

# Get making!

## With cardboard artist Lottie Smith



### Resource guide

**Calling all Little Inventors!** You have thought of an invention idea, drawn it, and now you want to take it to the next step - making a prototype!

Take inspiration from Little Inventors Magnificent Maker and cardboard artist Lottie Smith as she shows you how to work with cardboard and recyclable materials. Do try this at home, take care with scissors and get some adult help.

There are six tutorials too to help you with your project - happy making!



### 1. Introduction to get making!

In this series of films, we're going to show you some great hints and tips about making your own invention models. This is the first step and finding what you might need to get started!

<https://youtu.be/4F4TIWleF6o>

Tutorial! Making movement -  
Tabs/Nets/Templates

### 2. Basic Skills - Scoring & Strengthening



Learning how to score and strengthen pieces of cardboard can be the best start! Have a practice and think about how you might use these skills when you make your model - moving parts might need to be stronger.

<https://youtu.be/Kq-vZXVsQ9U>



Click these links to watch  
Lottie's instructional videos!

### 3. Basic Skills - Circles

You can use circles in so many ways and Lottie will show you how to draw and cut a circle in the middle of a piece of cardboard. You'll also learn how to make your very own drawing compass - what can you use it for? Maybe a clock, a rotating plate, or wheels?

<https://youtu.be/s5LijUO29f4>

Tutorial! Basic skills - Circles

With thanks to our funders



Supported using public funding by  
**ARTS COUNCIL  
ENGLAND**

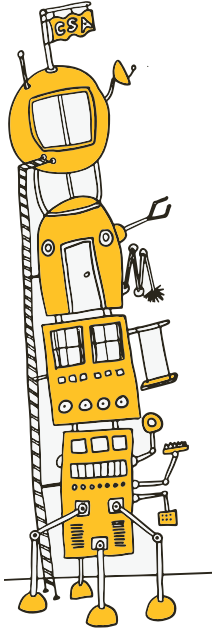


TEES VALLEY  
COMBINED  
AUTHORITY

TEES VALLEY MAYOR

More this way





#### 4. Basic Skills - Cones

Cones are a really useful way to make so many things. Lottie shows you how to make a cone out of cardboard and paper. This shape can be great to make satellite dishes, a hat or a flower - what will yours become?

<https://youtu.be/OkD2x8ecz6I>

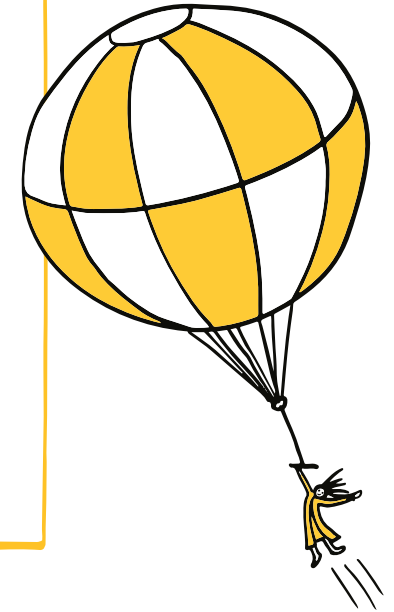
Tutorial! Basic skills - Cones

#### 5. Making Connections - Flanges & Tabs



One of the best ways to make a connection between two different shapes and materials is to make a flange or a tab. Watch Lottie show you how to make your own connections. When you are making your prototype, think about the best way to connect your different elements so it's stable and doesn't break easily.

<https://youtu.be/8-sevKRdVJQ>



#### 6. Making Connections - Slots



Another good way to connect two pieces of cardboard together is by making slots. What can you make using slots? They might be particularly good to build strong walls or create a structure quickly.

[https://youtu.be/Fha\\_vz33Qw4](https://youtu.be/Fha_vz33Qw4)

#### 7. Textures - Folding

Texture can add interest to your model. Lottie shows you how to fold paper to use in different ways, such as creating a fan or a spring. Where could you use these techniques to add interest to your prototype? Think of mechanical things that need to create movement, like accordions or watches.

<https://youtu.be/DjG1riPtFLU>

#### 8. Textures - Fringing and Layering

Fringing and layering are brilliant and fun ways to add lots of detail to your model. Here you can see Lottie using fringing to create fur on her bear head, it looks so realistic! What can you make using these techniques?

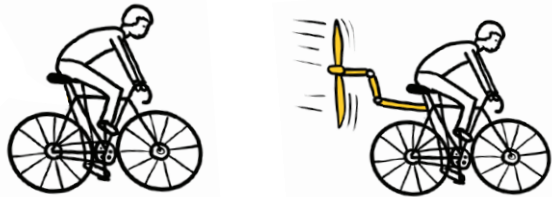
<https://youtu.be/km7B1EF1Q8Y>



## 9. Textures - Corrugation & Curves

Lottie explains about the corrugation effect of a piece of cardboard and how you can use it to create smooth curves in your model. Does your prototype have curves?

<https://youtu.be/791UhWWBQ6s>

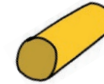


## 12. Making Movement - Wheels & Axles

Do you want your model to move? Lottie shows you how to make wheels and axles and add them to your model. Get moving!

<https://youtu.be/jgHwolyQtc4>

## 10. Making Movement - Cuffs



This is a good way to add movement to your model. Follow Lottie's tips on how to make a cuff - why don't you make your own inventor's cuff?

<https://youtu.be/xLimGx-A2Fg>

Tutorial! Making Movement - Cuffs



## 11. Making Movement - Dials

Dials are used for so many reasons, whether it's for an action such as turning sound up or down, or choosing a setting for a machine like a washing machine. Here's how to make your own!

