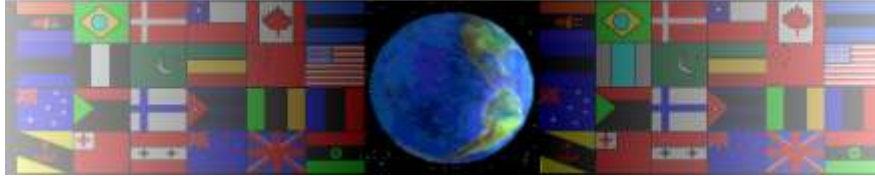


# EDUCATIONAL TOY

V.Ryan © 2000 - 2009

On behalf of The World Association of Technology Teachers

## W.A.T.T.



World Association of Technology Teachers

This exercise can be printed and used by teachers and students. It is recommended that you view the website ([www.technologystudent.com](http://www.technologystudent.com)) before attempting the design sheet .

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# PRODUCT ANALYSIS - EXERCISE

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The educational toy seen opposite is a game aimed at helping young children identify letters. The letters slot into the base, in alphabetical order. Parents can also help their child identify short words. Some of the letters have pictures of animals and everyday objects to help the child remember the letters.

You are to carry out a product analysis of the educational toy. Write a sentence or more alongside the prompts. There is space for your own individual remarks about the toy.

## WHAT PRODUCT ANALYSIS TELLS US ABOUT THE EDUCATIONAL TOY

1. Material:
2. Estimated Weight:
3. Strength and resistance to knocks:
4. Colour:
5. What does the child learn?
6. Stability / balance:
7. Safety:
8. Manufacturing processes:
9. Overall size:
10. Efficient use of space / inefficient use of space.
11. Layout of letters:
- 12.
- 13.

## DESIGN / PRODUCT IMPROVEMENTS

Now that you have carried out your own product analysis, describe a few design improvements.

# EDUCATIONAL TOYS AND DEVICES

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It is well known that young children learn more quickly when they enjoy what they are doing. Parents often buy their children toys/learning devices to encourage them to learn. For example, a simple jigsaw helps a young child to put together a picture. To be successful the child has to develop good hand/eye coordination.

1. What is hand/eye coordination ?

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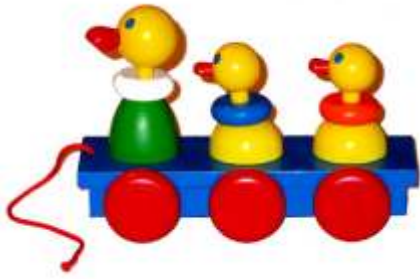
2. Different types of toy are listed below. Alongside each type name a specific toy and include an explanation of how the toy/device is used. What does the child learn?

EDUCATIONAL TOY	HOW IT WORKS	WHAT THE CHILD LEARNS
	<p>SHAPE RECOGNITION</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	<p>HAND/EYE COORDINATION</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
	<p>BUILDING/CONSTRUCTION</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

EDUCATIONAL TOY

EXPLANATION

WHAT THE CHILD LEARNS



MECHANICAL  
MOVEMENT

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LETTER RECOGNITION

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LETTER RECOGNITION

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SHAPE AND MOVEMENT

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COUNTING AND TIME

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# THE DESIGN SPECIFICATION

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Having asked all the important questions, the designer can now write a design specification. The specification is a list of factors that the design must satisfy. This information can be used when drawing ideas, to ensure that all the clients needs are considered. The designers specification is seen below.

1. The educational toy will encourage the child to learn and develop new skills for instance; hand / eye coordination, learning letters and words.
2. The toy will encourage the child to construct and build and physically interact with it.
3. The toy will include mechanisms that allow for movement.
4. The overall size of the toy will be 300 X 300 X 200mm. It will fit on a coffee table top.
5. The toy will be lightweight so that it can be carried by a young child
6. It will be possible for a young child to play with the game by himself/herself or with parents and other children.
7. It will cost a maximum of ten pounds to manufacture.

At this point other points may be added such as;

8. It will be safe to use as it will not have sharp edges. It will satisfy British and European safety standards.
9. It will be made from recycled material.
10. It will be manufactured in a range of colours.
11. It will be possible to expand the toy so that it can be made more complex as a child gets older.

