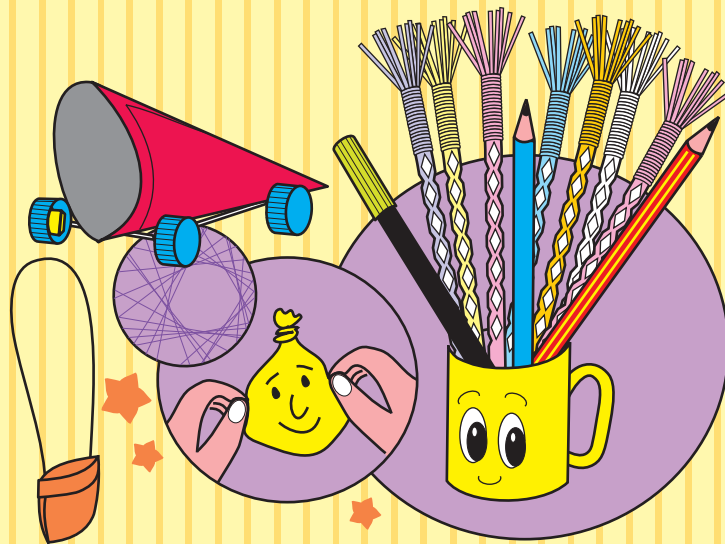


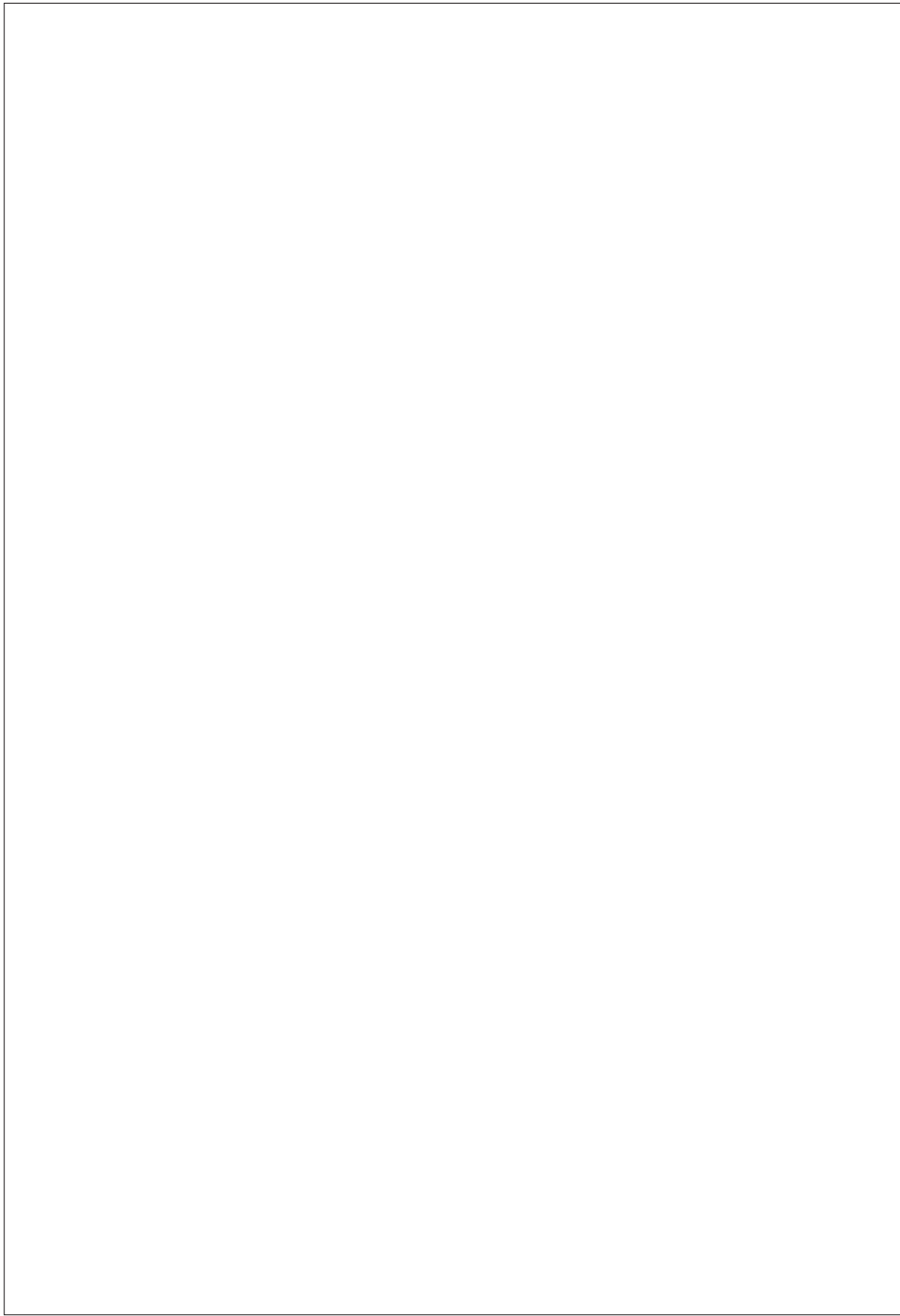


**AMAZING  
ACTIVITIES**

ARVIND GUPTA

ILLUSTRATIONS BY RESHMA BARVE





**ARVIND GUPTA** graduated from the Indian Institute of Technology, Kanpur (1975) with a degree in Electrical Engineering. He has written 15 books on science activities, translated 140 books into Hindi and presented 125 films on science activities on *Doordarshan*. His first book *Matchstick Models & Other Science Experiments* was translated into 12 Indian languages and sold over half a million copies. He has received several honours, including the inaugural *National Award for Science Popularization amongst Children* (1988), *Distinguished Alumnus Award of IIT, Kanpur* (2000), *Indira Gandhi Award for Science Popularization* (2008) and the *Third World Academy of Science Award* (2010) for making science interesting for children. Currently he works at IUCAA's Children's Science Centre, Pune, and shares his passion for books and toys through his popular website <http://arvindguptatoys.com>

**RESHMA BARVE** studied Commercial Arts at the Abhinav Kala Mahavidyalaya, Pune. She is a freelance artist and designer and has illustrated many children's books.

Dedicated to Mr. K. V. Potdar -  
our mentor and guide who  
generously shared many of  
these activities with us.

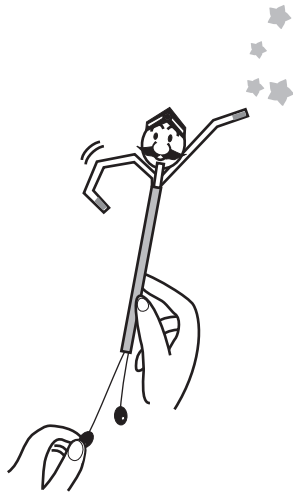
This book was developed under a grant from the  
Navajibai Ratan Tata Trust.

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Illustrations Copyright: Reshma Barve

# AMAZING ACTIVITIES

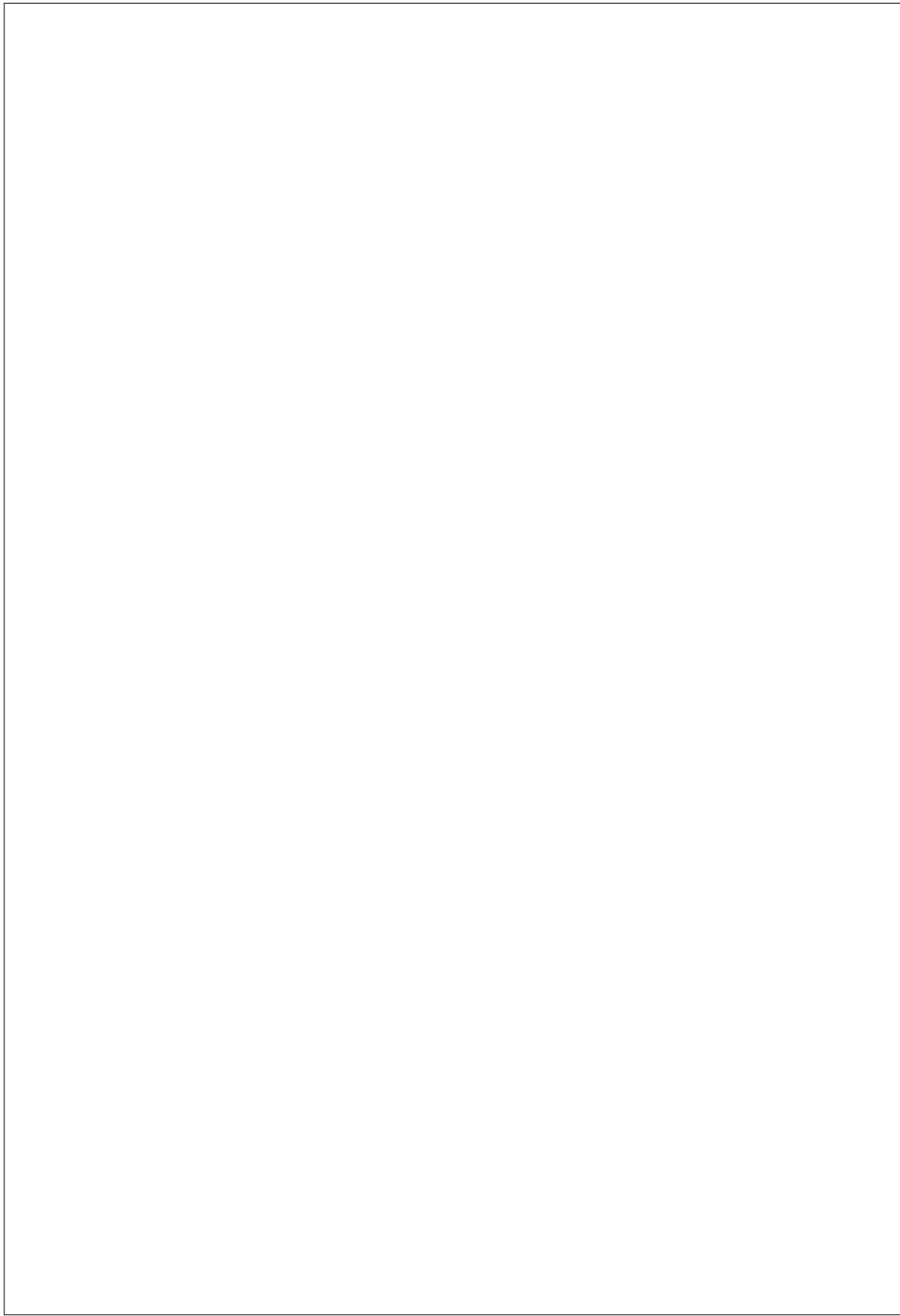
ARVIND GUPTA  
ILLUSTRATIONS BY RESHMA BARVE



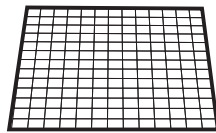
# Activities

1. Area of a Triangle .....	1
2. Tilt Balance .....	2
3. CD-Coin Spinner .....	3
4. Simple Tessellation .....	4
5. Tug of War .....	5
6. Static Strands .....	6
7. Paper Static .....	7
8. Fishy Fish .....	8
9. Lucky Star .....	9
10. Paper Waves .....	10
11. Strip Tetra .....	11
12. Envelope Petals .....	12
13. Paper Chandelier .....	13
14. Bernoulli Cone .....	14
15. Pin Spin .....	15
16. Moving Monkey .....	16
17. Shimmering Matchbox .....	17
18. Tumbling Matchbox .....	18
19. Mother and Child .....	19
20. Jet Car .....	20
21. Paper Cone Ferrari .....	21
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23. Dancing Acrobat .....	24
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25. Straw Sculpture .....	26

26. Elephant's Trunk	.....27
27. Simple Rocket	.....28
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32. Crawling Coin	.....33
33. Pluck String Spin Disc	.....34
34. Mother Teresa's Medicine Pouch	.....35
35. Face Fraud	.....36
36. Boyle's Balloon	.....37
37. Bottle Turbine	.....38-39
38. Bottle Barometer	.....40
39. Inertia Bottles	.....41
40. Bottle Lid Spinner	.....42
41. Marble Tippy-Top	.....43
42. Circle to Ellipse	.....44
43. Bag Jack	.....45
44. Total Internal Reflection	.....46
45. Tetra Measures	.....47
46. Animal Jigsaw	.....48







1-CM GRID PAPER

CARDBOARD BASE (10-CM X 20-CM)



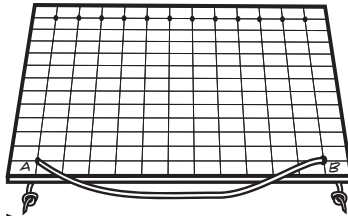
NAIL



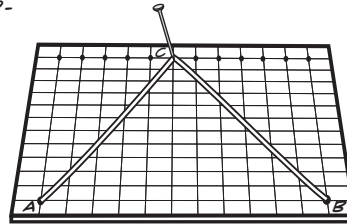
ELASTIC THREAD



1 MAKE HOLES ON TOP NODES.



2 MAKE HOLES AT A AND B. WEAVE AND TIE KNOTS IN AN ELASTIC THREAD.

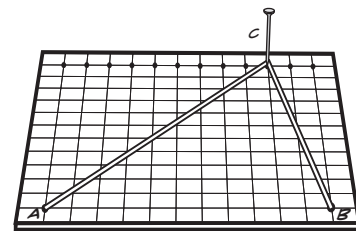


3 STRETCH ELASTIC TO POINT 'C'.

INSERT NAIL IN THE HOLE TO MAKE TRIANGLE 'ABC'.