<https://youtu.be/qAM4HKtcyoM>

Tutorial! Making movement -  
Dials and buttons

Check out our free resources to start inventing and making on [littleinventors.org/resources](http://littleinventors.org/resources)

Check out our Little Inventors **inventor's log** which will give you plenty more tips to get started with developing your idea and prototyping it!

Share your models with us on Facebook, Twitter and Instagram with hashtag **#timeforcreativity**

With thanks to our funders

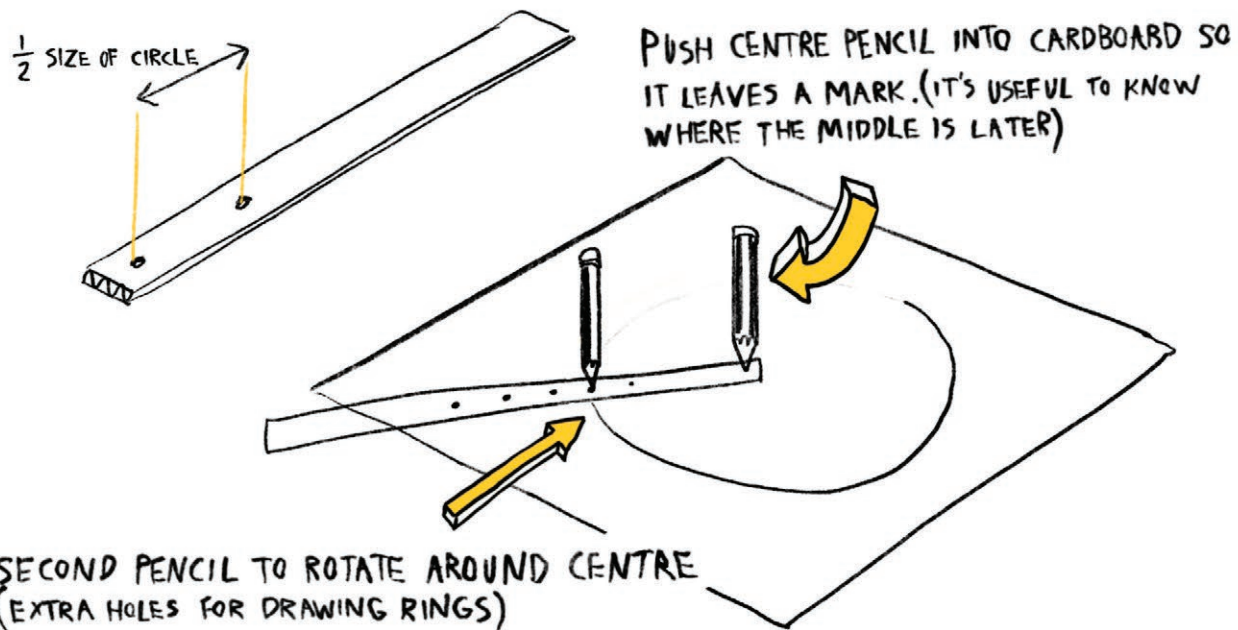


Supported using public funding by  
**ARTS COUNCIL  
ENGLAND**



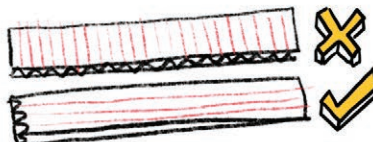
**TEES VALLEY MAYOR**

## MAKING YOUR COMPASS

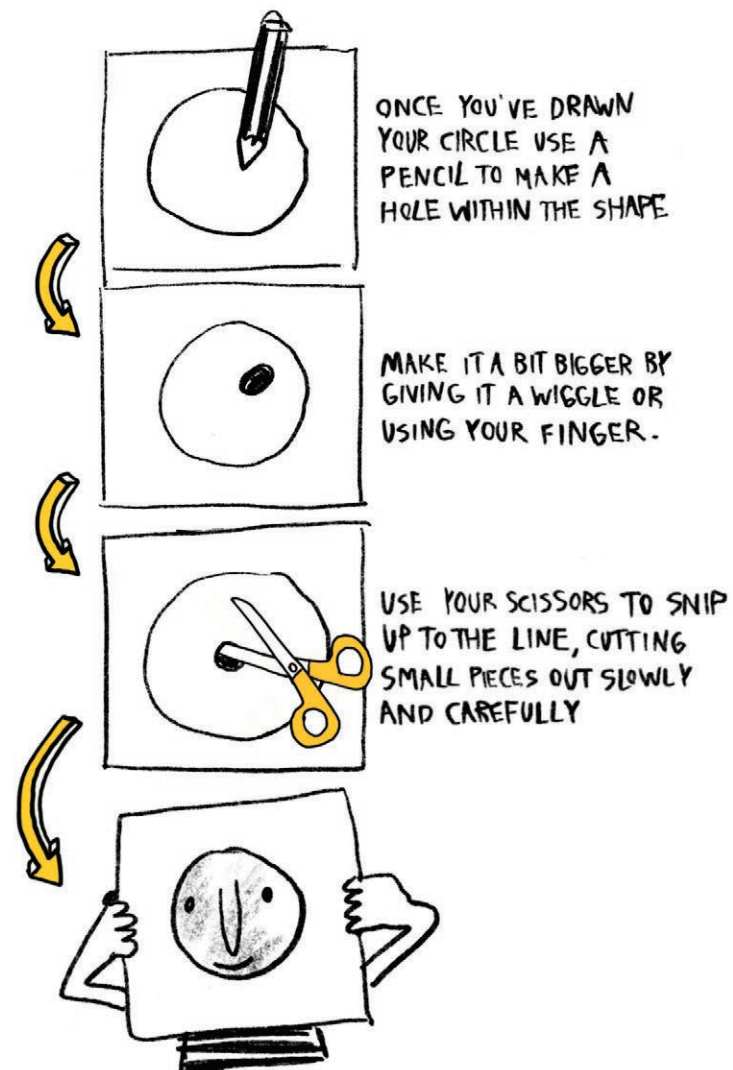


### HANDY HINT

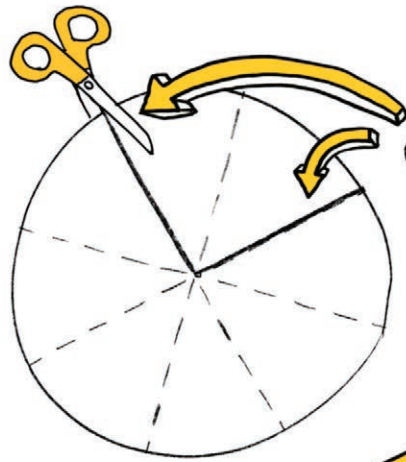
