THE JCB ACADEMY

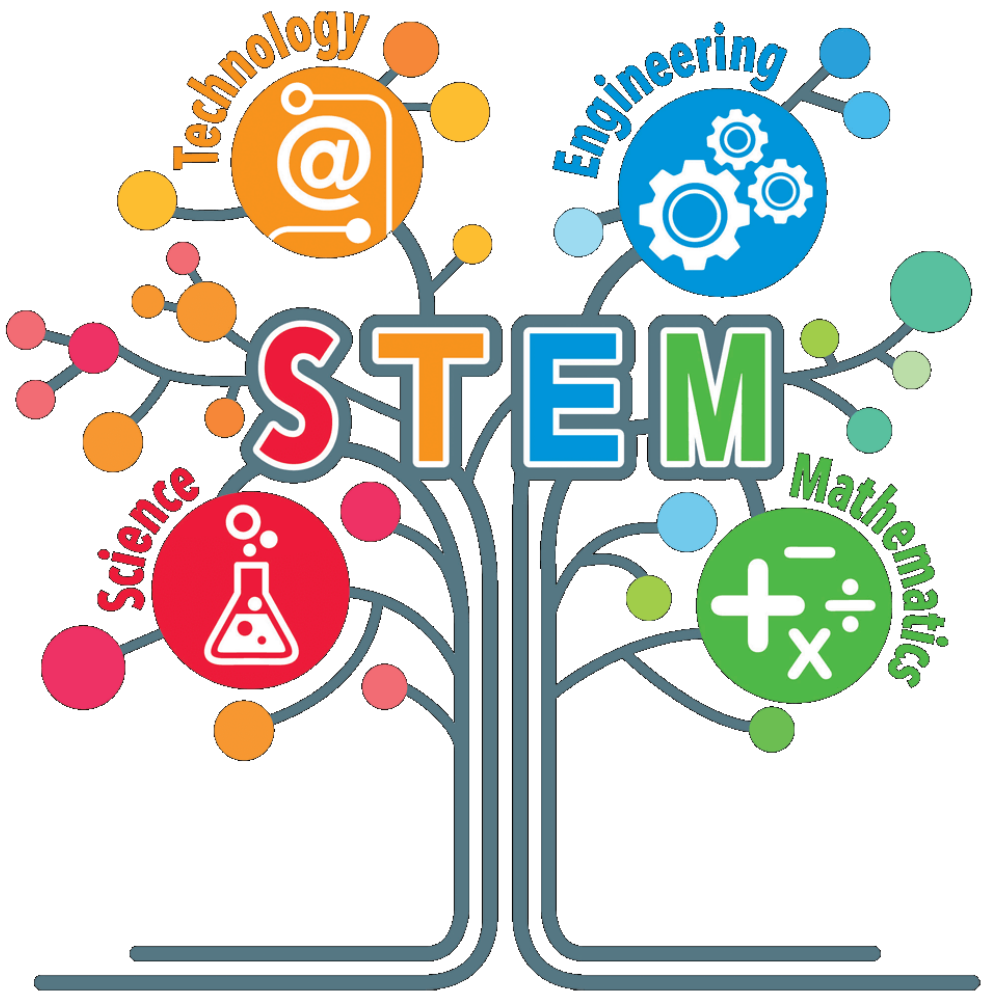
STEM Challenges

What's it like at the JCB Academy?

https://jcb-academy.com/

STEM Challenge

What is STEM?



STEM stands for -

Science

Technology

Engineering

Mathematics

These subjects are linked directly to each other and this task will highlight your skills in each of these subject areas.

Objectives To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

Classroom STEM Challenge

Using origami, create your own snapping toy.

The Challenge

You are going to follow a series of instructions to create your own Snappy face
(a pointy Pacman if you will!)

The challenge for this lays in attention to detail and patience.

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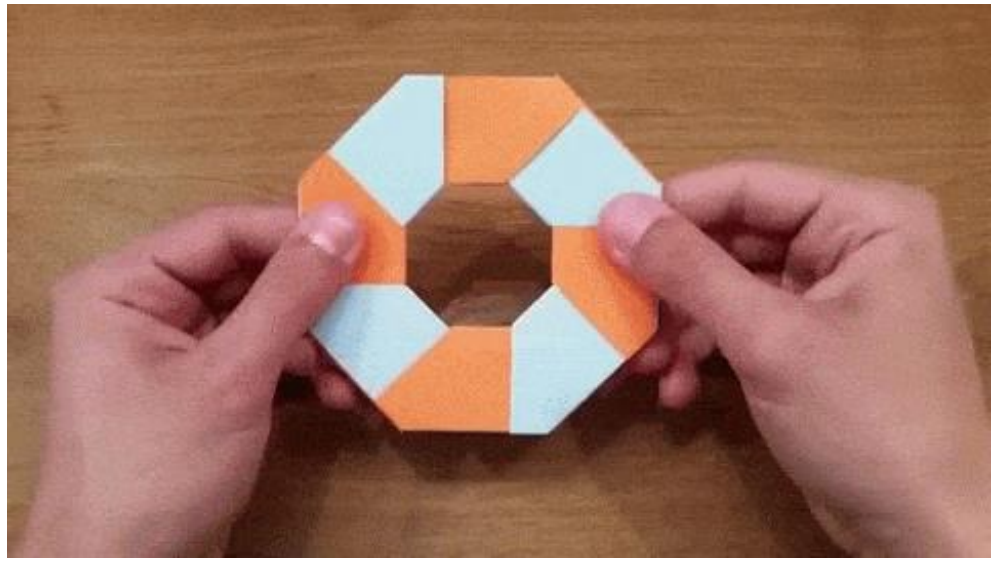
Classroom STEM Challenge

Origami and maths?

Origami is largely thought to have started in Japan.

In fact, paper folding has existed in almost all cultures. Origami does come from the Japanese words *ori* (folding) and *kami* (paper).



In maths, it is used to study shapes and symmetry and our understanding of dimensions!

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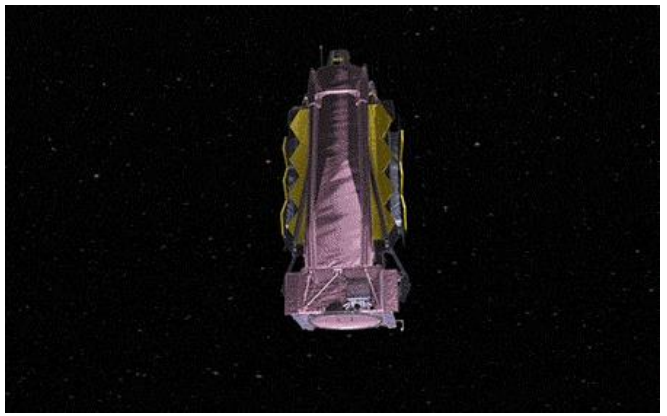
Classroom STEM Challenge

Origami and engineering?

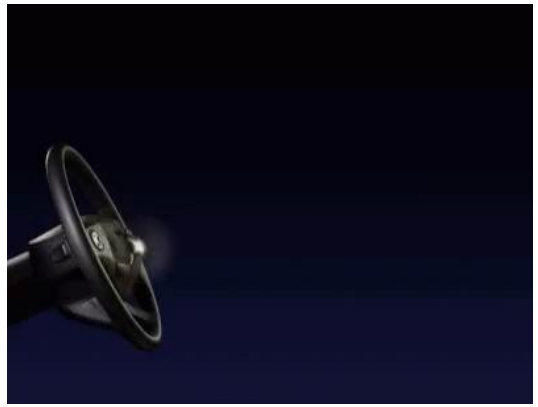
Parachutes, Cars and NASA!

For humans and space shuttles, engineers use origami to get the biggest canopy into the smallest space!



Satellites launched into space can, pretty much, unfold themselves thanks to origami and engineering!

Large airbags can be packed into the steering wheel in a car to keep drivers safe from harm!



Objectives To understand what is meant by STEM. To understand how STEM skills are used when completing a manufacturing

STEM Challenge

Using origami, create your own snapping toy.

What you will need -

- A sheet of A4 paper, any colour you like.
- A pen to mark folding lines (optional)
- Materials to decorate (optional)

- To access a video of the construction, follow this link to a UTC YouTube channel.

