

OPTICAL ILLUSIONS

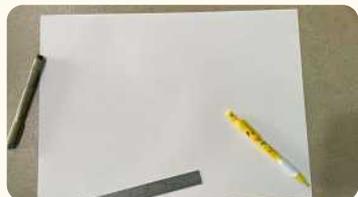
THE 3D LADDER

MATERIALS



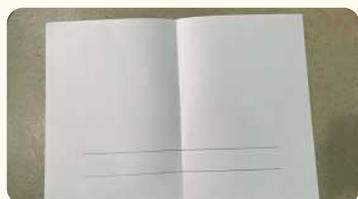
- PENCIL
- RULER
- PLAIN A4 PAPER
- BLACK/DARK BLUE MARKER

STEP 1



- USE A PLAIN WHITE A4 PAPER.
- FOLD IT IN HALF HORIZONTALLY.

STEP 2



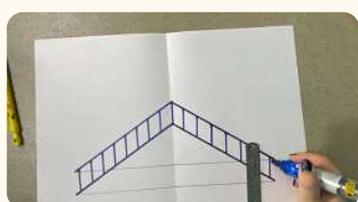
- WITH A PENCIL, DRAW 2 EQUAL LINES ON EACH SIDE OF A RULER.
- DO THIS NEAR THE BOTTOM OF THE PAPER, IN LANDSCAPE.
- THIS IS YOUR SHADOW!

STEP 3



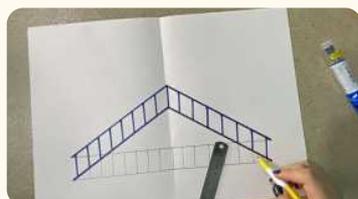
- DRAW STRAIGHT LINES FROM THE ENDS OF THE SHADOW LINES TO THE CREASE IN THE MIDDLE OF THE PAPER.
- YOU CAN SKETCH THESE LINES WITH A PENCIL FIRST THEN USE A MARKER TO TRACE THEM.
- DO THE SAME FOR THE OTHER END OF THE SHADOW LINES!

STEP 4



- TO COMPLETE YOUR LADDER, USE THE RULER AND MARKER TO CONNECT THE LINES DRAWN IN MARKER WITH STRAIGHT VERTICAL LINES! THESE WILL BE THE RUNGS.

STEP 5



- USING A RULER AND PENCIL, DRAW SIMILAR VERTICAL LINES ON THE SHADOW LINES. FOLLOW THE SPACING OF THE LADDER RUNGS YOU HAVE DRAWN.
- ONCE YOU ARE DONE, FOLD THE PAPER TOWARDS YOU AND TRY TO LOOK AT THE LADDER FROM DIFFERENT PERSPECTIVES. AT THE RIGHT ANGLE, IT WILL LOOK 3D!

WATCH AND LEARN!

WHAT IS THE SCIENCE BEHIND CERTAIN EYE-MAZING OPTICAL ILLUSIONS?

[HTTPS://GO.GOV.SG/EARLYREAD-OPTICALILLUSIONS](https://go.gov.sg/earlyread-opticalillusions)



OPTICAL ILLUSIONS

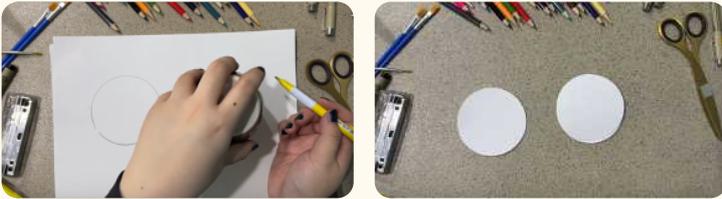
CRAFTING YOUR THAUMATROPE

MATERIALS NEEDED:

- A THICK PIECE OF PAPER
- A HOLE PUNCHER
- SCISSORS
- A GLUE STICK
- A PENCIL AND ERASER
- COLOURED MARKERS OR PAINT
- AN OBJECT WITH A ROUND BASE, LIKE A CUP
- 2 PIECES OF STRING, EACH AT LEAST TWICE THE LENGTH OF THE BASE OF YOUR CUP



STEP 1



- USE THE BASE OF THE CUP TO DRAW TWO CIRCLES.
- CUT OUT THE CIRCLES.

STEP 2



- SKETCH THE FIRST IMAGE ON ONE CIRCLE.
- PLACE THE OTHER CIRCLE ON TOP OF THE FIRST AND SKETCH THE SECOND IMAGE.

STEP 3



- WHEN YOU'RE HAPPY WITH THEM, COLOUR THE IMAGES IN WITH MARKERS / COLOUR PENCILS / PAINT!
- MAKE SURE THAT ONE IMAGE IS THE RIGHT SIDE UP AND THE OTHER IS UPSIDE DOWN BEFORE STICKING THE CIRCLES TOGETHER ON THEIR BACKS.
- USE GLUE TO STICK THE CIRCLES TOGETHER! BOTH IMAGES SHOULD BE SEEN AND FACING OUTWARDS.

STEP 4



- WITH ONE IMAGE FACING YOU AND ON THE RIGHT SIDE UP, POKE TWO HOLES ON THE OPPOSITE ENDS OF THE HORIZONTAL AXIS.
- THREAD A PIECE OF STRING THROUGH ONE HOLE AND TIE A KNOT AT THE END. DO THE SAME FOR THE OTHER SIDE.

STEP 5



- START BY LOOSELY HOLDING ONTO THE TWO STRINGS. THEN, DRAW CIRCLES AWAY FROM YOU UNTIL THE CIRCLE FLIPS OVER AND OVER, AND THE STRINGS ARE TWISTED.
- FINALLY, PULL BOTH STRINGS TIGHTLY AND WATCH THE MAGIC HAPPENS!

WATCH AND LEARN!

WHAT IS THE SCIENCE BEHIND CERTAIN
EYE-MAZING OPTICAL ILLUSIONS?

[HTTPS://GO.GOV.SG/EARLYREAD-OPTICALILLUSIONS](https://go.gov.sg/earlyread-opticalillusions)