MAKE YOUR COMPASS WITH CORRUGATION LINES FOLLOWING THE LONGER SIDE OF YOUR CARDBOARD STRIP. IT MAKES IT LAST LONGER AND YOUR LESS LIKELY TO END UP WITH A WIBBLY CIRCLE.



## CUTTING OUT CIRCLES

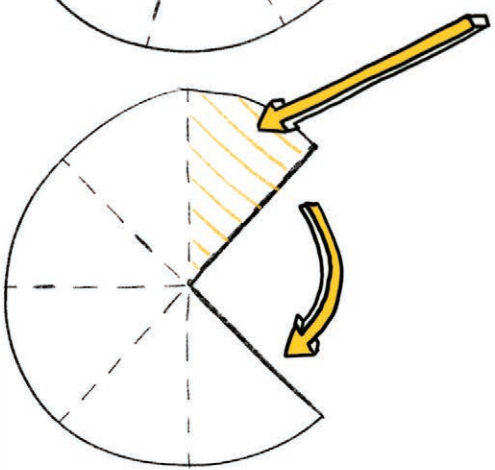


## MAKING A CONE

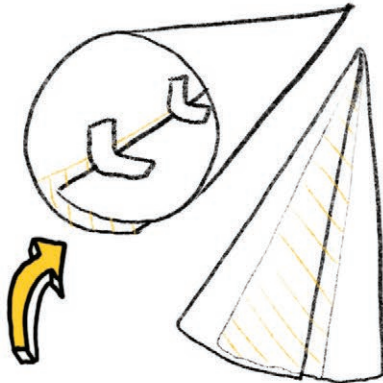


CUT TO CENTRE

- SCORE DOTTED LINES



TAB FOR GLUING

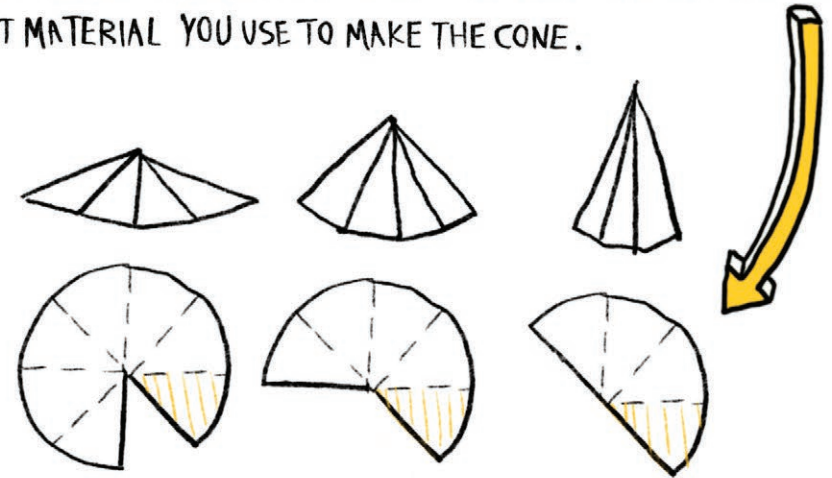


- ROLL UP AND GLUE/TAPE TAB

## DIFFERENT CONE SHAPES

WHY NOT TRY LOTS OF DIFFERENT TYPES OF CONES BY VARYING:

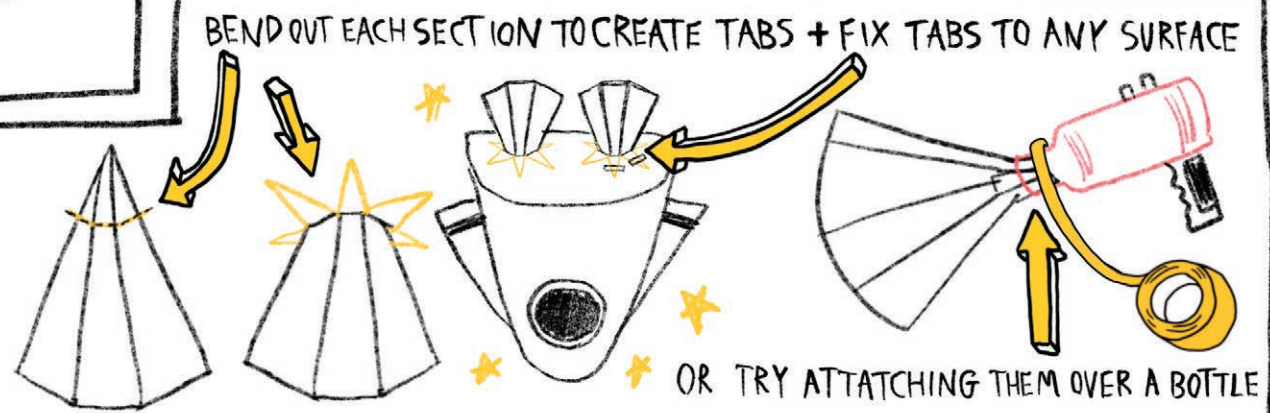
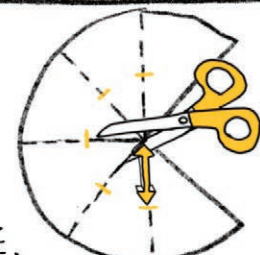
- HOW MANY LINES YOU SCORE TO THE CENTRE.
- HOW EVENLY THESE LINES ARE SPACED APART.
- HOW MUCH OF YOUR CIRCLE YOU REMOVE WHEN MAKING THE TAB
- WHAT MATERIAL YOU USE TO MAKE THE CONE.



