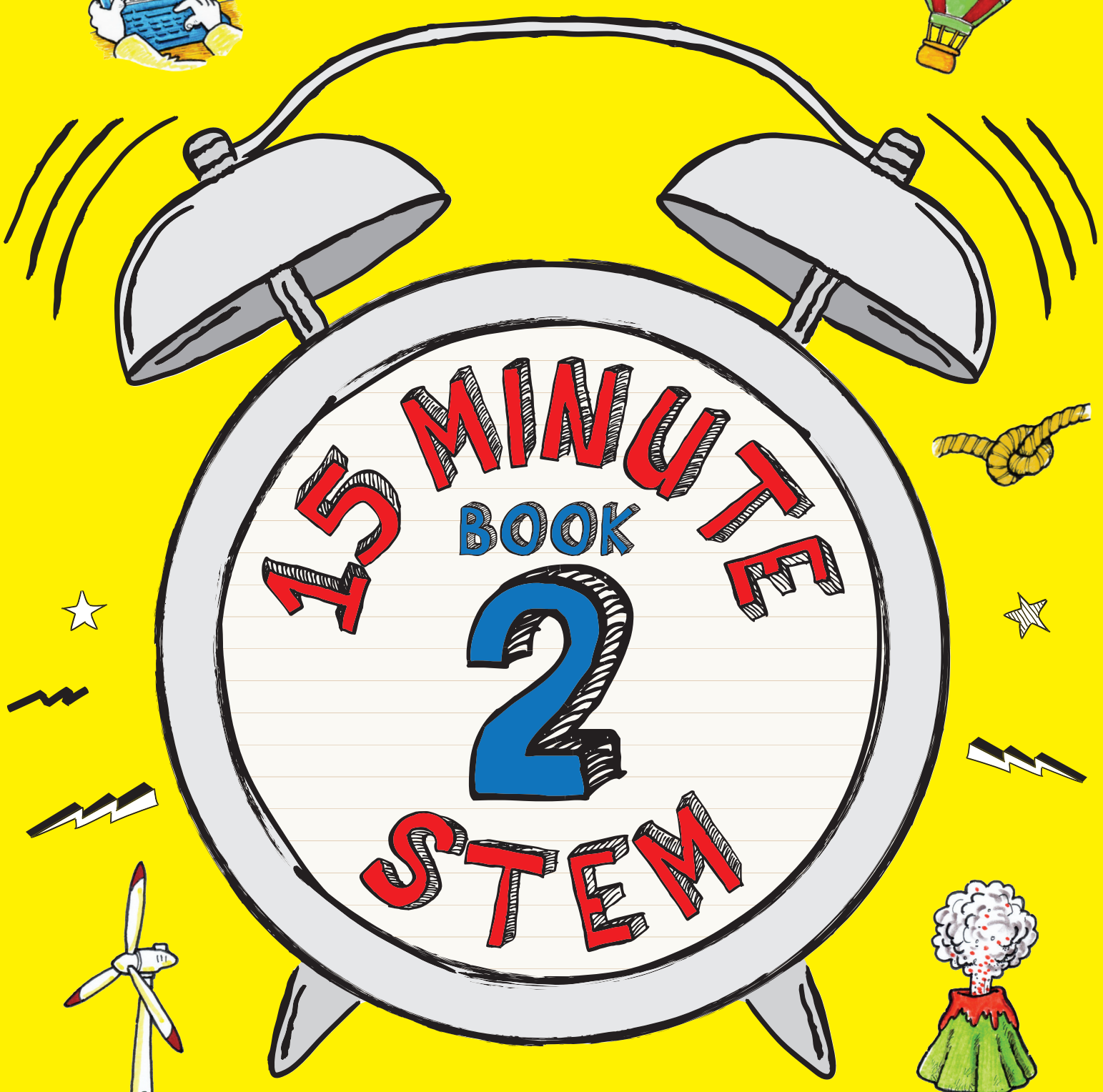
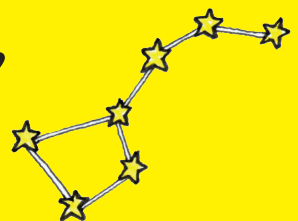


Emily Hunt



More quick, creative Science,

Technology, Engineering and Mathematics  
activities for 5-11-year-olds



# PRAISE FOR 15-MINUTE STEM BOOK 2

In a world in which our children will increasingly be expected to possess skills from the STEM world in order to thrive and flourish as adults, this inspirational book is a must-have for any primary school staffroom or indeed for parents with young children. Emily Hunt has collected 40 imaginative, engaging and easy-to-access STEM activities that will open up the minds of our young people.