Can you think of any more points that need adding to the specification ? List them below.

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Write five points that you think are the most important to be included in a specification of an educational toy.

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# DESIGN PROBLEM

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Working parents often find that they are so busy that they have little time to spend with their children. Often children are left to occupy their own time by watching television. Research has found that children left to occupy their own time develop learning skills much more slowly than those who play with educational toys. It has been found that children who regularly play with educational toys develop reading skills, hand eye coordination skills and many more. When young children master these skills it usually leads to greater progress at school. However, there is only a small range of quality educational toys available in the shops at this point in time. Companies designing and making toys often forget that learning through play is very important. They tend to think about sales of their products before their educational value.

## KEY WORDS / PHRASES:

You may want use these words or similar words in your design problem.

COMPANY : SALES : SKILLS : LEARN/LEARNING : ALPHABET : NUMBERS :  
DEVELOP : HAND/EYE COORDINATION : MARKET : TARGET GROUP :  
MECHANICAL : MOVEMENT : TIME : PARENTS : PLAY

Using the design problem outlined below. Re-word each of the sentences so that the design problem is in your own words.

Working parents often find that they are so busy that they have little time to spend with their children.

Often children are left to occupy their own time by watching television.

Research has found that children left to occupy their own time develop learning skills much more slowly than those who play with educational toys.

It has been found that children who regularly play with educational toys develop reading skills, hand eye coordination skills and many more.

When young children master these skills it usually leads to greater progress at school.

However, there is only a small range of quality educational toys available in the shops at this point in time.

Companies designing and making toys often forget that learning through play is very important.

They tend to think about sales of their products before their educational value.

# DESIGN BRIEF

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I am going to design and make an educational toy/game. The toy will educate young children through play, maintaining interest and enjoyment. It will be aimed at young children of the age range 1 to 3 years. It will also help develop their hand / eye coordination skills.

The educational toy will fit on a table top comfortably and be easy to understand. It will be colourful and require a level of concentration in order to use successfully.

The educational toy will be safe to use especially by young children. Parents will feel confident that the toy/game will help their child learn. The new toy/game will keep young children occupied and ensure that parents feel confident that it is helping their child learn.

**KEY WORDS / PHRASES:** You may want use these words or similar words in your design brief.

**PARENTS : EDUCATIONAL : INTERESTING : ENJOYABLE : COORDINATION :  
UNDERSTAND : CONCENTRATION : COLOURFUL : SUCCESSFULLY : SAFETY :  
CONFIDENT : LEARN/LEARNING**

Using the design brief outlined below. Reword each of the sentences so that the design brief is suitable for your project.

I am going to design and make an educational toy/game.

The toy will educate young children through play, maintaining interest and enjoyment.

It will be aimed at young children of the age range 1 to 3 years. It will also help develop their hand / eye coordination skills.

The educational toy will fit on a table top comfortably and be easy to understand. It will be colourful and require a level of concentration in order to use successfully.

The educational toy will be safe to use especially by young children.