## ATTACHING YOUR CONE

- CREATING TABS AT CONE POINT
- CUT DOWN SCORED LINES
- CUT THE SAME LENGTH DOWN ON EACH ONE.

THE IMPORTANT PART IS THAT THE TABS ARE BIG ENOUGH TO HOLD THE CONE IN POSITION

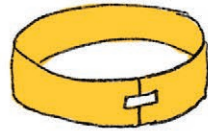


BEND OUT EACH SECTION TO CREATE TABS + FIX TABS TO ANY SURFACE

OR TRY ATTACHING THEM OVER A BOTTLE

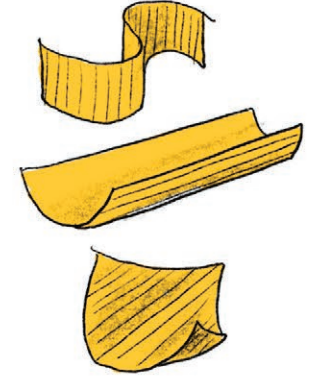
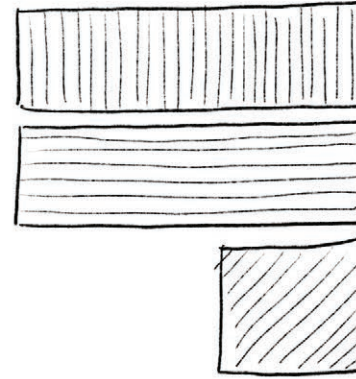
# MAKE CURVIER CURVES USING CORRUGATION

YOU MIGHT HAVE NOTICED THE DIFFERENCE BETWEEN CURVES YOU GET WITH CARDBOARD AND WHEN YOU DO THE SAME WITH PAPER OR CARD.



THIS TECHNIQUE HELPS TO GET YOU SMOOTHER CURVES USING CARDBOARD

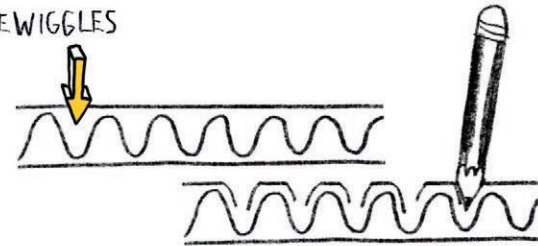
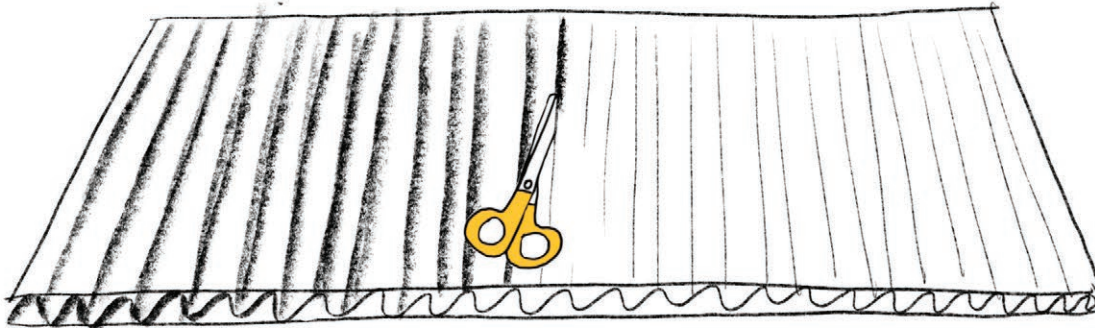
FIRST YOU WANT TO MAKE SURE THE CORRUGATION IS IN THE CORRECT DIRECTION TO HELP WITH THE CURVE YOU WANT :



USING A PENCIL OR CLOSED SCISSORS PUSH DOWN INTO EACH FLUTE. DO THE SAME ON EACH UNTIL YOU'VE DONE YOUR WHOLE STRIP



FLUTES ARE THESE WIGGLES



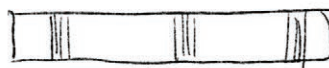
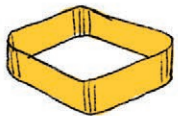
TOP LAYER  
WIGGLES - CORRUGATION/FLUTES  
BOTTOM LAYER

