



ICE SUPERHEROES

CIVIL ENGINEERS

SHAPING THE WORLD

ANOTHER ADVENTURE
BROUGHT TO YOU BY

ice.org.uk/wice

ICE SUPERHEROES ASSEMBLE!

ICE superheroes are engineers on a mission to look after people and the environment by designing, building and maintaining...



Transport systems to help us get around



Clean water and safe sewer systems



Sustainable energy



Protection from floods and other dangers



Great buildings to live, work and play in



Engineering is how we make things we need.
An **engineer** is a person who does engineering.

Engineers solve problems, invent and build things using maths and science.



Civil engineers design and build the **BIG** things that we need to live.
They are shaping our world. You could too if you become a civil engineer!

MEET OUR SUPERHEROES!

ICE superheroes are real civil engineers who help people and make our world a better place to live in.

Design your own civil engineer superhero. See page 15!



AYO SOKALE IS...

ECO REBEL

Ayo works for the UK Environment Agency – an organisation that looks after our natural environment.

She loves how her job shapes the world around her. In her spare time Ayo enjoys performing and singing and raising money for charity.

Top project: special tunnels (fish passes) that let trout and other fish and river wildlife pass through man-made structures in a river in Oxford.

ice.org.uk/eco-rebel



JENNY GILES IS...

COASTAL CRUSADER

Jenny lives and works on Guernsey – an island off the South West coast of England.

Her work as a maritime engineer is to protect civilisation when the sea attacks the coastline. But also to protect the natural environment of the coastline from being damaged by civilisation.

She really enjoys the exciting things she gets to do for her job, like travelling to remote lighthouses by helicopter! But also having the chance to work outside and enjoy the beauty of the sea, the cliffs the beaches, the boats and harbours and all that comes with our coasts.

Top project: Stabilising the boat landing on Les Hanois lighthouse.

ice.org.uk/coastal-crusader





ANDY MITCHELL IS...

INFRASTRUCTO

Andy is in charge of work to build London's 'super sewer' called Tideway.

This will prevent sewage flowing into the River Thames in the future and protect both the natural environment from pollution and many homes and businesses from flooding.

He loves knowing what he's doing is making our world better. He is also a big fan of nature.

Top project: Vast Tideway sewer system - building a new network of tunnels six times longer than the pipes that are there now.

ice.org.uk/infrastructo



HIBA KHAN IS...

PEOPLE PROTECTOR

Hiba designs barriers to protect people's houses from flooding and often works overseas in Asia as well as the UK.

She also creates irrigation (providing water) systems for growing food.

She loves exploring new countries; learning the languages and eating local food. She also likes to find ways to help the environment.

Top project: Stopping the erosion of river banks in Bangladesh.

ice.org.uk/people-protector



PARTHAJIT PATRA IS...

METRO MAN

Parthajit has worked on many clean water supply, sewer and tunnelling projects which have helped hundreds of thousands of people.

As well as being responsible for many of the major projects in his home city Kolkata he has also worked in other countries including Bangladesh and Bhutan.

Top project: Kolkata Metro, India's first underground city railway is more than 22km long. It was while working on this Parthajit saw how much the sewer systems needed improving.

ice.org.uk/metro-man





DR ELLIE COSGRAVE IS...

URBAN ANGEL

Ellie works at a university looking at the best ways to build our future cities.

She wants to make sure that urban areas are designed for everyone, so that people who can find it difficult to get around (for example people with disabilities or parents with pushchairs) can travel and have the same opportunities.

Ellie started an organisation called Science Grrl to get more girls into engineering. She also helps the charity Engineering Without Borders.

Top project: Ellie's research - Choreographing the City - showed how future engineering could be created like performance artists make dance.

ice.org.uk/urban-angel



DR ROBIN SHAM IS...

CAPTAIN CONNECTOR

Robin designs some of the world's longest and most difficult bridges to build.

His work includes the Taizhou Bridge - the world's longest three pylon suspension bridge which joins some of China's biggest cities across the Yangtze River.

Robin started his career working in the UK but is now based in his home city Hong Kong. He has received a CBE honour from HM Queen Elizabeth II for his work in engineering.

Top project: Robin designed our world-record breaking Lego bridge!

ice.org.uk/captain-connector



KATE CAIRNS IS...

ENVIRO

Kate is an environmental and civil engineer who is on a mission to help construction companies be greener.

An expert in new technologies, she gives them advice to help them work more sustainably and safely.

Her work to protect people walking and cycling from the dangers of heavy vehicles has saved many lives. Kate is also active in making sure that everyone who wants to can have a career in civil engineering.

ice.org.uk/enviro



FAMOUS CIVIL ENGINEERS OF THE PAST

These civil engineers of the past lived and worked during the industrial revolution – a time of huge developments in science and society.

ISAMBARD KINGDOM BRUNEL IS...

CAPTAIN INNOVATION

Isambard Kingdom Brunel aka Captain Innovation
1806-1859

Brunel built roads, bridges, ships, docks and railways. He was incredibly ingenious, often using new technologies and designs.