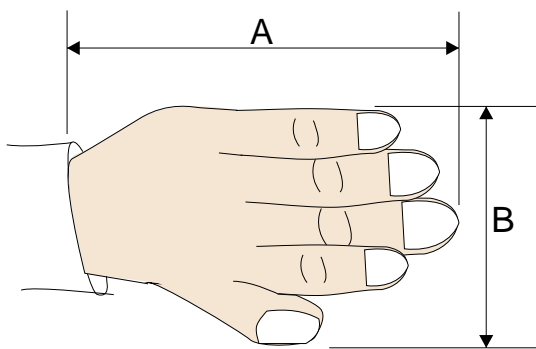
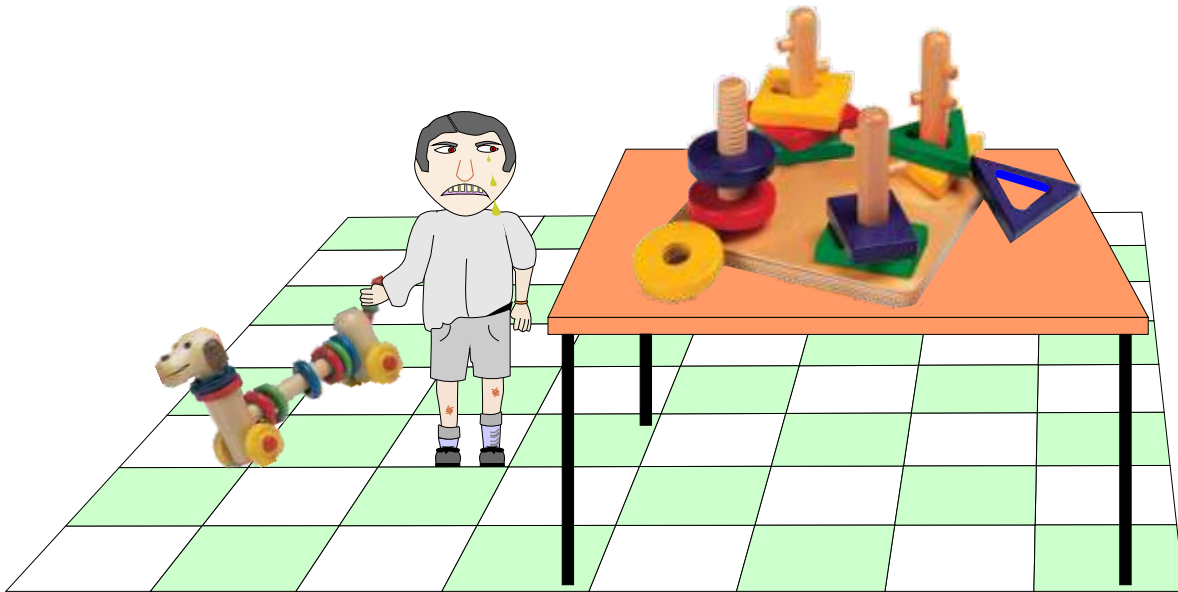
Parents will feel confident that the toy/game will help their child learn.

The new toy/game will keep young children occupied and ensure that parents feel confident that it is helping their child learn.

# EDUCATIONAL TOY AND ERGONOMIC CONSIDERATIONS

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Our sample parents, have employed a team of experts to design an educational toy. Unfortunately they employed the wrong team as they have ignored ergonomic factors. Ergonomics is all about collecting measurements and applying them to a design. The design team have failed to measure the hands of young children. As a result of ergonomics not being considered, the manufactured educational toy is far too large for its purpose - it is not suitable for the hands of a young child



The design team should have collected a range of measurements/sizes of children's hands and fingers. The design and size of the educational toy should be based on these 'ergonomic' measurements. This is likely to ensure that it is the correct size for its function / purpose. The diagrams opposite display some of the important measurements that need collecting.

## Questions:

1. In the space below, draw simple diagrams of two educational toys and place the important ergonomic dimensions on each one. Explain why these measurements are important.
2. How will the collection of these measurements help you design an educational toy ?

TOY ONE

TOY TWO

NOTES: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

NOTES: \_\_\_\_\_

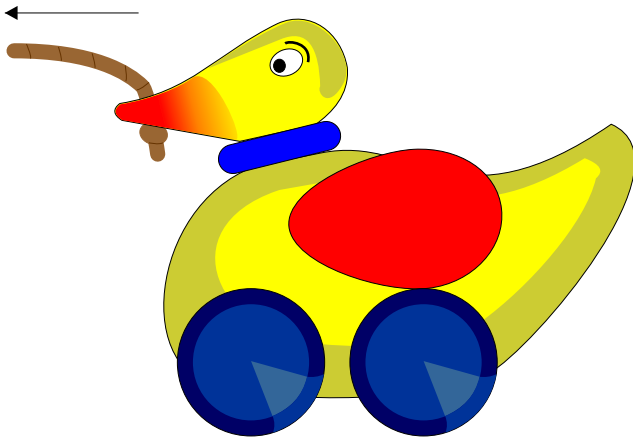
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# ANOTHER MECHANICAL TOY