HERE'S HOW IT LOOKS FROM THE SIDE. THE LAYER YOU PUSH INTO ON TOP TEARS MAKING IT EASIER TO BEND

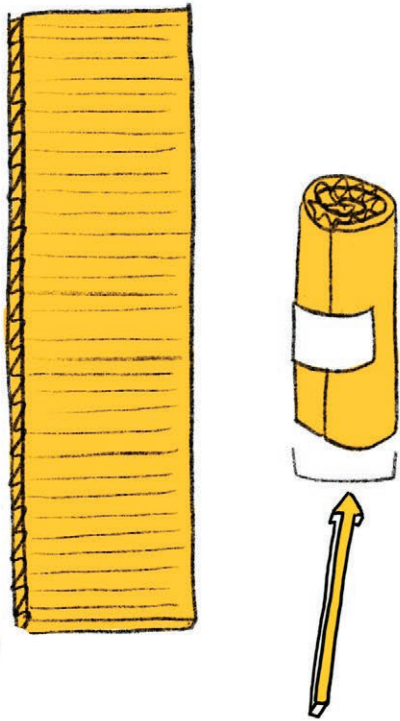
WHAT YOU'RE DOING HERE IS A BIT LIKE SCORING, YOU'RE JUST USING LINES THAT ARE ALREADY THERE

HANDY HINT

YOU DON'T HAVE TO USE THE TECHNIQUE ON THE WHOLE LENGTH. USE ON SEGMENTS TO CREATE MORE INTERESTING FORMS.

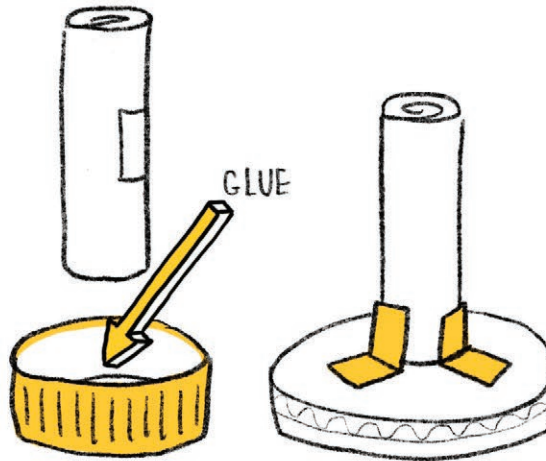


- ROLL UP A STRIP OF CARDBOARD
- FIX WITH TAPE OR GLUE

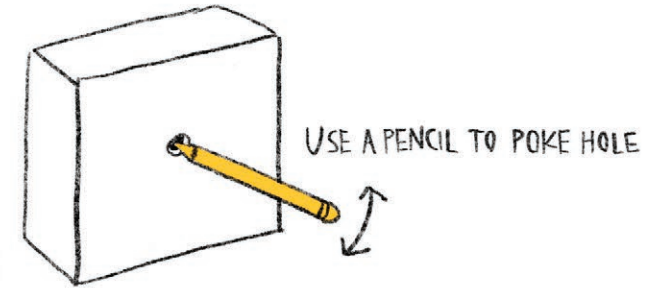


THE LONGER THE STRIP THE BIGGER THE ROLL.  
(A BIGGER ROLL IS EASIER TO GLUE TO YOUR CIRCLE)

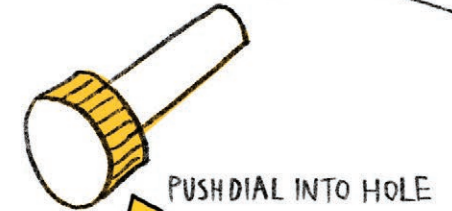
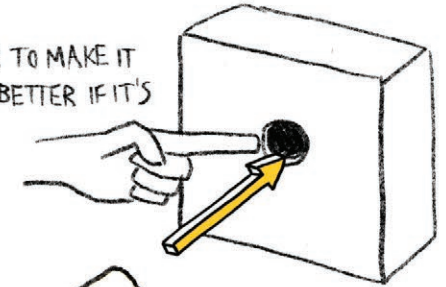
- MAKE THE DIAL HEAD FROM AN OLD LID OR CUT OUT SOME CIRCLES



- GLUE YOUR ROLL TO THE CENTRE OF YOUR CIRCLE OR LID
- USE TABS TO STRENGTHEN



USE YOUR FINGER TO MAKE IT BIG ENOUGH (IT'S BETTER IF IT'S A BIT SMALL)



### ADD CONTROLS TO AN INVENTION BY ADDING DIALS



(COULD YOU USE ONE TO TURN DOWN THE VOLUME OF THE NEIGHBOURS DOG?)



HANDY HINT

YOU CAN CREATE TEXTURE BY TAKING OFF THE TOP LAYER OF CARDBOARD TO REVEAL THE CORRUGATION.

### MAKING MOVEMENT : DIALS

KEY:

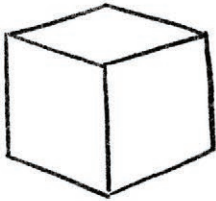
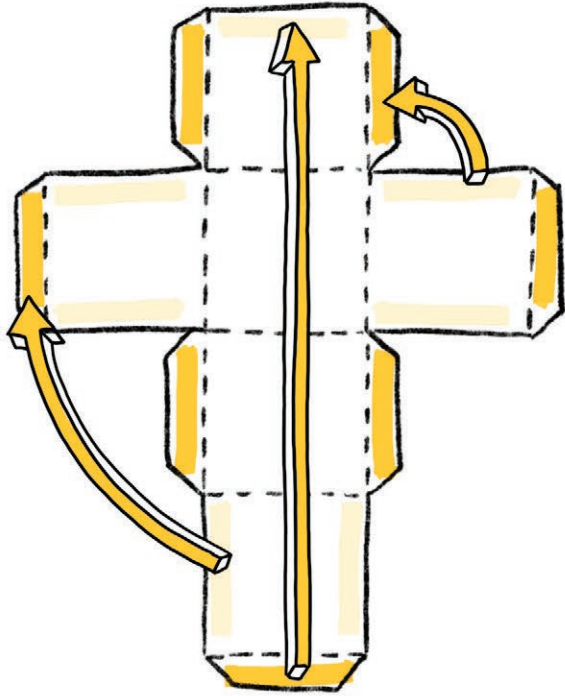
GLUE 

