

IN BRIEF

Building the Future is the true story of a boy who changed the world: Isambard Kingdom Brunel. Many of the things he built are still used by us today! This pack is all about his achievements and the marvels of engineering...



1. LITERACY LESSON IDEAS

- Did your students have difficulty with any of the words in our story about Isambard Kingdom Brunel? Ask them to look them up in the **Storytime Glossary** – it's good to encourage them to find answers for themselves!
- Brunel came up with new ways to get from one place to another, so the **Class Discussion Sheet** is about different modes of transport. The questions encourage students to think about the way people moved around in earlier times, and how transport has changed in the modern day.
- The **Reading Comprehension Sheet** challenges kids to spot a *preposition*, two different kinds of punctuation and an example of *alliteration*. Can they do it?
- Test how well kids know the story of Brunel's childhood by asking them to put the events on the **Story Sequencing Sheet** in the right order by numbering them. This one can be tricky, so encourage them to go back and read the story again if they need to figure out when something happened.
- The **Storyboard** page has illustrations from this month's tale and spaces underneath for kids to retell Brunel's story in their own words. What aspects of his story do they emphasise in their version?
- What did the class think of Isambard? Turn to **Character Sheet: Brunel** and ask them the questions you will find there to get their opinions...
- The **Incredible Isambard Crossword** tests students' knowledge of Brunel and his works. Get them to reread the story (and read the **Isambard's Greatest Hits!** page) if they are having difficulty coming up with the answers.

Continued on page 2...

2. HISTORY LESSON IDEAS

- Find out about Brunel's most impressive creations on the **Isambard's Greatest Hits!** page. You can visit many of them today, and they could make ideal destinations for an educational school trip...
- Brunel was only one of the people that helped to transform the world during the Industrial Revolution of the eighteenth and nineteenth centuries. The **Ingenious Engineers!** page lists six amazing individuals and their achievements. Which one did your students find most interesting?

3. DESIGN & TECHNOLOGY LESSON IDEAS

- Were students inspired by the story of Brunel? Get them to come up with their own cool creations using the **If I were an Inventor...** pages. The first sheet asks them questions about what their device is for, what problems it has to deal with, and so on. The second page is a 'blueprint sheet' that they can draw their invention on!
- Bridges are very important in modern life, as they allow people and things to get from one place to another! Students can find out about eight of the most incredible ones in the world on the **Brilliant Bridges!** page. (One was designed by Isambard Kingdom Brunel – and another was partly designed by his son!) Can they match up the bridges described on the page with the pictures at the bottom?
- 'Infrastructure' is a big word for a big concept: it means the structures and facilities that allow our society to function. The **Incredible Infrastructure page** has six problems on it... and six infrastructure cards for students to cut out. Can they match the correct piece of infrastructure to each problem?
- The **Why Do Ships Float?** sheet has a cool experiment that teaches children about displacement! They will build a simple 'boat' out of aluminium foil that will stay on the surface of water where a solid ball of foil will sink like a stone! This was the principle that enabled Isambard Kingdom Brunel to build giant ships out of heavy iron plates...

Continued on page 3...

3. DESIGN & TECHNOLOGY LESSON IDEAS CONTINUED

- The **Make a Great Western Railway!** pages have a tricky puzzle on them: can students draw a railway line from one end piece on the game board to the other, using only straight sections and 90-degree bends? To make things even trickier, they can only use a certain number of sections in each row and column.

They can draw in the sections of track with a pencil (and use an eraser if they need to make adjustments) or they can cut out the track pieces on the first page and lay them down on the game board to complete the puzzle.

4. ART LESSON IDEA

- Bridges are amazing because they bring people and places closer together! The **A Bridge Between Two Worlds!** page has a bridge in the middle, and kids should draw two things that they would like to bring closer together at each end... what will they choose?

STORYTIME GLOSSARY

Look up any new words in this handy reference section!

The Cuttlefish's Love Story (Page 6)

- ▷ **Coral** – stony substance made by certain tiny sea creatures
- ▷ **Flitted** – moved quickly and lightly
- ▷ **Suitor** – person who wants to marry her
- ▷ **Googly** – rolling
- ▷ **Tentacles** – thin flexible limbs
- ▷ **Reef** – underwater ridge
- ▷ **Beneath** – under
- ▷ **Current** – flow of water
- ▷ **Investigate** – find something out
- ▷ **Composition** – piece of music he wrote
- ▷ **Gleefully** – in a very happy way
- ▷ **Crescendo** – very loud and intense part of a piece of music
- ▷ **Modestly** – in a humble way

Anansi Gets Hungry! (Page 10)

- ▷ **Rumble** – hungry growling noise
- ▷ **Hissed** – made a noise like 'hiss'
- ▷ **Blast** – sudden noise
- ▷ **Flopping** – moving loosely and clumsily
- ▷ **Ancestors** – people from the past that he is related to
- ▷ **Foothills** – hills next to mountains
- ▷ **Fibbing** – lying
- ▷ **Claws** – sharp pointy nails on paws
- ▷ **Contest** – game to see who will win
- ▷ **Quavering** – shaking
- ▷ **Bundled** – wrapped