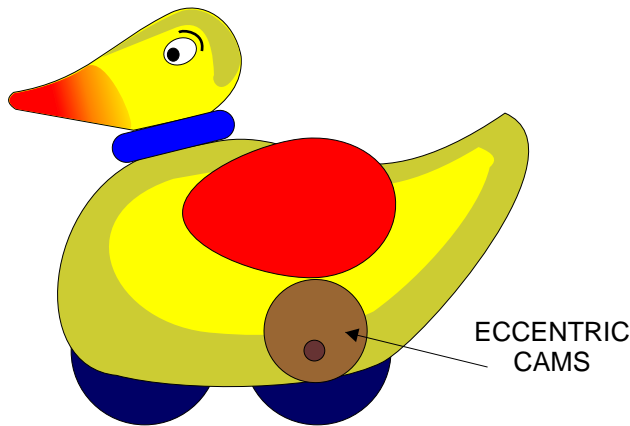
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As the mechanical duck is pulled forward the wings flap upwards and downwards. This is achieved through the use of an eccentric cam fixed to each axle. The diagrams below show how the mechanism works.

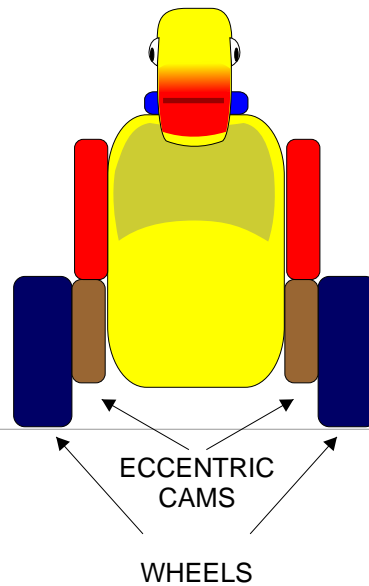
As the wheels and axle rotate the eccentric cams also rotate. As the eccentric cams move upwards they also push the wings upwards. As the eccentric cam rotates downwards the wings drop down. The faster the toy is pulled forward the faster the wings flap.

SIDE VIEW



SIDE WHEELS HAVE BEEN REMOVED SO THAT THE ECCENTRIC CAMS CAN BE SEEN

FRONT VIEW



1. What materials could be used to manufacture the body of the duck / mechanical toy ?

\_\_\_\_\_

2. What are the properties of the material you have chosen ?

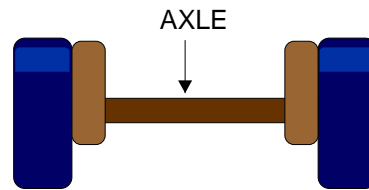
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Name an alternative material that could be used to manufacture the body of the duck / mechanical toy ?

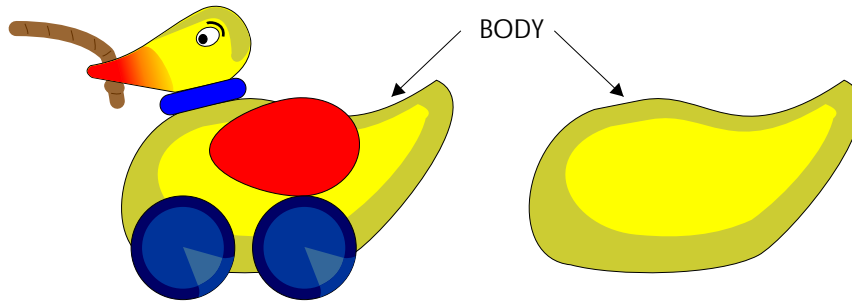
\_\_\_\_\_

4. What are the properties of the alternative material you have chosen ?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



5. A manufacturer is hoping to make hundreds of the mechanical duck from a plastic material using 'blow' moulding as the process.



5A. Name a suitable material for use in the process blow moulding: \_\_\_\_\_

5B. Why have you chosen this material? \_\_\_\_\_

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Diagrams representing the blow moulding process are seen below. Add notes to diagram 1 and 2 to explain how the process works.