COUNT SQUARES IN TRIANGLE TO ESTIMATE ITS AREA.

IGNORE LESS THAN HALF SQUARES. COUNT MORE THAN HALF SQUARES AS ONE.

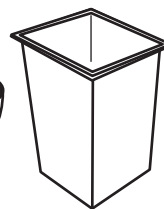


4 SHIFT 'C' TO MAKE YET ANOTHER TRIANGLE AND MEASURE ITS AREA.

5 ALL THESE TRIANGLES WILL HAVE THE SAME BASE AND HEIGHT, SO THEY WILL ENCLOSE THE SAME AREA.



SQUARE BASE  
BOX / GLASS

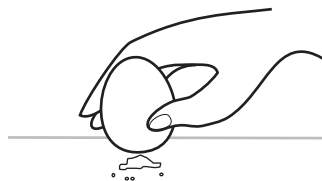
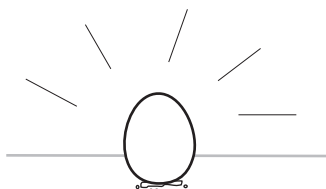


**1** PLACE A PINCH OF SALT ON THE TABLE.

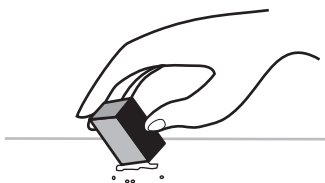
**EGG BATTERY METAL  
BLOCK**



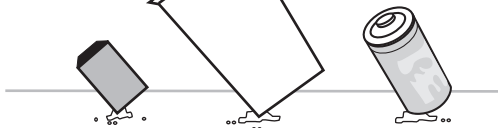
**2** TRY STANDING THE EGG ON A FEW GRAINS OF SALT! DON'T GIVE UP. YOU WILL SUCCEED!

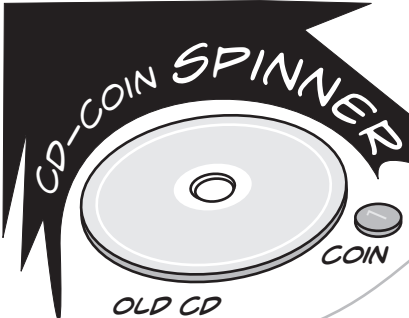


**3** SIMILARLY STAND ONE EDGE OF A METAL BLOCK OR A SQUARE GLASS ON A FEW GRAINS OF SALT!



**4** TRY RECLINING A BATTERY ON A FEW GRAINS OF SALT!





**CD-COIN SPINNER**

OLD CD

COIN

COLOUR DISC

1 HOLD COIN WITH PLIER. HEAT ON A GAS FLAME.

2 PRESS HOT COIN IN CENTRE OF OLD USED CD.

3 HOT COIN WILL MELT CD. INSERT ONLY HALF COIN.

4 IMMEDIATELY POUR WATER TO COOL. THIS WILL AFFIX THE COIN.

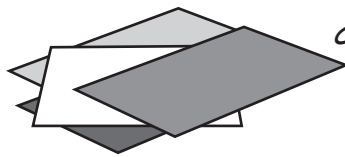
5 STICK COLOUR DISC TO CD.

6 HOLD COIN ALONG RIM AND SPIN.

SEEK ADULT HELP

The diagram illustrates the six steps of creating a CD-coin spinner. Step 1 shows a coin being heated by a gas flame using pliers. Step 2 shows the hot coin being pressed into the center of an old CD. Step 3 shows the coin being inserted into the CD, with a warning to use only half the coin. Step 4 shows water being poured over the CD to cool it. Step 5 shows a color disc being attached to the CD. Step 6 shows the coin being held along the rim and spun.

# SIMPLE TESSELLATION TESSELLATION SIMPLE



CARD SHEETS

CELLO-TAPE

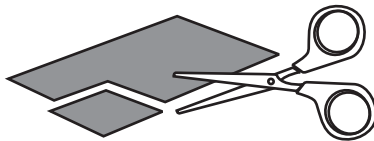


SCISSORS

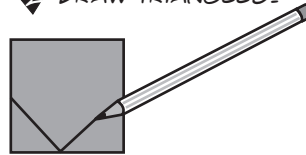


PENCIL

1 CUT A 10-CM SQUARE FROM A CARD SHEET.



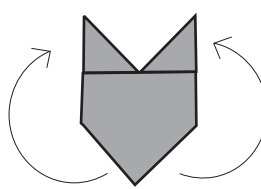
2 DRAW TRIANGLES.



3 CUT TRIANGLES.



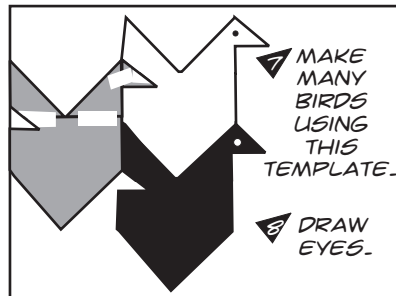
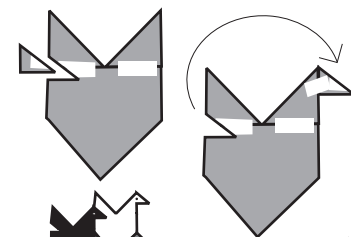
4 SHIFT TRIANGLES.



5 SECURE TRIANGLES WITH TAPE.

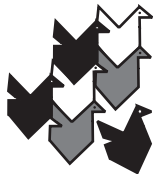


6 CUT BEAK AND STICK WITH TAPE.



7 MAKE MANY BIRDS USING THIS TEMPLATE.

8 DRAW EYES.

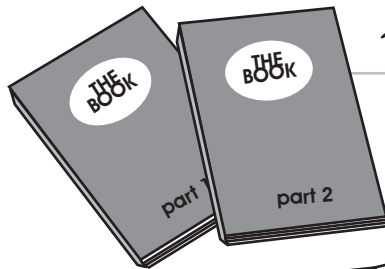


**FLOCK READY!**

LIKE FLOOR TILES TESSELLATIONS ALSO USE THE SAME PATTERN TO COVER AN AREA.

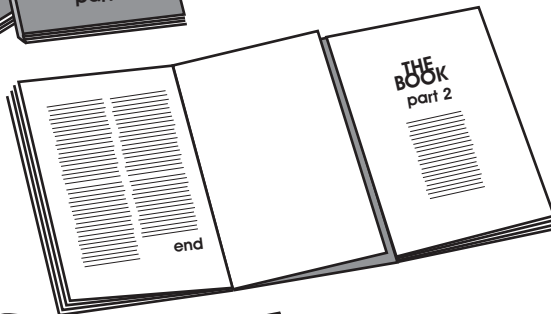
# TUG OF WAR

2 SIMILAR BOOKS



1 TAKE TWO SIMILAR BOOKS.

2 PUT BACK COVER OF BOOK ONE ON FRONT COVER OF BOOK TWO.



3 ALTERNATELY PLACE PAGES OF ONE BOOK ON THE PAGES OF THE OTHER.

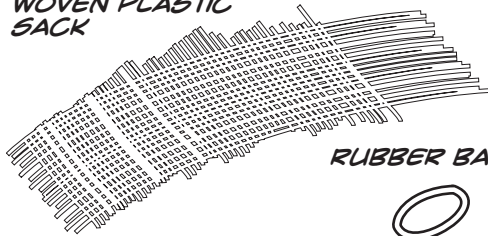
4 THE PAGES OF THE TWO BOOKS WILL BE INTERLOCKED.

FINALLY THE BOOKS WILL LOOK LIKE THIS



5 HOLD BOOKS ON THEIR SEAMS AND PULL OUT. YOU WILL FAIL!!!

STRIP FROM A  
WOVEN PLASTIC  
SACK



RUBBER BAND

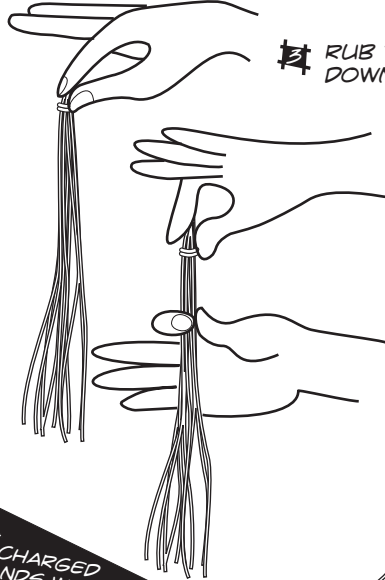


1 JOIN TEN, 45-CM LONG PLASTIC STRANDS WITH A RUBBER BAND AT ONE END.

2 HANG THEM WITH THE TIED END ON TOP.

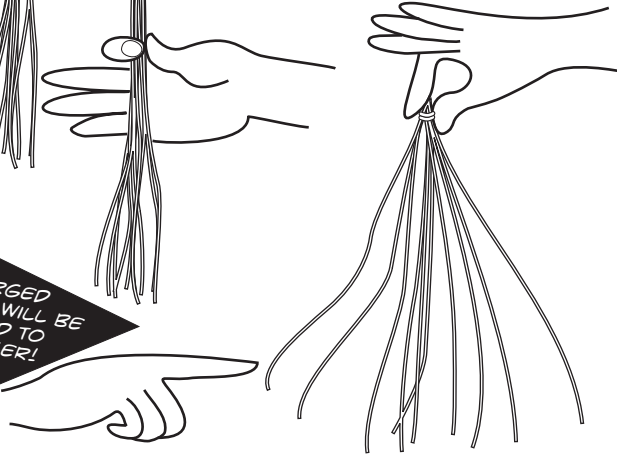


3 RUB THE STRANDS DOWNWARDS QUICKLY.

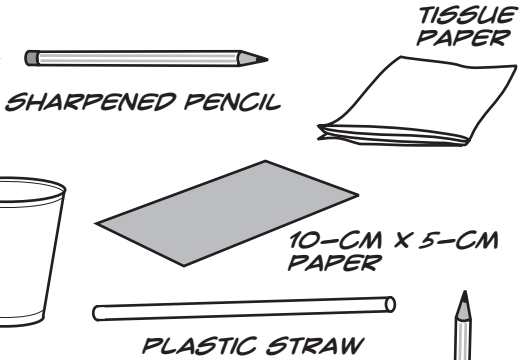


4 THE STRANDS WILL ACQUIRE THE SAME ELECTRICAL CHARGE AND WILL REPEL EACH OTHER.

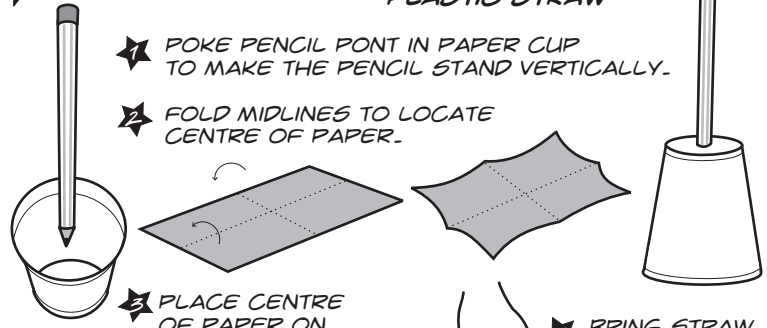
THE CHARGED STRANDS WILL BE ATTRACTED TO YOUR FINGER!



# PAPER STATIC



- 1 POKe PENCIL POINT IN PAPER CUP TO MAKE THE PENCIL STAND VERTICALLY.
- 2 FOLD MIDLINES TO LOCATE CENTRE OF PAPER.



- 3 PLACE CENTRE OF PAPER ON PENCIL POINT.

- 4 RUB PLASTIC STRAW WITH TISSUE PAPER.

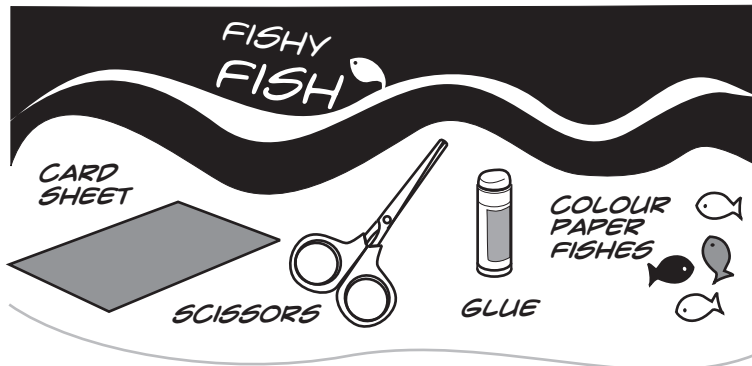
- 5 BRING STRAW CLOSE TO END OF PAPER

DO NOT TOUCH PAPER WITH STRAW

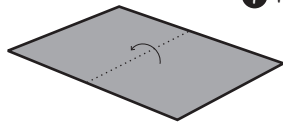


THIS WILL ELECTRICALLY CHARGE THE STRAW.

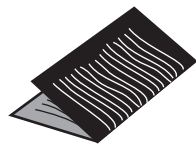
THE PAPER WILL ROTATE WITH THIS MAGIC WAND.



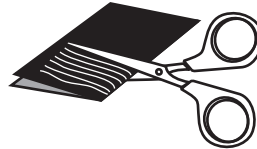
1 FOLD CARD SHEET IN HALF.