▷ **Gruel** – thin porridge

▷ **Scuttled** – ran with short, quick steps

Building the Future (Page 15)

- ▷ **Impressive** – grand and awesome
- ▷ **Dockyard** – place where ships are fixed
- ▷ **Encouraged** – supported and persuaded
- ▷ **Geometry** – mathematics dealing with shapes, distances and angles
- ▷ **Creaked** – made noises like 'creak'
- ▷ **Sawdust** – powder made from wood
- ▷ **Shaft** – tunnel going straight down
- ▷ **Much obliged** – very grateful
- ▷ **Sewage** – poo and dirty water from toilets and sewers

The Billy Goats' Sandcastle (Page 20)

- ▷ **Bleated** – said in a wavering way
- ▷ **Trip-trapped** – walked in a way that makes a 'trip-trap' sound
- ▷ **Bucketloads** – buckets full
- ▷ **Battlements** – protected walkways on wall
- ▷ **Keep** – central fort in a castle
- ▷ **Driftwood** – wood washed up from sea
- ▷ **Stomped** – stepped heavily
- ▷ **Tide** – daily rise and fall of sea levels
- ▷ **Incoming** – coming towards them
- ▷ **Collapsed** – fell down

Continued on page 2...

STORYTIME GLOSSARY

2 OF 2

Petrosinella (Page 22)

- ▷ **Craved** – hungered strongly
- ▷ **Haunted** – disturbed
- ▷ **Fragrant** – nice-smelling
- ▷ **Towered over** – stood high above
- ▷ **Snorted** – breathed out sharply through her nose
- ▷ **Cheerful** – happy and positive
- ▷ **Tresses** – locks of hair
- ▷ **Thumping** – loud noises
- ▷ **Corsican** – from the island of Corsica
- ▷ **Brayed** – made a loud, harsh noise
- ▷ **Pounced** – jumped
- ▷ **Windowsill** – ledge at bottom of window

The Racer from Outer Space (Page 30)

- ▷ **Chariot** – small two-wheeled wagon
- ▷ **Barn** – farm building for storing things in
- ▷ **Flyer** – a small printed advertisement
- ▷ **Drone** – remote-controlled machine
- ▷ **Wreckage** – remains of a destroyed thing
- ▷ **Porthole** – round window in vehicle
- ▷ **Beckoning** – gesturing to come closer
- ▷ **Roamed** – travelled
- ▷ **Zooming** – going quickly
- ▷ **Cockpit** – place for pilot to sit
- ▷ **Steered** – directed the vehicle
- ▷ **Dodgem** – vehicle made to bump into others, common at funfairs
- ▷ **Pinball** – ball that bounces around a pinball game table

Thor Goes Fishing (Page 36)

- ▷ **Echoed** – bounced back and forth
- ▷ **Fumed** – said in an angry way
- ▷ **Bait** – food to attract fish
- ▷ **Twitch** – move slightly
- ▷ **Tiddlers** – tiny fish
- ▷ **Encircles** – goes around
- ▷ **Straining** – almost breaking
- ▷ **Surface** – top of the water
- ▷ **Hook** – catch with a hook
- ▷ **Cowardice** – being a coward

The Three Dolls (Page 40)

- ▷ **Thrilling** – exciting
- ▷ **Identical** – exactly the same
- ▷ **Bustled** – came in a busy way
- ▷ **Ingenious** – very clever
- ▷ **Amuse** – entertain and make laugh
- ▷ **Acrobatics** – spectacular leaps, tumbles and other gymnastic movements
- ▷ **Juggling** – throwing and catching
- ▷ **Eccentric** – different from normal
- ▷ **Poked** – pushed
- ▷ **Threaded** – pushed through a narrow hole

CLASS DISCUSSION SHEET

LET'S TALK ABOUT... **modes of transport!** Isambard Kingdom Brunel built railway lines, ships and other ways of getting from one place to another... so let's discuss how we travel!

- 1.** How do you think people moved about in Isambard Kingdom Brunel's time? Try to list all the ways they could travel...

- 2.** What modes of transport do we have today that didn't exist in Brunel's era? In which respects are they better than older ways of getting around, and can you think of any drawbacks they have?

- 3.** What is your favourite means of getting from one place to another? Tell us why you think it is the best – come up with at least three reasons why others should try it!

MY DREAM TRIP!

Can you think of a method of travelling that you haven't used but would really like to try? Draw a picture of it on the right – it can be a real means of transport or one that doesn't exist... yet!

I would really like to travel by:



NAME _____

CLASS _____

READING COMPREHENSION SHEET

Do you know the difference between a preposition and alliteration?
Show off your knowledge by answering the questions about this extract!

66

Marc and Isambard sailed under the bridges that carried people and wagons between north and south London. These bridges were very crowded and creaked under the weight of the traffic on them. Isambard thought they looked very unsafe.

"Why do we need bridges to go across the river?" Isambard asked one day. "There must be a better way to do it!"

99

1. A *preposition* is a kind of word that tells us where somebody or something is. Can you spot the preposition that means 'beneath' in the first sentence of the extract?

2. An *alliteration* is a word that sounds like the thing it is describing. Can you find an alliteration in the second sentence?

