

INTRODUCTION

TECHNOLOGY TEASERS contains a collection of 20 challenges relevant to the technology of mechanisms, electronics and control. The challenges are mostly suitable for students who have had some experience with technology tools and processes for example, cogs, pulleys, electrical circuits and so on. Each challenge poses a problem which needs to be solved through using technological principles and systems. There are two pages for each challenge - one for teachers and one for students.

While all design solutions should ideally be reached via authentic 'real-life' contexts, this is not always practical or possible. Sometimes it is useful to teach particular technical skills and approaches to problem solving through discrete pre-planned problems which can be used as a springboard into seeking technological solutions for more authentic problems. This is the aim of the challenges in this book - to help students develop some aspects of their 'technological literacy' which they can then apply to problems which they come up with for themselves.

The challenges in **TECHNOLOGY TEASERS** offer no solutions directly to students, (except in Cheap Cheep, which is a "follow the instructions" activity). However, a possible solution is included in accompanying teachers' notes. This means teachers can choose to direct students to particular solutions if they want to keep the activities brief and contained. Although only one solution is offered, there are many others equally or better suited to the problem and students should be encouraged to try a range of ideas.

Teachers should take the opportunity to set up class visits to places where problem solving, designing and processing work is done. If this is not possible, invite speakers to technology classes to discuss the work they do. It is important for students to see that problem solving is something that happens everyday in the wider world. Making links with the social or implications of technological solutions is also important.

Whilst use of the design process is not stated in the challenges, students will be familiar with the process and will follow it naturally. The challenges are suitable for students to work with individually, in pairs or small groups.

I hope that teaching with these challenges gives you as much pleasure as I've had. Thanks to the students who trialled them for me.

Rob Nelson

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YOU WILL USE THESE SKILLS IN YOUR TECHNOLOGY CHALLENGES



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A WEIGHTY MATTER

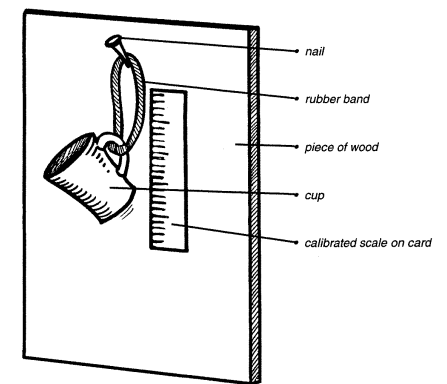
- MATERIALS NEEDED**
- Wood
 - Nails
 - Hammer
 - Cups
 - Strong rubber bands
 - Card
 - A copy of the challenge for each student

HINTS One way to build a measuring device is shown below. Using this method, the cup becomes the receptacle for the item to be weighed. Consequently, any item placed in the cup will stretch the rubber band and its mass can be read from the calibrated scale. Students can use the set of weights initially to help them work out the calibrated scale.

There are other possibilities. In discussing solutions with students, the main point to be considered is that the design must ensure a consistent method of measuring the mass.

NOTE - after a while the rubber band begins to lose its elasticity, and will begin to give incorrect measurements.

POSSIBLE SOLUTION



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THE DUNGEON

You are on a secret magic mission to save a prince who has been captured by the nasty guards. You have been imprisoned in his huge dungeon. The dungeon is full of rats and slimy creatures. You dropped your wand. Your only chance to escape is to find your wand. You must be yourself invisible so that you can slip out of the dungeon.

You have no matches and the dungeon is dark. You must find a way through, though, you trip over an assortment of rubbish. Among the rubbish you can feel:

- a toilet roll
- batteries for a battery-powered toothbrush

Also, you happen to have these crucial items: a flashlight, a large pocket inside your cloak:

- wires
- tape and glue
- a bulb.

Can you make a flashlight, find your wand, and escape the world?



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TEACHER ACTIVITY NOTES

- MATERIALS NEEDED**
- Nails
 - Card or plastic (ice cream lids)
 - Wire
 - A copy of the challenge for each student

HINTS This activity is technically demanding because it requires the design and building of efficient windmill blades, efficient pulleys, and a pulley/gearing system to change the drive at right angles.

POSSIBLE SOLUTION

To build a windmill wheel from card or plastic

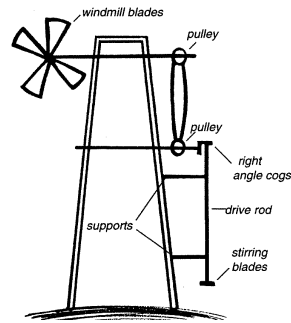
Build a tower. Attach a fixed axle to the windmill wheel and attach the tower so that it can turn, first attaching a fixed pulley.

