

Read this first

Ask before you explain. Explain only after they've tried.

Paper columns

Shape beats material

Say	"Three sheets of paper against five books. Which shape survives?"
Ask first	"Round, square or triangle: which gives up first?"
After: explain	Columns fail where they are weakest. Corners and flat sides give the paper a place to buckle first; a round tube spreads the weight evenly, so it usually lasts longest.
Look around	Find a round pillar, a lamp stand or a table leg. Why are so many of them round?
Close with	"Could you make the square one stronger without more paper?"

The diver in a bottle

Pressure and floating

Say	"I can make it sink without touching it."
Ask first	"What happens to the diver when you squeeze the bottle?"
After: explain	There is a tiny air bubble inside. Squeezing squashes the bubble, so the diver takes up less space for the same weight, gets less push from the water, and sinks.
Close with	"How do real submarines go up and down?"

The book tug of war

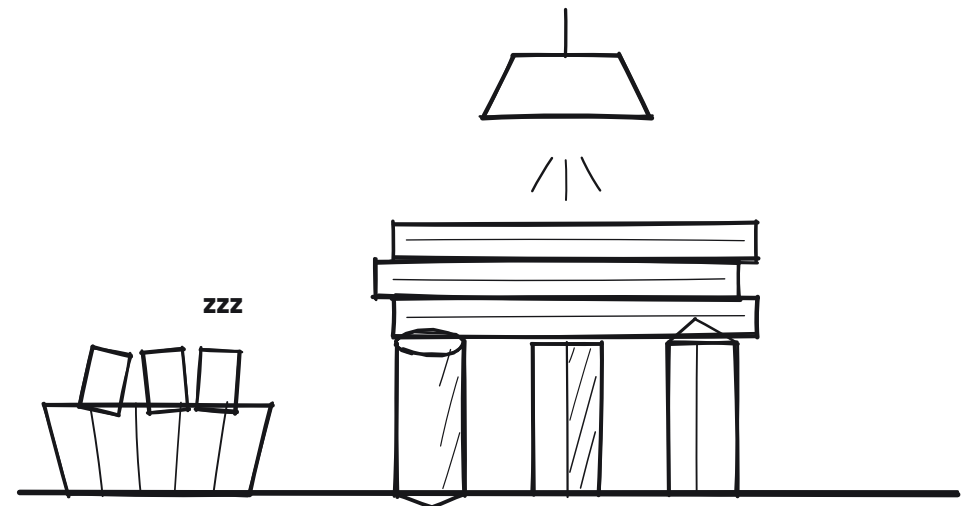
Friction adds up

Say	"These are just paper. Bet you can pull them apart."
After: explain	Each page grips its neighbour a little. With dozens of pages, all those small grips add up, and pulling squeezes the pages together even harder. It is friction, not glue and not air pressure.
Close with	"How many pages did it take before it held?"

Squeeze the bottle over a sink or a towel. Keep the tug of war on the floor, not near a table edge.

Tonight at home

30 minutes after dinner, 3 challenges, ages 8 to 13



Phones go in the basket. Paper comes out.

Grown-ups: start on the back page.



Find these around the house

No shopping needed.

3	5	1
sheets of paper	books, similar size	plastic bottle with cap
1	2	1
sauce packet or pen cap	notebooks or magazines	roll of tape

How tonight works

- 1** Every phone goes in a basket by the door. Yours too.
- 2** Kids follow the pictures. Grown-ups ask the questions.
- 3** Three challenges, about ten minutes each. Stop while it's still fun.



Our scores tonight

Date _____

Strongest column

_____ books held

Diver stopped halfway?

_____ yes / no

Tug of war winner

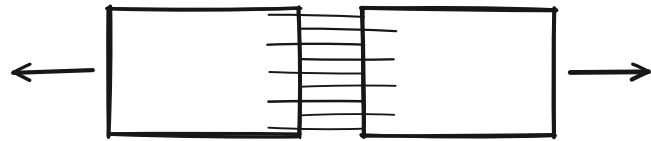
Tomorrow, the phone basket goes...