3. In the last two sentences, there is one punctuation mark that tells us that young Isambard is asking a question, and one that tells us that he is saying something loudly. What are they?

PREPOSITION PUZZLE!

What are the opposites of the prepositions below?

Near: _____

Below: _____

Ahead: _____

ANSWERS: 1. Under. 2. Creaked. 3. The question mark (?) and the exclamation mark (!).
Preposition Puzzle! Far, above and behind.

STORY SEQUENCING SHEET

The story of Isambard Kingdom Brunel has been jumbled up. It's up to you to put the events back in the right order – check the story if you need to!

Isambard said there must be a better way to get across the river.
Marc agreed and told him he had an idea about how to dig a tunnel!

Isambard loved going to the dockyard where his father worked.
They would take a boat that went along the River Thames.

Marc had designed a 'tunnelling shield' that would help them dig
a tunnel under the River Thames.

Isambard was inspired by his father's clever ideas and decided that
he wanted to be an engineer like his dad when he grew up.

When the boy had finished school, Marc hired him to help design
new things. He said he had an interesting new project!

Isambard Kingdom Brunel's mother was English, and his father was
French. The boy was born in London and had a happy childhood.

After many years of work, Isambard finished the tunnel – the first of
many amazing engineering projects he would complete!

Marc told Isambard that he got the tunnelling idea from a shipworm,
which eats through wood and builds a tunnel behind itself with its poo!

The Brunels began working on the tunnel. It was dirty and dangerous
work, and Marc soon got ill. He put Isambard in charge of the digging.

When he was old enough, Isambard went off to school in Hove.
His favourite subjects were maths and drawing.

As the boat went down the river, Isambard drew the things he saw.
Marc gave him tips to help make his pictures more accurate!

NAME _____

CLASS _____

STORYBOARD

Tell the tale of Isambard Kingdom Brunel your own way! Write about what happened to him under the colourful pictures below...

1



2



3



4



NAME _____

CLASS _____

CHARACTER SHEET: BRUNEL

Isambard Kingdom Brunel was certainly a creative kid!
What did you learn about him in this month's story?
Show your knowledge by answering these questions...



Who do you think was Isambard's greatest inspiration?

What do you consider to be Isambard's most impressive achievement?

From the story you read, what three adjectives would you use to describe the young Isambard Kingdom Brunel?

What symbol would you put on Isambard Kingdom Brunel's coat of arms? Draw it here!



If Isambard was your friend, what would you get him as a birthday gift?

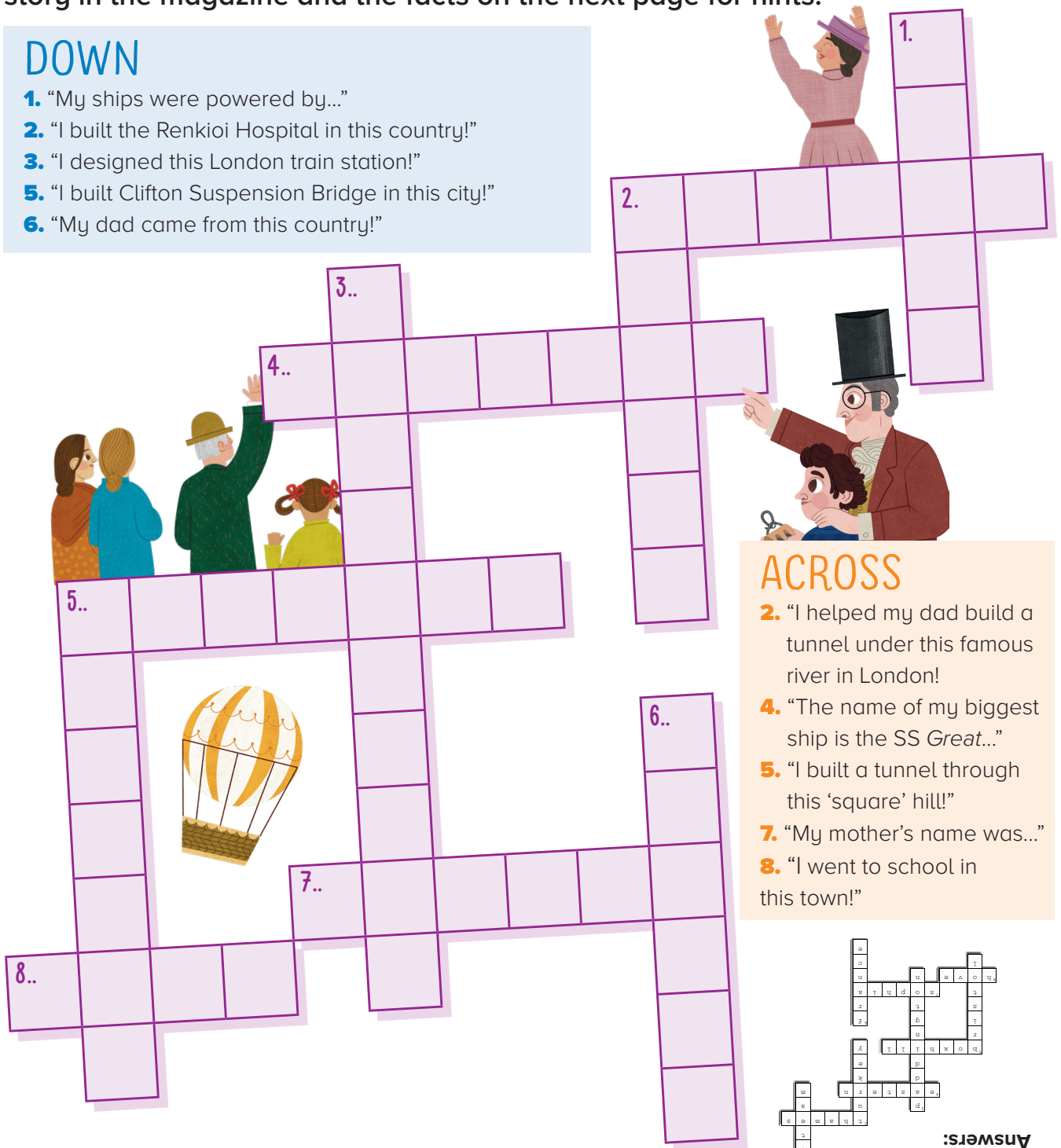
If Isambard visited the UK in modern times, what buildings or other structures do you think he would be impressed by?