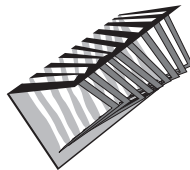
2 CUT SEVERAL WAVY LINES AWAY FROM THE FOLD.



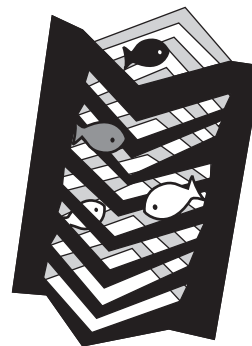
3 LEAVE 1-CM UNCLUT FROM THE EDGES. THE CUT LINES WILL MAKE SEA WAVES.



4 FOLD ALTERNATE STRIPS BACK AND PINCH. THE STRIPS WILL LOOK LIKE SEA WAVES.



5 STICK COLOUR FISHES ON WAVES. THE FISHES WILL APPEAR TO BE SWIMMING IN THE SEA.







SCISSORS

A-4 PAPER STRIP  
(1.5-CM X 30-CM)

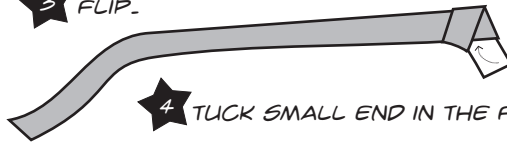


**1** TIE A KNOT AT ONE END OF THE STRIP.

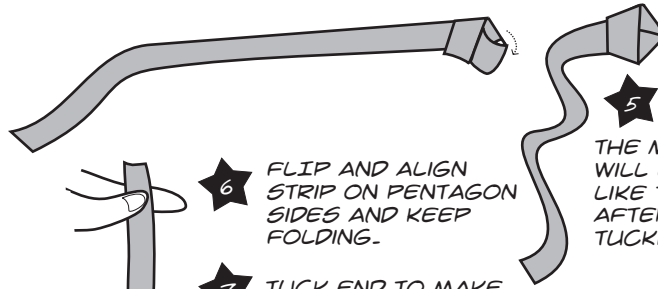


**2** TIGHTEN AND FLATTEN THE KNOT. IT WILL LOOK LIKE A PENTAGON.

**3** FLIP.



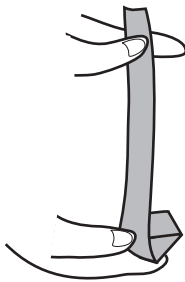
**4** TUCK SMALL END IN THE FOLD.



**6** FLIP AND ALIGN STRIP ON PENTAGON SIDES AND KEEP FOLDING.

**5** THE MODEL WILL LOOK LIKE THIS AFTER TUCKING.

**7** TUCK END TO MAKE A FAT PENTAGON.

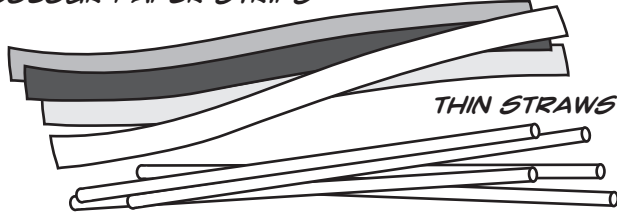


**8** PINCH MIDPOINTS TO MAKE THE STAR BULGE.



# PAPER WAVES

COLOUR PAPER STRIPS



THIN STRAWS

SINGLE PUNCH



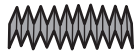
CELLO-TAPE



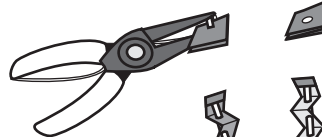
1 FAN FOLD A COLOUR PAPER STRIP.



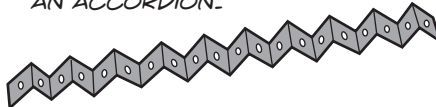
2 COMPRESS ITS FOLDS.



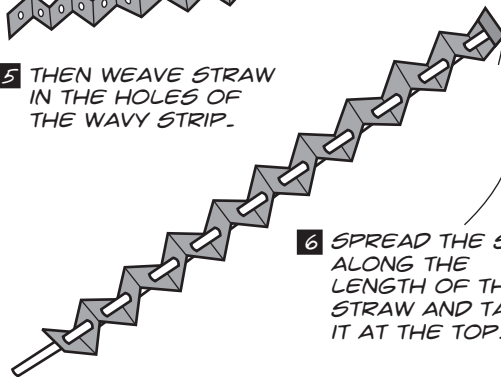
3 MAKE A THROUGH HOLE WITH A SINGLE PUNCH.



4 OPEN FOLDS LIKE AN ACCORDION.

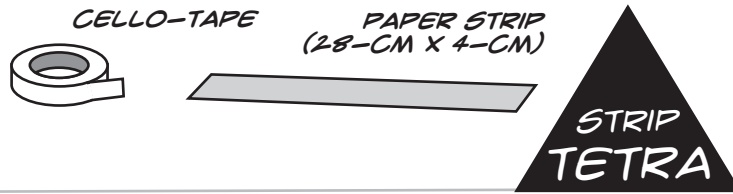


5 THEN WEAVE STRAW IN THE HOLES OF THE WAVY STRIP.

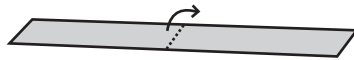


6 SPREAD THE STRIP ALONG THE LENGTH OF THE STRAW AND TAPE IT AT THE TOP.

MAKE MANY COLOURFUL STRAWS AND ARRANGE THEM IN A VASE.



**1** FOLD A PAPER STRIP 28-CM X 4-CM IN HALF.  
BRING THE FREE ENDS TOGETHER ....



**2** ... AND TAPE THEM.



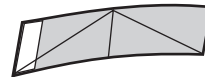
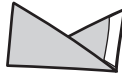
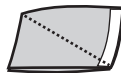
**3** BRING THE TAPED  
END TO ONE SIDE.



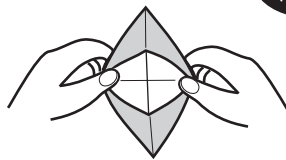
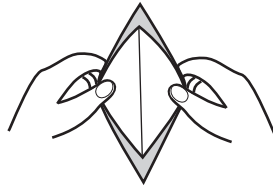
**4** FOLD AGAIN IN HALF.



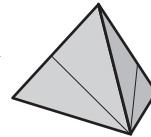
**5** FOLD MOUNTAIN/ VALLEY  
ALONG DIAGONALS.  
OPEN THE MODEL.



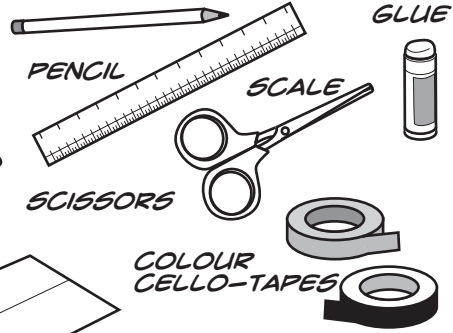
**6** OPEN UP LIKE A BOAT.  
BRING THE TWO EDGES  
TOGETHER...



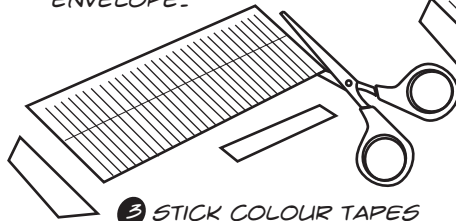
...TO  
COMPLETE THE  
TETRAHEDRON!



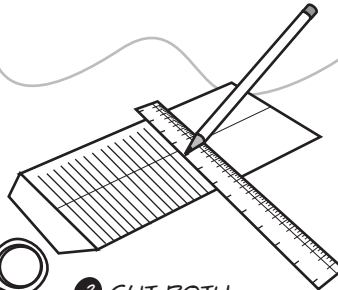
# ENVELOPE PETALS



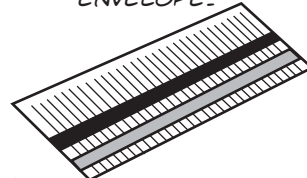
1 DRAW PARALLEL LINES LEAVING 1-CM FROM THE TOP EDGE OF AN OLD ENVELOPE.



2 CUT BOTH ENDS OF THE ENVELOPE.

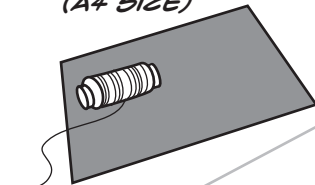


3 STICK COLOUR TAPES ON THE ENVELOPE AND CUT ALONG ALL THE MARKED LINES.

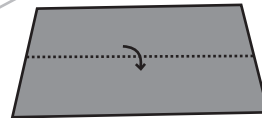


4 OPEN PETALS WITH BOTH HANDS TO MAKE A CIRCULAR FLOWER AND TAPE BOTH ENDS.



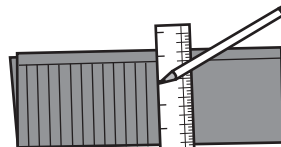


THREAD

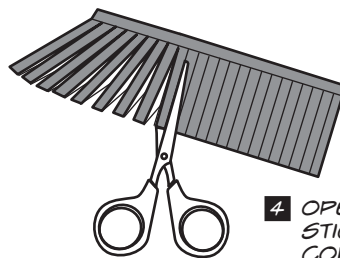


**1** FOLD AN A-4 SIZE PAPER IN HALF ALONG ITS WIDTH.

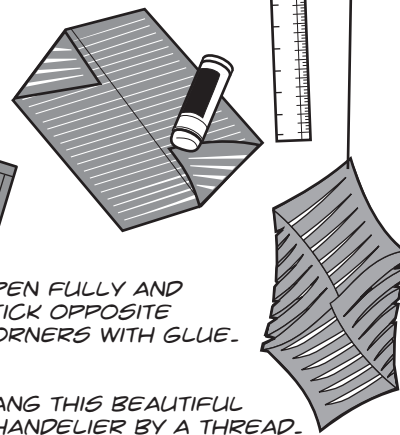
**2** MARK A 1-CM MARGIN LINE ALONG THE OPEN ENDS.



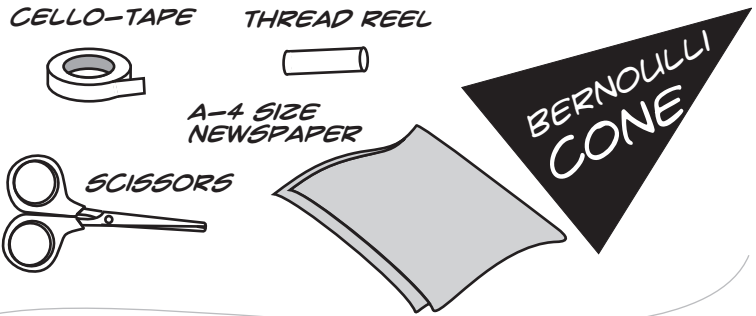
**3** DRAW 1-CM WIDE PARALLEL LINES ALL ALONG THE LENGTH OF THE PAPER AND CUT THIN STRIPS.



**4** OPEN FULLY AND STICK OPPOSITE CORNERS WITH GLUE.

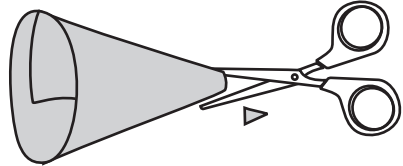
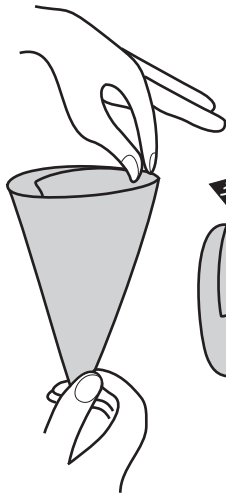


**5** HANG THIS BEAUTIFUL CHANDELIER BY A THREAD.



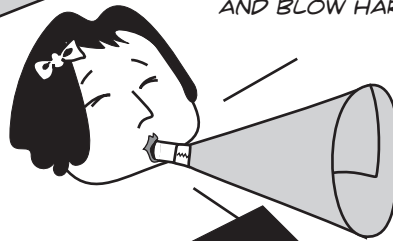
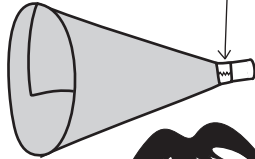
1 ROLL AN A-4 SIZE NEWSPAPER AND TAPE TO MAKE A CONE.

2 CUT POINTED END OF CONE TO FIT REEL.



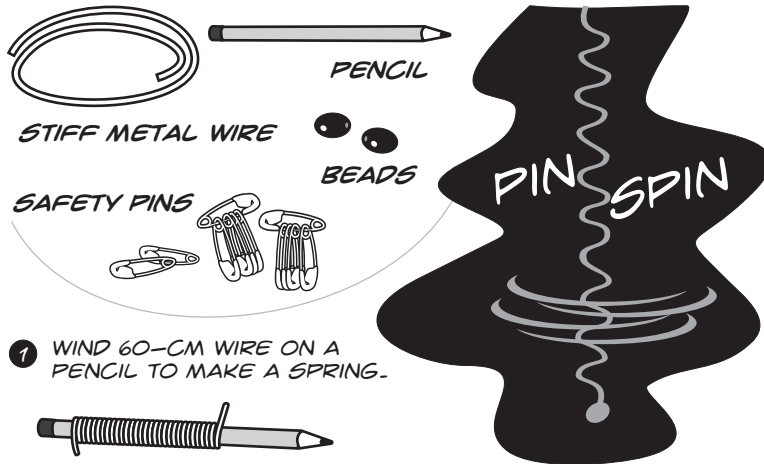
3 FIX REEL TO CONE WITH CELLO-TAPE.