SCORE ---

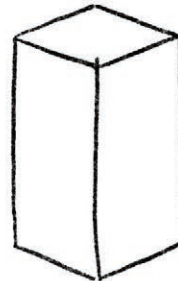
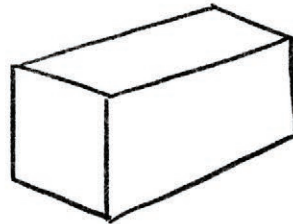
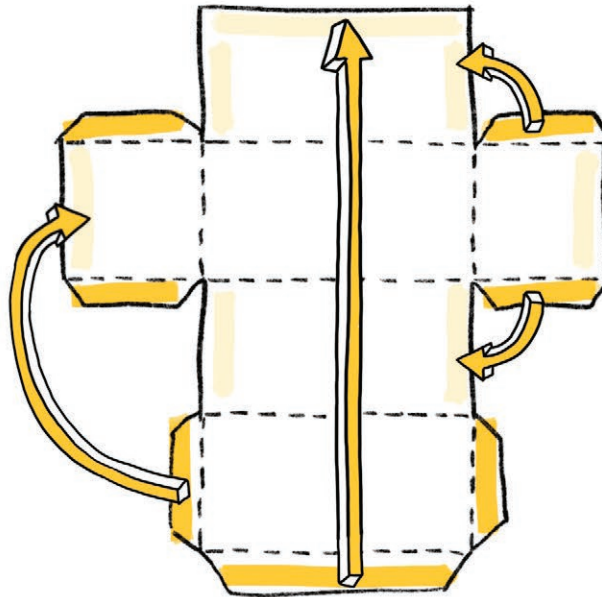
CUT —

- YOU CAN USE NETS OR TEMPLATES TO MAKE 3-DIMENSIONAL SHAPES FROM PAPER OR CARDBOARD
- HERE ARE A FEW EXAMPLES...
- IF YOU CAREFULLY TAKE APART BOXES FROM THE RECYCLING YOU COULD FIND EVEN MORE TO TRY...

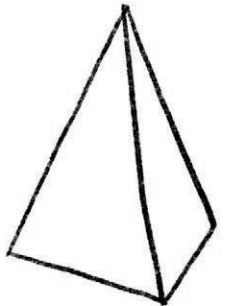
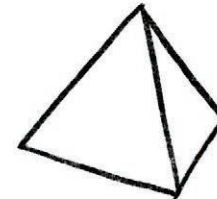
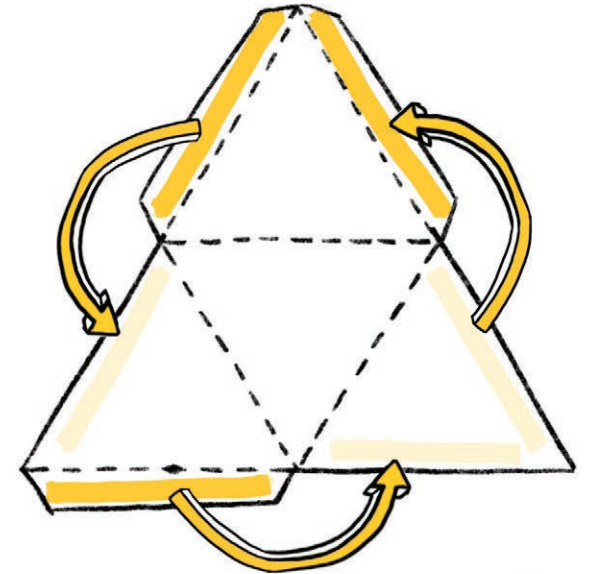
CUBE



CUBOID  
(3D RECTANGLE)