BRILLIANT BRUNEL CROSSWORD

How well do you know the story of Isambard and his ingenious inventions? Test your knowledge by completing this crossword... and check out the story in the magazine and the facts on the next page for hints!

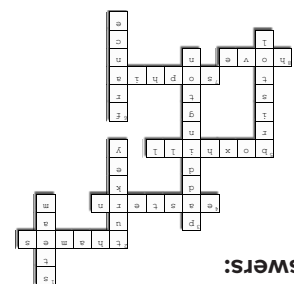
DOWN

1. "My ships were powered by..."
2. "I built the Renkioi Hospital in this country!"
3. "I designed this London train station!"
5. "I built Clifton Suspension Bridge in this city!"
6. "My dad came from this country!"



ACROSS

2. "I helped my dad build a tunnel under this famous river in London!"
4. "The name of my biggest ship is the SS Great..."
5. "I built a tunnel through this 'square' hill!"
7. "My mother's name was..."
8. "I went to school in this town!"



Answers:

NAME _____

CLASS _____

ISAMBARD'S GREATEST HITS!

Check out the boxes below for facts about Isambard Kingdom Brunel's most awesome creations. You can still see many of them today!

THE CLIFTON SUSPENSION BRIDGE

This awesome bridge stretches across the Avon Gorge between Bristol and Leigh Woods. It's 412 metres long and 101 metres above the River Avon.

Cool fact: It took so long to build that Brunel died before it was finished.

Can you visit it? Yes! It is a top tourist spot in Bristol.



THE GREAT WESTERN RAILWAY

Brunel was in charge of building this railway line from London to Bristol and Exeter. He built many impressive bridges, viaducts and tunnels for it – as well as Paddington Station in London!

Cool fact: The tracks on this line were placed far apart for a smoother ride.

Can you visit it? Yes! It is still in use.



THE THAMES TUNNEL

Isambard helped his dad build the first tunnel under the Thames when he was a teenager.

Cool fact: The lad almost drowned when the tunnel flooded!

Can you visit it? Yes! London Overground trains still go through the tunnel, and the shaft used to build it is part of the Brunel Museum!



SS GREAT EASTERN

This steamship could carry 4000 passengers from the UK to Australia and was the biggest vessel in the world at the time.

Cool fact: It was used to lay the first telegraph cable between Europe and North America.

Can you visit it? No! It was scrapped in 1889.

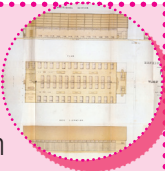


RENKIOI HOSPITAL

Brunel designed a hospital that could be assembled from a kit. It was built in Turkey, and many soldiers who were sick or injured in the Crimean War recovered there.

Cool fact: It had good drainage, ventilation and even central heating.

Can you visit it? No! It no longer exists, but you can see where it stood!



THE ROYAL ALBERT BRIDGE

This 666-metre-long bridge crosses the river Tamar between Plymouth, Devon and Saltash, Cornwall. Its design includes two large and unusual arching tubular sections.

Cool fact: Brunel's name was put on the bridge at both ends in big letters!

Can you visit it? Yes, and you can also see a picture of it on the British £2 coin!



INGENIOUS ENGINEERS!

Isambard Kingdom Brunel wasn't the only clever inventor who helped to change the world during the Industrial Revolution! Read about some of the others here!

ISAMBARD KINGDOM BRUNEL

Born in: Portsmouth, England
Lived: 1806-1859

Most famous for: building the Great Western Railway and its many bridges and tunnels.

You should also know about: his ground-breaking iron steamships, his air-driven railway and helping his father build the first successful tunnel under the River Thames!

