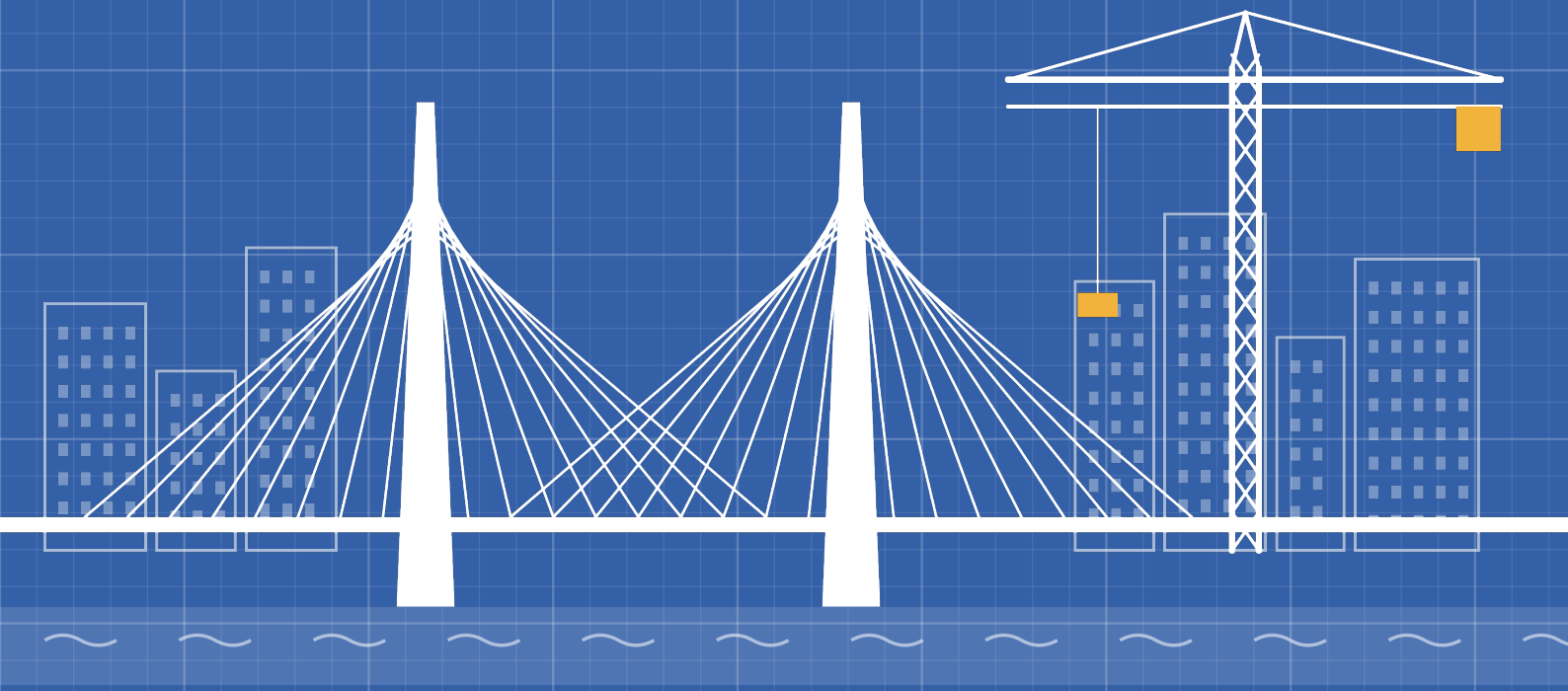


HOMEWORK PACK

STRUCTURES HOMEWORK PACK

Six short homework tasks — one a week — to help you remember, research and practise what you learn in class.

Each homework takes about 15–20 minutes. Bring it back by the date your teacher gives you.

NAME _____ CLASS _____ TEACHER _____

designclass
design | engineering | technology

HOMEWORK PACK

YOUR HOMEWORK PLAN

#	Homework	Links to	Tick when done
1	Meet an engineer — careers research	Course notes p3 · Worksheet 1	
2	Structure spotter — mass, frame, shell	Course notes p4–5 · Worksheet 1	
3	Scottish bridge fact file	Course notes p6–7 · Worksheet 2	
4	Forces at home	Course notes p8–12 · Worksheet 2	
5	Beam and brace hunt	Course notes p9, 13 · Worksheet 3	
6	Moments practice	Course notes p14–15 · Worksheet 3	

HOW TO GET THE MOST FROM HOMEWORK

Each homework starts with a **Quick recall** section — try it **without** looking at your notes first, then check. This is called **retrieval practice**, and research shows it is one of the best ways to make learning stick.

SAFETY FIRST

When you go out to spot structures, stay with an adult, keep away from roads, railways, water and building sites, and only take photos where it is safe and allowed.