4 PLACE THE REEL IN YOUR MOUTH AND BLOW HARD.



5 THE TWO OPPOSITE SIDES OF THE CONE WILL COLLAPSE.

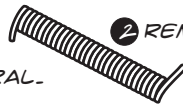
ACCORDING TO BERNOULLI'S LAW - HIGH SPEED AIR CREATES A LOW PRESSURE ZONE AND THIS COLLAPSES THE CONE.



1 WIND 60-CM WIRE ON A PENCIL TO MAKE A SPRING.



3 PULL ENDS OF SPRING TO MAKE A SPIRAL.



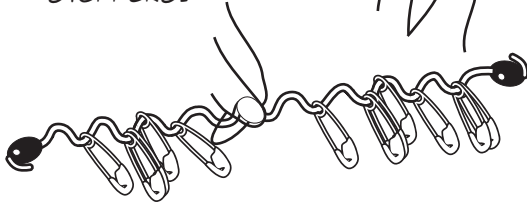
2 REMOVE SPRING FROM PENCIL.



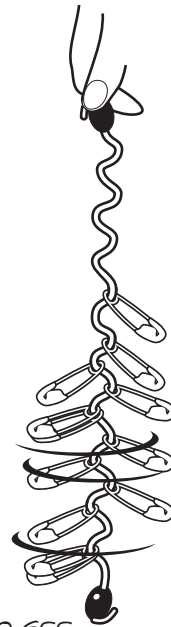
4 WEAVE A DOZEN SAFETY PINS.



5 FIX BEADS AT BOTH ENDS AS STOPPERS.

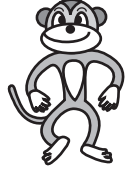


6 HOLD VERTICALLY TO SEE PINS SPIN DOWN MAJESTICALLY!



**M  
O  
N  
K  
Y**

"MONKEY"



CARD SHEET  
MONKEY

ICE CREAM STICK



BIG RUBBER BAND



STIFF STRAW  
(2-CM)



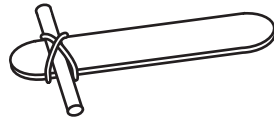
SMALL  
RUBBER BAND



SCISSORS



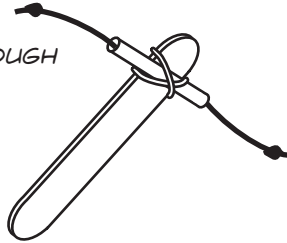
- 1 FIX A 2-CM STIFF STRAW TO AN ICE CREAM STICK WITH A SMALL RUBBER BAND.



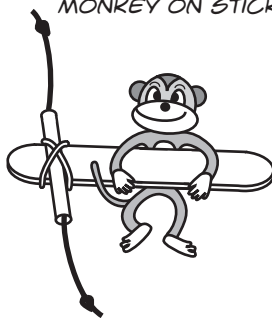
- 2 CUT A BIG RUBBER BAND.



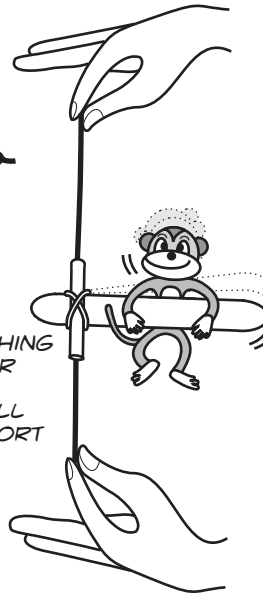
- 3 WEAVE IT THROUGH THE STRAW. TIE KNOTS ON BOTH ENDS.



- 4 FIX CARD SHEET MONKEY ON STICK.



- 5 ON STRETCHING THE RUBBER BAND THE MONKEY WILL FALL IN SHORT JERKS.

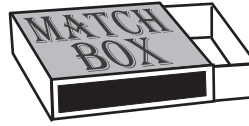




# SHIMMERING MATCH BOX



2 CLIPS



EMPTY MATCH BOX

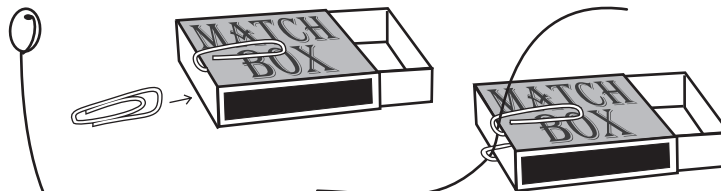


2 BEADS

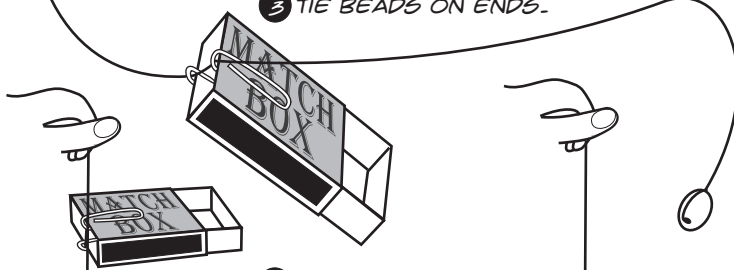


THREAD

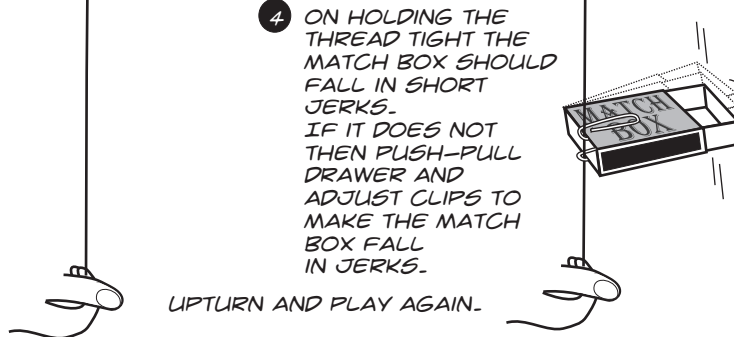
- 1 FIX CLIPS IN MATCH BOX SHELL.
- 2 WEAWE THREAD.



- 3 TIE BEADS ON ENDS.



- 4 ON HOLDING THE THREAD TIGHT THE MATCH BOX SHOULD FALL IN SHORT JERKS. IF IT DOES NOT THEN PUSH-PULL DRAWER AND ADJUST CLIPS TO MAKE THE MATCH BOX FALL IN JERKS.



LIPTURN AND PLAY AGAIN.

# TUMBLING MATCH BOX



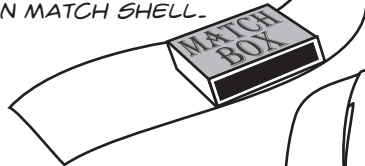
ONLY MATCH BOX SHELL



CELLO-TAPE



1 WRAP CARD STRIP ON MATCH SHELL.



2 WRAP IT LOOSE AND REMOVE THE MATCH SHELL.



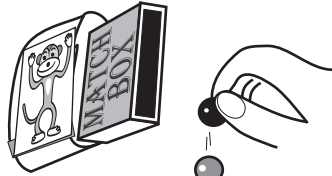
3 TAPE OVAL CARD RING.



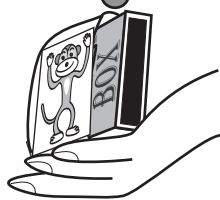
4 STICK MONKEYS ON BOTH SIDES.



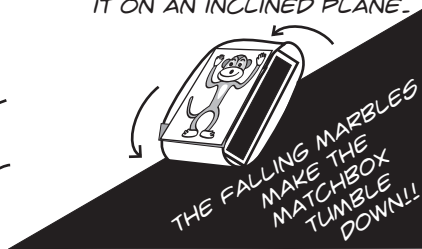
5 PLACE MATCH SHELL IN OVAL CARD RING.

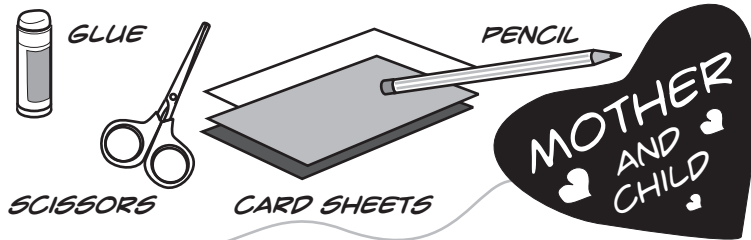


6 DROP TWO MARBLES.

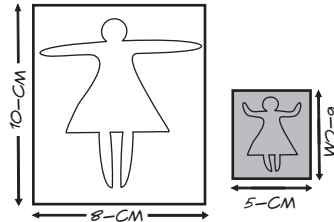


7 PUSH MATCH SHELL FULLY IN RING AND PLACE IT ON AN INCLINED PLANE.





1 DRAW A MOTHER AND CHILD.



2 CUT BOTH PICTURES ALONG THEIR OUTLINES.



3 APPLY GLUE ON BOTH HANDS OF THE MOTHER.



4 STICK THE MOTHER'S HANDS TO THE CHILD. NOW THE MOTHER WILL BE HOLDING THE CHILD.

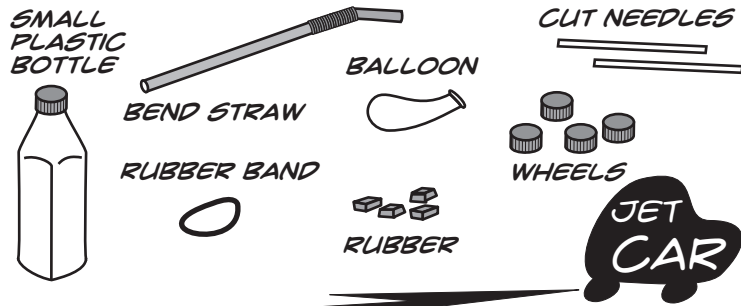


5 STICK MOTHER-CHILD ON THE DARK CARD SHEET.



6 HANG THIS 3-D SCULPTURE ON THE WALL.





1 MAKE FOUR HOLES IN A BOTTLE. WEAVE CUT NEEDLES THROUGH THEM TO MAKE WHEEL AXLES.

2 MAKE HOLES IN BOTTLE LIDS TO MAKE WHEELS.

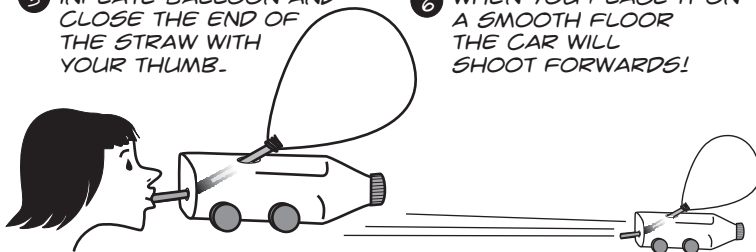
LID RUBBER WIRE

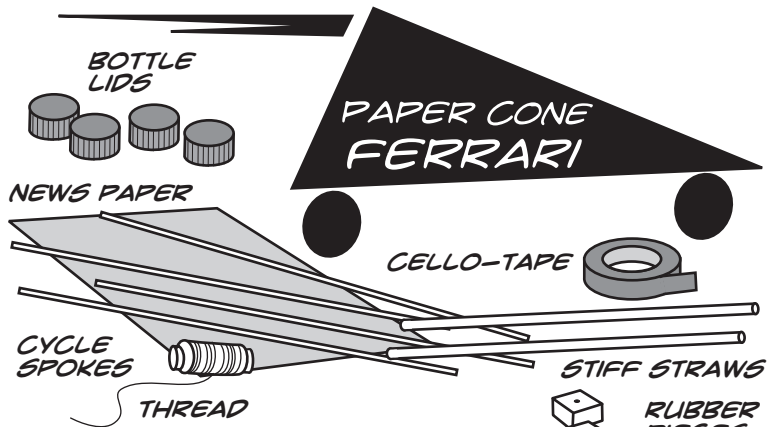
3 MAKE TWO HOLES IN THE BOTTLE. ONE ON THE BASE AND THE OTHER ON THE TOP.

4 ATTACH BALLOON TO THE STRAW WITH A RUBBER BAND.

5 INFLATE BALLOON AND CLOSE THE END OF THE STRAW WITH YOUR THUMB.

6 WHEN YOU PLACE IT ON A SMOOTH FLOOR THE CAR WILL SHOOT FORWARDS!





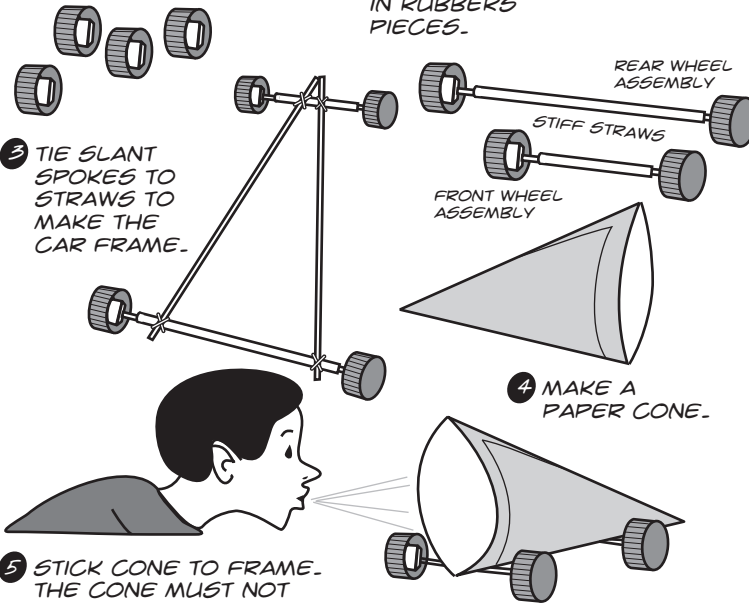
1 STICK RUBBER PIECES INSIDE PLASTIC LIDS.