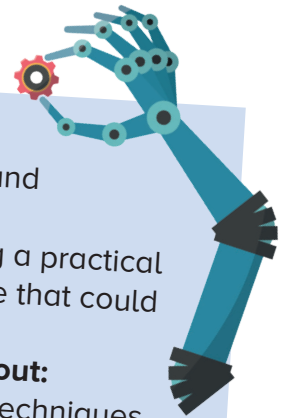


JAMES WATT

Born in: Greenock, Scotland
Lived: 1736-1819

Most famous for: creating a practical and efficient steam engine that could drive trains.

You should also know about: his copying machine and techniques for bleaching cloth!



RICHARD TREVITHICK

Born in: Portsmouth, England
Lived: 1771-1833

Most famous for: building the first steam locomotive, which first ran in 1804.

You should also know about: his work on mining technology and his invention of a steam-driven road vehicle called the London Steam Carriage!



ELEANOR COADE

Born in: Exeter, England
Lived: 1733-1821

Most famous for: developing a very high-quality kind of artificial stone, now known as 'Coadestone'. It is used in many famous buildings and landmarks!

You should also know about: her success as a businesswoman and sculptor!

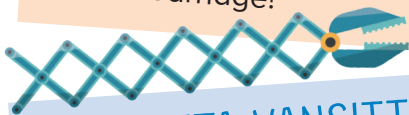


HENRIETTA VANSITTART

Born in: Gosforth, England
Lived: 1833-1883

Most famous for: inventing the fast and efficient Lowe-Vansittart ship propeller (which evolved from a design by her father, James Lowe)!

You should also know about: Henrietta being the first woman to write a scientific paper!

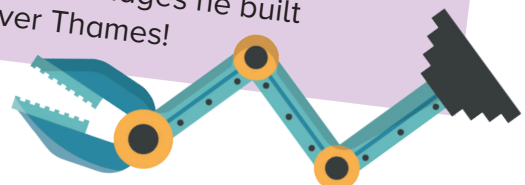


JOSEPH BAZALGETTE

Born in: London, England
Lived: 1819-1891

Most famous for: designing and building London's sewers – which stopped thousands of people from dying of diseases and made the city less stinky!

You should also know about: the many iconic bridges he built over the River Thames!



IF I WERE AN INVENTOR...

1 OF 2

Create your own amazing invention by following this worksheet, and then draw it in the frame on the next page.

1. What is your invention for? Is it for travelling long distances, going to new places or doing a difficult job quickly and easily?

MY INVENTION IS FOR:

2. How is your invention controlled? Is it run by a computer or a person? Is it remote-controlled?

IT IS CONTROLLED BY:

3. What is your invention powered by? Electricity, solar power, petrol, or something else?

MY INVENTION IS POWERED BY:

4. What problems will your machine have to deal with? Come up with two!

MY INVENTION WILL HAVE TO

DEAL WITH: _____

AND: _____

5. What will your invention have for overcoming these problems?

IT WILL HAVE A _____

AND A: _____

Great! Now that you have completed this form, it's time to draw your invention on the blueprint sheet! Don't forget to include all the bits you have listed above and then colour it in!