At the midpoint of the tower, attach another axle (free of the tower) with a single pulley. Attach a loop drive belt to the two pulleys.

From the lower axle a right angle gear needs to be attached, that is fixed to the end of the axle. The other gear should be fixed to the milkshake maker drive rod, and held perpendicular to the ground with some clearance to put the drink underneath (these gears could be made from card or plastic - they are available in Lego, from toyshops etc).

Make a blade arrangement for the milkshake maker.

Test your design with an artificial wind source, a hairdryer, fan or turn it by hand.



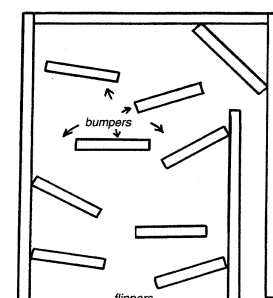
TEACHER ACTIVITY NOTES

- MATERIALS NEEDED**
- Wooden boards (or the tops of photocopy paper boxes)
 - Pieces of wood
 - Marbles
 - Wood glue
 - Saws
 - Hammer and nails
 - Electric drill (teacher use only)
 - Rubber bands
 - A copy of the challenge for each student

HINTS The aim is to construct a pinball game. This can be done on a board with sides added, or in a box. Blocks are added to act as bumpers. For flippers, a block of wood drilled near one end and sitting freely over a nail can be used. Alternatively, a rubber band can be used to propel the marble.

A hole at the bottom of the board acts as a dead zone (rest the board on a block so that it tilts towards the player). Flippers can be built again to try to keep the ball in play, or alternatively build a frame over this area and tie long paddles on (eg. pieces of ruler) and use these as flippers.

POSSIBLE SOLUTION



Can be made from wood or sturdy cardboard!

A CHEAP CHEEP

You have commenced work experience for the Puppet Company working on a new TV series for little kids (2-4 years).

Your boss has told you that your job is to make a bird puppet for an upcoming sketch with the famous mega-movie star Fontane Patella.

Your boss has left you instructions and materials. Your job is to construct a bird puppet as explained, then to decorate it using your own creativity.

You are not to receive assistance, this is too expensive.

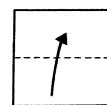
YOU CAN DO IT. REMEMBER THE SHOW MUST GO ON!

Your materials are:

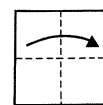
- Square of 18cm² strong paper
- Florist wire - 40cm
- Drinking straw
- Materials to decorate
- Sticky or masking tape

INSTRUCTIONS ARE:

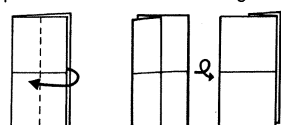
1. Cut out the paper in half from top to bottom edge. Fold it, then unfold.



2. Fold the top-hand edge over to right hand edge and crease. Repeat for the bottom-hand edge.



3. Fold the top left-hand piece over to the left-hand edge and crease. Repeat for the bottom-hand piece.



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STUDENT EVALUATION SHEET

NAME _____

IDEA	COMMENT
Investigates other contexts	<input type="checkbox"/> _____
Devises ways to gather information	<input type="checkbox"/> _____
Gives oral/written/drawn idea	<input type="checkbox"/> _____
DESIGN	
Records progress of ideas	<input type="checkbox"/> _____
Extends initial idea	<input type="checkbox"/> _____
Draws design and labels	<input type="checkbox"/> _____
Estimates resource needs	<input type="checkbox"/> _____
MAKING	
Identifies material suitable for task	<input type="checkbox"/> _____
Selects and uses appropriate tools safely	<input type="checkbox"/> _____
Minimises waste	<input type="checkbox"/> _____
Uses drawings to assist construction	<input type="checkbox"/> _____
Appropriate method of construction	<input type="checkbox"/> _____
Modifies where necessary	<input type="checkbox"/> _____
Asks for/accepts others suggestions	<input type="checkbox"/> _____
TESTING	
Reviews design	<input type="checkbox"/> _____
Comments on design solution	<input type="checkbox"/> _____
Justifies decisions made	<input type="checkbox"/> _____
Communicates effectively	<input type="checkbox"/> _____
Identifies modifications	<input type="checkbox"/> _____
Reviews in regard to design brief	<input type="checkbox"/> _____
PERSONAL QUALITIES	
Works co-operatively	<input type="checkbox"/> _____
Works independently where necessary	<input type="checkbox"/> _____
Perseveres	<input type="checkbox"/> _____
Shows originality and creativity	<input type="checkbox"/> _____
COMMENTS	_____