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STEM Challenge

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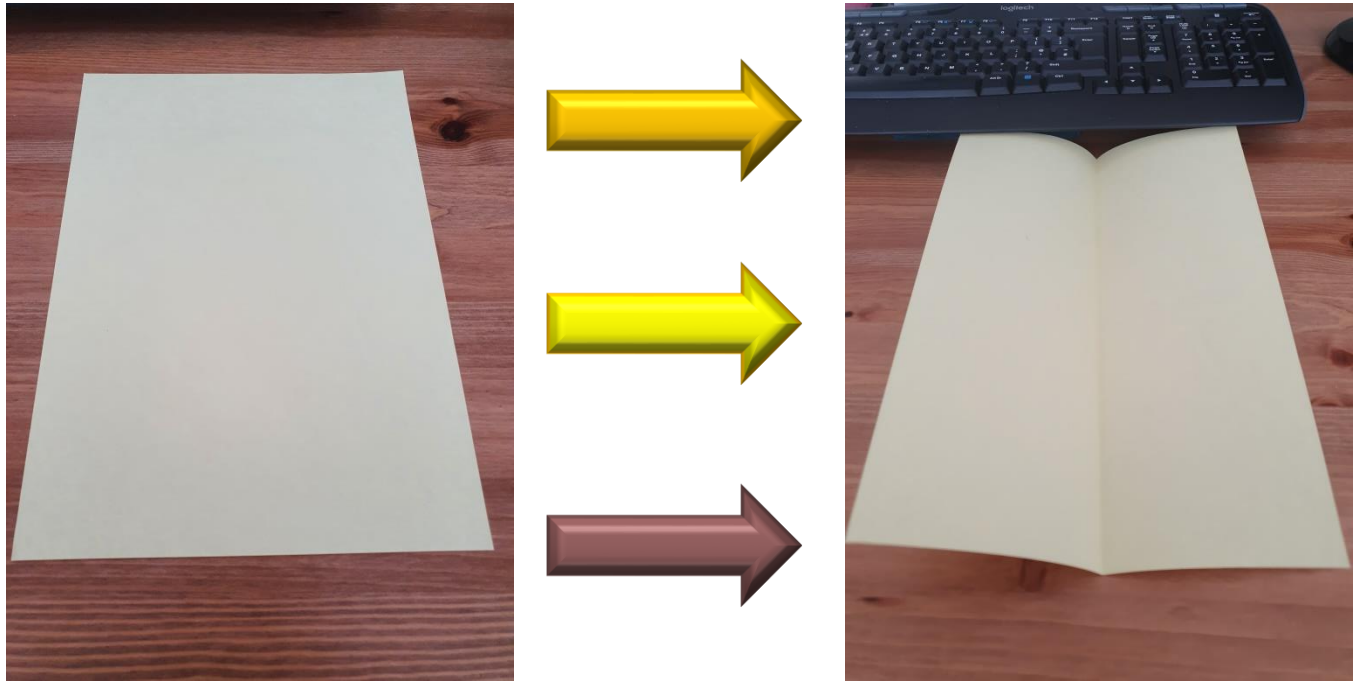
Quality check.

- Does your new fold match the next picture?
- Have you been precise with your folds?
- Have you pressed into the creases to reinforce the fold?



Stage 1

Fold the paper in half vertically, make sure your fold is as accurate as possible.

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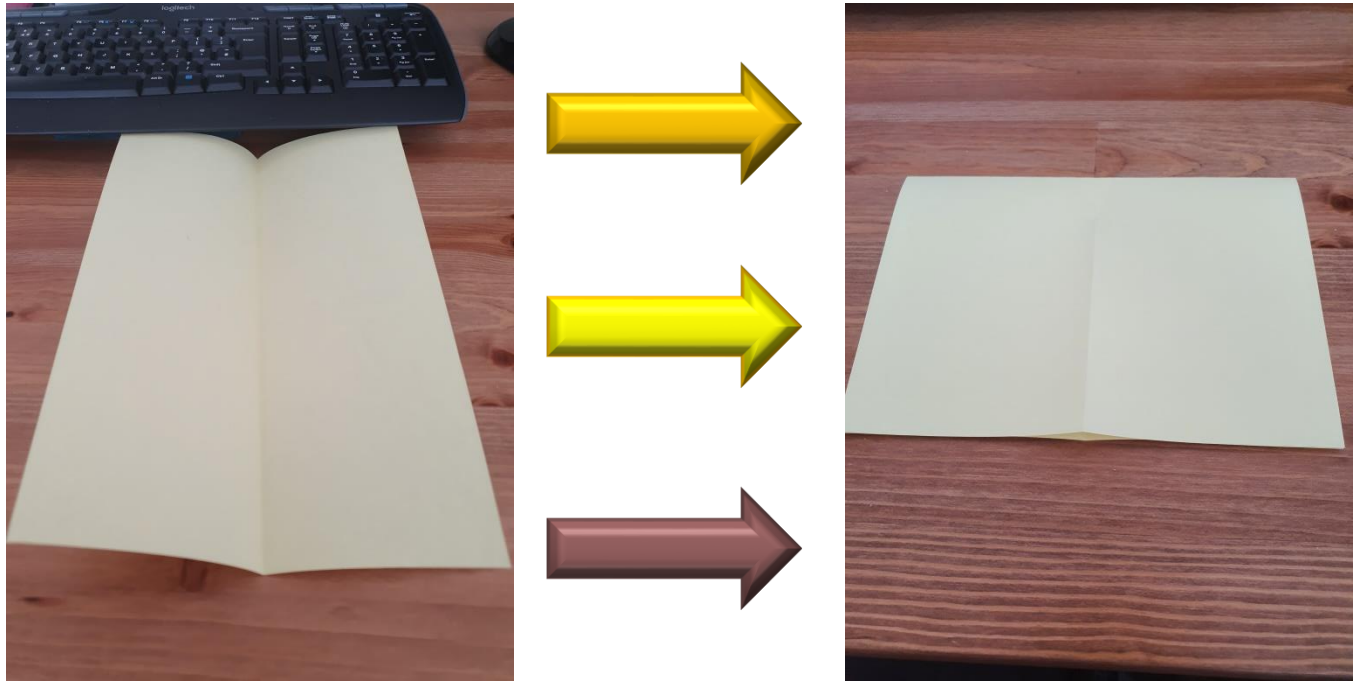

Stage 2

Unfold, then fold your paper in half horizontally. You can leave it folded this way.

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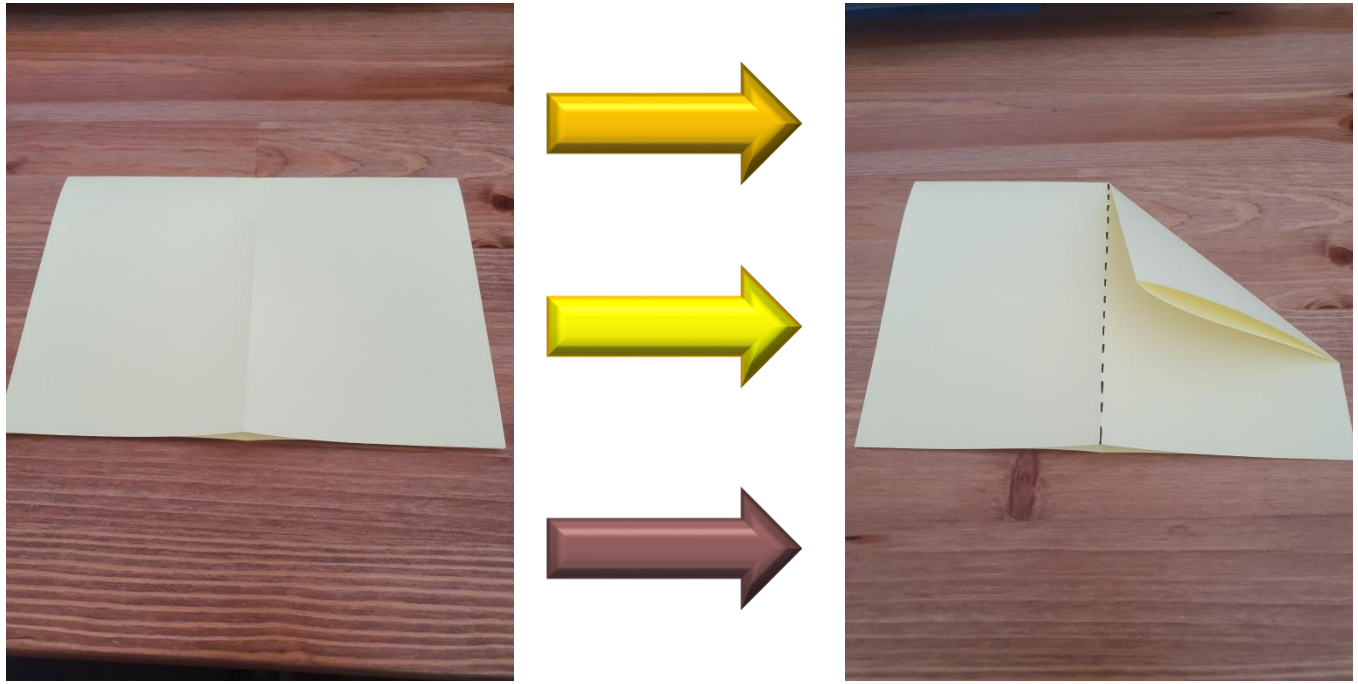

Stage 3

Fold the top right corner to the centre line. Make sure your paper runs right along the centre.