He famously wore a very high hat and at only around 5ft tall he was known as the Little Giant!

His most well-known projects were the Clifton Suspension Bridge and the first iron sea-going propeller ship the S.S. Great Britain.



THOMAS TELFORD IS THE...

COLOSSUS OF ROADS

Thomas Telford aka The Colossus of Roads
1757-1834

Telford designed and built so many roads he was given his nickname 'The Colossus of Roads'! He also worked on many other structures, including canals which were a really important way of moving food and goods.

He built the Menai Suspension Bridge between the island of Anglesey and Wales and was ICE's first president.

JOSEPH BAZALGETTE, IS...

CAPTAIN SANITATION

Joseph Bazalgette aka Captain Sanitation
1819-1891

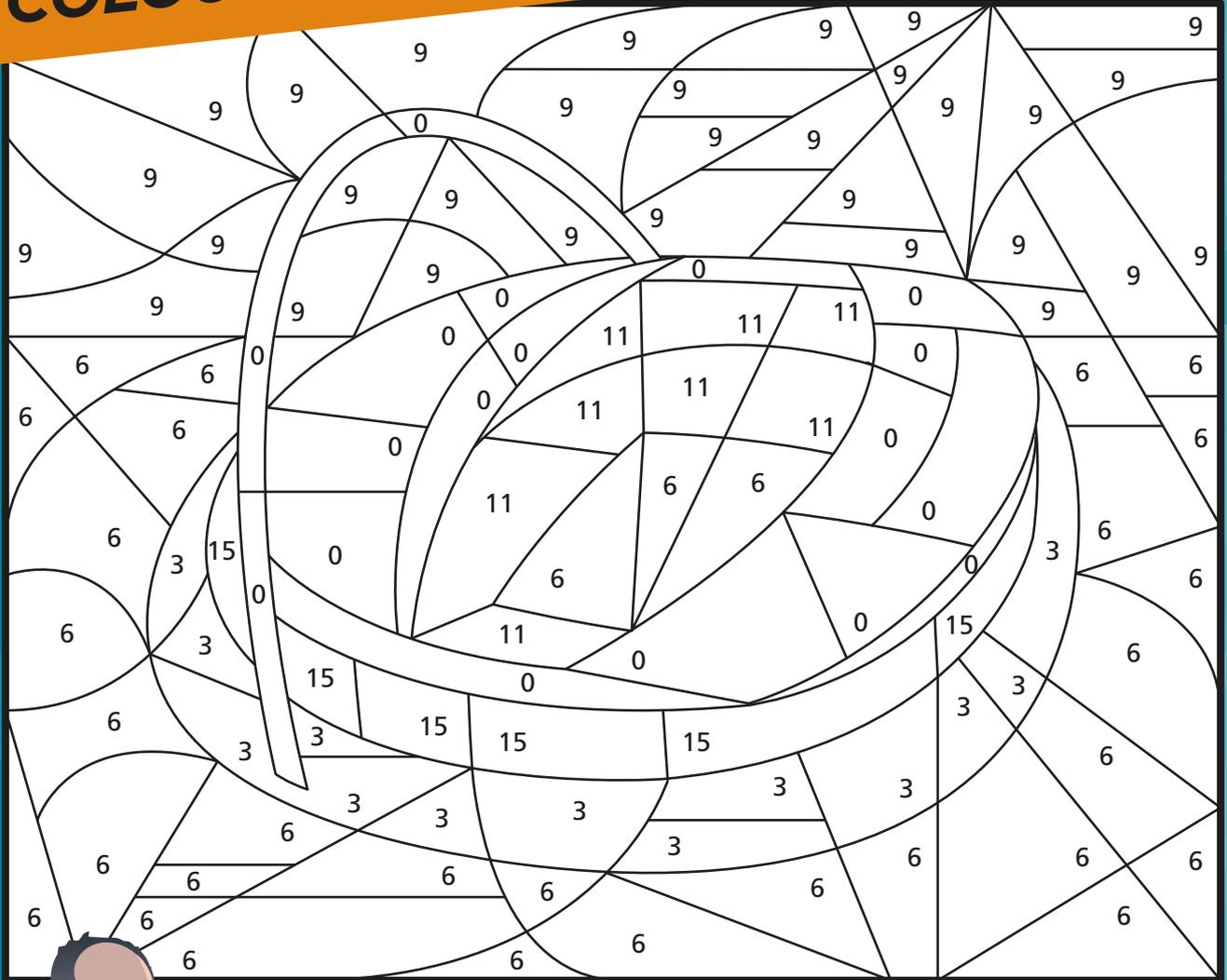
Bazalgette's great work was to create a vast network of sewers for London – saving countless future lives from diseases carried by water, like cholera.

It was the 'great stink' of 1858 when Bazalgette was given the task, after very hot weather and low rainfall meant that sewage built up in huge amounts on the banks of the River Thames. The smell was so bad that Parliament couldn't work and rapidly passed a law to raise money to pay for a solution!

The sewers he created are still being used today.



COLOUR BY NUMBERS



Find out what impressive structure is hiding in this picture by colouring in the segments. Work out the code for the colours by doing the simple maths questions first.