BGE STRUCTURES · HOMEWORK · CC BY-NC

HOMEWORK 1

MEET AN ENGINEER

Careers in structural engineering

15–20 min

Due: _____

QUICK RECALL

1 Which job calculates the forces in beams and columns so a structure is safe?

- ☐ **A** Architect
- ☐ **B** Structural engineer
- ☐ **C** Quantity surveyor
- ☐ **D** Site manager

2 Which job controls the **costs** of a building project?

- ☐ **A** CAD technician
- ☐ **B** Civil engineer
- ☐ **C** Quantity surveyor
- ☐ **D** Architect

3 Name **three** routes into an engineering career.

RESEARCH TASK

Choose **one** of these careers: structural engineer · civil engineer · architect · quantity surveyor · CAD technician · site manager. Use **My World of Work** (myworldofwork.co.uk) or another reliable website to complete the fact file.

Fact file	Your research
Job title	
What do they do each day?	
Qualifications or routes in (university, college, apprenticeship)	
School subjects that help	
Skills you need (e.g. maths, teamwork, problem solving)	
Would this job suit you? Why or why not?	
Website(s) I used	

HOMEWORK 2

STRUCTURE SPOTTER

Mass, frame and shell structures

15–20 min

Due: _____

QUICK RECALL

1 What is **biomimicry**?

2 A structure that stays up because it is very heavy is a...

☐ **A** Mass structure ☐ **B** Frame structure ☐ **C** Shell structure

SPOTTER TASK

Find **two** examples of each type of structure at home or in your local area (with an adult). Fill in the table.

Structure I found	Mass, frame or shell?	How do I know?
	Mass	
	Mass	
	Frame	
	Frame	
	Shell	
	Shell	

3 Sketch your favourite structure from the table. Label what it is made from.

SKETCH HERE

Type-in version: describe your idea here, or sketch on paper / a tablet and attach a photo.

BGE STRUCTURES · HOMEWORK · CC BY-NC

HOMEWORK 3

SCOTTISH BRIDGE FACT FILE

Bridges, the environment and the economy

20 min

Due: _____

QUICK RECALL

1 What does the **span** of a bridge mean?

2 Which bridge type uses cables that run **straight** from the towers to the deck?

☐ **A** Suspension ☐ **B** Cable-stayed ☐ **C** Arch ☐ **D** Beam

FACT FILE

Pick a Scottish bridge — for example the Forth Bridge, Forth Road Bridge, Queensferry Crossing, Tay Road Bridge, Kessock Bridge, Erskine Bridge, Skye Bridge, Glenfinnan Viaduct, the Clyde Arc in Glasgow, or a bridge near you. Research it and complete the fact file.

My research	
Name of bridge	
Where is it? What does it cross?	
Type of bridge	
Year it opened	
Main span or total length	
One effect on the **economy**	
One effect on the **environment**	

3 Sketch your bridge from the side. Label the deck, towers or piers, and any cables or arches.

SKETCH HERE

Type-in version: describe your idea here, or sketch on paper / a tablet and attach a photo.

HOMEWORK 4

FORCES AT HOME

Mass, force and types of force

15–20 min

Due: _____

QUICK RECALL

1 Mass is measured in _____ and force is measured in _____.

2 Which force tries to make a material **longer**?

☐ **A** Compression ☐ **B** Tension ☐ **C** Torsion ☐ **D** Shear

FORCE HUNT

Find an example of each type of force at home. Try to find examples that are **different** from the ones in class.

Type of force	My example at home
Static	
Dynamic	
Torsion (twisting)	
Shear	
Tension (pulling apart)	
Compression (squashing)	

THINK LIKE AN ENGINEER

3 Two shelf brackets are tested. Bracket A has a mass of 200 g and holds 20 kg (20 000 g). Bracket B has a mass of 250 g and holds 30 kg (30 000 g). Work out **load ÷ mass** for each. Which has the better strength-to-weight ratio?

WORKING

Better bracket:

HOMEWORK 5

BEAM AND BRACE HUNT

Beam sections, frames, struts and ties

15–20 min

Due: _____

QUICK RECALL

1 What is **racking**?

2 A member in **compression** is called a…

☐ **A** Tie ☐ **B** Strut ☐ **C** Beam ☐ **D** Cable

HUNT TASK

Look for beams and cross-bracing around you: scaffolding, electricity pylons, goalposts, playground frames, gates, sheds, bridges, roof trusses, shelving. Record **four** finds.

Where I saw it	What I spotted (section shape or bracing)	Why is it there?