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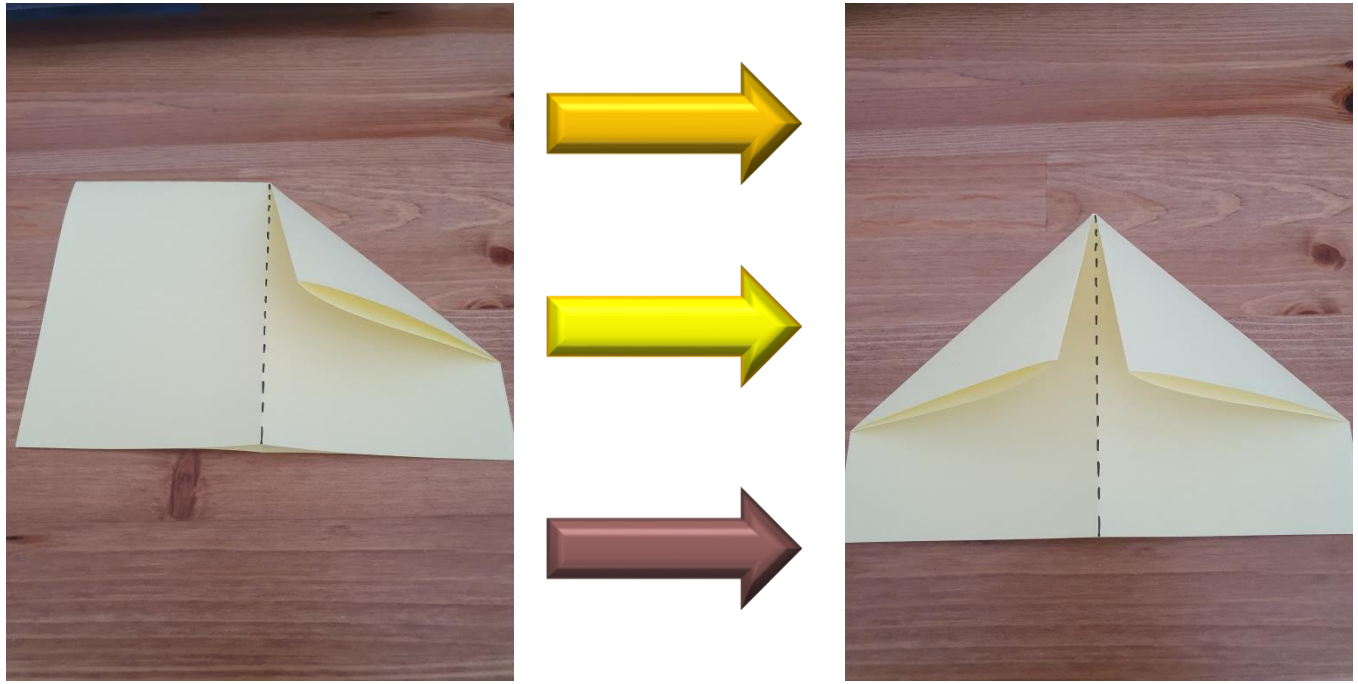

Stage 4

Fold the top left corner in the same way.

Puzzle: what is the angle at the top corner now?

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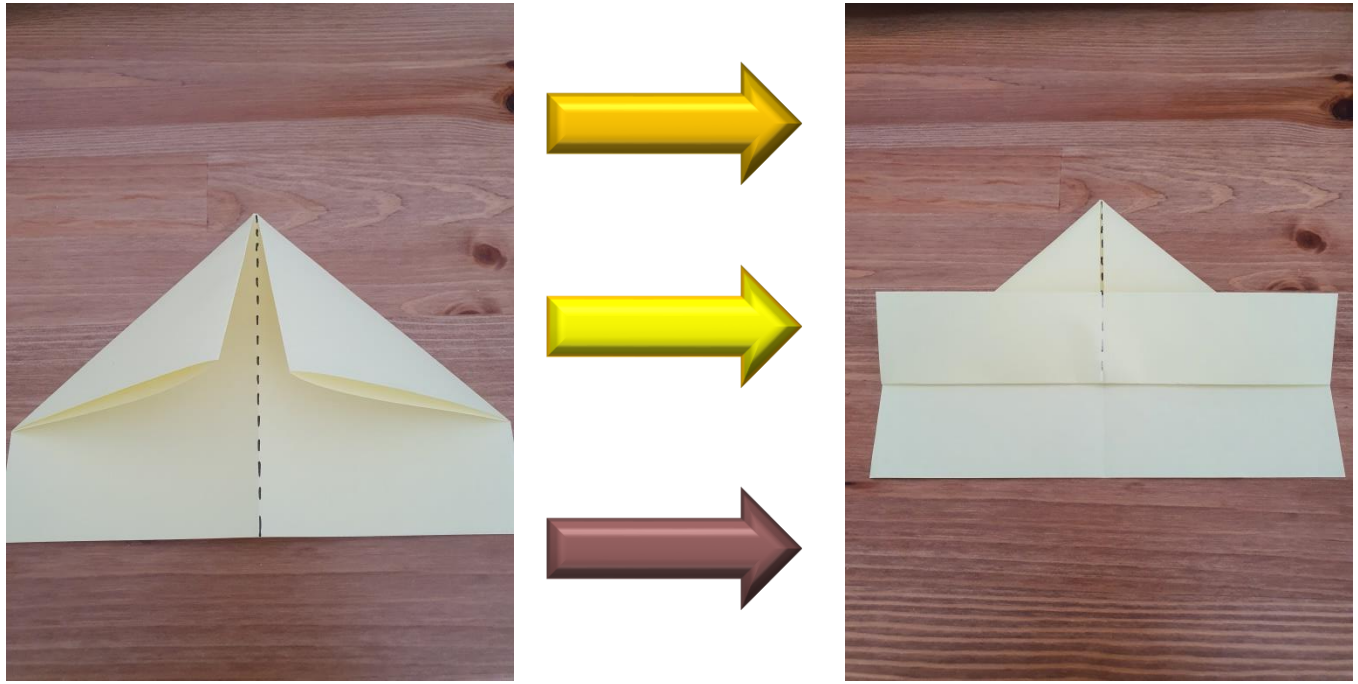

Stage 5

Fold the bottom lip over the triangle you have now created.

Answer: 90° *weird right!*

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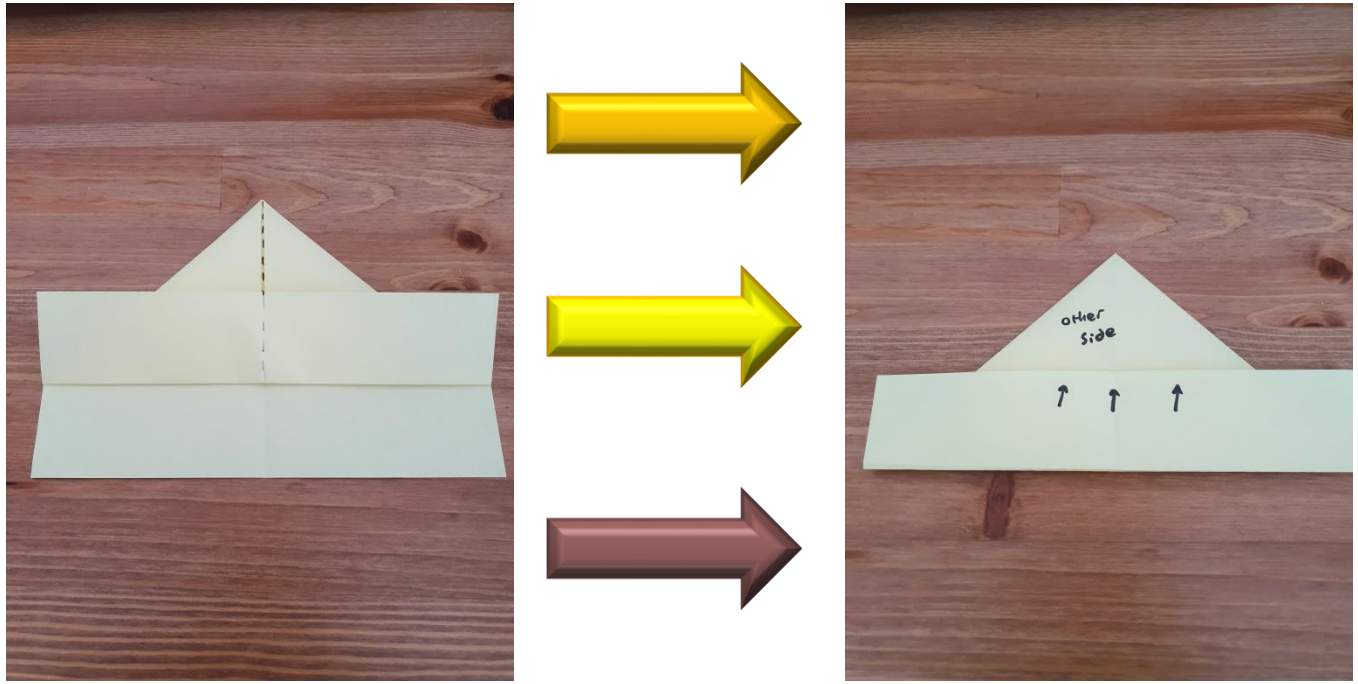

Stage 6

Turn the paper over and perform the same fold on the other side.