*Bobby Seagull, school maths teacher, author of *The Life-Changing Magic of Numbers* and co-presenter of the BBC's *Monkman & Seagull's Genius Guide to Britain**

Emily Hunt does it again! *15-Minute STEM Book 2* is a must-have resource for busy teachers wanting to implement meaningful hands-on STEM learning. It offers highly engaging activities that walk you through the challenge, beginning with the set-up and materials and ending with connections to STEM careers as well as the concepts behind each activity. Your students will beg for more!

*Carly and Adam Speicher, STEM Curriculum Developers at Carly and Adam LLC*

*15-Minute STEM Book 2* offers a wide range of inexpensive, hands-on activities to stoke young children's engagement and develop their transferable soft skills as they explore new ways of thinking and doing.

The book features an amalgamation of well-known and loved activities as well as new ones (e.g. the Ocean Plastic Problem) that let the children lead their learning, while the hook questions will also be very effective in generating excitement and sparking debate. Furthermore, the 'What are we learning?' explanations will allay some adults' potential concerns about not knowing the answer, offering them a valuable scaffold with which to answer the children's questions on the subject.

*Dr Lyn Haynes, Senior Lecturer in Education and Science Tutor (Teach First Programme),  
Canterbury Christ Church University*

Emily has compiled a perfect book for teachers and families looking for simple STEM activities to do with young children. There are 40 ideas that can be done in any home or classroom using everyday resources. Plus, each challenge has career connections and ideas for further exploration. Get this book for every parent and teacher you know!

*Chris Woods, teacher, speaker, STEM nerd and author of *Daily STEM**

This book is crammed with loads of exciting and challenging learning opportunities to really get children hooked into STEM subjects. It offers engaging activities with clear instructions, and the beautiful illustrative photography makes it clear that we can all get stuck in, get mucky and develop our creative and logical thinking.

*15-Minute STEM Book 2* is just the resource to get kids excited for learning, and it will prove to be a treasure trove of ideas for the busy teacher.

*Martin Illingworth, Senior Lecturer in Education,  
Sheffield Hallam University and author of *Forget School**

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# ACKNOWLEDGEMENTS

It has been incredibly heart-warming to see the activities in *15-Minute STEM* come to life in the homes and schools of readers across the country. The opportunity to continue the series with a second book was too good to miss!

To the team at Crown House Publishing, thank you again for sharing my enthusiasm for STEM education and for your guidance throughout the process. It has been a pleasure to work with you once more.

To Jane Hewitt, whose wonderful photography brings each activity to life, thank you for all your hard work. Thanks also to Leonie, Tommy, LJ and Alex for their involvement in testing and modelling many of the activities.

This book was written in a time of unique global and personal challenges: in the midst of the COVID-19 pandemic and while on maternity leave with my newborn son, George. In a year marked by school closures and social distancing, parents and educators have been thrown in at the deep end with home learning. Suddenly, everyday items have been seen in a new light, as meaningful resources to bring learning to life. Learning about big ideas from ordinary objects is the very essence of the 15-minute STEM approach and I hope this book serves as a useful and inspiring resource for many.

# INTRODUCTION: MAKING REAL-WORLD STEM CONNECTIONS IN JUST 15 MINUTES

STEM (science, technology, engineering and mathematics) will play a crucial role in shaping our futures. From the digital revolution to the construction industry, from caring for our environment to space exploration, STEM industries continue to grow at a rapid rate and many young people will go into STEM-related jobs. STEM skills will be instrumental to meeting some of the biggest global challenges, as set out in the UN's sustainable development goals.<sup>1</sup>

STEM education is a captivating, inspiring way of connecting educational experiences to real-life opportunities. It's a cross-disciplinary approach with problem solving at its heart. In starting with a real-world problem or question we make the activity relevant to children's lives, helping them to make connections between what they are learning, *why* they are learning it and how they could use it in the future.

But then again, if you've picked up this book, the chances are you already know all of that. Perhaps you've already enjoyed *15-Minute STEM*<sup>2</sup> and are back for more quick, easy-to-resource STEM activities. If you haven't, then you may well be looking for answers to one or all of the following questions:

How do I get children excited about STEM education?

What equipment do I need?

How do I introduce the 15-minute STEM activities?

How can children learn STEM skills in just 15 minutes?

Is 15-minute STEM purely about science, technology, engineering and maths?

*15-Minute STEM Book 2* is compiled of 40 quick, easy-to-resource activities for primary school teachers and is also ideal for parents to use at home with their children. Each activity can be made suitable for ages 5–11 with a little bit of adaptation. The activities have been tested to ensure that they take just 15 minutes, although some require a little advanced preparation or need to be returned to later in the day – these are clearly indicated. This means that with minimal preparation you can slot them into those spare moments in an otherwise busy day.