2 INSERT SPOKE AXLES IN RUBBERS PIECES.

3 TIE SLANT SPOKES TO STRAWS TO MAKE THE CAR FRAME.

4 MAKE A PAPER CONE.

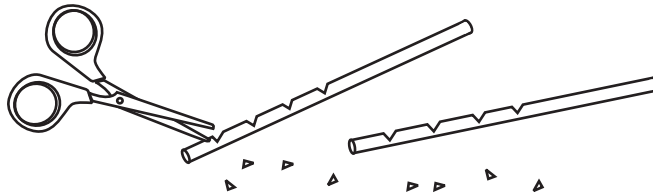
5 STICK CONE TO FRAME. THE CONE MUST NOT TOUCH THE WHEELS. PLACE CAR ON A SMOOTH SURFACE AND BLOW HARD INTO THE CONE. YOUR FERRARI WILL SHOOT FORWARDS!!!



# T R A F F I C P O L I C E



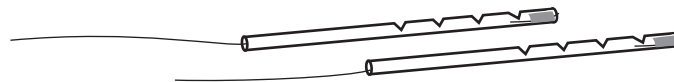
- 1 CUT FOUR 'V' NOTCHES IN TWO THIN STRAWS. THE NOTCHES SHOULD BE 3-CM APART.



- 2 WEAVE THIN THREAD THROUGH BOTH STRAWS.



- 3 TAPE RIGHT ENDS OF THREAD TO STRAWS WITH CELLO-TAPE.



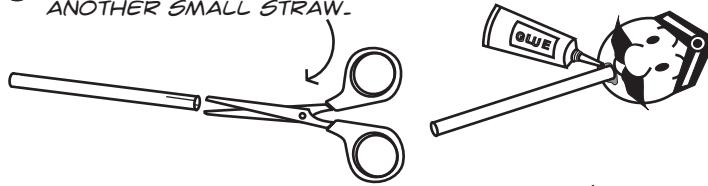
- 4 PLACE BOTH THIN STRAWS WITH THREADS INSIDE A FAT STRAW.



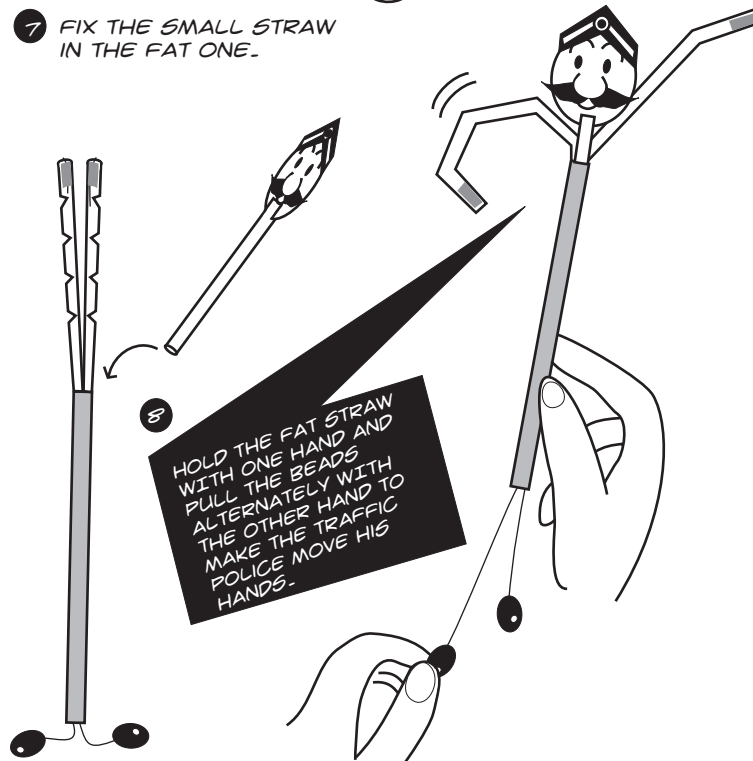
5 TIE BEADS ON THE LEFT ENDS OF BOTH THREADS.



6 GLUE THE CARD HEAD OF A POLICEMAN TO ANOTHER SMALL STRAW.



7 FIX THE SMALL STRAW IN THE FAT ONE.



# "DANCING ACROBAT"

PLASTIC STRAWS

THREAD



SCISSORS

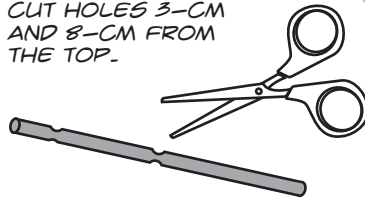


CARD SHEET HEAD

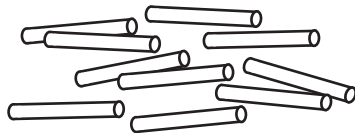


CELLO-TAPE

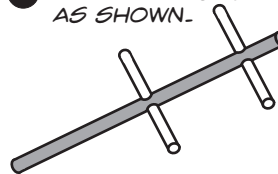
- 1 TAKE A STRAW AND CUT HOLES 3-CM AND 8-CM FROM THE TOP.



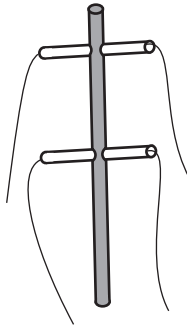
- 2 CUT TEN STRAW PIECES. EACH SHOULD BE 6-CM LONG.



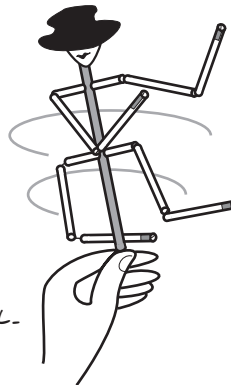
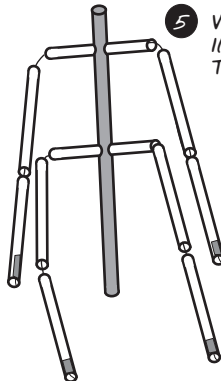
- 3 FIX TWO PIECES AS SHOWN.



- 4 WEAVE 2 LONG THREADS.



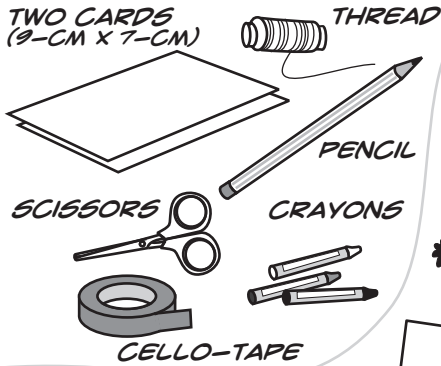
- 5 WEAVE 2 PIECES OF STRAW IN EACH THREAD. TAPE THREAD ENDS TO STRAWS.



- 6 HOLD THE MIDDLE STRAW AND TWIRL. THE ACROBAT WILL EXECUTE A WONDERFUL DANCE!



# BOBBING BUTTERFLY



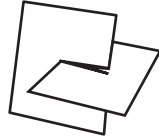
1 MAKE HALF CUTS  
IN BOTH CARDS.



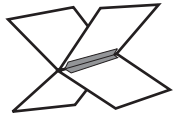
2 INTERLOCK  
CUTS TO  
MAKE 'X'



3 TAPE THE  
TWO PIECES.

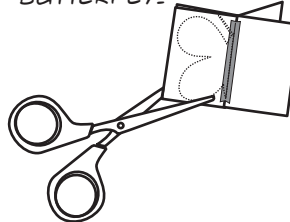
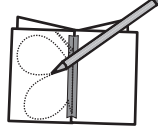


'X' SHAPE  
LIKE A  
BUTTERFLY.

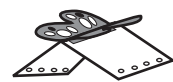


4 DRAW HALF  
BUTTERFLY.

5 CUT TWO LAYERS TO  
MAKE A FULL  
BUTTERFLY.

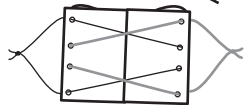


6 COLOUR THE  
BUTTERFLY.

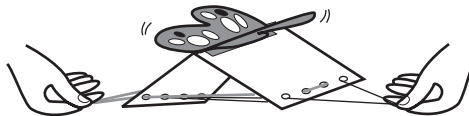


7 MAKE 8 HOLES.  
WEAVE TWO THREADS  
AS SHOWN.

8 TIE ENDS.



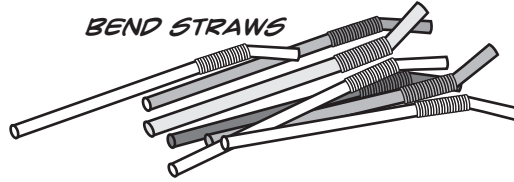
9 PULL AND RELEASE KNOTS TO  
MAKE THE BUTTERFLY FLAP.



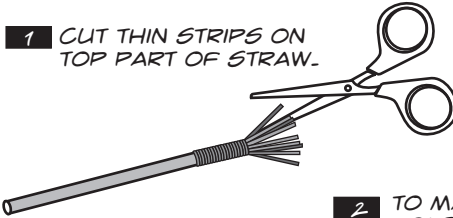
# STRAW SCULPTURE



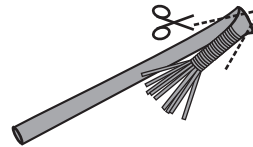
SCISSORS



BEND STRAWS



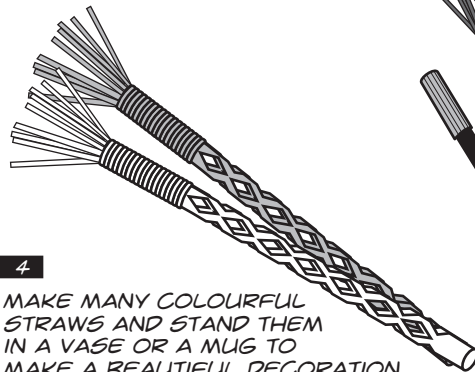
**1** CUT THIN STRIPS ON TOP PART OF STRAW.



**2** TO MAKE A DIAMOND PATTERN FOLD STRAW AND THEN NIP BOTH CORNERS AS SHOWN.



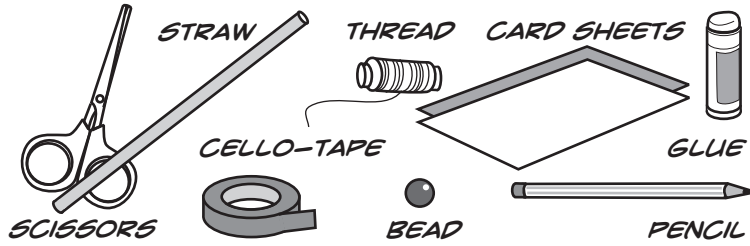
**3** TO MAKE THE NEXT DIAMOND TURN THE STRAW BY 90 DEGREES. FOLD AND CUT AS BEFORE AND CONTINUE....



**4** MAKE MANY COLOURFUL STRAWS AND STAND THEM IN A VASE OR A MUG TO MAKE A BEAUTIFUL DECORATION.



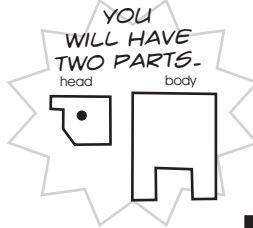
# ELEPHANT'S TRUNK



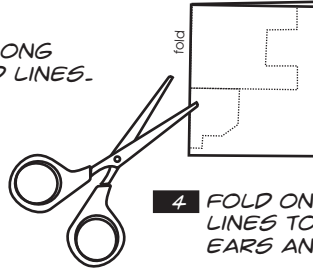
**1** CUT A DIAMOND PATTERN ON A STRAW.



**2** FOLD CARD SHEET AND DRAW AN ELEPHANT.

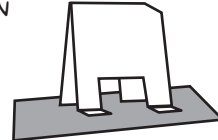


**3** CUT ALONG DOTTED LINES.

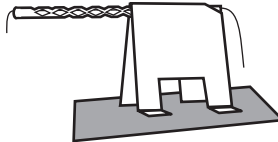


**4** FOLD ON DOTTED LINES TO MAKE EARS AND FEET.

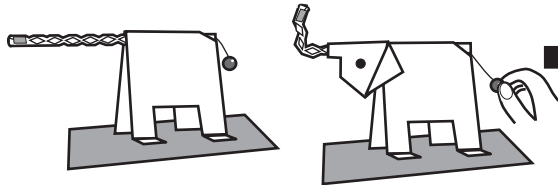
**5** STICK FEET ON A CARD BASE.