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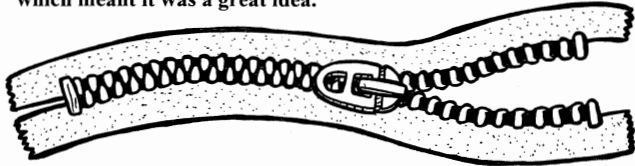
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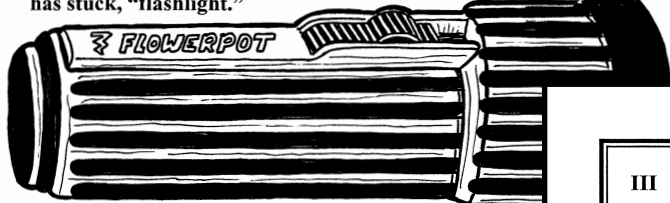
WHAT'S IN A NAME?

There are many valuable lessons in the history of inventions that teach us the importance of a name. The name an inventor chooses can determine the success or failure of the invention. It is interesting to learn just how and why some of the most popular inventions were named. The following are a few examples that provide interesting facts about the origin and evolution of the names of some of them:

- The typewriter was first called "An Artificial Machine or Method for the Impressing or Transcribing of Letters, Singly or Progressively one after another, as in Writing, whereby all Writing whatsoever may be Engrossed in Paper or Parchment so Neat and Exact as not to be distinguished from Print." WHEW? Needless to say, when its name was shortened to "typewriter," it sold much more (probably partly because people could remember it much better).
- The zipper was first called "The Clasp Locker and Unlocker." It was renamed when someone exclaimed that it was a "zipper" of an idea - which meant it was a great idea.



- The flashlight was originally called the "Electric Flowerpot." It was changed to "Portable Electric Light" before evolving into the name that has stuck, "flashlight."

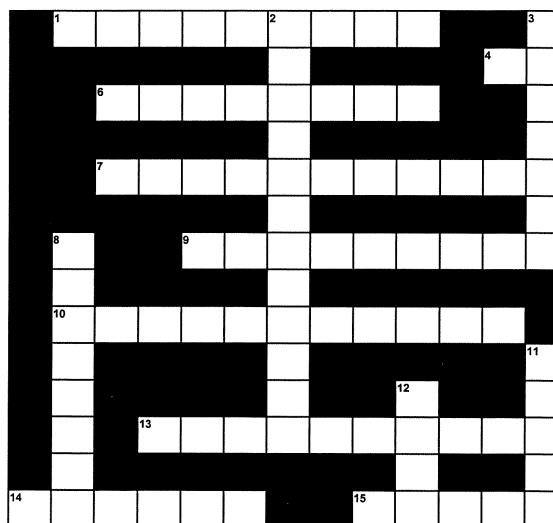


- "Twinkies" were first called "Little Shortcake Fingers" when a sign one day selling "Twinkle Toe Shoes." He liked it so much that he shortened it to "Twinkies" and renamed it.

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INVENTION CROSSWORD PUZZLE



Across

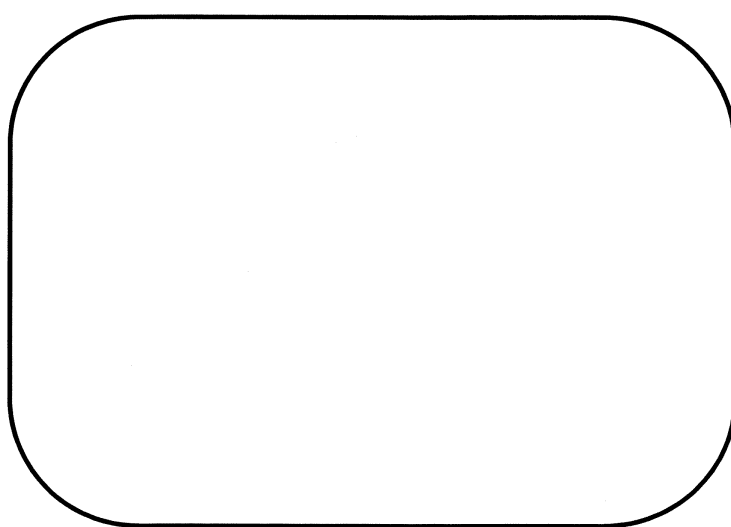
- This invention began as a vacuum cleaner and then was transformed into a pink bonnet that fit over a person's head.
- This invention was created at the World's Fair in 1904 when an ice cream paper bowls. He searched for more, but in the end purchased several thin from another vendor in which to serve his ice cream inside. Now, more than 100 years later, the cream eaten is inside this invention.
- This invention was derived from "roots" of the sarsaparilla plant and was cough syrup. Charles Hires liked the taste and experimented with it to create a beverage that we enjoy today.
- This very popular cartoon character began as a black and white rabbit. Legal complications caused him to change to a mouse - who lives in a house.