The photographs in this book were taken during the COVID-19 pandemic. Due to school closures and social distancing restrictions only a small number of children could be used to illustrate the activities. We look forward to featuring more children in the images for subsequent reprints when restrictions allow.

---

1 <https://sdgs.un.org/goals>.

2 Emily Hunt, *15-Minute STEM: Quick, Creative Science, Technology, Engineering and Mathematics Activities for 5–11-Year-Olds* (Carmarthen: Crown House Publishing, 2018).

## How do I get children excited about STEM education?

### Hook children in with a real-world problem or question

Each activity begins with a hook question, designed to generate excitement and spark debate. These hooks can be found below the title of each activity. They are worded as a question that a child might ask themselves and make real-world links to a diverse range of areas, from natural disasters to robotics. Wording the hook questions in this way helps to contextualise the learning, giving the activity a real-world purpose and helping children to see the practical application of the skills and learning involved. The diversity of the hook questions also gives you the flexibility to select an activity based on – for example – a particular area of interest, a topical issue or a current area of learning.

## What equipment do I need?

### Keep your resources simple

When we think of STEM education, we often think of expensive equipment such as 3D printers, computers and robotics kits. In reality there are lots of fantastic STEM activities that can be resourced using everyday materials found at home or in the classroom, allowing you to deliver them at short notice. By keeping the resources simple and familiar, we encourage children to think more creatively about how to use them. The 'You will need' boxes outline the resources you will need to complete each activity once. You will need a set of resources for each child or group undertaking the activity.

## How do I introduce the 15-minute STEM activities?

### Let the children lead the learning

Pose your hook question, expose the children to the resources and then step back and let them lead the learning. So often we 'teach' children how to do activities, guiding them through each step to help them avoid mistakes. Instead, the 15-minute STEM instructions are written as a script that can be delivered directly to the children, and you'll notice that these instructions are on the lighter side. I'd encourage you to be hands-off with the children, supporting where needed with guidance and encouragement.

## How can children learn STEM skills in just 15 minutes?

### Know your key takeaway points

While we want to encourage children to lead the learning, it's also important to end each activity with a shared understanding of what we have learnt. Therefore each activity is accompanied by a 'What are we learning?' box which provides a simple, child-friendly explanation of the activity, reassuring you that you don't need to be an expert to deliver high-quality STEM education. You may find that an activity introduces a new concept, or it may help to consolidate an area of prior learning by encouraging your child or class to put their knowledge into practice within a real-world context. Stick to the basic structure of the activity with younger children and use the 'Investigate' cues to extend the task with older children.

## Is 15-Minute STEM purely about science, technology, engineering and maths?

### Each activity develops soft skills

When we step back and let children solve problems themselves, we provide a fantastic opportunity for them to develop soft skills. Critical thinking, problem solving, confidence, creativity, the list goes on ... These soft skills are crucial to success in STEM, as well as in other careers. You will see from the icons at the top of each page that many of the activities have the option to be completed in teams. This provides children with an excellent opportunity to develop the skills of teamwork and communication, for example. The activities also give children opportunities to make mistakes in a safe, supportive environment, enabling them to develop the important skill of resilience. Remind them that mistakes are an important part of the learning process, they're inevitable and, often, they're an important milestone on the way to something greater.

### Oh, and another thing ...

### 15-minute STEM activities link to future careers

Each activity is linked to two STEM careers that engage with conceptually similar tasks, a glossary of which is included at the back of the book. Research shows that the perceptions children have about certain jobs and careers are formed at a young age and that gender stereotyping exists from the age of 7.<sup>3</sup> By introducing children to relevant STEM careers we can challenge these early perceptions and stereotypes and widen their career aspirations. Giving children activities that expose them to the world of work from an early age isn't daft; it's helping to give them the best start in preparing for their futures. When children are learning something, they should be thinking about *why* they're learning it.

### Now, let's get started!

---

3 Nick Chambers, Elnaz T. Kashefpakdel, Jordan Rehill and Christian Percy, *Drawing the Future: Exploring the Career Aspirations of Primary School Children from Around the World* (London: Education and Employers, 2018). Available at: <https://www.educationandemployers.org/wp-content/uploads/2018/01/Drawing-the-Future-FINAL-REPORT.pdf>.