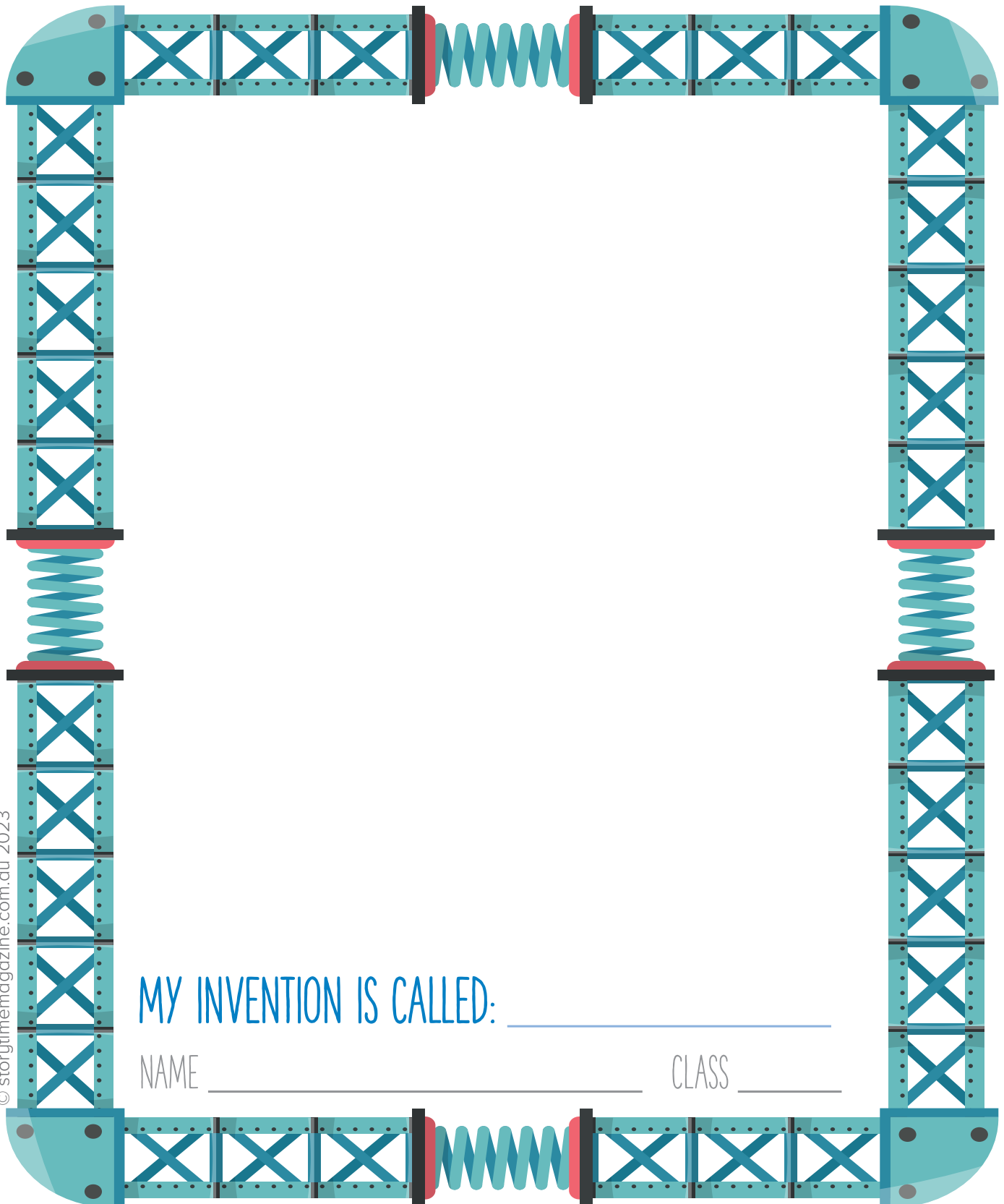
NAME _____ CLASS _____

IF I WERE AN INVENTOR...

2 OF 2

It's time draw your own ingenious creation.

Give it a catchy name and colour it in!



MY INVENTION IS CALLED: _____

NAME _____ CLASS _____

BRILLIANT BRIDGES!

Can you match up the descriptions of the bridges below with the pictures at the bottom of the page? You can look up the bridges if you need help!

1. SYDNEY HARBOUR BRIDGE

WHERE? Sydney, Australia

WHEN WAS IT BUILT? 1932

WHAT MAKES IT SPECIAL? It's the tallest steel arch bridge in the world, and a famous symbol of Sydney. It carries train, vehicles, bikes and pedestrian traffic.

2. PONTE VECCHIO

WHERE? Florence, Italy

WHEN WAS IT BUILT? circa 900 CE

WHAT MAKES IT SPECIAL? Its name means 'old bridge' in Italian, which is appropriate as it is over 1000 years old! It has shops on it, which was common for old bridges.

3. TOWER BRIDGE

WHERE? London, UK

WHEN WAS IT BUILT? 1894

WHAT MAKES IT SPECIAL? It is partly a suspension bridge and partly a bascule bridge! It is an icon of London, and Isambard's son, Henry Marc Brunel, helped design it!

4. CLIFTON SUSPENSION BRIDGE

WHERE? Bristol, UK

WHEN WAS IT BUILT? 1864

WHAT MAKES IT SPECIAL? It is Isambard Kingdom Brunel's most famous bridge, and was the longest one in the world when it was built. It took 33 years to complete!

5. GOLDEN GATE

WHERE? San Francisco, USA

WHEN WAS IT BUILT? 1937

WHAT MAKES IT SPECIAL?

When it was built, it was the longest and tallest suspension bridge in the world. It isn't really golden – it's 'International Orange'.

6. DANYANG-KUNSHAN GRAND BRIDGE

WHERE? Near Shanghai, China

WHEN WAS IT BUILT? 2010

WHAT MAKES IT SPECIAL? It's the longest bridge in the world at 164,800 metres. It is a viaduct bridge, meaning it is supported by many pillars.

7. MILLAU BRIDGE

WHERE? Aveyron

Departement, France

WHEN WAS IT BUILT? 2004

WHAT MAKES IT SPECIAL? It's the world's highest bridge, at 336.4 metres. It only took four years to build!

8. GREAT BELT BRIDGE

WHERE? Between Zealand and Funen, Denmark

WHEN WAS IT BUILT? 1998

WHAT MAKES IT SPECIAL?

It connects eastern and western Denmark and has a bridge for vehicles and tunnels for trains!

A.

☐


B.

☐


C.

☐


D.

☐


E.

☐


H.

☐


G.

☐


F.

☐


INCREDIBLE INFRASTRUCTURE

Brunel created railroads, bridges and many other things that help cities, countries and businesses to keep running. Can you work out which pieces of infrastructure are needed for different jobs?

A.

I need something to carry passengers and cargo from one city to another!
I need a:

B.

How do I get water from a reservoir to people's homes and businesses?
I need:

C.

I have to get from one side of this steep valley to the other! Time to build a:

D.

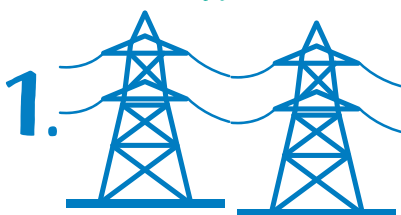
My railway line is blocked by this hill! I should dig a:

E.

