DIY Water Filter — Engineering Work Log

Build it, test it, measure it, improve it.

Name: _____ **Date:** _____ **Key stage:** KS3

What I am learning

Tick each box when you can do it

- ☐ I can explain how filtration separates insoluble solids from a liquid.
- ☐ I can explain how activated carbon removes colour and smell by adsorption.
- ☐ I can build a prototype and change one layer to improve it (the engineering design process).
- ☐ I can measure volume (mL) and time (s) and calculate flow rate in mL/s.
- ☐ I can explain why a filter removes dirt but cannot make water safe to drink.

My filter design

Draw and label your layers, top to bottom

Layer 1 (top)
Layer 2
Layer 3
Layer 4
Base

Thickness of each layer (cm)

Gravel: _____

Fine sand: _____

Activated carbon: _____

Cotton base: _____

My prediction: which design will give the cleanest water?

_____

_____

Materials I used

Tick what you gathered

- ☐ Clear 2 L bottle
- ☐ Activated carbon
- ☐ Stopwatch
- ☐ Coarse gravel
- ☐ Cotton balls / cloth
- ☐ Ruler
- ☐ Fine sand
- ☐ Measuring jug (mL)
- ☐ 500 mL dirty water sample

Safety first.

Never drink the filtered water, even if it looks clear. A home filter does not remove germs or dissolved chemicals. An adult helps with cutting the bottle. Wash your hands after handling soil and dirty water.

My results

Score clarity 1 (crystal clear) to 10 (muddy)

Design / layers	Water in (mL)	Water out (mL)	Time (s)	Flow rate (mL/s)	Clarity 1–10	Smell / colour gone?
Trial 1						
Trial 2						
Trial 3						
Trial 4						

Work out your numbers

Use your own measurements

1. Flow rate

Flow rate = water out (mL) ÷ time (s)

My best design:

Flow rate = _____ ÷ _____

= _____ mL/s

2. Water recovery

Recovery = (water out ÷ water in) × 100

My best design:

Recovery = _____ ÷ _____ × 100

= _____ %

The engineering trade-off

Speed versus cleanliness

Which design let the water through fastest? _____

Which design gave the cleanest water? _____

Why can't you have the fastest and the cleanest at the same time? Use the word pore size.

What I found

My conclusion

My best filter design was _____ because

One thing I would change to make it even better: _____