3 + 3 = Green

8 + 3 = Red

10 + 5 = Light grey

14 - 5 = Blue

7 + 4 = Dark grey

7 - 7 = White

ANDY MITCHELL IS...

INFRASTRUCTO

PARTHAJIT PATRA IS...

METRO MAN

TUNNELLING MAZE



Tunnel your way from A-B in your TBM. Find a route that avoids water, trainlines and pipes and joins the sites of future stations 1-4 together.



TBMs (Tunnel Boring Machines) are giant digging machines that can create tunnels between 1-17.6m across.

AYO SOKALE IS...

ECO REBEL

WORDSEARCH

Help Eco Rebel find all these structures to keep safe.

- SKYSCRAPER
- BRIDGE
- DESIGNING
- DAM
- HIGH SPEED RAIL
- WIND TURBINE
- ENGINEERING
- WATER SUPPLY
- TUNNELLING
- BUILDING

D F D T G Q C F A E B G Z V U I G O H J
 A S E R E Z W I N D T U R B I N E G W U
 H E S F T Y J A C V B U I M N P U U A M
 N N I H E L J K V C S D U B H O G T T U
 D G G R A I H Z S K Y S C R A P E R E T
 E I N H J B Y S P E E H V I D A G U R R
 S N I S U P P L J Q K C X D K D O L S S
 I E N E N G I N Y J G Y L G Y A L G U E
 H E G T Y W E D F V B O H E J M G L P H
 N R H G H I G H S P E E D R A I L Y P G
 Y I T U R B I M F S A T Y X L G J K L P
 F N P S S D R B R O G E W Q R F E S Y X
 D G W E H I G E S D R E E G H N K G O I
 G Q R B U I L D I N G U H P O R T G H V
 D D G H X W T T U N N E L L I N G G J K
 C S D S W E G S K Y S D E C S A R F C V



SPOT THE DIFFERENCE

Look carefully at these two pictures of a city. Can you see 5 differences?



DR ELLIE COSGRAVE IS...

URBAN ANGEL



AMAZING PROJECTS

ORESUND BRIDGE

Civil engineers designed and built this incredible bridge which joins an underwater tunnel to link two countries – Denmark and Sweden.

The weight of the bridge is partly supported by massive steel cables joining the deck (where the cars and trains run) to towers over 200m tall. It is 8km long making it the longest cable-stayed bridge in the world.

Find out more: ice.org.uk/oresund-bridge

Top Project Fact

Most of the bridge parts were made on the mainland and then floated out to where the bridge was being built.



AMAZING PROJECTS

HALLEY VI ANTARCTIC RESEARCH STATION

The Halley VI Antarctic base provides a home for scientists in this unique ice-covered continent.

It has skis attached to each leg to allow it to be dragged to safety when the ice cracks. Its legs can also lift it up out of deep snow when needed.

It has eight living and working modules made from steel and fibreglass panels. The base makes it easy to study wildlife like Emperor penguins, Weddell seals and many whales and seabirds, and the effects of climate change.

Find out more: ice.org.uk/halley-VI

Top Project Fact

Building the base took four years because it could only be safely done in the Antarctic summer!



AMAZING PROJECTS

ICON ROLLERCOASTER

Civil engineers designed the track for ICON the UK's first double launch rollercoaster.

This thrill-seeking ride reaches speeds of up to 85km/h and has two 'pushes' to make it twice as exciting!

Engineers designed the complex track using digital 3D computer drawings to make sure the different parts came together exactly.

Find out more: ice.org.uk/icon-rollercoaster

Top Project Fact

The ride goes through, over or under other rides 15 times during its high-speed journey across the Blackpool Pleasure Beach Park!



GET ENGINEERING

Learn more and start practicing to shape our world by becoming a civil engineering superhero in training!

ICE do-at-home activities

Check out our website for fun activities you can do in your home or classroom using everyday materials.

Build a bridge out of chocolate, create ice orbs, spaghetti marshmallow towers and more.

ice.org.uk/educationresources

ICE in schools

We've got over 2000 STEM ambassadors who volunteer to inspire young people in schools and clubs. If you'd like to find out more about what we offer then get in touch at careers@ice.org.uk or check out the ICE education page for your region (UK) at ice.org.uk/near-you



DESIGN YOUR OWN CIVIL ENGINEER SUPERHERO

Why not imagine yourself as a future civil engineering superhero? What problems will you solve? How will your amazing feats help people and the environment?

Superhero's
Name

Special
Powers

Superhero's
Feats



*Draw your
superhero here*

*Take of a photo of your drawing
and share with us using social media -
we'd love to see your ideas!*

Where next?

Get inspired by amazing people and projects.
[ice.org.uk/wice](https://www.ice.org.uk/wice)

Follow our social media accounts on
Instagram or Twitter

Look on our resources page for fun things to do
at home.

[ice.org.uk/educationresources](https://www.ice.org.uk/educationresources)

Ask a question or invite an ICE STEM
Ambassador to do something fun at your
school or STEM club.

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#WhatisCivilEngineering