Engineers _____



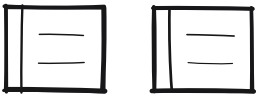
The book tug of war

5 minutes



Kid vs grown-up. Who wins?

1



Lay the two notebooks spine to spine

2



Shuffle the pages in, one by one

3



Grab a spine each and pull

Levels

■□□ Can't pull them apart

☐

■██ Only overlap half the pages

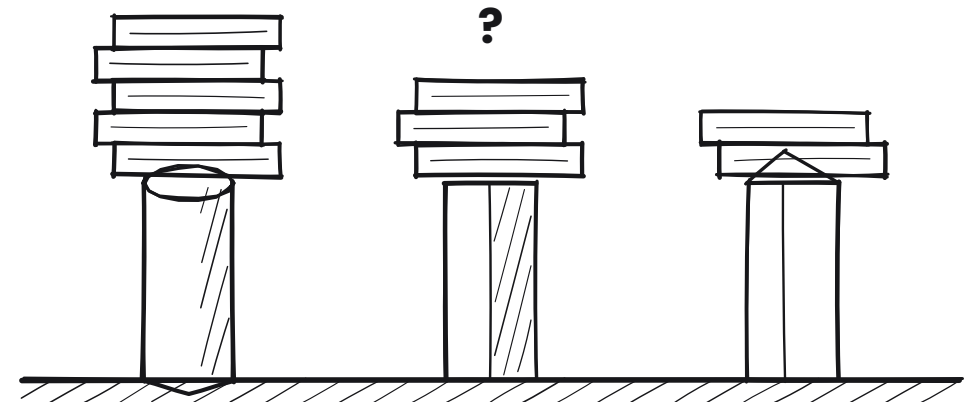
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■■█ Count how many pages it takes to hold

☐

Paper columns hold up books

10 minutes



Which one gives up first?

Levels

■□□ Find the strongest shape

☐

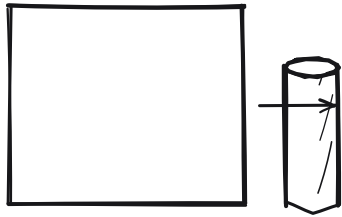
■■█ Hold 5 books on one column

☐

■■█ Hold 5 books using half a sheet

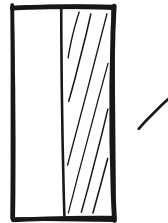
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1



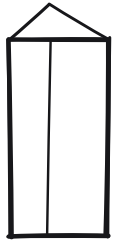
Roll one sheet into a tube

2



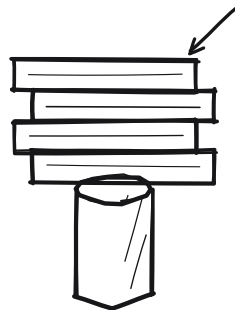
Fold one into a square

3



Fold one into a triangle

4

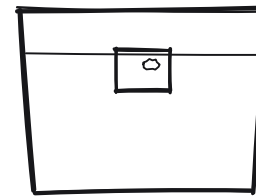


Add books one by one

The diver in a bottle

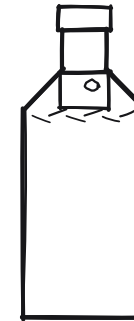
10 minutes

1



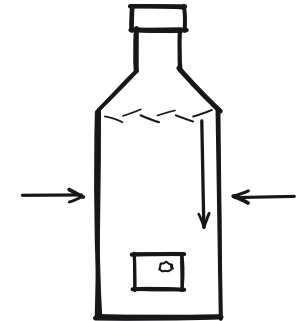
Test in a glass: it should only just float

2



Bottle full to the top, cap on tight

3



Squeeze: it sinks. Let go: it rises

No sauce packet? A pen cap with a pea-sized blob of Blu Tack on the clip works too.

Levels

■□□ Make it sink and rise

■██ Make it stop halfway down

■■█ Explain it to a grown-up