# HEALTH, SAFETY AND A FEW OTHER BITS

- ⦿ Some activities come with templates or resources for you to copy (e.g. activity 13, Hot Air Balloon Flight), but you might want to have a go at making your own instead.
- ⦿ Some of the activities are seasonal. For example, activity 28, Rainbow Leaf Walk, works best in the autumn when there are lots of fallen leaves. Save these activities for the right time of year.
- ⦿ Some of the activities are messy! It's a good idea to try them outside and to make sure that you are wearing suitable clothing. This is indicated at the start of these activities – see the key below.
- ⦿ Some of the activities need to be returned to throughout the day (e.g. activity 33, Shadows and Sundials). Again, this is noted at the start of these activities.
- ⦿ Some of the activities require a small amount of advanced preparation (e.g. for activity 40, Winter Coats, you will need to have a tray of ice cubes frozen ready).
- ⦿ Some of the activities involve the use of single-use plastics. Where possible, reuse these plastics for other activities.

Some important guidelines to share with the children:

- ⦿ When working with warm water, take it from the hot tap rather than a boiling kettle.
- ⦿ When doing outdoor activities, remember to stay within sight of an adult.
- ⦿ Take care with sharp objects, such as scissors.
- ⦿ Never taste any of the products of the experiments.
- ⦿ Wash your hands after completing each experiment and be careful not to touch your eyes.
- ⦿ Be respectful of the natural environment, being careful not to disturb it.
- ⦿ When working with living creatures such as minibeasts, make sure they are returned to where they are found.

Throughout the book you'll find different icons next to the activities. Here's what they mean:



You will need to return to these activities later in the day to make observations or collect more results.



These activities can be done individually.



These activities can be done inside.



These activities are also suitable for teams.



These activities are best done outside.



Be extra safety-conscious with these activities; adult help or accompaniment may be necessary.





Best done outside



Can be done individually



Suitable for teams

# 1. ANIMAL CAMOUFLAGE WALK

How do animals protect themselves from predators?

## You will need

- A camera, or phone/ tablet with a camera
- A magnifying glass
- A timer

## Investigate

The military often uses camouflage to protect its people and equipment from observation by enemy forces. See if you can find three examples.



## How to do it

1. Decide on an outdoor setting for your walk (e.g. a woodland, a field, a playground).
2. You have just 15 minutes to find and photograph as many examples of animal camouflage as you can find. See if you can find examples from across different animal groups (e.g. birds, mammals and arthropods, which includes insects).
3. Use a magnifying glass to investigate each animal further. Try looking closely at tree trunks, leaves and flowers, and within leaf litter.
4. When the time is up, review the findings and count how many examples you photographed.

**Optional:** Now select a different outdoor setting and see if you can find different examples of animal camouflage.

## What are we learning?

Some animals protect themselves from predators by blending into their surroundings using camouflage. Examples of this might be a grey squirrel against tree bark, a moth on a wall or a green shield bug on a leaf. Other animals use colour to make them stand out as a defence against predators. Examples of this are the red of a ladybird or the black and yellow stripes of a bee. This is called 'warning colouration' and signals to any potential predators that the animal is too costly to attack and eat, because it may be poisonous or aggressive.



Biologist



Naturalist



Can be done inside



Can be done individually

## 2. BALLOON HOVERCRAFTS

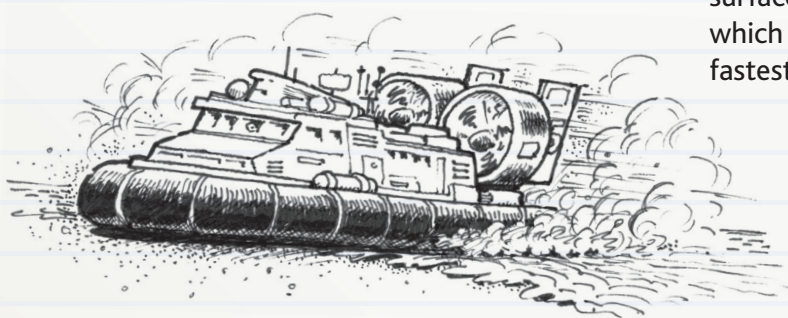
How can we reduce friction using air?

### You will need

- A balloon
- A CD
- A push-up sports bottle cap
- Sticky tack

### Investigate

Now vary the amount of air in the balloon to see how this affects its speed of travel.



### How to do it

1. Push the bottle cap down into the closed position and place it in the middle of the CD, over the hole, securing using sticky tack.
2. Inflate the balloon and stretch the opening to place it over the bottle cap.
3. Position your hovercraft on a flat surface, lift the bottle cap (inside the balloon) up into the open position and watch your hovercraft move. You may need to give it a gentle nudge to get it started!
4. Now test your hovercraft on a range of different surfaces (e.g. table, carpet, concrete playground). On which surface does your balloon hovercraft move fastest? On which is it slowest?