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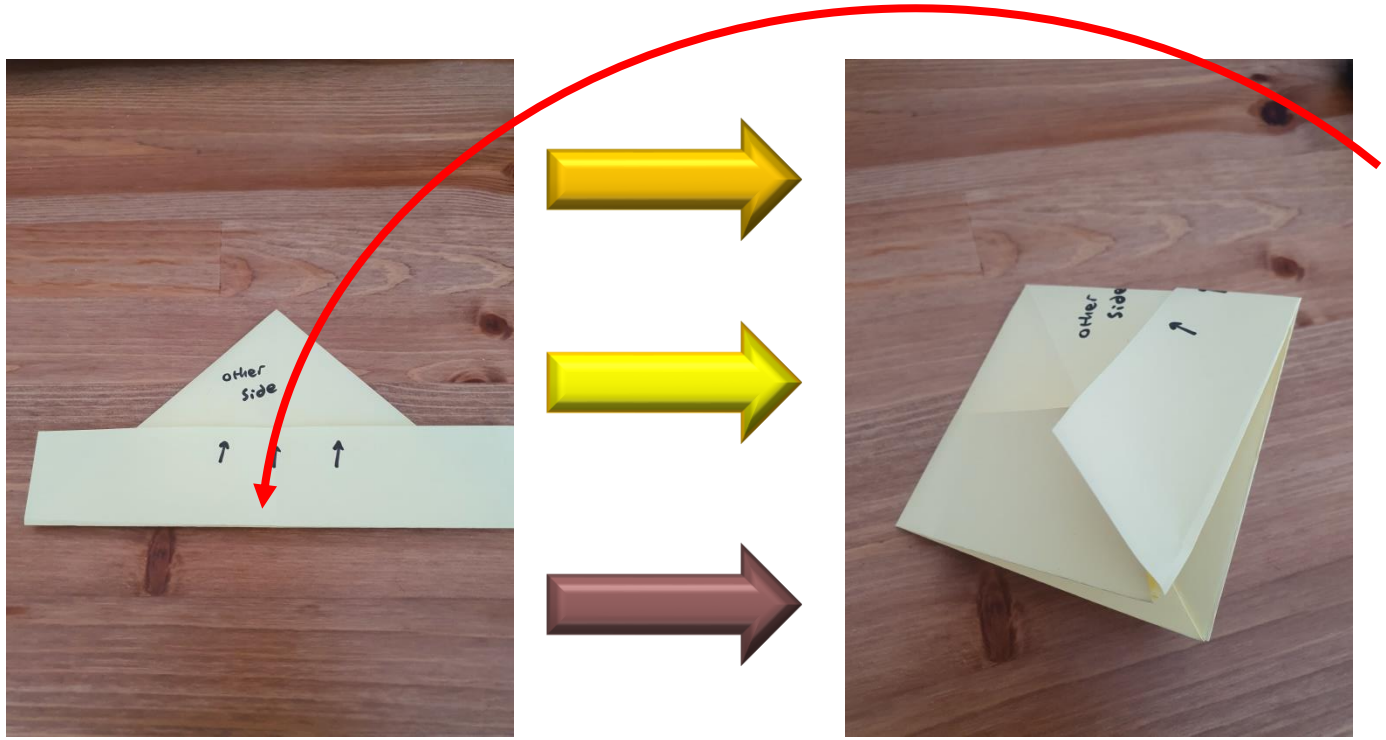

Stage 7

At the bottom of the paper, pinch both sides at the centre and pull outwards to create a square-ish shape.

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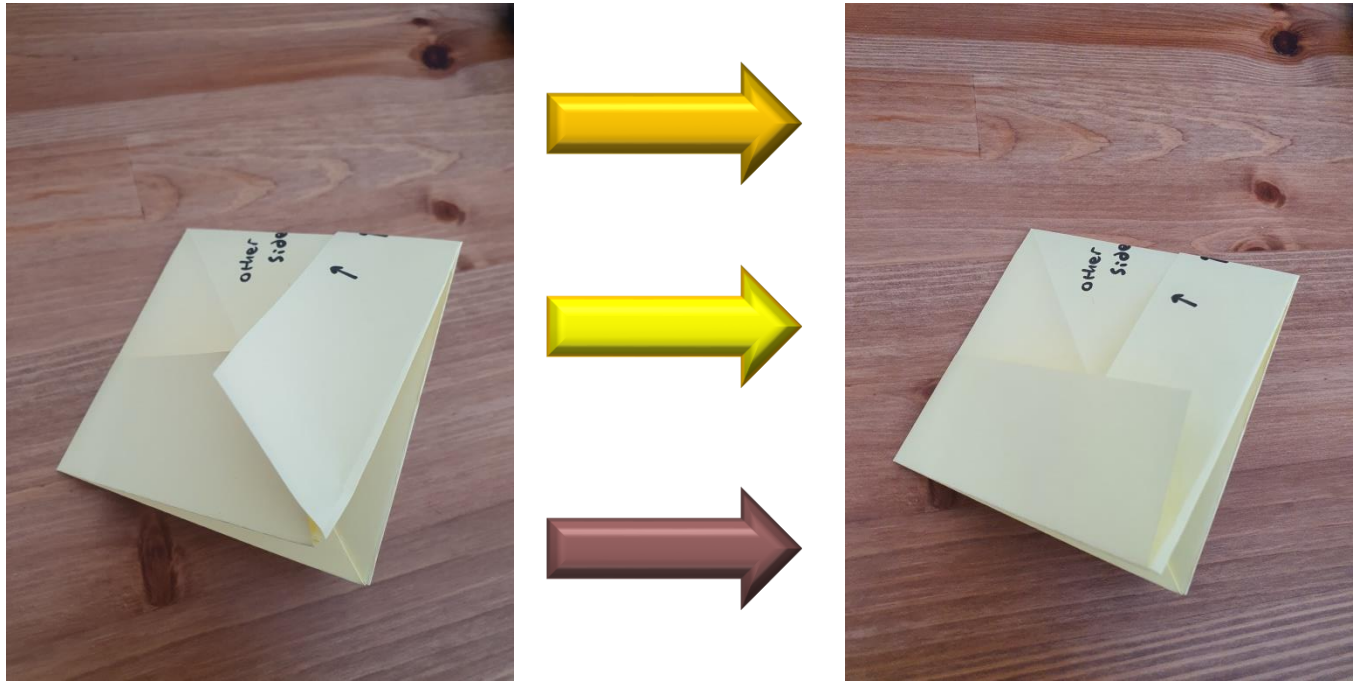

Stage 8

See those annoying bits poking out?

Poke them in from the right hand side.

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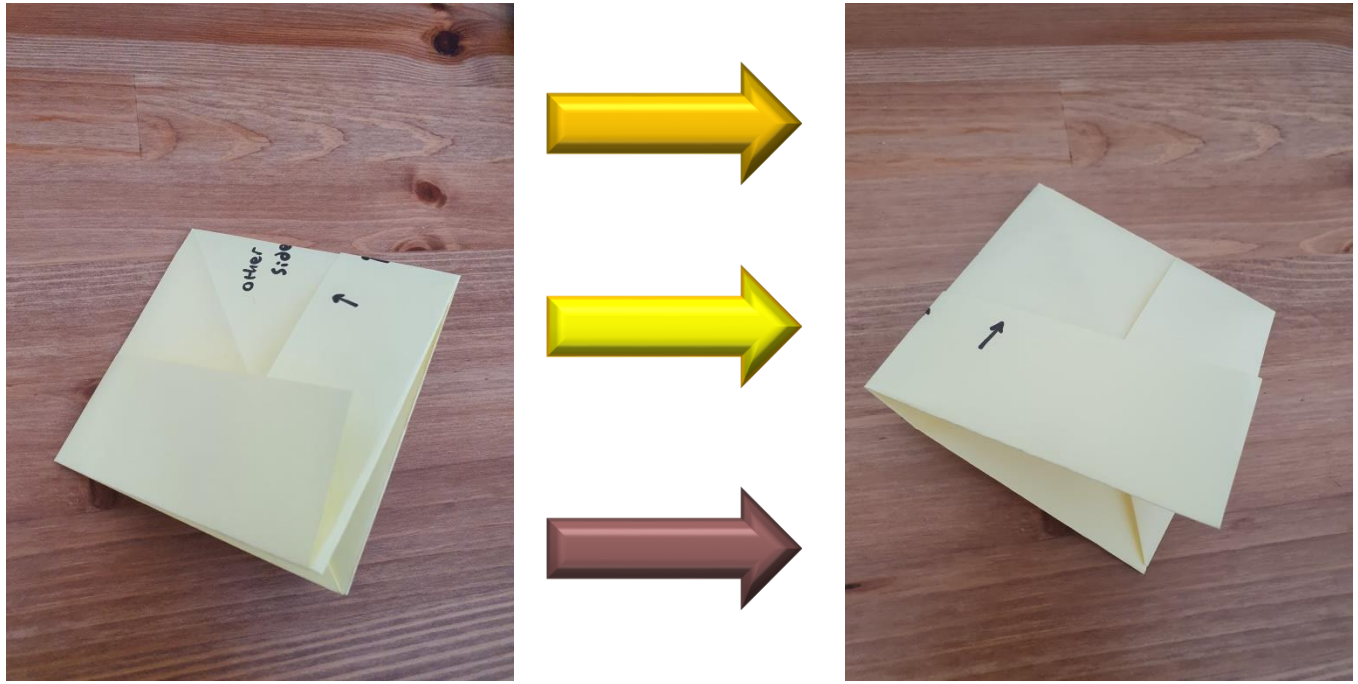

Stage 9

Same on the other side!