3 Concrete is strong in compression but weak in tension. Explain why steel bars are placed inside concrete beams.

HOMEWORK 6

MOMENTS PRACTICE

moment = force × distance · the principle of moments

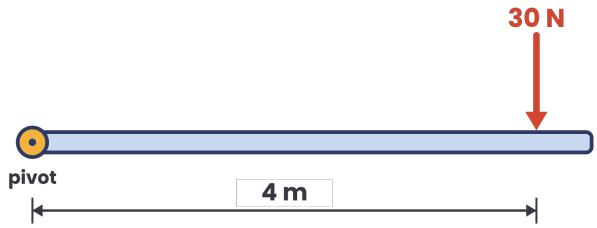
20 min

Due: _____

REMEMBER

moment (Nm) = force (N) × distance (m). When balanced: clockwise moments = anticlockwise moments. Show your working and units!

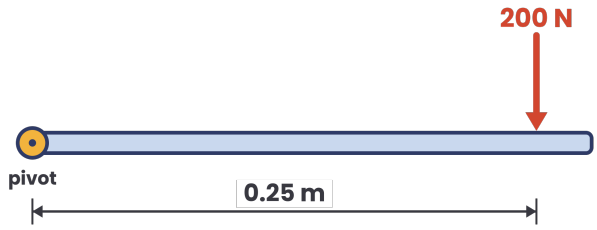
1 Calculate the **moment** of the force about the pivot.



WORKING

Answer = _____ **Nm**

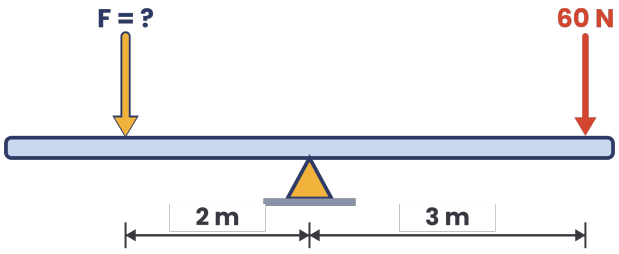
2 Calculate the **moment** of the force about the pivot.



WORKING

Answer = _____ **Nm**

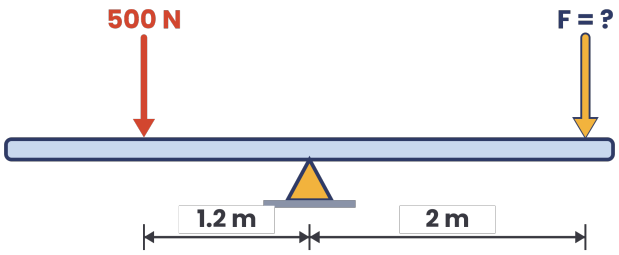
3 The beam is balanced. Calculate the force **F**.



WORKING

Answer = _____ **N**

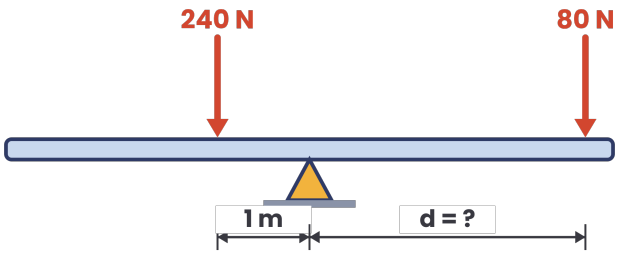
4 The beam is balanced. Calculate the force **F**.



WORKING

Answer = ____ **N**

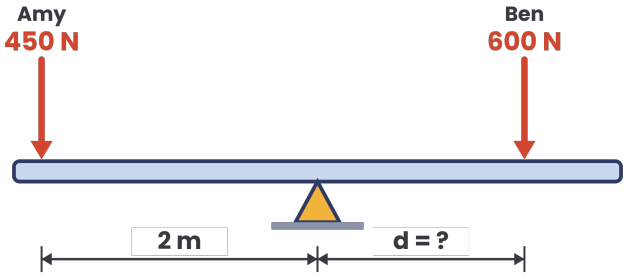
5 The beam is balanced. Calculate the distance **d**.



WORKING

Answer = ____ **m**

6 Amy (450 N) sits 2 m from the pivot of a see-saw. Ben weighs 600 N. How far from the pivot must Ben sit to balance?



WORKING

Answer = ____ **m**

7 Explain, using the word **moment**, why a door is easier to push open near the handle than near the hinges.

HOMEWORK DONE.

Hand in your pack and get ready for the **topic test**.

Revise with the **Knowledge Organiser** and the course notes at **detscotland.co.uk**.

"Engineering is the art of directing the great sources of power in nature for the use and convenience of man."

Thomas Tredgold, civil engineer (1788–1829)

designclass
design | engineering | technology

Free Design, Engineering & Technology resources for Scottish schools — detscotland.co.uk
© DesignClass 2026 · Licence CC BY-NC: free to use and adapt, not for sale · contact@designclass.co.uk