Civil Engineering in Your Town

STEM activity workbook for primary classes

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Contents

Introduction

Welcome to the 'Civil Engineering in Your Town' (CEIYT) classroom activity for primary schools.

It uses a cartoon image of a town and asks the children to see how many examples of civil engineering they can spot in the picture. The cartoon / competition format helps to engage the children and opens up a discussion about the way civil engineers transform people's lives and keep us safe.

The discussion format gives flexibility over the activity timings: they can be extended or shortened to reflect the class ability and the time available (ask the teacher how long they think would be suitable when preparing).

Planning and preparation

The following summary is designed to help you plan and prepare for the activity. Please discuss your requirements in advance with the teacher or youth group leader to make sure everything ready on the day.

Type of activity	Interactive classroom session
Aim	An understanding of civil engineering, its benefit to society and how to become a civil engineer.
Age range	8-11
Duration	30-40 mins
Number of participants	Whole class (approximately 30 students)
Space required	Classroom
Resources (provided by STEM ambassador)	Presentations / handouts: CEIYT image (on laptop or memory stick) Materials: 25x A4-size copies of the CEIYT cartoon, colour if possible 1x printed copy of Annex B, so the teacher can check the answers if they wish
Resources (to be provided by school)	Projector / screen and laptop. Cable to connect to projector. Paper and pencils for children to down their write answers.
Risk assessment	See Annex A.
Curriculum links	-
Types of civil engineering featured	All

Running the activity

The activity is designed to be completed in a single classroom session. It is structured into the following stages:

- Preparation
- Introduction
- The CEIYT challenge
- A results and discussion session
- Time to clean-up before the next class

Preparation

- Have the CEIYT image ready to show on screen or, if that is not available, have at least one colour copy per table and one for you to hold up in front of the class
- Have the activity sheets ready to hand out
- Have the activity sheets ready to hand out

Introducing yourself, the activity and civil engineering (10 mins)

- Introduce yourself and say who you are
- Say that the class is going to work together to see what makes our towns and cities work for everyone
- Lead a short class discussion to get them to think about the infrastructure that we all depend on. One approach is to ask them what they did this morning and how they got to school. For example:
  - Turning on the tap to brush their teeth (water)
  - Flushing the toilet (waste water)
  - Eating breakfast (transport and logistics)
  - Turning the lights on or boiling a kettle (energy)
  - Travelling to school by car, bus, train, bike or on foot – on roads and pavements (transport)
  - Watching TV or checking phones (communications)
  - What happens when it rains? Where does the water go? (flood protection)
  - Who built the school they are in? (buildings and structures)

Ask the questions "*where does that come from?"* and "'*who makes it happen?*" as you go along. Try to hold back the answer, "*civil engineers*", to the end of the discussion period!

If time allows, ask them what they think a civil engineer looks like. Some may know about hard hats and high-vis jackets, which can lead on to an explanation of health & safety. It can also be used to introduce the idea that many civil engineers work in offices – so civil engineers have choices about where they work.

The CEIYT challenge (15 mins)

1. Congratulate the class on their ideas and explain you are going to challenge them to see how many examples of civil engineering they can spot in a picture.
2. Ask the class to work in pairs (or perhaps tables if the teacher thinks that is a better– see what they say) and handout the cartoon pictures.
3. Explain that the picture is part of a class competition to find the most examples of civil engineering and civil engineers at work. Students may write a list or draw a ring around their

selection. They have 10 minutes to find as many as they can (again, you can vary this depending on the class – the teacher should be able to advise on the ability range of the children and how much time the students might want to work on the sheets)
4. Walk around the classroom and check on the children as they work on the sheets in case they have any questions. Encourage them where they are doing well and offer hints if any are getting stuck. Let them know when they have 5 and 1 minutes left – and when the time is up.

The CEIYT results (10 mins)

1. Ask the class to put up their hands if they got more answers than 5, 10, 15, 20… (it is a quick way to get the results and have all of them engaged). When you are left with just two or three hands, ask them exactly how many each got and congratulate the winner.
2. Use the image on screen (or colour copies on the tables) to check on examples:
   Either ask each table to give an example
   Or ask the class to come up with examples, of transport, energy, waste, flood protection, etc.
3. Whichever examples come up, ask (or explain) why they are civil engineering. Ask what happens if it did not exist and how it would affect them

Conclusion (5 mins)

1. Thank them for their good work and for their questions.
2. Ask them to tidy-up their desks and hand over to the teacher.
3. Leave the answer sheet (see Annex B) for anyone who wants to check in more detail.