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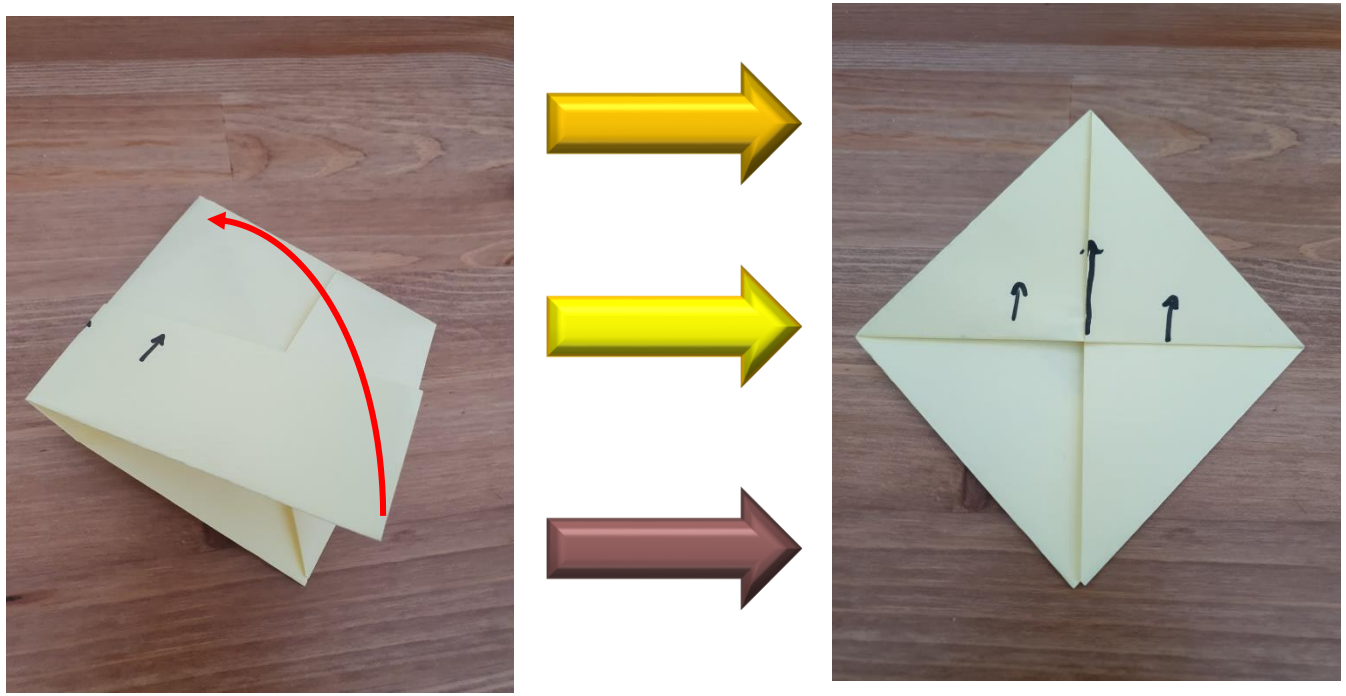

Stage 10

Fold one half of the square upwards, tip to tip.

Hint: Are you still checking that your creases are well pressed?

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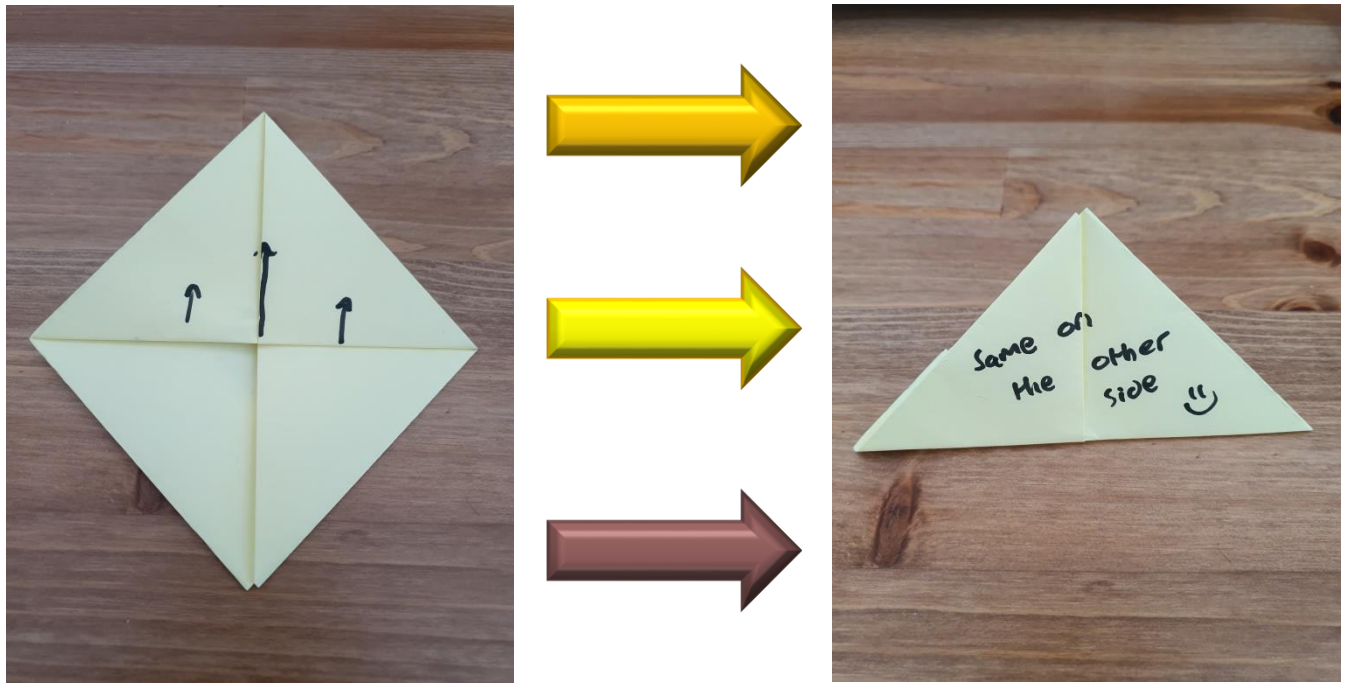

Stage 11

Turn your paper over and make the same fold you did in stage 10.

Puzzle: We are clearly looking at a triangle but what type?