How can I get electricity from the power station to people's homes?
This calls for:

F.

I need to get internet from the internet hub to people's homes!
I will put in some:



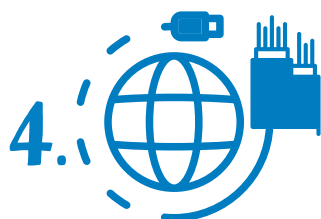
Power lines



Railway Line



Bridge



Fibre-optic cables



Water pipes



Tunnel

Answers: A. 2, B. 5, C. 3, D. 6, E. 1, F. 4.

WHY DO SHIPS FLOAT?

Brunel built some very impressive ships that were made of iron. Iron is heavy – so why didn't they sink? This cool experiment will show you why!

YOU WILL NEED:

- ✿ Kitchen foil
- ✿ Scissors
- ✿ Ruler
- ✿ 10 small coins
- ✿ Bucket or large bowl of water

WHY DOES THIS HAPPEN?

Objects float or sink based on how much water they push out of the way. If an object pushes aside (displaces) more water than it weighs, it will float!

The small ball doesn't push aside much water, so it sinks. The big, almost empty 'boat' pushes a lot of water aside, so it floats!

HOW TO DO THE EXPERIMENT:

- 1 Using the ruler and scissors, cut out two squares of foil that are 10cm long on each side.
- 2 Put 5 coins in the middle of one foil square and crumple it up around them to make a ball.
- 3 Use the second piece of foil to make a square 'boat' by folding up each side and pinching the corners together securely. Then, put 5 coins in the 'boat' you have made.
- 4 Now it's time to do your experiment. First, place the crumpled-up ball of foil in the bucket or bowl of water. What happens to it?
- 5 Now, gently place the foil boat in the water. What happens to it?

A: The ball should sink, while the 'boat' should float!

TYPES OF BOATS

There are many types of boats in the world. We have listed some of them below – but can you think of any others?

- | | |
|---------------------|----------------------|
| 1. Fishing Trawlers | 9. Launches |
| 2. Tugboats | 10. Jet Boats |
| 3. Yachts | 11. Lifeboats |
| 4. Cruise Ships | 12. Container Ships |
| 5. Catamarans | 13. Submarines |
| 6. Ferries | 14. Inflatable Boats |
| 7. Houseboats | 15. Pontoon Boats |
| 8. Canoes | 16. Cabin Cruisers |



MAKE A GREAT WESTERN RAILWAY!

1 OF 2

This puzzle challenges you to complete a railway line from one place to another – but can you do it with only a certain number of pieces? The rules and pieces for the game are on this page, and the board is on the next page.


DRAW A RAILWAY!

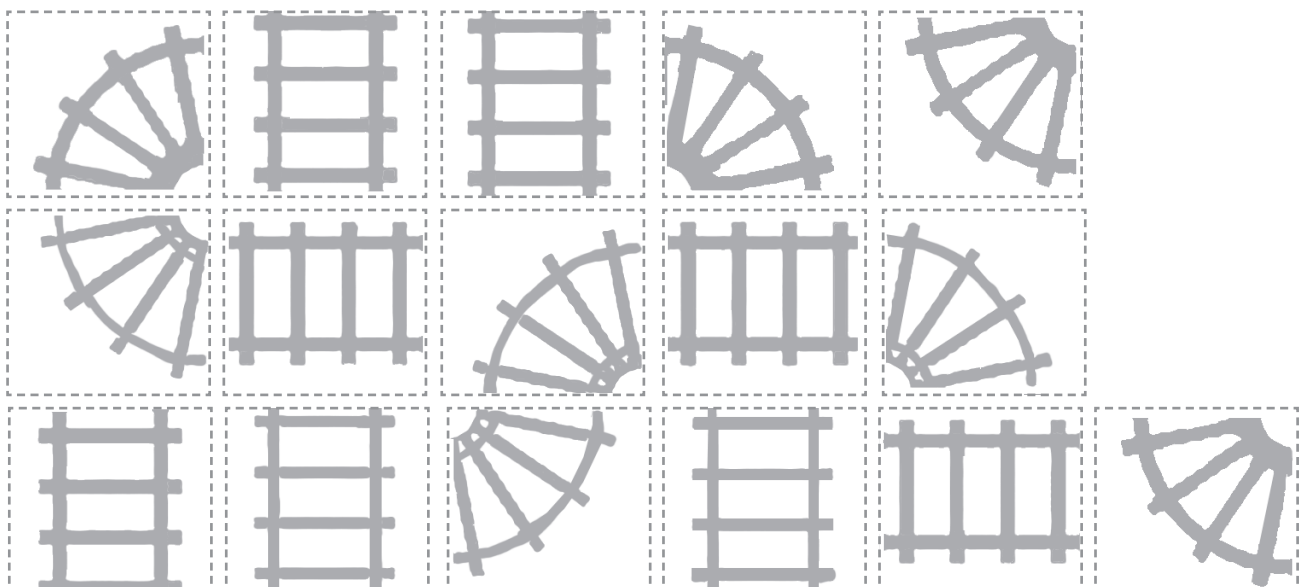
1 You can only use straight sections and curves to complete the track between the two sections marked on the board.

