics: Shape, space and measure (Directional Language)

Geography: Geographical skills (compass points, positional language)

###### Differentiation ideas:

- A simpler maze to navigate through. Perhaps copy and remove some options for younger pupils.
- Junk modelling to create a landing capsule.
- Pupils could set up a maze in the hall or outdoors, and navigate their landing craft around obstacles. Use directional language to describe their movements, reflect and describe what the experience was like.

##### Lower Key Stage 2

###### Curriculum links:

Science: Materials; Earth and space; forces

Language and Literacy: Spoken language; communicating ideas

Mathematics: Shape, space and measure (Directional Language)

Geography: Geographical skills (compass points, positional language, grid references)

###### Differentiation ideas:

- Describe the journey through the maze using coordinators or simple directional language like right, left, up, down. Giving the maze a more 3D aspect. They could grid the page and use map coordinates to stretch and challenge.
- Write a diary entry describing the return to Earth. Express thoughts and feelings about leaving space, the journey home and looking forward to being back.
- Junk modelling to create a landing capsule.

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- Pupils could set up a maze in the hall or outdoors, and navigate their landing craft around obstacles. Use positional and directional language to describe the journey for a partner to navigate.

### Upper Key Stage 2

#### Curriculum links:

Science: Materials (smart materials); Earth and space; forces

Language and Literacy: Spoken Language; communicating ideas

Mathematics: Shape, space and measure (Directional Language)

Geography: Geographical skills (compass points, positional language, grid references)

#### Differentiation ideas:

- Additional puzzles to solve as they move through the maze. These could be situations that arise as a capsule reenters the atmosphere based on the extension information.
- For mixed ability groups: Produce a short drama piece. Members of the group act as the crew as they perform re-entry.
- More able pupils or classes could write a diary entry describing the journey back to Earth. You could use a video of Tim Peake describing his landing to support this and generate vocabulary:  
<http://www.itv.com/news/update/2016-06-18/tim-peake-describes-arriving-back-on-earth/> or describing the re-entry  
[http://www.huffingtonpost.co.uk/entry/tim-peake-recalls-his-re-entry-back-to-earth-from-the-international-space-station\\_uk\\_5769502ce4b0317bd8f4ad7f](http://www.huffingtonpost.co.uk/entry/tim-peake-recalls-his-re-entry-back-to-earth-from-the-international-space-station_uk_5769502ce4b0317bd8f4ad7f)
- Make your own heat shield: <http://www.spacetoeearthchallenge.org.uk/materials-how-smart-materials-are-used-resources/>

## CURRICULUM LINKS: ENGLAND

### Activity 6.2: The Journey Home

#### KS1

Curriculum links:

**Mathematics:** Measures, units

**Geography:** Geographical skills (compass points, positional language); locational knowledge; map reading and drawing skills

**SMSC:** Team work; resilience

Differentiation ideas:

- Pupils could draw a map of their local area and map a journey through it, perhaps relating it to a treasure hunt, to inspire and engage.
- Provide the pupils with grid paper to support plotting. Allow them to think about distances and scale.

#### Lower Key Stage 2

Curriculum links:

**Mathematics:** Measures – Units, scale and conversion

**Geography:** Geographical skills (compass points, positional language, grid references); locational knowledge; map reading and drawing skills

**SMSC:** Team work; resilience

Differentiation ideas:

- Lower ability learners could develop their understanding on a smaller scale. They could draw a scale map of the Baikonaur Cosmodrome, for example. Provide pupils with a range of resources such as maps, scale drawings and the route Tim took, to support their map drawing skills.

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

**Mathematics:** Measures – Units, scale, ratio and conversion

**Geography:** Geographical skills (compass points, positional language, grid references); locational knowledge; map reading and drawing skills

**SMSC:** Team work; resilience

#### Differentiation ideas:

- More able pupils could be extended to consider the effect of taking different routes/modes of transport e.g. the distance will vary for air and ground travel. Provide them with some challenge questions, e.g. Can you relate each part of the journey as a fraction of the total distance?

Activity 6.3: Send a Postcard to Space

KS1

Curriculum links:

Language and Literacy: Writing – Participate in modelled, shared, guided and independent writing for a variety of purposes and audiences

History: Important events post 1066.

Differentiation ideas:

- Use this clip to stimulate and generate rich vocabulary and ideas about their time in space. Come up with some starter sentences: [http://www.esa.int/spaceinvideos/Videos/2016/06/Tim\\_Peake\\_mission\\_wrap\\_up](http://www.esa.int/spaceinvideos/Videos/2016/06/Tim_Peake_mission_wrap_up)
- For younger or less able pupils there are opportunities for modelled and shared writing or paired work.
- Pupils could write a few sentences to inform their fellow astronauts and could think about using appropriate punctuation when writing e.g. full stops and capital letters.

Lower Key Stage 2

Curriculum links:

Language and Literacy: Writing, selecting, planning and using appropriate style and form; develop increasing competence in the use of grammar and punctuation to create clarity of meaning

History: Important events post 1066.

Differentiation ideas:

- Use the questions for the class from the teachers notes to engage pupils. Use the video wrap up of Tim’s time in space [http://www.esa.int/spaceinvideos/Videos/2016/06/Tim\\_Peake\\_mission\\_wrap\\_up](http://www.esa.int/spaceinvideos/Videos/2016/06/Tim_Peake_mission_wrap_up) to stimulate and generate vocabulary, focusing on the theme of literacy (adjectives, noun phrases, fronted adverbials etc) Pupils could then create their own recount of their time in space.
- For more able students, can they write their postcard as a poem?

## CURRICULUM LINKS: ENGLAND

### Upper Key Stage 2

#### Curriculum links:

**Language and Literacy:** Writing, selecting, planning and using appropriate style and form; develop increasing competence in the use of grammar and punctuation to create clarity of meaning

**Computing:** Search technologies; using the internet safely and responsibly

**History:** Important events post 1066

#### Differentiation ideas:

- More able or older pupils in KS2 could develop their writing to consider organising their ideas in paragraphs, using appropriate vocabulary, spelling and punctuation and writing in the correct form and tense. Give them specific targets to suit their learning in literacy, e.g. add a relative clause, use an appropriate preposition or use a semi-colon in a subordinate clause. Pupils could research ideas from the starter video (on teacher notes) and include this in their postcard, e.g. Tim's spacewalk, Tim's daily fitness routine, running the marathon in space.
- For most able, challenge them to write their postcard using all three purposes: to persuade, to inform and to entertain.