PYRAMID

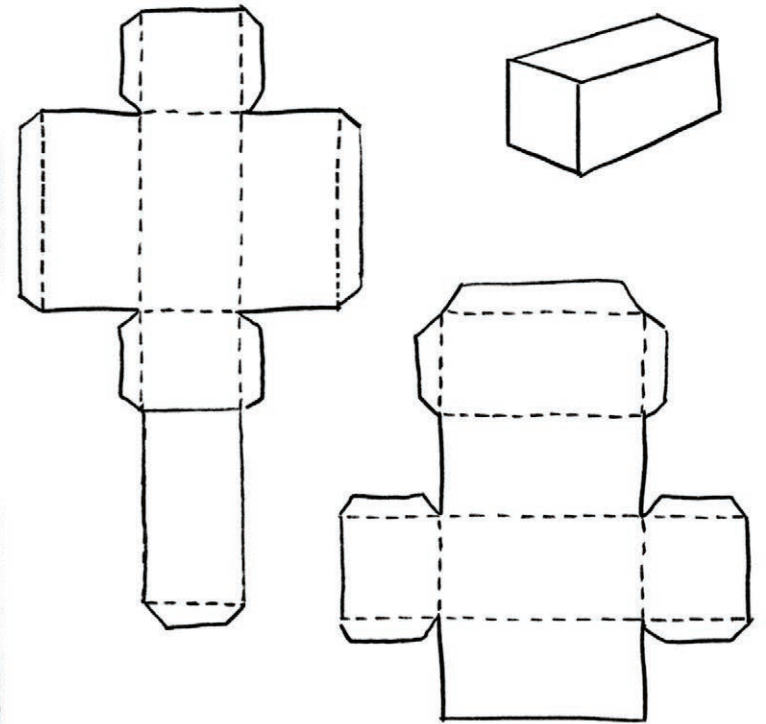
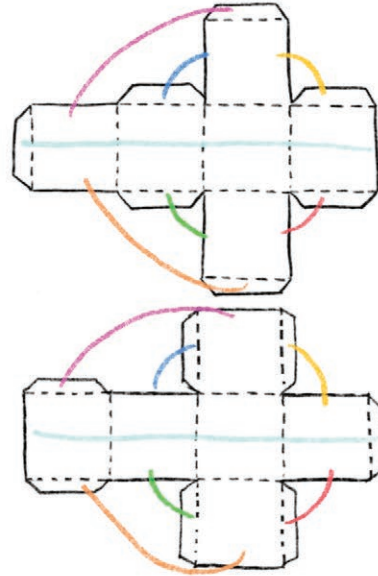
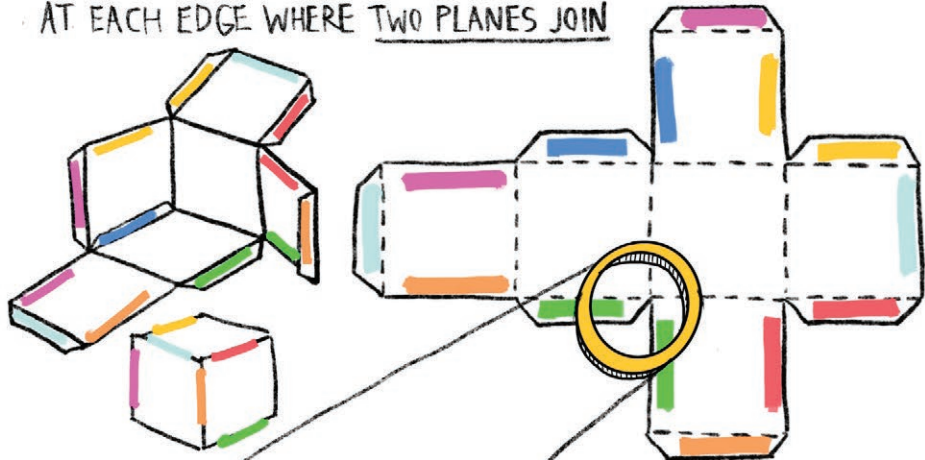




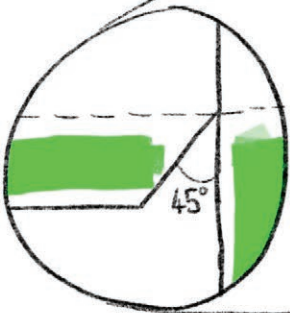
- YOU CAN MAKE A NET BY DRAWING EACH SIDE, OR 'PLANE', OF A 3D SHAPE. (FOR A CUBE THIS IS 6 SQUARES OF THE SAME SIZE.)

THE SIDES NEED TO BE DRAWN IN A WAY WHICH ALLOWS ALL THE PLANES TO FOLD TOGETHER INTO THE CORRECT SHAPE  
THERE MIGHT BE DIFFERENT WAYS TO DO THIS

THE TABS DON'T NEED TO BE IN EXACTLY THE SAME PLACE,  
WHAT IS IMPORTANT IS THAT THERE IS ONE TAB FOR GLUEING  
AT EACH EDGE WHERE TWO PLANES JOIN