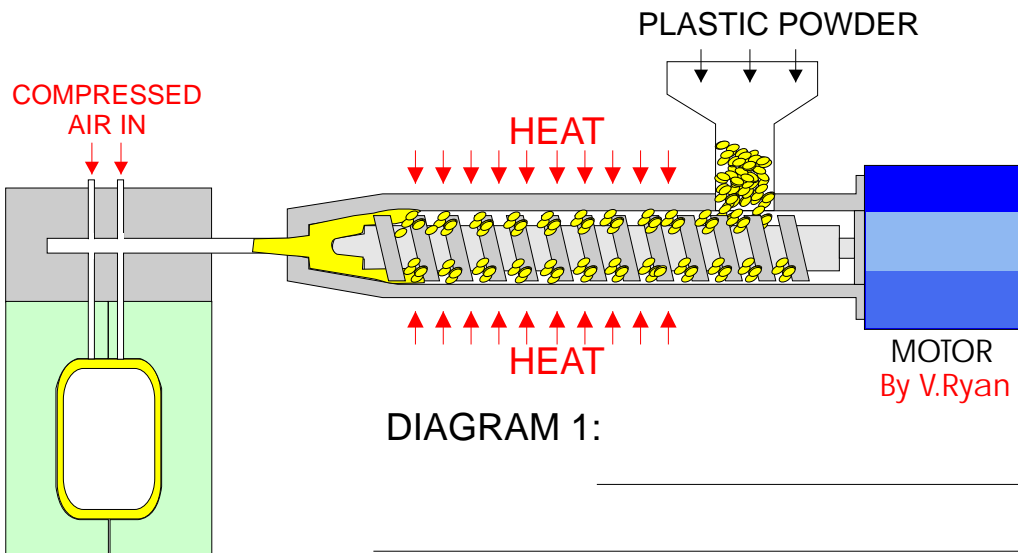


DIAGRAM 1:

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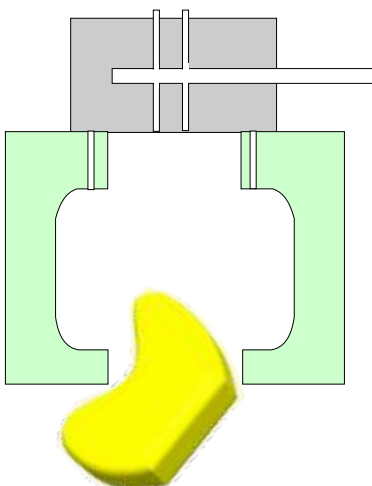


DIAGRAM 2:

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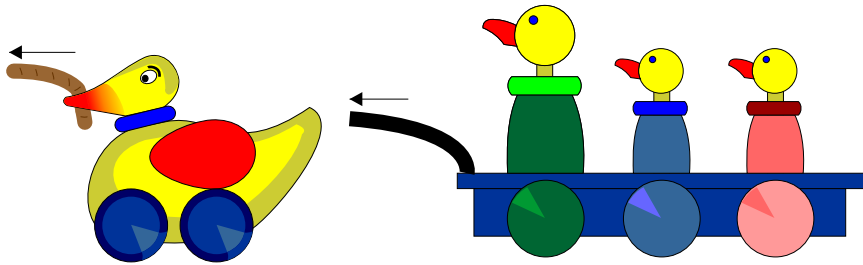
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# EXAMINATION QUESTION

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The two educational toys opposite are commonly used by young children.

1. Name two materials that could be used to manufacture either of the sample toys.

MATERIAL ONE:

MATERIAL TWO:

\_\_\_\_\_

2. Choose one of the materials you named in question 1. One property your material must possess is described below

PROPERTY: TOUGHNESS \_\_\_\_\_

WHY: The material must be tough so that it can withstand knocks and blows. If it is knocked off the table it must not break or shatter.

Describe three more properties that the material must have and why the properties are important.

- A. Property 1: \_\_\_\_\_ WHY: \_\_\_\_\_
- B. Property 2: \_\_\_\_\_ WHY: \_\_\_\_\_
- C. Property 3: \_\_\_\_\_ WHY: \_\_\_\_\_

3. What are the safety issues relating to toys used by young children?

\_\_\_\_\_

\_\_\_\_\_

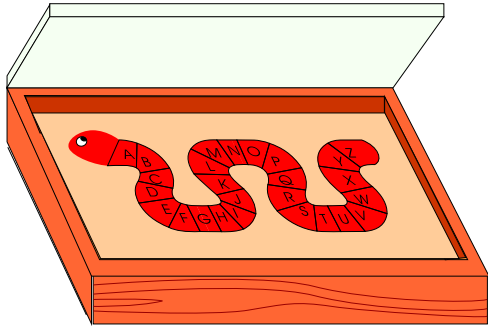
4. If a thousand of the same toy are to be manufactured, this is called BATCH manufacturing.