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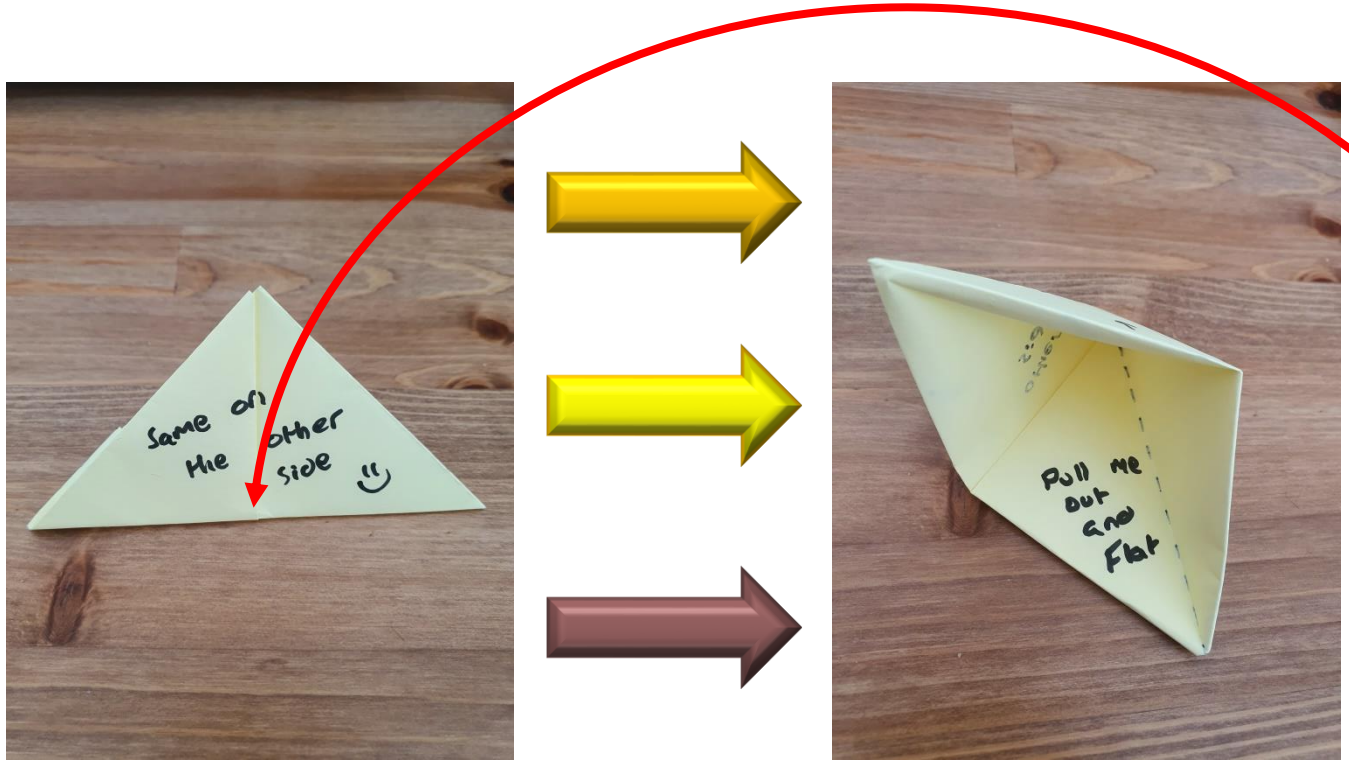

Stage 12

In stage 7, you pinched the centres in the middle and pulled out. Same again!

Answer: Isosceles right-angled triangle.

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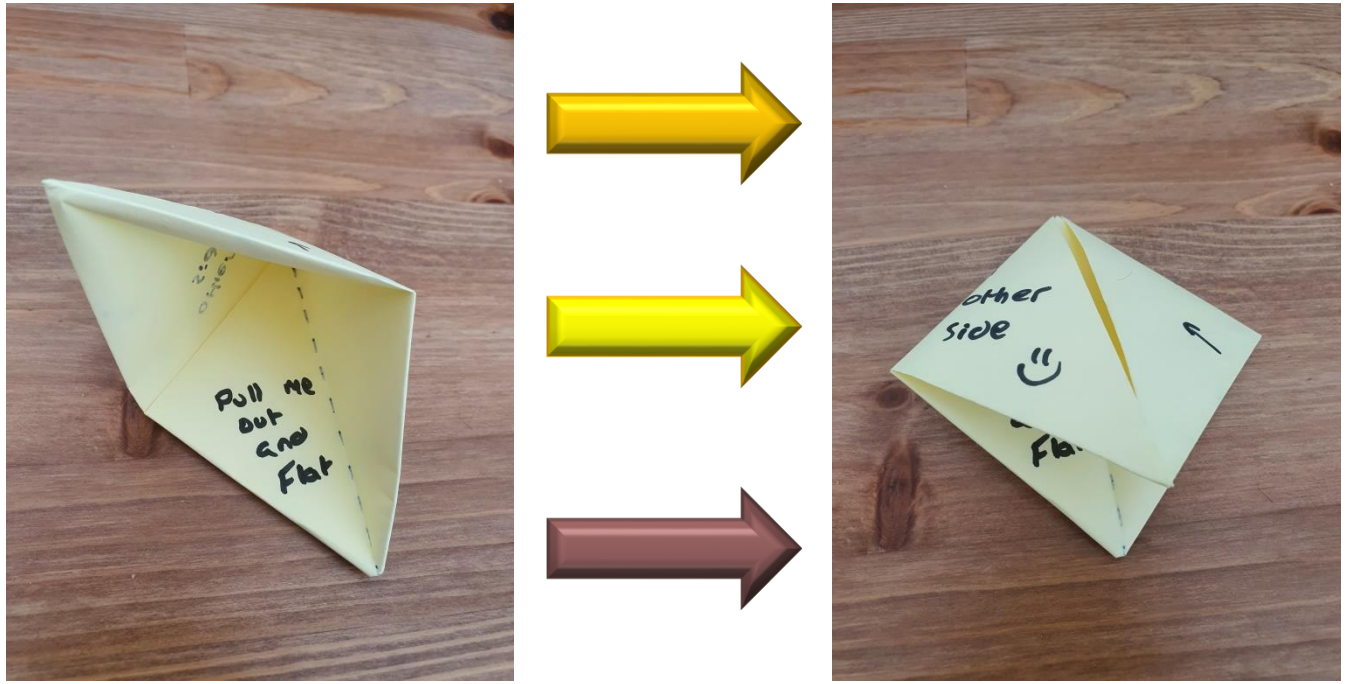

Stage 13

Press down flat on the shape. You should be looking at a very pretty square.

Well I think it is pretty!

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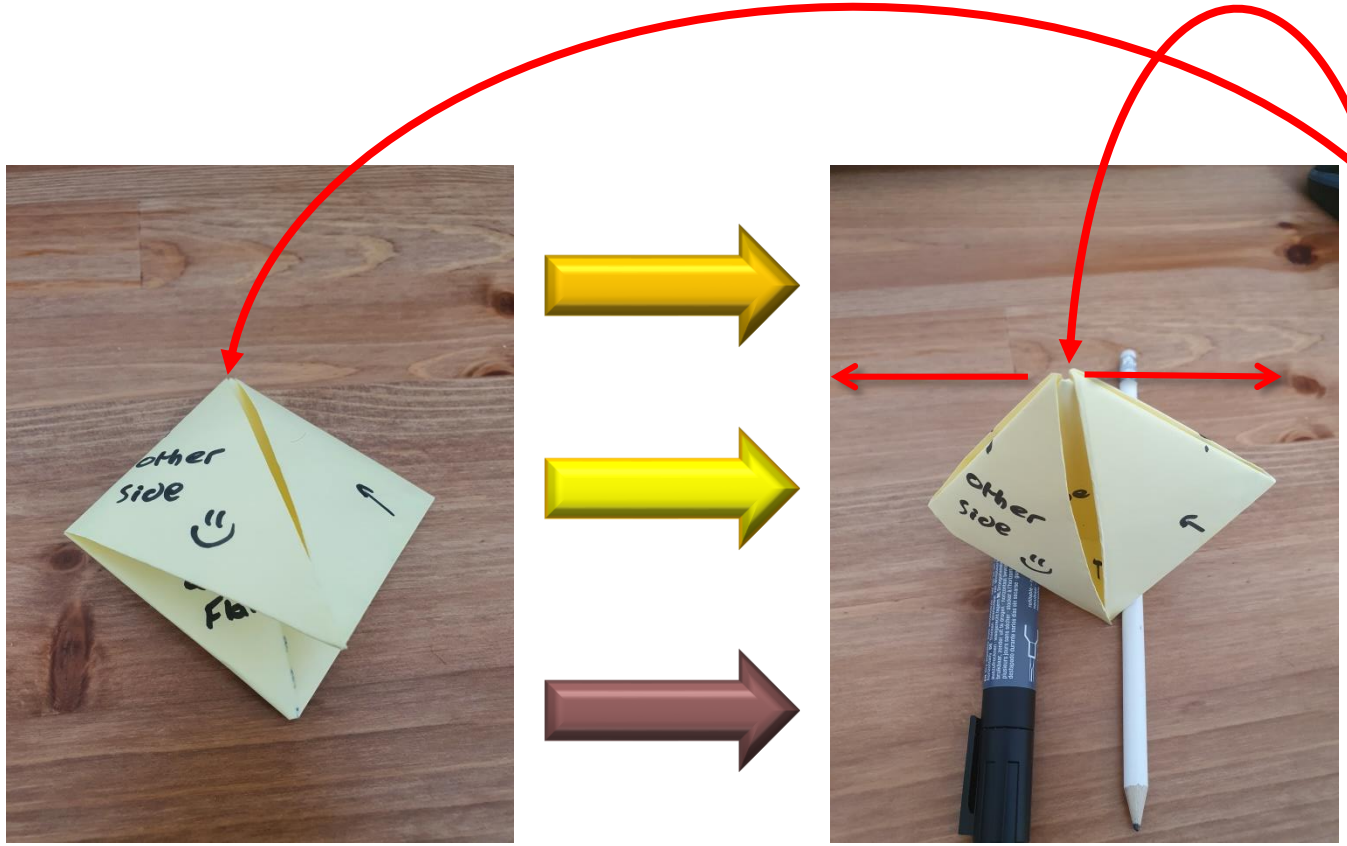

Stage 14

You are about to pinch the top two points *(known as vertices)* of your creation and pull outwards.

