

Introduction

Have you ever seen a child's shape sorting toy? Some are in the shape of an animal or a car and some are simply one side of a box.

Your task is to design a toy like this. You need to convince Acme Toy Company to produce toys with your design. Acme Toys has asked for information on the toy's reasonability, safety, enjoyment/stimulation, and type of material. So you need to think about:

- What shapes you are going to include
- What kind of material would you like to use for making your toy
- How much material will be required to actually produce your toy
- Anything else you think is important.



Acme Toys requires proposals for new toys to be typed and presented well. They also will be looking for diagrams of the toy and its pieces. The diagram should include measurements and calculations that show mathematically that the toy is indeed safe and functional.

In the second part of your proposal, you need to include a recommendation for what type of material you envision will be used. This will affect their production cost so you need to inform them of how much material will be required. Acme Toy Co. has their own suppliers of materials so they will determine the actual cost based on the calculations of materials you provide.

Good Luck!



Part 1: Creating the design

You need to create a design for a new shape sorting toy. Acme Toys has made the following specifications:

1. **The toy needs to include four pieces that are right prisms with bases of different shapes** The bases of your pieces should be a circle, a square, an equilateral triangle, and one of your choice. The one that you choose can be any shape for which you can calculate the area.
2. **Create accurate diagrams of each of the shapes you plan to use.** Your diagrams should be the actual size. Label the dimensions of each shape. Be sure to take care that your dimensions are reasonable and practical for a child to use.
3. When you create the pieces of this toy, **make sure that one piece cannot fit through the opening intended for a different piece.** For example, the circle should not fit through the opening for a square and the square should not fit through the opening for the circle. **Explain how you know this is true for your toy.**

Part 1 Due Date: Second Lesson After Exams (May 30/June 1)

On the above date, you need to have completed the following:

- A rough draft of the area calculations for each part of your toy
- An accurate diagram of each shape you are including. This needs to be the **final** version of the shapes. Use grid paper and ensure that each figure is outlined in ink. You may use a computer for this part, but it still needs to be the actual size.
- A rough draft of your explanation for #3 above.

Part 2: Determining the material needed

Acme Toys is interested in your design and considering production. In order to help determine their cost of production, they require more information. **What kind of material should they use? How much material will be necessary?**



4. How much material is needed for each of your shapes individually? How much is required altogether? Show your calculations. Support your calculations with
 - diagrams indicating actual dimensions
 - a model of your toy
5. Aside from the pieces that fit into the toy, what else will require additional material? Approximately how much would you need? Explain.

Conclusion: Reflect on your toy design. (Is this an appropriate toy for a baby? Is it safe? Is it engaging? Etc. Explain.)

Due Date: The actual model is due the first lesson of the week following this (6th/7th June – this is the final week of school)

Name:		Block:
Diagrams (Part 1)		
0	No diagrams are provided	Comments:
2	One or two diagrams are provided with dimensions labeled .	
4	One or two diagrams are provided, with dimensions labeled , and are drawn accurately .	
6	Two or three diagrams are provided with dimensions labeled .	
8	Three accurate diagrams are drawn on a grid with dimensions labeled .	
10	All four shapes are drawn accurately on a grid with dimensions labeled.	
Area Calculations		
0	No dimensions or areas are calculated	Comments:
1	The dimensions of objects are accurate and appropriate	
2	The dimensions are appropriate and area calculations are attempted	
3	The dimensions are appropriate and area calculations are completed (work may be lacking)	
4	The dimensions are appropriate and area calculations are thoroughly completed , with few errors	
5	The dimensions are appropriate and area calculations are thoroughly completed, with no errors	
Calculations of Required Material		
0	No calculations are provided	Comments:
1	The material calculations are attempted for some pieces	
2	The material calculations are attempted for most pieces	
3	The material calculations are completed (work may be lacking) for all pieces	
4	All necessary material calculations are thoroughly completed , with few errors	
5	All necessary material is computed accurately	
Reasonability of Results		
0	The student does not consider the reasonableness of the toy's design.	Comments:
1	The student attempts to consider the reasonableness of the toy's design.	
2	The student correctly interprets the reasonableness of the design.	
Use of Technology		
0	The student uses no technology	Comments:
1	The student attempts to use technological applications.	
2	The student makes limited use of technological applications	
3	The student makes full and resourceful use of technological applications	
Communication		
0	No explanations are provided	Comments:
1	The student attempts to provide explanations	
2	The student provides adequate explanations	
3	The student provides complete, coherent explanations	
Work Ethic		
0	The student did not use class time effectively	Comments:
1	The student used some of class time effectively	
2	The student used all class time effectively	
Actual Model		
1	A model toy is created with only some of the pieces	Comments:
2	A model of the entire toy is created, complete with pieces and a surface for the pieces to fit through.	
3	A the entire toy is created, complete with pieces and a surface for the pieces to fit through; the model is the same dimensions as the original diagrams.	
Total score		
— 33	Comments:	

Some Tips for how to earn Full marks on your Task:

Communication

In this section, you will be graded for the clarity of your explanations. Part of making your paper '**complete**' and '**coherent**' is writing your paper so that it stands alone. The reader should not need to look back at the questions to understand what you have written. That means that you need an opening paragraph that describes what the paper is about. It is okay if you just restate the directions that you were provided. It is also fine if you want to separate your paper into sections: Part 1, Part 2, etc.

Another item that you need to keep in mind is that any pictures or diagrams that you include must be placed within the text at the place where you refer to them. Do not place all of your diagrams together at the back of your paper.

Technology

In this, you can earn a mark of '1' if your paper is typed but no other technology is used. You can increase your score to a mark of '2' if your paper is typed **and** you have used one mathematical application like *Geometer's Sketchpad* or *Equation Editor* for about half of your calculations. To earn a mark of '3' in this section, you need to have typed your paper and used a mathematical application **throughout** your work.

Notation

Do not use calculator notation. For example, if you want to write '*x squared*' you should either write x^2 by hand or use *Equation Editor* to type it. **Do not** type in ' x^2 .'

General Scoring:

As you read in the **Technology** section, the way that the scoring works is from the bottom up. You begin with zero marks in each category. As your teacher reads your paper, she will look for the various components of your work that are listed in the rubric. You can increase your score by including all of the items listed in the rubric. Please take note that if you have not met the requirements for a mark of '2' in a category, you cannot achieve a mark of anything higher than '1'.