### What are we learning?

Friction is a force that is created when surfaces rub against each other. The balloon releases air, creating an air cushion beneath the CD. Without this air cushion the CD would have experienced far more friction if you had given it a gentle push to help it move across a surface and this would have slowed it down. Smoother surfaces (e.g. a polished floor) create a better air cushion than rougher surfaces (e.g. a carpet), allowing the balloon hovercraft to travel faster. Real hovercrafts create a cushion of air beneath them, drastically reducing frictional forces, and have propellers to drive them forwards across surfaces such as water or ice.



Mechanical engineer



Physicist





Can be done inside



Best done outside



Can be done individually



Suitable for teams

## 3. BEAVER DAMS

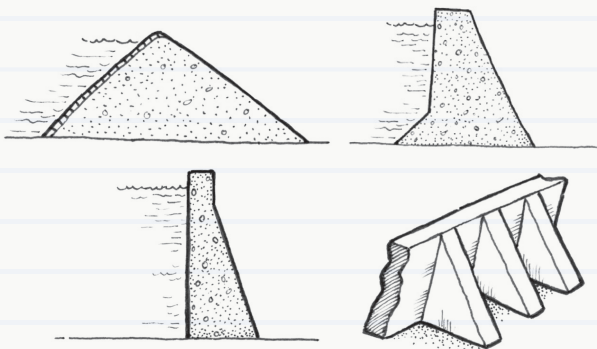
Why do beavers build dams?

### You will need

- A tray
- Water
- Natural materials (e.g. sticks, stones and sand)
- A jug

### Investigate

Research one of the world's most famous dams (e.g. the Hoover Dam in the USA or the Three Gorges Dam in China).

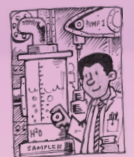


### How to do it

1. Begin with a tray, half-filled with water. This represents a river. For this activity you will need to imagine that you are a beaver, living on the river. Your challenge is to build a dam on the river to create a still area of water for you and your family to live in.
2. Collect natural materials (e.g. sticks and stones) that you could use to construct a dam.
3. Use these materials to build a dam wall across the middle of the river that will store the water, creating a still pool for your beaver family.
4. Slowly pour water from a jug into one end of the tray to represent the river flowing down from upstream. Does the dam work in stemming the flow of water? If not, how could you improve your design?

### What are we learning?

A dam is a barrier that restricts the flow of water in a river. Beavers are accomplished engineers who build dams on rivers using natural materials, creating a still pond to call their home. They are far more comfortable on water than they are on land, so a dam provides protection against predators and easy access to food. They use their strong teeth to gnaw through tree branches to add to the walls of their dam. There are four main types of man-made dam: embankment, gravity, arch and buttress. They are built from concrete or natural materials, such as rocks and earth, and are created to suppress floods or to store water for uses such as irrigation or drinking. We can also obtain electricity from the water through hydroelectric power, as water flows with the force of gravity to turn water turbines.



Water engineer



Environmental engineer



Building on the success of *15-Minute STEM*, Emily Hunt returns with another stimulating selection of easy-to-resource STEM activities designed to engage and inspire young learners.

Like most teachers and parents, you probably recognise STEM as being an important priority area for modern education. You may, however, be wondering:

- ① What does STEM education look like for young learners?
- ② How do I get children excited about STEM education?
- ③ How can children learn STEM skills in just 15 minutes?
- ④ What equipment do I need to teach STEM activities?

Enter 15-minute STEM with the answers!

Full of engaging and practical ideas, this resource reassures teachers and parents that they don't need to be experts to deliver high-quality STEM education.

This inspirational book is a must-have for any primary school staffroom or indeed for parents with young children. Emily Hunt has collected 40 imaginative, engaging and easy-to-access STEM activities that will open up the minds of our young people.



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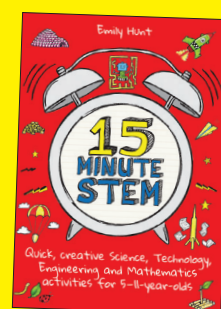
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*Dr Lyn Haynes, Science Tutor (Teach First Programme) and Senior Lecturer in Education, Canterbury Christ Church University*

Also available



Emily Hunt is an experienced primary school teacher with a passion for promoting STEM education. She regularly writes articles and speaks about STEM, and shares activities and blogs on her website [www.howtostem.co.uk](http://www.howtostem.co.uk). Emily holds a Masters of Education from the University of Cambridge and has also worked within the US education system to deliver science outreach.



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