What do you think you're going to create?

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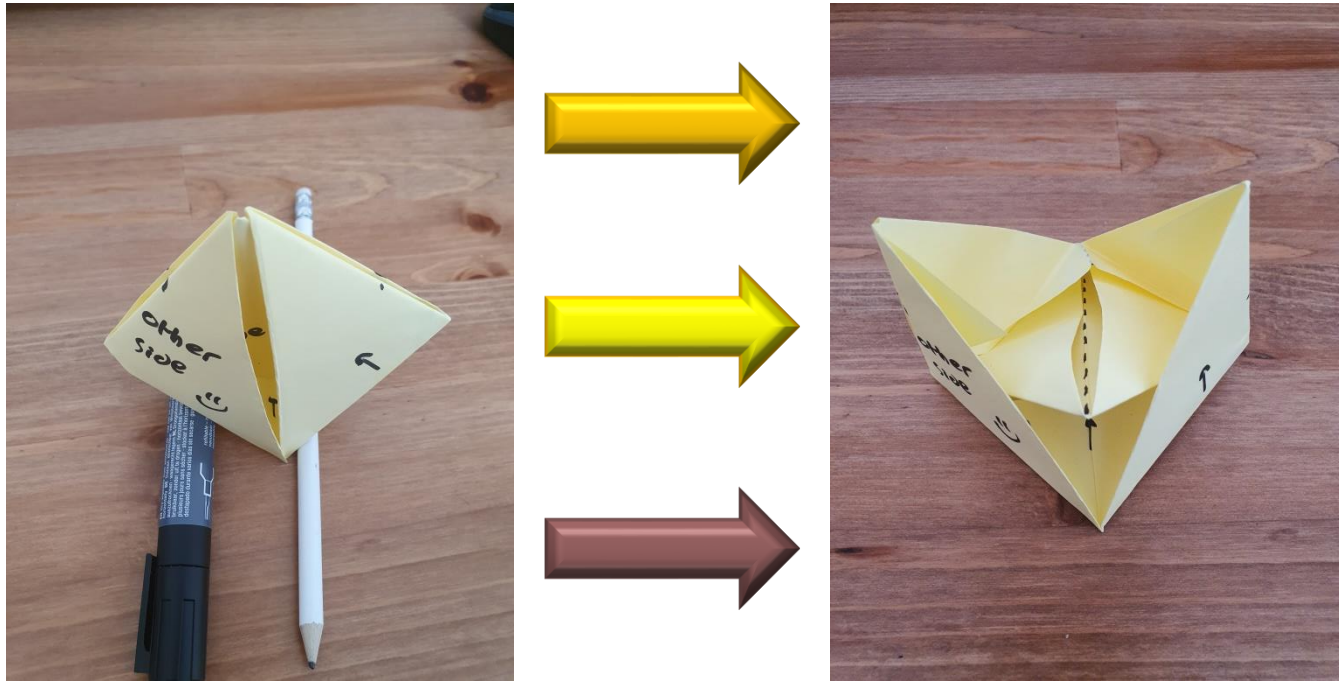

Stage 15

You've made a boat! Well almost!

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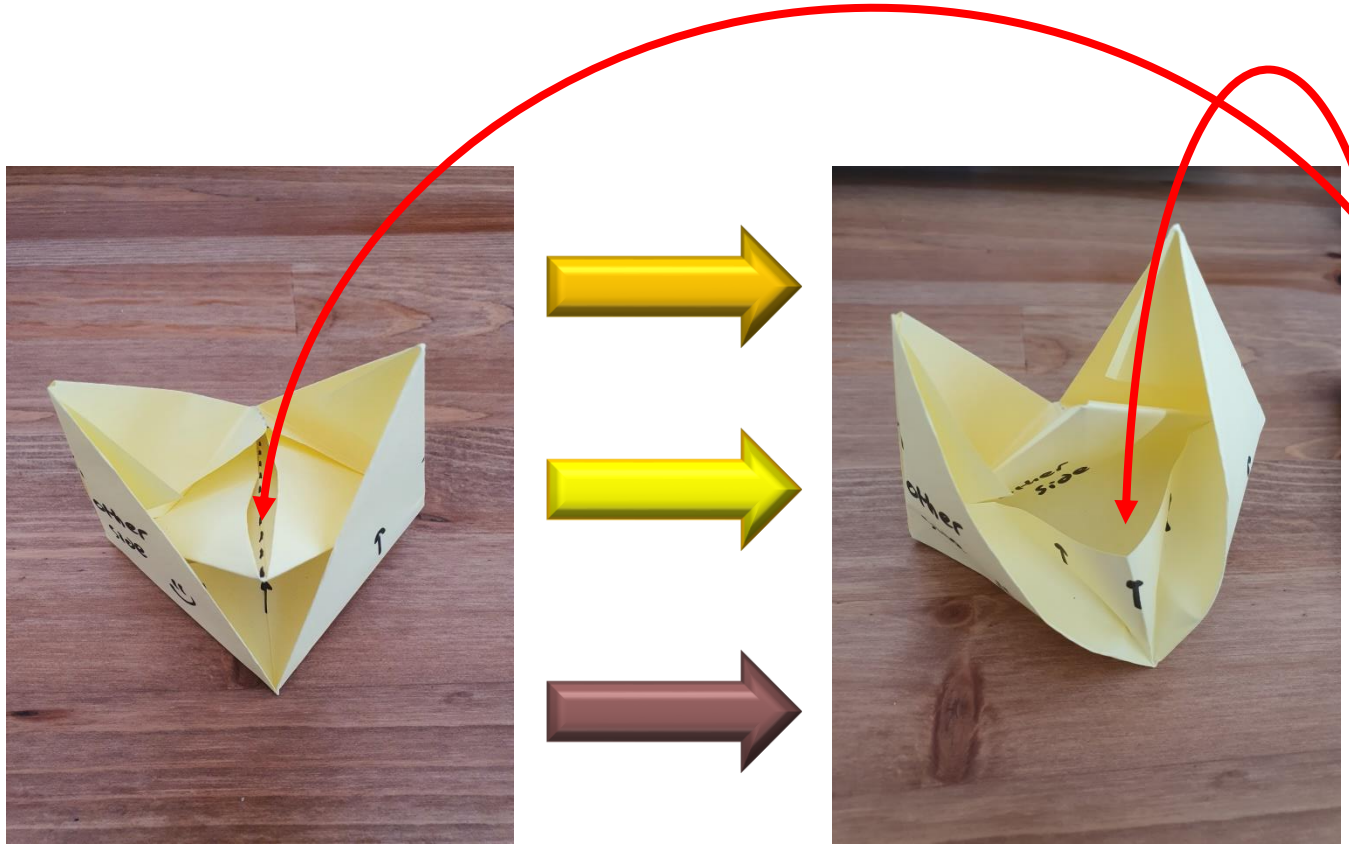

Stage 16

Now we've got a little annoying triangle that we need to tuck underneath the lip.

Take your time, this step is pretty fiddly!

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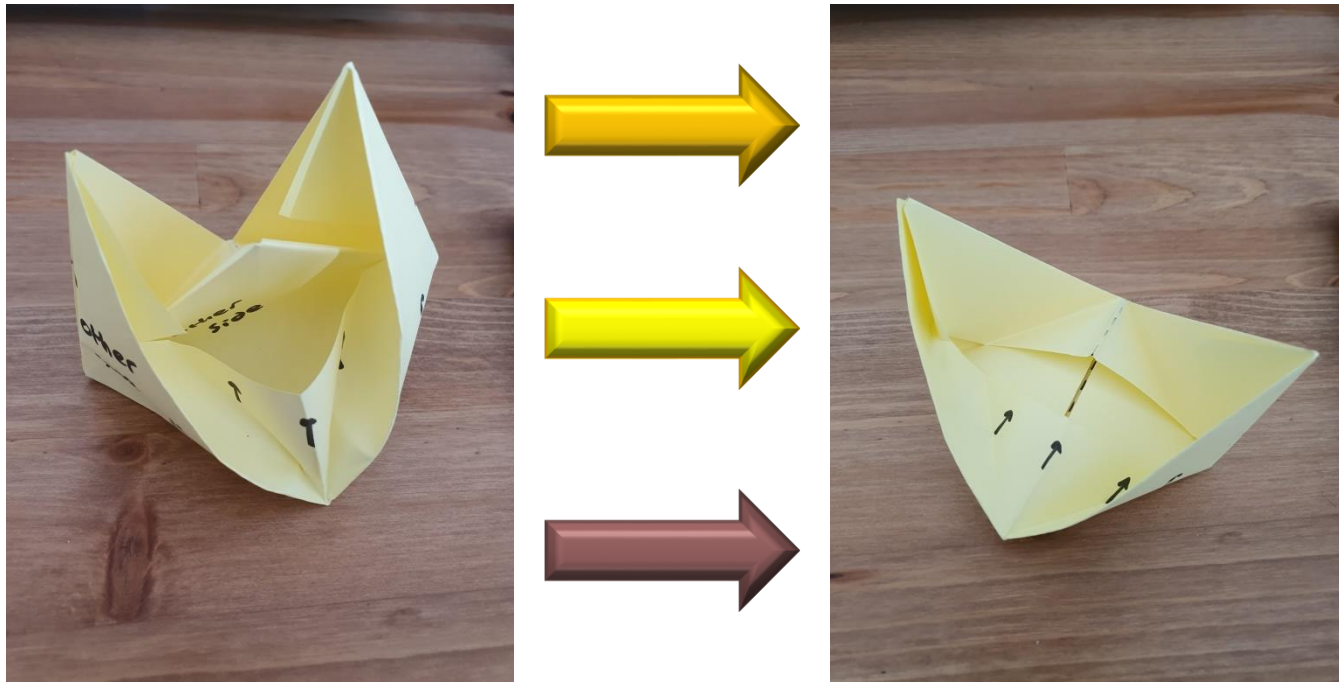