**6** STICK STRAW AS SHOWN AND WEAVE THREAD THROUGH IT.

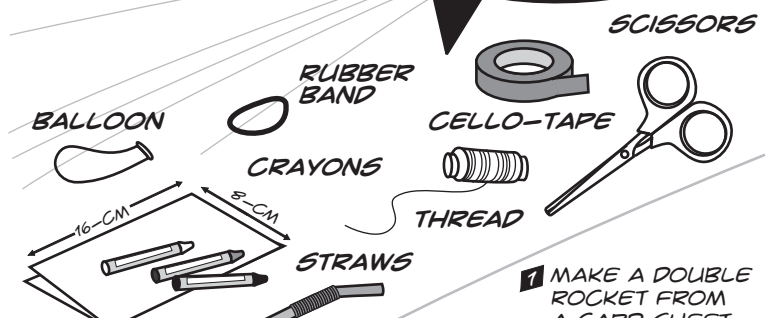


**7** TAPE LEFT END OF THREAD TO STRAW. TIE A BEAD ON ITS RIGHT END. STICK THE HEAD.

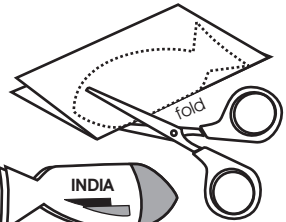


**8** NOW PULL BEAD TO MAKE THE ELEPHANT'S TRUNK LIFT!

# SIMPLE ROCKET

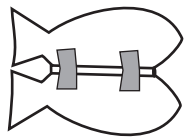


1 MAKE A DOUBLE ROCKET FROM A CARD SHEET.



2 OPEN THE ROCKET AND STICK THE STRAW WITH TAPE.

3 APPLY GLUE AND STICK THE ROCKET.

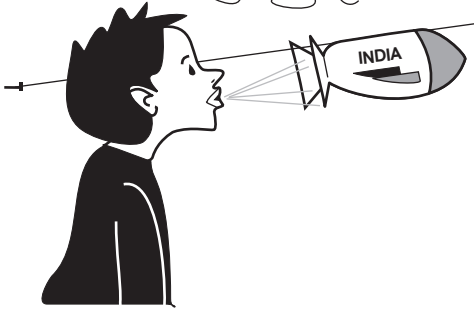


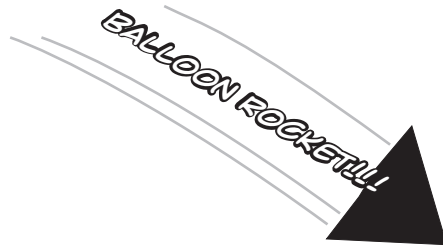
4 WEAVE THREAD THROUGH THE STRAW.

5 TIE THREAD TO A NAIL AND STRETCH THE THREAD TIGHT.

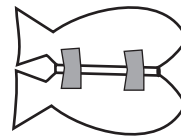


6 SPREAD OUT THE TAIL OF THE ROCKET. BLOW ON IT TO PROPEL THE ROCKET FORWARDS!

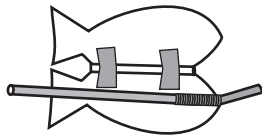




**1** MAKE A ROCKET AS BEFORE.



**2** STICK A BEND STRAW AS SHOWN.



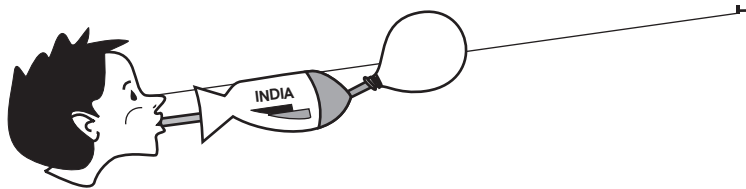
**3** CLOSE AND STICK THE TWO HALVES OF THE ROCKET.



**4** ATTACH A BALLOON TO THE BEND STRAW WITH A RUBBER BAND.



**5** TIE THREAD TO A NAIL AND STRETCH IT TIGHTLY. INFLATE THE BALLOON.



**6** PLACE FINGER ON TIP OF STRAW. ON REMOVING THE FINGER THE ROCKET WILL ZOOM FORWARDS.....



## BALLOON BENCH



FOUR BALLOONS



WOODEN BOARD

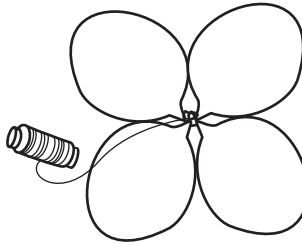


THREAD

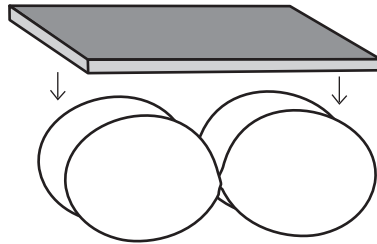
- 1 INFLATE FOUR BALLOONS EQUALLY.



- 2 TIE THEM WITH THREAD.



- 3 PLACE THE FOUR BALLOONS ON A SMOOTH FLOOR. THEN PLACE A BOARD ON TOP.



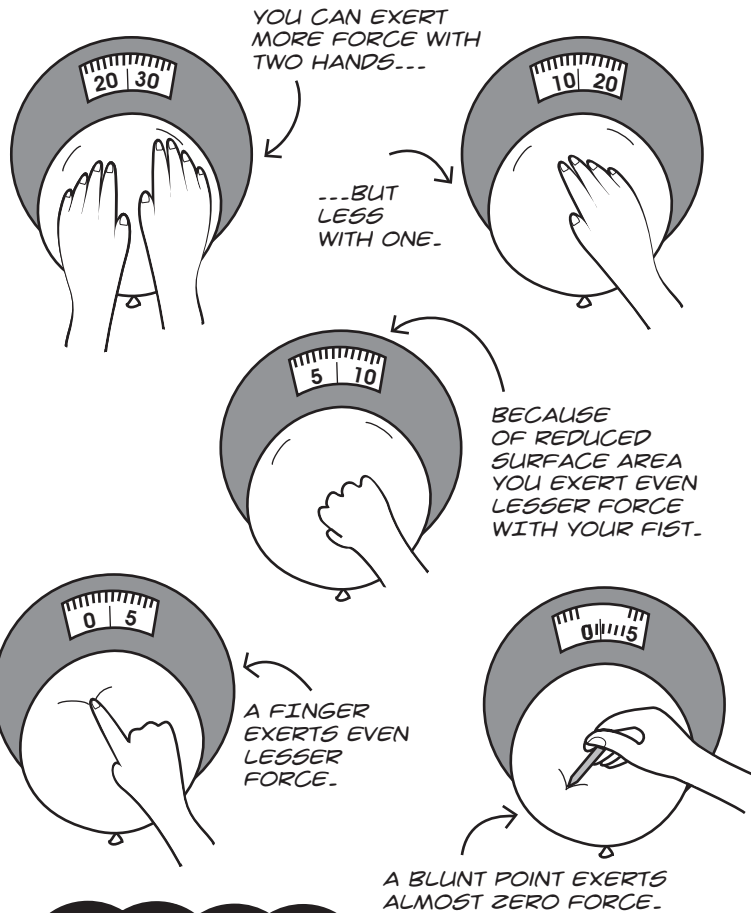
- 4 MAKE A CHILD GENTLY SIT ON THE WOODEN BOARD.



THE FOUR  
BALLOONS CAN  
EASILY HOLD  
A 40-KG  
LOAD.

## BALLOON STRENGTH

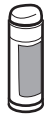
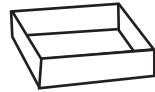
PLACE A BALLOON ON A WEIGHING MACHINE AND PRESS IT WITH BOTH HANDS. NOTE THE LOAD IT CAN WITHSTAND.



AS THE SURFACE AREA REDUCES SO DOES THE FORCE IT EXERTS!!!

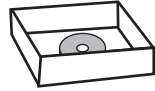
F  
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G

CARD SHEET SPIDER



**SPIDER**

1 GLUE COIN OR WASHER IN MATCHBOX DRAWER.



2 ATTACH TOOTHPICK.



3 WEAVE THREAD AS SHOWN. THE THREAD MUST RUB THE TOOTHPICK. TIE LOOPS ON BOTH ENDS.

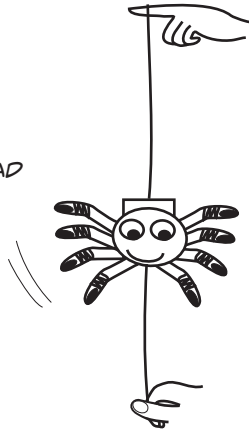


4 PASTE SPIDER ON BACKSIDE OF THE DRAWER.

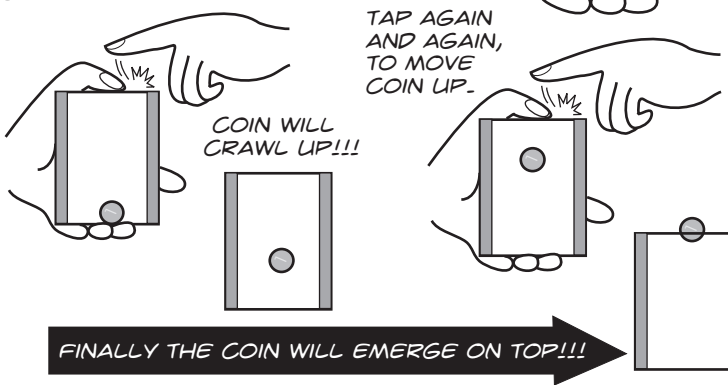
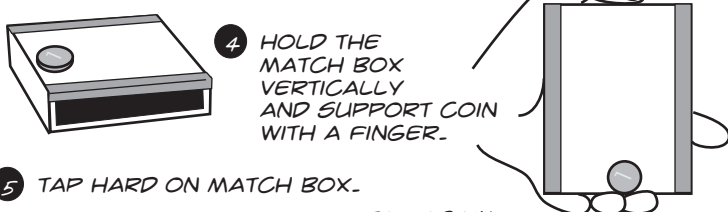
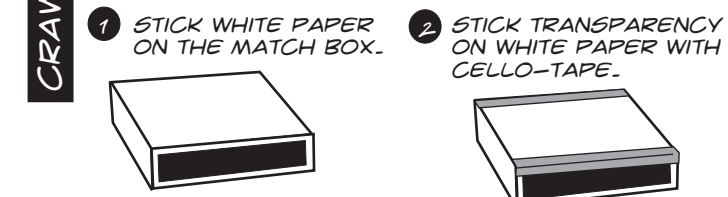
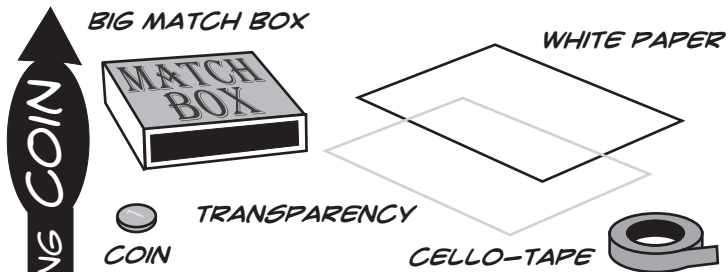


5 KEEP THE THREAD TIGHT TO "STOP" THE SPIDER!

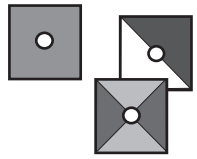
LOOSEN IT TO MAKE THE SPIDER "FALL".



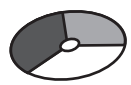




# PLUCK STRING **SPIN DISC**



COLOUR CARD DISCS WITH CLEAN HOLE IN CENTRE.

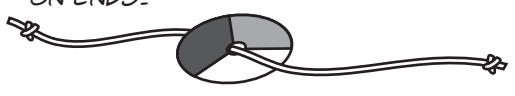


THIN THREAD

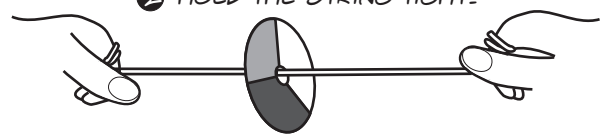


THICK STRING

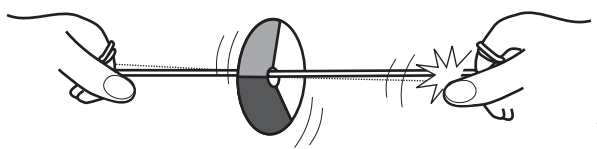
1 WEAVE STRING LOOSELY IN COLOUR DISC. TIE KNOTS ON ENDS.



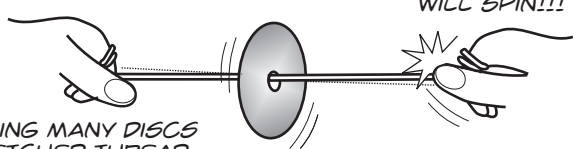
2 HOLD THE STRING TIGHT.



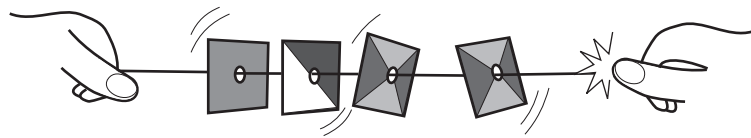
3 PLUCK STRING WITH YOUR THUMB.



THE DISC WILL SPIN!!!



4 TRY SPINNING MANY DISCS ON A STRETCHED THREAD.



# MOTHER TERESA'S MEDICINE POUCH

THREAD

USED A-4 SIZE SHEET

1 TAKE USED A-4 SHEET.

2 FOLD A 3-CM EDGE ALL ALONG THE LENGTH.

3 TURN THE PAPER.

4 FOLD IT IN THREE EQUAL PARTS.

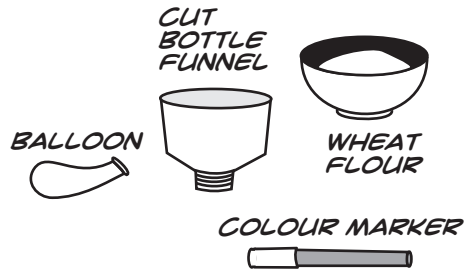
5 TUCK ONE FLAP INTO THE OTHER TO LOCK.