2 NETS MAKING EXACTLY THE SAME SHAPE

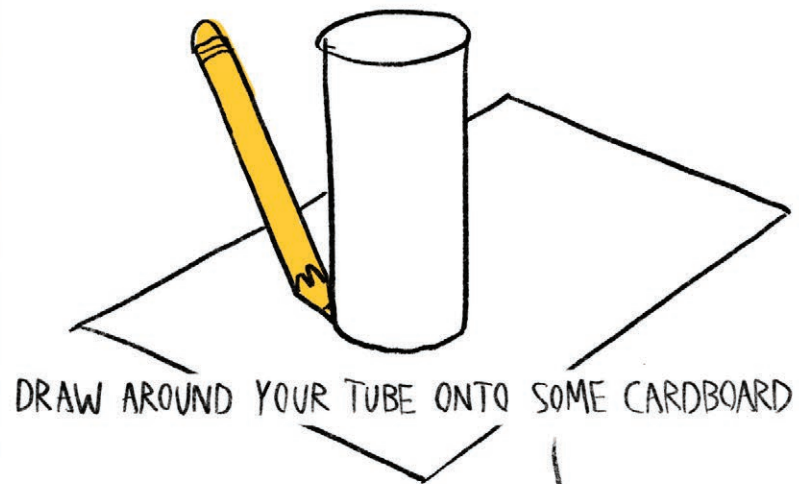


YOU CAN SEE ON THE DRAWINGS OF THE TABS THE CORNERS ARE ANGLED

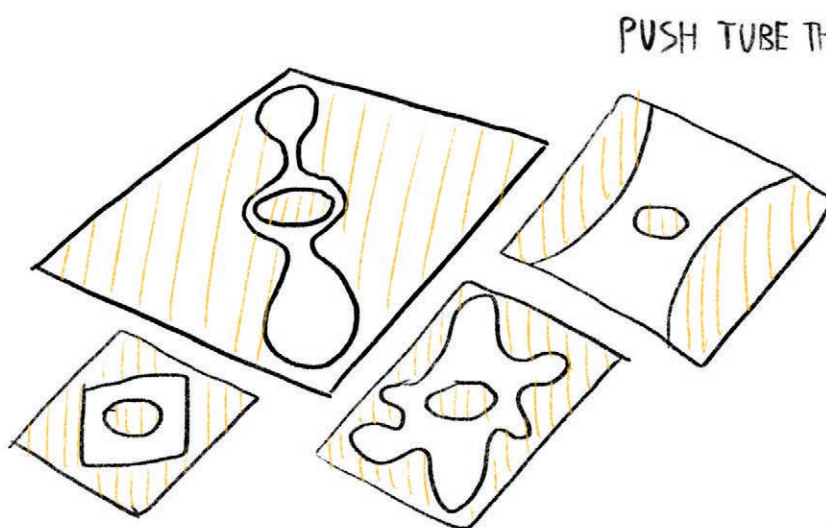
THIS IS TO HELP WHEN GLUEING, BY STOPPING THE FIDDLY CORNERS HAVING  
TOO MANY LAYERS IN THE SAME PLACE.

FOR A CUBE/CUBOID THE PERFECT ANGLE IS  $45^\circ$  - HOW DOES IT CHANGE FOR A PYRAMID?

ONCE YOU'VE MASTERED THE BASICS YOU COULD TRY AND MAKE A MUCH MORE COMPLEX SHAPE.  
THE ONLY REAL DIFFERENCE IS THERE ARE A LOT MORE LINES TO CUT, SCORE AND STICK!

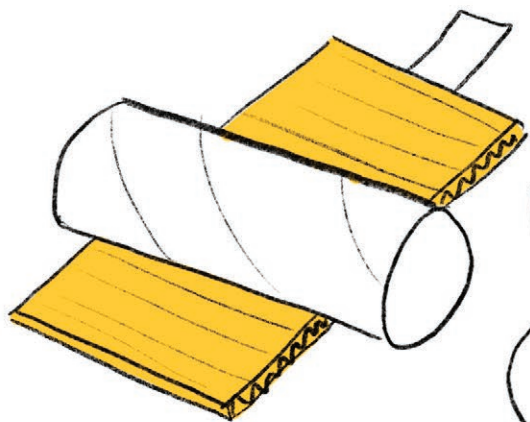
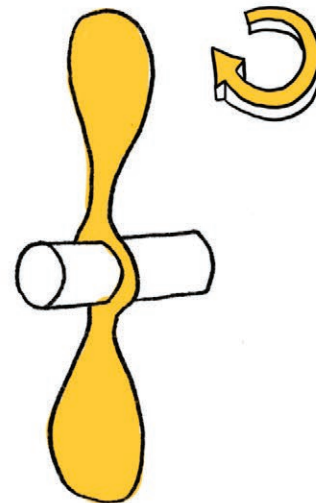


DRAW AROUND YOUR TUBE ONTO SOME CARDBOARD

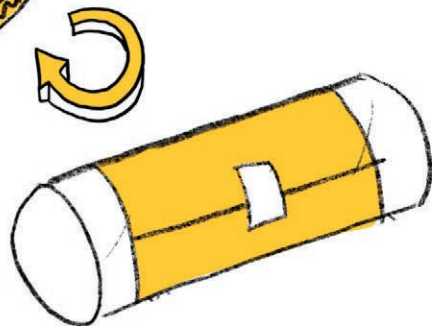


DRAW THE SHAPE YOU WANT ROTATING AROUND THE CIRCLE AND CUT OUT (ITS BETTER FOR THE CIRCLE HOLE TO BE A BIT SMALL)

PUSH TUBE THROUGH THE CIRCLE AND ROTATE!

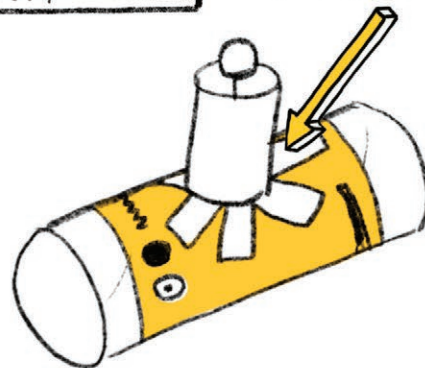


MAKING A REMOTE CONTROL INVENTORS CUFF

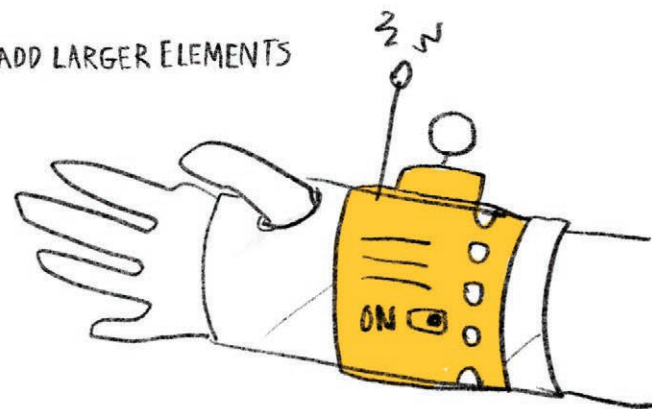


ROLL STRIP OF CARDBOARD AROUND TUBE  
PULL TIGHT AND TAPE/GLUE  
(DON'T TAPE THE STRIP TO THE TUBE ITSELF OR IT WON'T ROTATE!)

TRY USING TABS TO ADD LARGER ELEMENTS



ADD DETAILS ONTO THE ROTATING CUFF  
- BUTTONS / DIALS / SCREENS / ANTENNA



REMOTE CONTROL WRIST COMMAND