2 The numbers along the top tell you how many sections you are allowed to use in each column. For example, the first column has a '2', which means only 2 sections can be used in that column.

3 The numbers on the right of the board tell you how many pieces are allowed to be in each row. The number by the first row is '1', and there is already a section in one space – so you can't put any more pieces in that row!

4 Use a pencil to draw in your track sections and don't be afraid to rub sections out if you make a mistake. This is a tricky puzzle that would challenge Brunel – can YOU solve it?

 You can draw the track sections onto the board on the next page with a pencil OR cut out these pieces and use them to complete the puzzle!



MAKE A GREAT WESTERN RAILWAY!

2 OF 2

Use a pencil and rubber or the track pieces on the previous page to complete the railway line between the sections of rail marked on this board. You can only have a certain number of sections in each row and column!

2



5

2

1

3

4

1

6

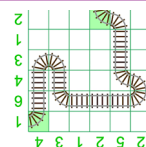
4

3

1

2

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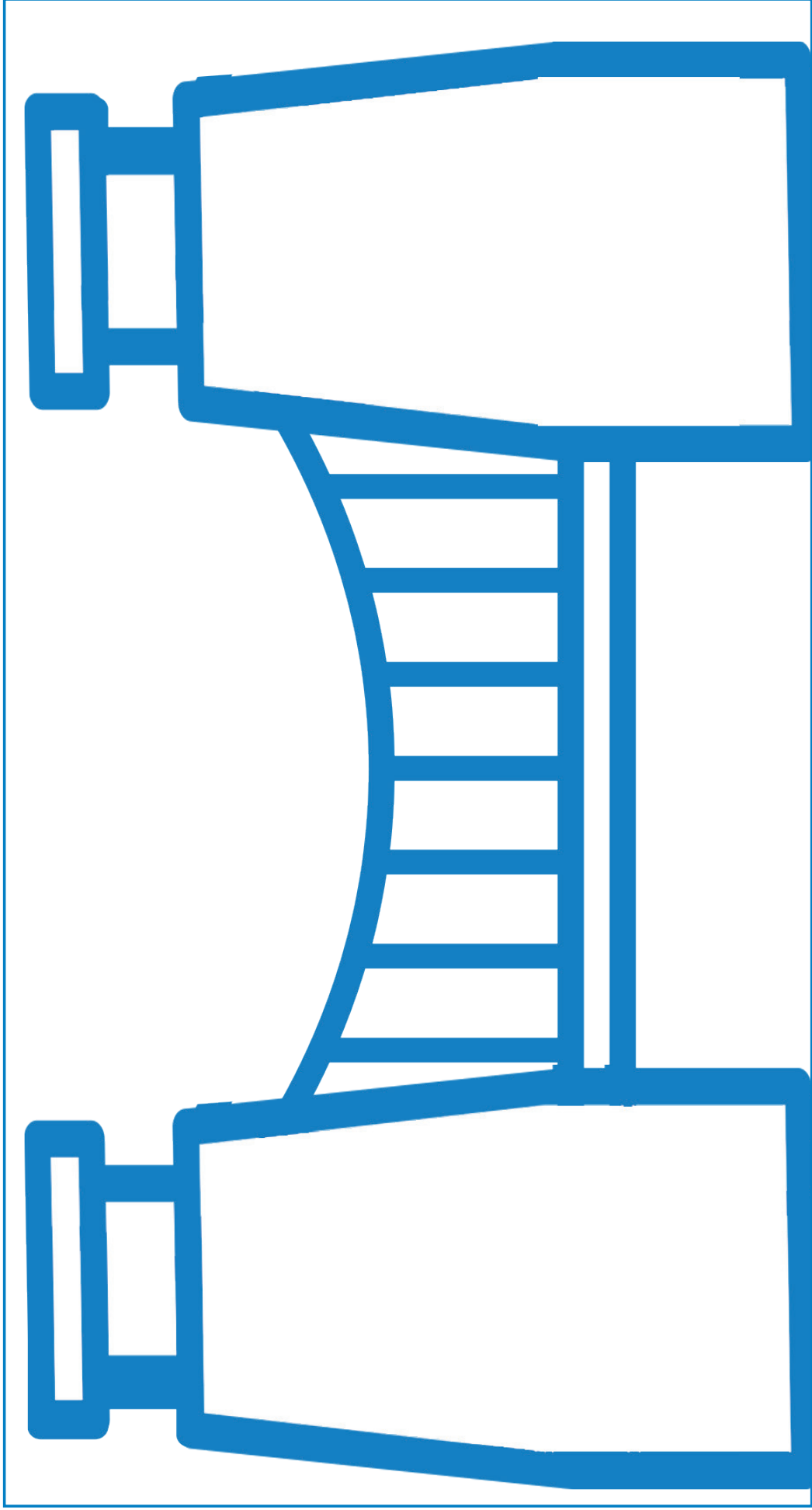


SOLUTION:

NAME _____

CLASS _____

A BRIDGE BETWEEN TWO WORLDS!



NAME _____

CLASS _____