6 TURN.

7 FOLD SKEWED TRIANGLES ON BOTH TOP CORNERS.

8 FOLD FLAP AND TUCK IT INTO THE POCKET. TIE A STRING TO THE POUCH.

MOTHER TERESA MADE THESE MEDICINE POUCHES FOR HER POOR PATIENTS WHO HAD NO POCKETS.



1 FILL BALLOON WITH WHEAT FLOUR.

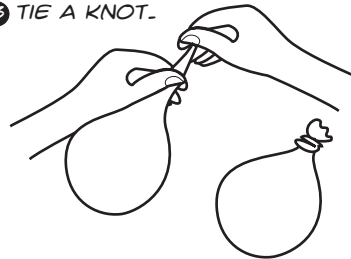


USE A CUT BOTTLE AS A FUNNEL. ATTACH BALLOON TO THE BOTTLE MOUTH.

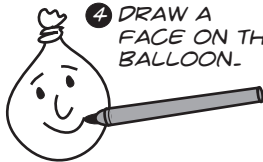
2 PUSH WITH A PEN TO PACK MORE FLOUR.



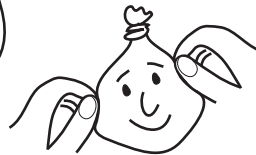
3 TIE A KNOT.



4 DRAW A FACE ON THE BALLOON.

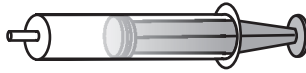
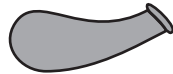


5 SQUEEZE IT TO MAKE FUNNY FACES. PLAY WITH IT LIKE CLAY DOUGH.



## BOYLE'S BALLOON

BALLOON



NEW 50-ML  
PLASTIC SYRINGE

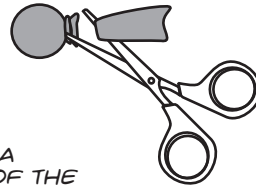
SCISSORS



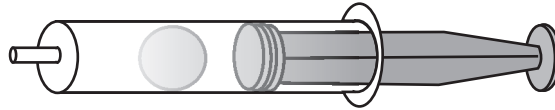
1 BLOW A SMALL  
BABY BALLOON.



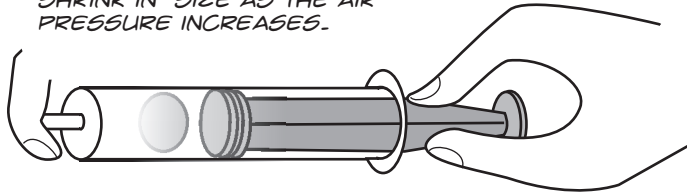
2 TRIM THE EXTRA RUBBER.



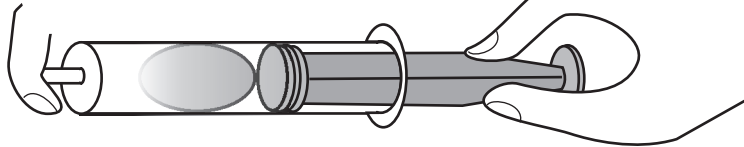
3 PLACE THIS BABY BALLOON INSIDE A  
SYRINGE BARREL. NOTE THE SIZE OF THE  
BALLOON BULB UNDER NORMAL PRESSURE.

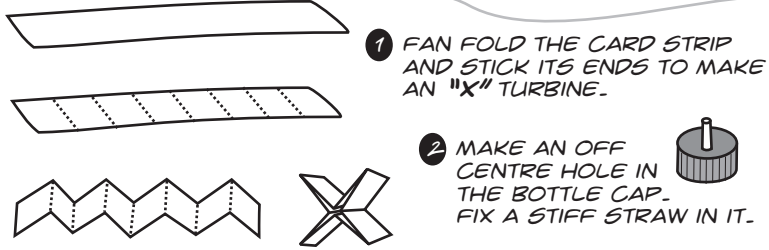
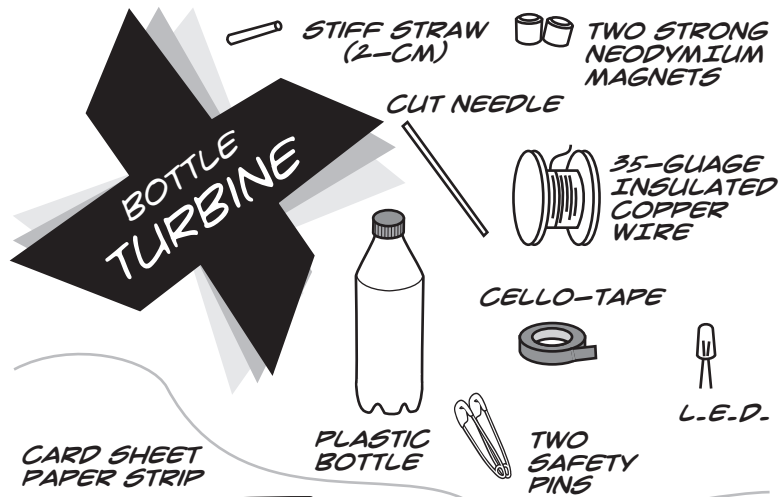


4 SHUT THE OUTLET OF THE SYRINGE WITH YOUR FINGERTIP  
AND PUSH THE PISTON IN. THE BABY BALLOON WILL  
SHRINK IN SIZE AS THE AIR  
PRESSURE INCREASES.

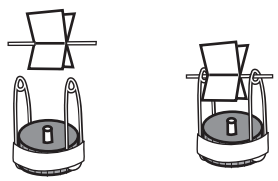


5 SLOWLY PULL OUT THE PISTON.  
WITH DECREASE IN AIR PRESSURE  
THE BALLOON WILL INCREASE IN SIZE.

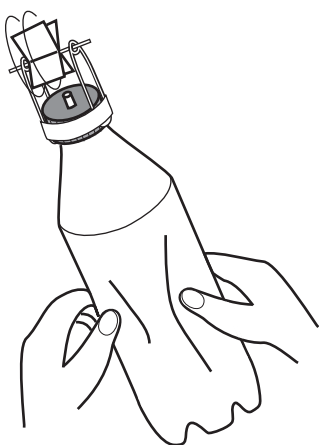




**3** STICK A NEEDLE IN THE TURBINE. AFFIX TWO SAFETY PINS WITH TAPE ON LID. PLACE THE NEEDLE AXLE IN PINHOLES.

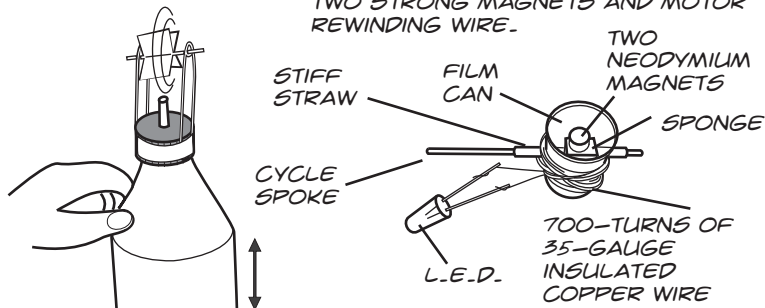


**4** SCREW LID ON BOTTLE. ON SQUEEZING AND RELEASING THE BOTTLE AN AIR JET WILL TURN THE TURBINE.

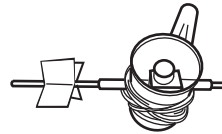


5 NOW CUT THE BASE OF THE BOTTLE AND MOVE IT UP AND DOWN IN A JAR OF WATER. AIR EXPELLED FROM THE BOTTLE WILL CONTINUOUSLY TURN THE TURBINE.

6 MAKE A **GENERATOR** UNIT USING TWO STRONG MAGNETS AND MOTOR REWINDING WIRE.

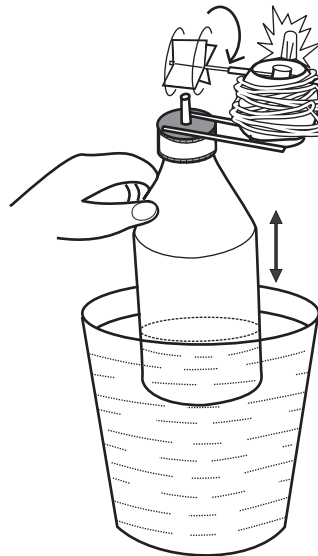


7 ATTACH A CARD SHEET TURBINE TO THE GENERATOR.

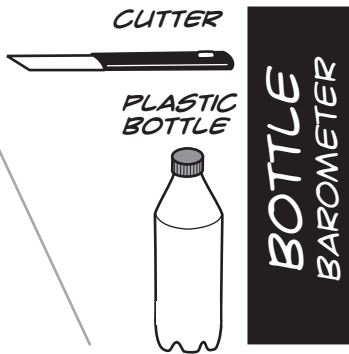


8 NOW MOVE THE CUT BOTTOM BOTTLE UP-DOWN IN A JAR OF WATER. AS THE WATER ENTERS THE BOTTLE IT EXPELS AIR.

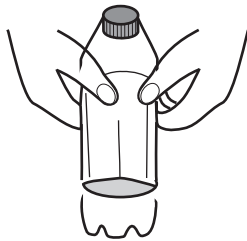
THIS JET OF AIR WILL SPIN THE TURBINE - WHICH IN TURN WILL SPIN THE MAGNETS INSIDE THE COIL. THIS SPINNING MAGNETIC FIELD WILL INDUCE AN EMF IN THE COIL - WHICH WILL LIGHT THE L.E.D.



**1** MAKE A HALF CUT ALONG THE SEMI CIRCULAR MARK OF A PLASTIC BOTTLE.



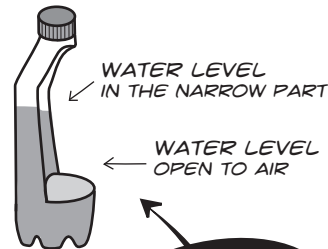
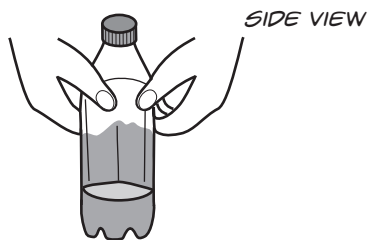
**2** PRESS WITH THUMB TO MAKE A CONCAVE SHAPE.



**3** DIP BOTTLE IN TANK TO FILL IT WITH WATER.



**4** STAND THE BOTTLE AND CHECK THE LEVEL OF WATER.

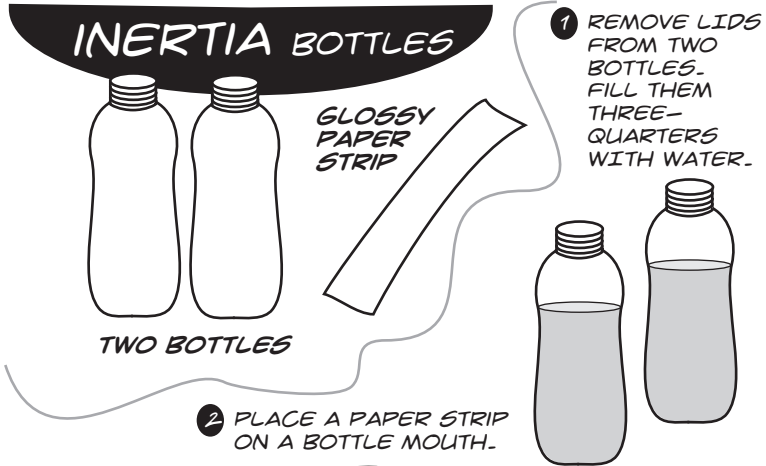


**5** WATER LEVEL IN THE NARROW PART CAN BE CHANGED BY CHANGING THE VACUUM.

WHY DOES THE WATER LEVEL RISE IN THE NARROW PART?



# INERTIA BOTTLES

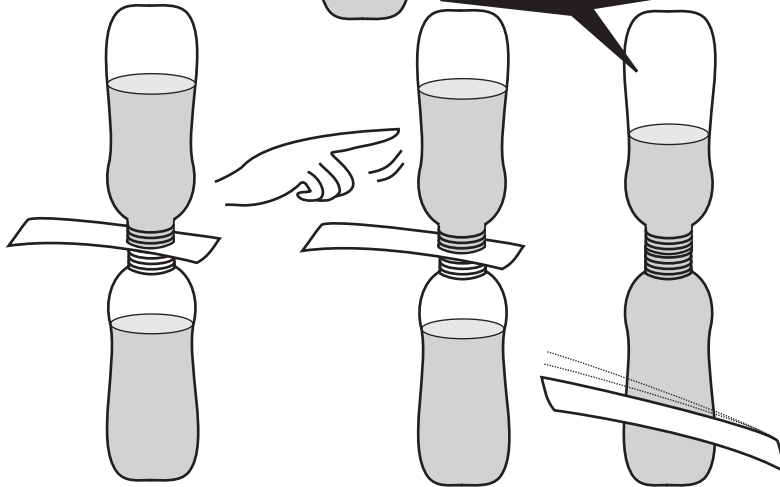


2 PLACE A PAPER STRIP ON A BOTTLE MOUTH.

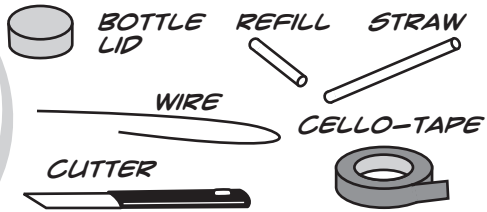


4 STRIKE THE END OF THE STRIP HARD WITH ONE FINGER.

THE STRIP WILL FALL, BUT MAGICALLY THE BOTTLES WILL STAND ONE ON TOP OF THE OTHER.