4a. If only one educational toy is to be manufactured , this is called \_\_\_\_\_

4a. If the educational toy is to be manufactured twenty four hours a day and 365 days a year, this is called \_\_\_\_\_

\_\_\_\_\_

## PRODUCT 'A'



## EXAMINATION QUESTION

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The products shown to the right and left are toys for young children. They are both designed entertain young children and to help them develop skills.

## PRODUCT 'B'



1. In your opinion, which product - 'A' or 'B' is the most suitable as an educational toy ? Explain your answer.

Which is the most suitable product? \_\_\_\_\_

Why is it the most suitable? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. Name a wood that could be used to manufacture product 'A'.

Name of wood: \_\_\_\_\_

Why have you chosen the material named above?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. Name a material that could be used to manufacture product 'B'.

Material Name: \_\_\_\_\_

Why have you chosen the material named above?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## TRADITIONAL EDUCATIONAL TOY



## EXAMINATION QUESTION

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1. The diagram opposite shows a typical educational toy, designed to educate and entertain young children.  
List three ways in which it aids learning.

1a. \_\_\_\_\_

1b. \_\_\_\_\_

1c. \_\_\_\_\_

2. The educational toy shown below could be improved. Draw three improvements / additions you could make to the design, without changing the design completely. Include notes to explain your changes / additions.

NOTES

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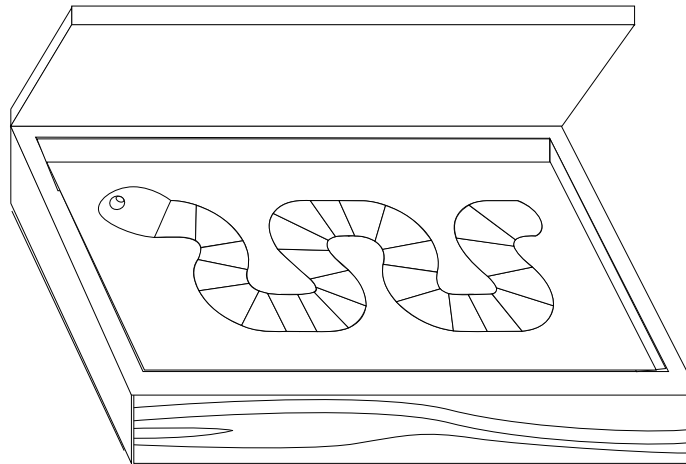
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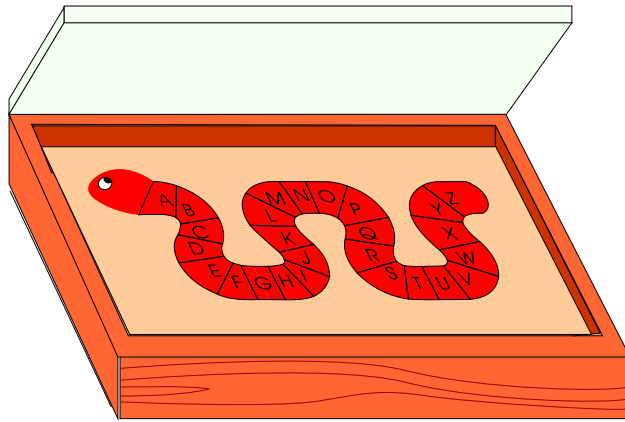
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# EXAMINATION QUESTION

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The diagram opposite shows a typical traditional educational toy, designed to entertain and educate young children.

1. On the front view, draw the joints you would use at the corners



FRONT VIEW

2. Name your chosen joint: \_\_\_\_\_

3. Explain your choice of joint. \_\_\_\_\_

4a. Children could easily trap their fingers when closing the lid. In the space below redesign the lid so that the risk of damaging fingers if trapped is small. Add notes to explain your alteration/design.