After the event

We would appreciate your help with two things after running the activity.

1. Information for teachers

Please do direct teachers / youth group leaders to the following resources, if they want to find out more about engineering:
- Tomorrow's Engineers: http://www.tomorrowsengineers.org.uk/
- ICE: https://www.ice.org.uk/what-is-civil-engineering

2. Feedback for ICE

Please go to surveymonkey.co.uk/r/ICEambassadors to let us know how you got on. As well as hearing about the activity, we'd very much like to know about the school and the number and type of

students who took part. Please feel to note down that information against the prompts below if that helps.

- **Date**
- **The name of school** (or STEM event)
- **Postcode** (or town/area if not known)
- The **year group**(s) that took part
- **Number of students** who took part
  - o An estimate of the number of **girls**
  - o An estimate of the number of **black or minority ethnic** (BME) students

The information and feedback helps us improve what we do and we can then include your activity on the Tomorrow's Engineers schools database. It is how we track which schools have been engaged by different engineering organisations and how many STEM activities have been delivered by ICE members. **Thank you!**

Contact us

If you have any questions please contact:

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Annex A: Risk assessment

Hazards Identified, Control Measures in Place & Risk Evaluation

Risk evaluation key	**Severity:**	5 Fatal	4 Major Harm	3 Moderate Harm	2 Minor Harm	1 Delay Only
	Likelihood:	5 Very likely	4 Likely	3 Possible	2 Unlikely, but conceivable	1 Highly Unlikely
	Risk rating:	20 – 25 Intolerable	15 – 19 High	10 – 14 Medium	7 – 9 Low	1 – 6 Trivial

Risk CEIYT

Hazards	Description of the hazard & possible events leading to harm	Existing Control Measures / Information, Instruction & Training	Additional risk: Factors which may further increase the likelihood /or severity of harm	Risk evaluation			Recommendation
				S	L	R	
Vehicle hazard: insurance	Car insurance does not cover volunteering/ work usage as appropriate.	Volunteers to check work and/or personal insurance to make sure they have adequate cover.		5	½	5/10	
Vehicle hazard - venue	Young people behaving unsafely on-site and in the immediate vicinity may present a hazard.	Check parking arrangements in advance		5	1	5	
Floor Level Hazards – trip	Trailing cables resulting from	Pre-arrange with venue or ensure safe set-up		2	2	4	Visual check on arrival

hazard	visitor's laptop/equipment set-up.	on arrival.					
Electrical Hazards – low voltage	Floor cable outlets may be exposed.	Report any marked deterioration; ensure wiring is safely located		2	3	6	Visual check on arrival
Musculoskeletal Hazards - seating	In primary schools, working with children may involve low-level work and seating with risk of back injury.	Ensure staff/volunteers are aware of hazard		3	2	6	Visual check on arrival
People hazards: safeguarding	A student may disclose information that suggests they are at risk.	See ICE guidance to volunteers engaged on school activities. The volunteer must state that they cannot keep the information to themselves; report to the person in the institution responsible for child-protection/safeguarding		2	1	3	

ANNEX B: Answers to the 'Civil Engineering in Your Town' challenge

Number	Civil engineering description	Type
1	Stadium	Buildings
2	Power station	Energy
3	Electricity pylons	Energy
4	Helipad	Transport
5	Hospital	Buildings
6	Renewable energy	Energy

7	Bridges	Transport
8	Airports and runways	Transport
9	Roads	Transport
10	Office-based civil engineer working on paper designs	Civil engineer
11	The Institution of Civil Engineers, the professional membership body for civil engineers	Buildings
12	Office-based civil engineers working on computer designs	Civil engineer
13	Flood defence and management, also known also coastal engineering	Water
14	Tunnel engineering or geotechnical engineering	Under the ground
15	Housing and associated infrastructure	Buildings
16	Lighting	Waste
17	Sewerage transport and treatment	Waste
18	Health and Safety	Health & safety
19	Schools	Buildings
20	Railway system	Transport
21	Road system	Transport
22	Road furniture	Transport
23	Civil engineer working outside and investigating a site	Civil engineer
24	Civil engineers must consider the impact of their work on the environment, animals and plant life	Environment
25	Infrastructure that distributes energy and water services to the community	Under the ground
26	Civil engineer building infrastructure	Civil engineer
27	Civil engineer directing and managing a project	Civil engineer
28	Civil engineers working in a team	Civil engineer