III Place the

(Place number in the blank)

- scotch tape
- elastic
- scissors
- light bulb
- plow
- Game Boy

IV Draw a picture of the invention that you think was the most important.



WHEN WERE THEY INVENTED?

I Circle the invention that was invented first.

- | | | |
|------------------|------------|------------|
| 1. ball | dishwasher | seatbelt |
| 2. robot | skateboard | rope |
| 3. tractor | diaper | fireworks |
| 4. brick | satellite | clock |
| 5. escalator | submarine | battery |
| 6. traffic light | aspirin | tools |
| 7. stapler | mirror | sunglasses |

II Draw a line through the invention that was not invented first.

- | | | |
|---------------------|---------------|---------------|
| 8. television | 9. calculator | 10. toaster |
| yo-yo | chess | shoe |
| 11. washing machine | 12. wig | 13. fork |
| compass | button | playing cards |
| Coca-Cola | lawn mower | bicycle |

INVENTION CONVENTION INSTRUCTIONS (MAJOR PROJECT)

Name: _____

Objective

original inventions and present them with poster advertisements at an Invention Convention.

To complete this project, you will need to do the following: Turn in the following papers to your teacher (all stapled together and in order: "Invention Convention Instructions"; "Drawing Board" handout - This handout will guide you through the invention process. Follow the steps carefully. Fill out all the information in complete sentences on a different piece of paper for a rough draft so that your final copy is neat.) "Advertisement Strategy" - This handout will explain your strategy for selling your invention to consumers. Complete all the information - including the picture of your invention.

Model of your invention - Check with your teacher about size restrictions and make a model before making your poster. Be creative and neat! Many people will view your invention at the Invention Convention.

Advertisement - Using the information on "My Advertisement Strategy" handout, create a poster advertising your invention. Remember, it will be displayed at the Invention Convention.

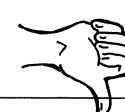
Think About assignment - Your teacher will assign you an important job and you will share that job with you on the lines below:

- Job sharing my job: _____
- _____
- _____
- Model of your invention - _____
- Advertisement - _____
- "Think About" assignment - _____

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THUMBS UP - THUMBS DOWN



Name: _____

Directions: With permission, watch 30 minutes of television - paying close attention to the commercials. Complete the following questions and chart during the 30 minutes:

Date: _____
 Time Started: _____ Time Ended: _____
 Total Number of Commercials: _____

Identify the following information for five of the commercials you watched: (Don't forget to rate how effective you think the commercial is in selling the product - 10 is the best and 0 is the worst.)

Commercial Advertising Chart

#	Product Name	Technique(s) Used	Target Market	Music (yes/no)	Rating
1					
2					
3					
4					
5					

What do you think is the most effective technique a company can use to sell their product?

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Part II - Use the items in the bag to create an invention.
 Part III - Answer the questions about your invention.

PART I: Assign Team Members' Jobs (All team members help create the invention too!)

- Captain - _____ (team leader)
- Scribe - _____ (writes the team's ideas on this paper)
- Time & Materials Keeper - _____ (watches the time & in charge of items)
- Presenter - _____ (presents invention to the class afterwards)

PART II: Create the Invention

PART III: Answer Invention Questions

- What is your invention's name and function? _____
- Who benefits from your invention? _____
- Why is your invention necessary? _____
- Why will your invention be a success? _____
- When is the "right time" to share your invention with the public? _____

MY ADVERTISEMENT STRATEGY

Name: _____

Directions:

- Review the many strategies that are used to advertise inventions/products.
- Choose at least one strategy to effectively sell your invention to consumers. List the strategy(s) you have chosen on the line below. _____
- Create a poster advertising your invention that could be placed in a store window, making sure it:
 - Provides a slogan
 - Lists the inventor's name and invention's name
 - Describes briefly the invention's purpose
 - Shows a picture or drawing of the invention
 - Presents the invention in an overall eye-catching way
- Draw a small-scale version of your poster in the box below.



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