## NOTES

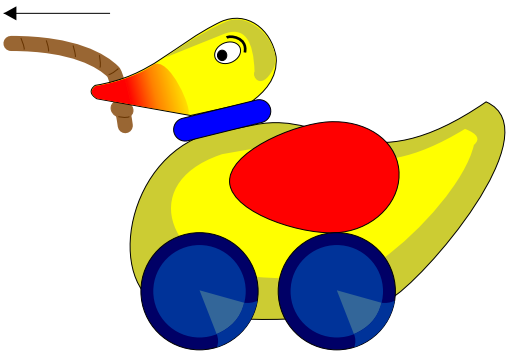
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# EXAMINATION QUESTION

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The product shown to the left is a modern toy for a very young child. It has been manufactured from a 'plastic' material.

1. Name a suitable plastic: \_\_\_\_\_

2. Describe four properties the material possesses and why each property is important for the product.

PROPERTY 1: \_\_\_\_\_

PROPERTY 2: \_\_\_\_\_

WHY IMPORTANT: \_\_\_\_\_

WHY IMPORTANT: \_\_\_\_\_

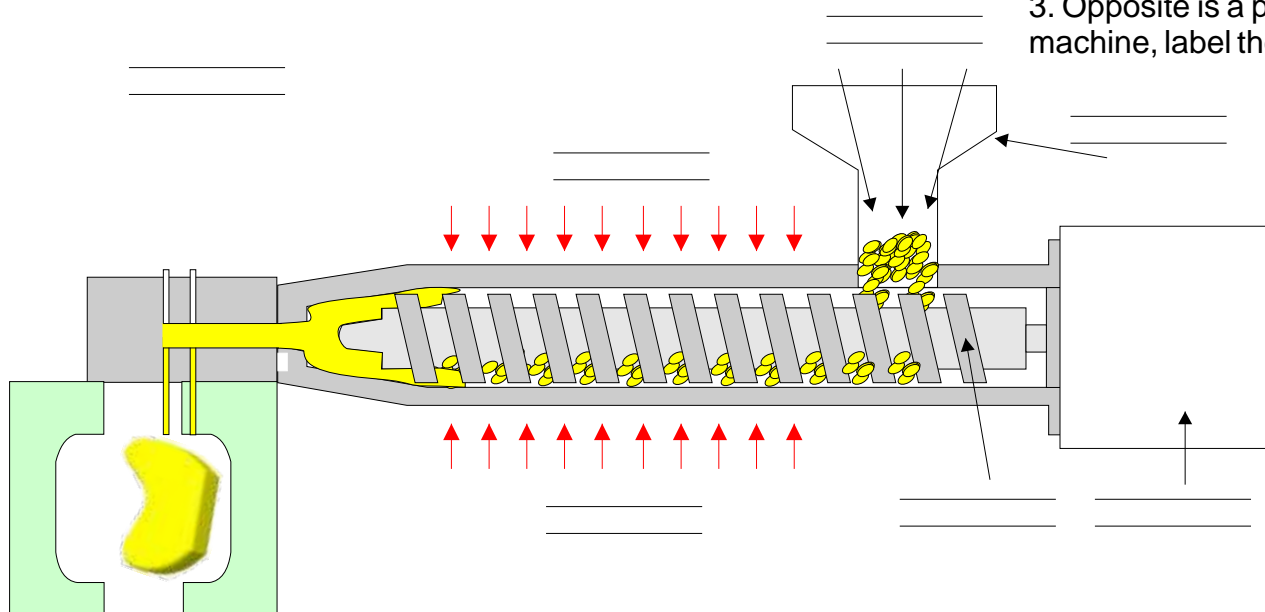
PROPERTY 3: \_\_\_\_\_

PROPERTY 4: \_\_\_\_\_

WHY IMPORTANT: \_\_\_\_\_

WHY IMPORTANT: \_\_\_\_\_

3. Opposite is a piece of machinery that is used to manufacture the toy. Name the machine, label the parts and describe the process of manufacture.



MACHINE NAME: \_\_\_\_\_

PROCESS DESCRIPTION: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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