# BOTTLE LID SPINNER



1 CUT VANES IN BOTTLE LID.



2 MAKE A HOLE IN THE BOTTLE LID AND FIX A PIECE OF BALL PEN REFILL AS A BEARING.



3 MOUNT LID ON A WIRE AS SHOWN. THE WIRE LOOPS WILL PREVENT THE LID FROM FALLING.



4 FIX A 6-CM LONG STRAW TO THE WIRE WITH TAPE.



5 THEN BLOW THROUGH THE STRAW.



A JET OF AIR WILL STRIKE THE VANES AND SPIN THE LID LIKE A TURBINE!

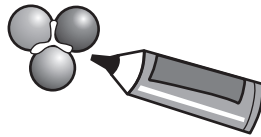
FOUR MARBLES



RUBBER GLUE  
(FEVIBOND)



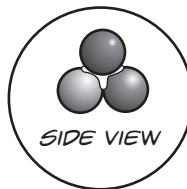
1 STICK THREE MARBLES TOGETHER -



2 GLUE FOURTH MARBLE TO MAKE A TETRAHEDRON SHAPE.

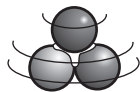
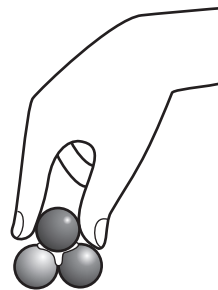


TOP VIEW

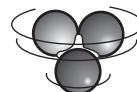


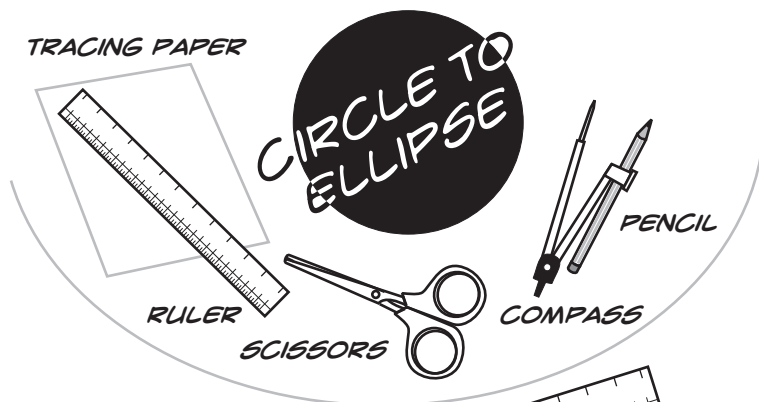
SIDE VIEW

3 GRIP TOP MARBLE AND SPIN LIKE A TOP.

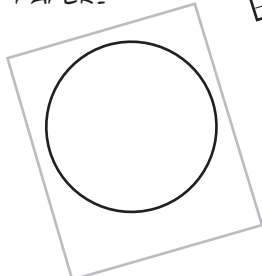


AFTER A WHILE YOUR TOP WILL UPTURN!

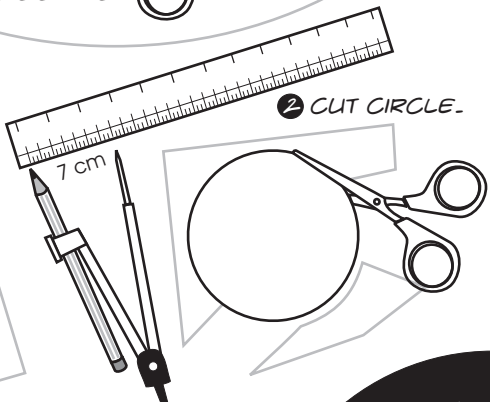




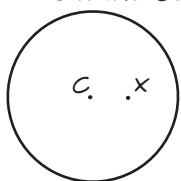
1 DRAW A 7-CM RADIUS CIRCLE ON A TRACING PAPER.



2 CUT CIRCLE.



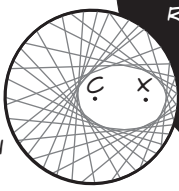
3 MARK CENTRE 'C' AND POINT 'X' ABOUT 2-CM FROM THE CENTRE.



4 FOLD A CHORD SUCH THAT EDGE OF THE CIRCLE FALLS ON 'X'.



5 KEEP FOLDING. EACH TIME THE CIRCUMFERENCE MUST FALL ON POINT 'X'. SOON YOU WILL SEE A LOVELY ELLIPSE WITH 'C' AND 'X' AS ITS FOCI.



THE ELONGATION OF THE ELLIPSE DEPENDS ON HOW FAR 'X' IS FROM THE CENTRE 'C'. CLOSER MEANS A MORE ROUNDED AND FARTHER MEANS A MORE ELONGATED ELLIPSE.

# BAG JACK

TWO EMPTY PLASTIC MILK BAGS

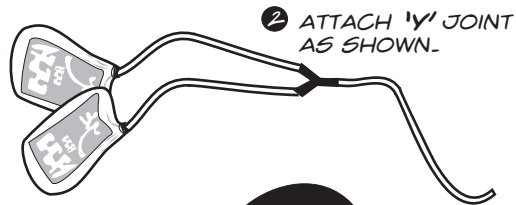
LEAK PROOF 'Y' JOINT

FLEXI PLASTIC TUBES

THREAD

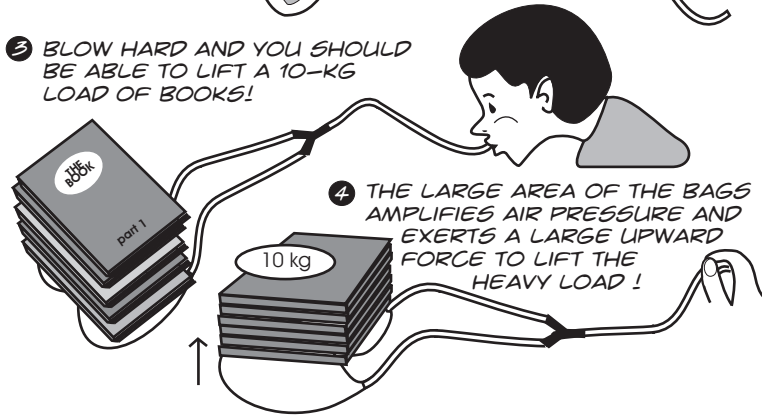


1 TIE TUBES TO TWO PLASTIC BAGS WITH STRONG THREAD.



2 ATTACH 'Y' JOINT AS SHOWN.

3 BLOW HARD AND YOU SHOULD BE ABLE TO LIFT A 10-KG LOAD OF BOOKS!



4 THE LARGE AREA OF THE BAGS AMPLIFIES AIR PRESSURE AND EXERTS A LARGE UPWARD FORCE TO LIFT THE HEAVY LOAD!

# TOTAL INTERNAL REFLECTION

**EMPTY GLASS BOTTLE**

**DETTOL BOTTLE**

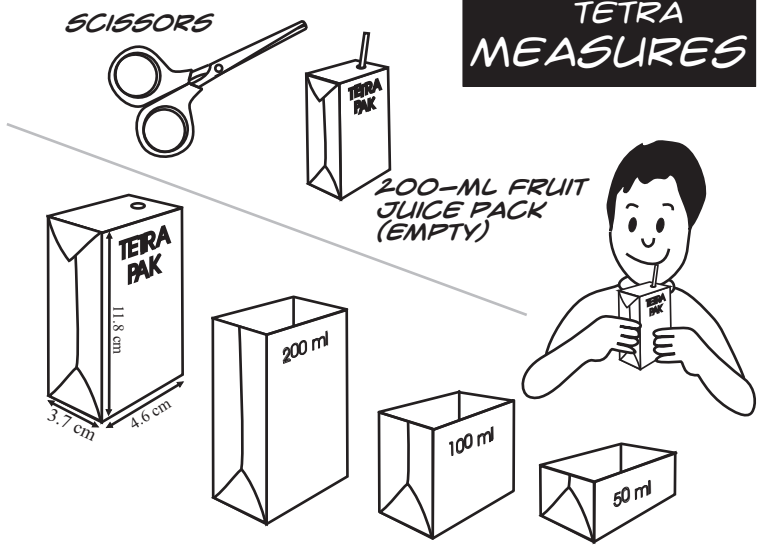
**LASER POINTER**

**INCENSE STICK**

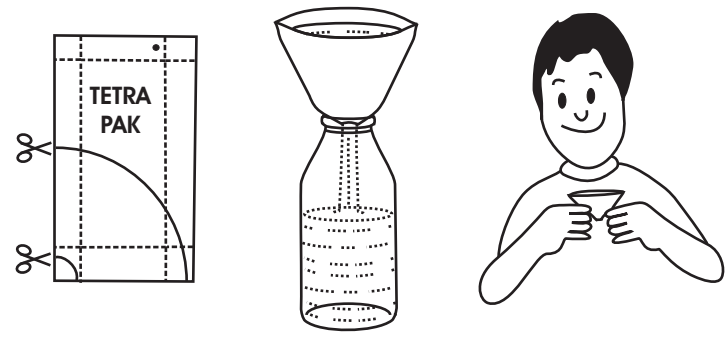
**GLASS OF WATER**

- 1** FILL BOTTLE HALF WITH WATER AND ADD A FEW DROPS OF DETTOL.
- 2** POINT LASER PARALLEL TO THE WATER LEVEL. THE BEAM WILL GO STRAIGHT.
- 3** POINT BEAM AT VARIOUS ANGLES. AT CRITICAL ANGLE YOU WILL SEE "TOTAL INTERNAL REFLECTION".
- 4** FILL SMOKE WITH AN INCENSE STICK IN THE BOTTLE. THEN SHUT ITS LID.
- 5** POINT LASER FROM BELOW. GOING FROM DENSER TO A RARER MEDIUM THE BEAM WILL BEND AWAY FROM THE NORMAL.

# TETRA MEASURES



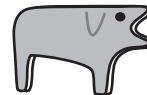
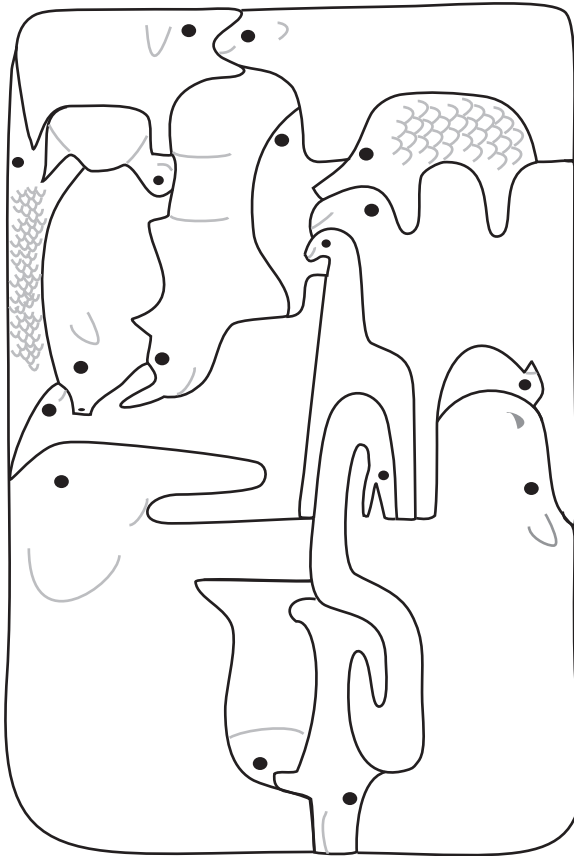
**1** THIS TETRA PAK CONTAINED 200-ML OF FRUIT JUICE. CUT THE TOP TO MAKE A 200-ML MEASURE. CUT IN HALF AND QUARTER TO MAKE 100-ML AND 50-ML VOLUME MEASURES. THESE SAFE AND WATER PROOF CUPS CAN BE FLATTENED AND STOWED AWAY IN THE POCKET DURING TRAVEL.



**2** FLATTEN THE TETRA PAK AND CUT TWO ARCS AS SHOWN. OPEN THE CUT PORTION AND SHAPE IT LIKE A FUNNEL. THIS COLLAPSIBLE FUNNEL CAN BE FLATTENED AND CARRIED IN THE POCKET.

# ANIMAL JIGSAW

THICK  
CARD



- 1 DRAW 17 ANIMALS ON A THICK CARD BOARD OR PLYWOOD. THEN CUT THEM WITH A CRAFT KNIFE OR A FRET SAW. YOU CAN STAND THESE ANIMALS INDIVIDUALLY TO MAKE A ZOO OR ELSE SNUG THEM TOGETHER INTO A JIGSAW.



## AMAZING ACTIVITIES

There is a stereotype that science can only be learnt wearing a white coat using burettes and beakers. This is far from the truth. Exciting science can be done with simple, low-cost materials - often discarded things.

This book documents many exciting activities with clear lucid illustrations which children can easily do at home or in the school.