Stage 17

Almost there!

Once you have tucked that annoying triangle away, you should have something that looks like this.

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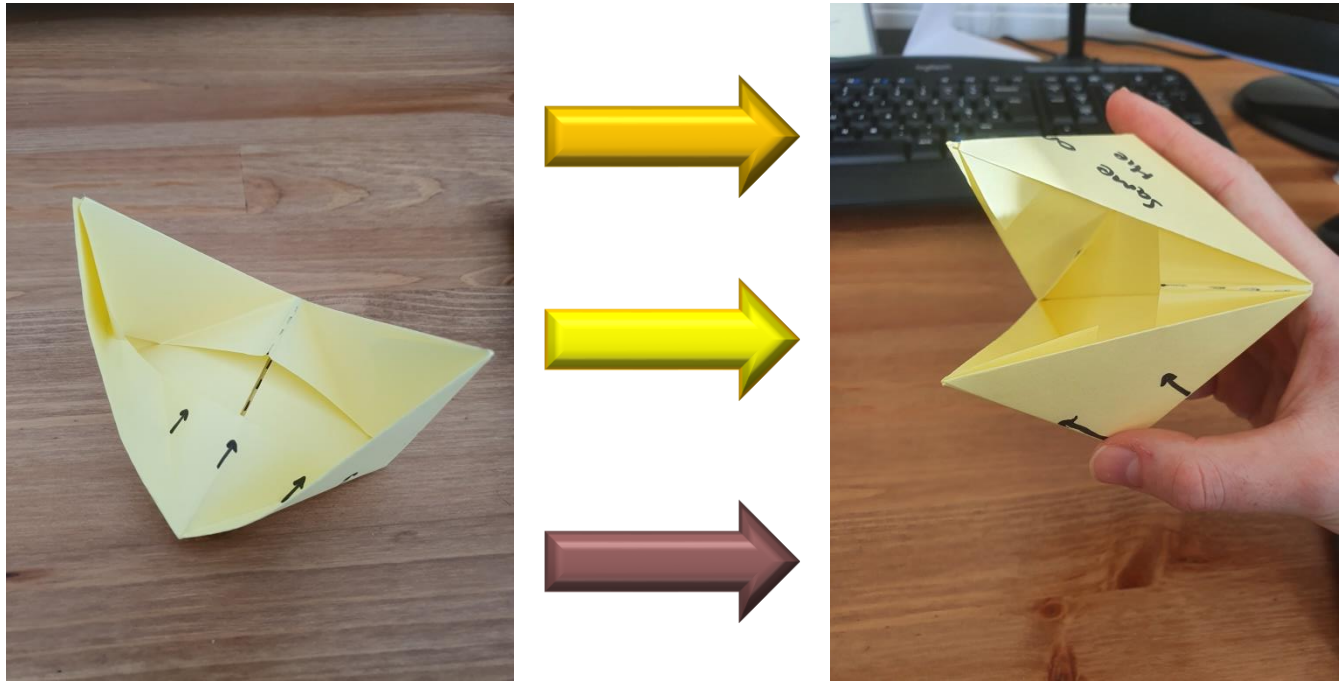

Stage 18

Now hold your fingers at the top and bottom of the square and make your guy snap. *Careful, he snaps back!*

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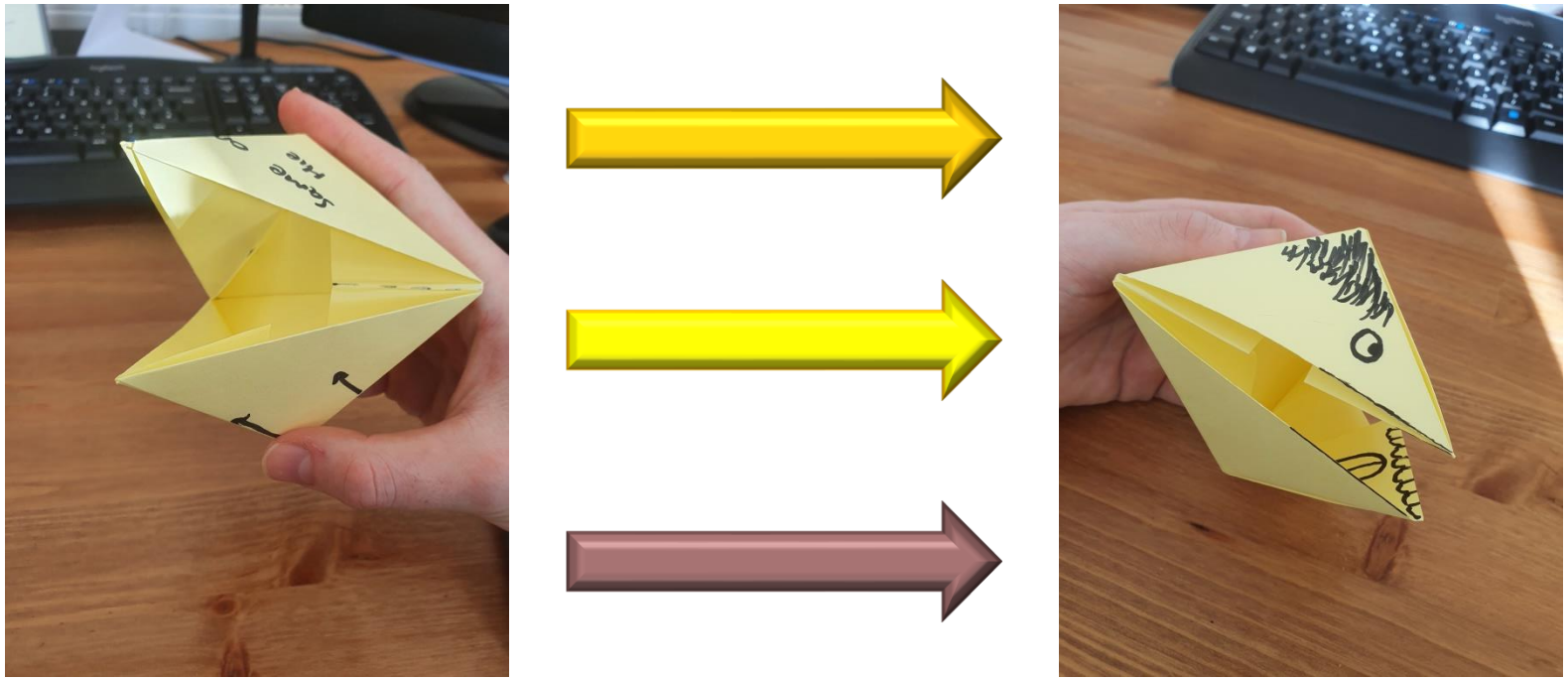
Using origami, create your own snapping toy.

Congratulations!

You now have your snappy toy complete.
Time to add your own decoration, or create a few more!



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Taking it further

- **There's loads more origami pieces you can create!**
  - Be wary, they vary in difficulty.
  - Some have a lot of *fiddly* steps.
  - In some cases, instructions aren't always clear.
    You'll need to be a problem solver to figure out what you need to do.
- **Check out some other cool things you can make with origami.**
  - http://www.origami-instructions.com/modular-origami-instructions.html
  - https://www.origami-fun.com/origami-instructions.html

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STEM Challenge

What's next?

- **Share your achievements**
  - Send pictures or videos of your activities to us. Make sure its clear what school you are from.

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Instagram @thejcbacademy
https://www.instagram.com/jcbacademy/

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https://twitter.com/TheJCBAcademy

Please let us know if you are **not** happy with us sharing your images on our own social media forums and website.

- **Try some more Challenges from our website!**