

# Prototypes

## The Movie:

Eastman Kodak senior industrial designer Carole Bilson explains how an idea goes from sketch to prototype to product. Featured: Carol Bilson, senior industrial designer, Eastman Kodak Company.  
(Movie length: 1:01)



## Background:

If you take a look around, you will likely find that nearly all of the objects in your environment were designed—that is, someone very deliberately decided to make each one have the shape, materials, and features that you can see. The process by which a new idea for a product becomes a physical object generally involves at least three stages:

A rough sketch conveys the basic idea and the look of the product. This might be used in internal meetings or as a tool for surveying potential customers.

A dimensioned drawing gives all exact dimensions, generally in top, side, and front views.

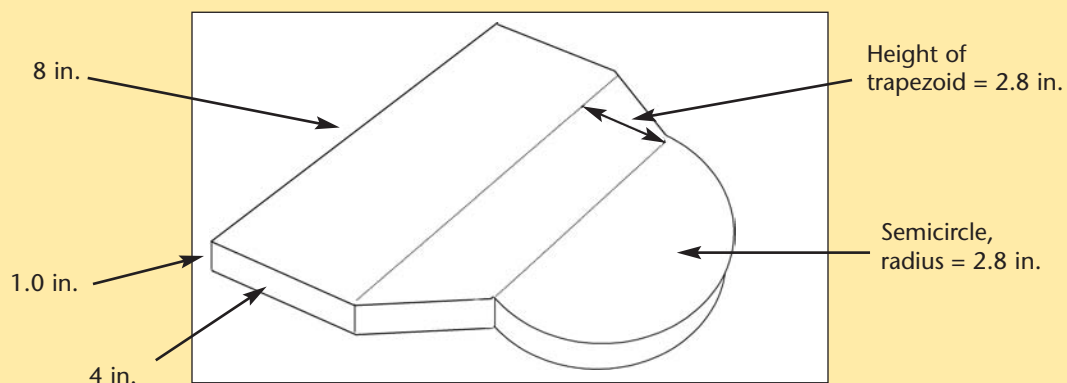
A prototype is a model of the product, built from the dimensioned drawings, which can be tested in various ways for functionality and appeal.

## Curriculum Connections:

### Geometry (polygons, circles), Decimals

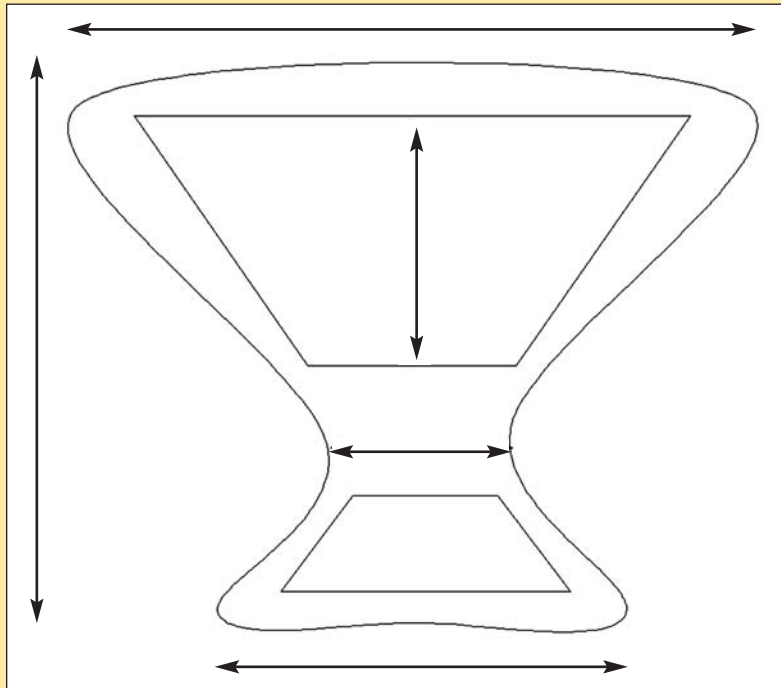
1

This diagram shows a prototype of a new CD player. If the case of the CD player is to be plastic which is 0.12 inches thick, how many cubic inches of plastic will be required to make the case?



## Fractions, Decimals, Measurement

This is a full-scale drawing of a prototype for a new Personal Digital Assistant device. Measure all indicated dimensions in inches and fractions of an inch with a ruler, then change all fractions to decimals and convert all measurements to millimeters (multiply by 25.4).

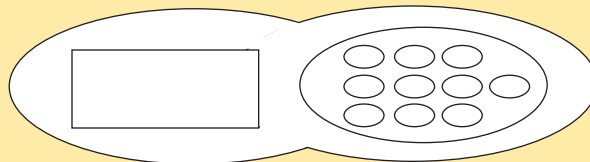


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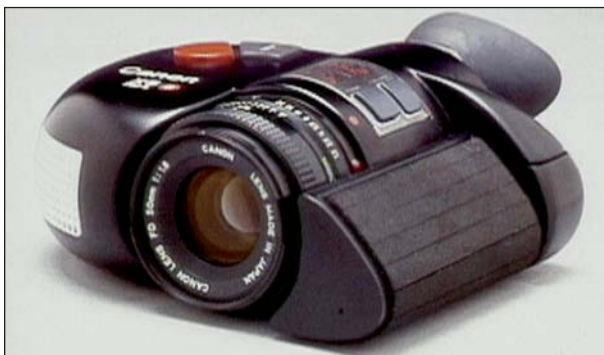
## Measurement, Ratios

This top view drawing of a prototype cell phone has a scale of 2.75:1 (1 inch on the drawing represents 2.75 inches on the actual device). Find the indicated dimensions of the actual device.

- Overall length
- Width and height of rectangular screen
- Width of top half of phone
- Width of bottom half of phone
- Width and height of buttons



3



## Percents

To be successful, a prototype must be designed so as to be manufacturable. Suppose that a new product must have no more than 7% failures when tested, otherwise the prototype must be re-done. Which of these are successful products?

| Product number | Number tested | Number failed | Successful? |
|----------------|---------------|---------------|-------------|
| Product #1     | 75            | 6             |             |
| Product #2     | 214           | 12            |             |
| Product #3     | 163           | 9             |             |
| Product #4     | 578           | 36            |             |
| Product #5     | 120           | 8             |             |

4

## Building A Better Mouse

To:       Apprentice designers  
From:     Senior Designer  
Subject:   Building a better mouse

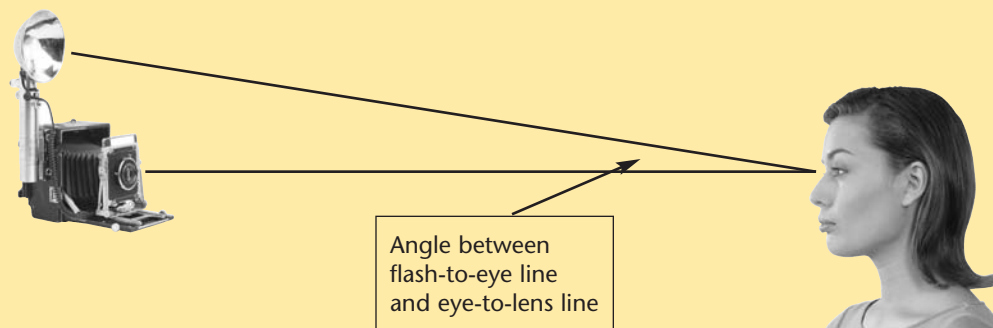
We want a new design for a computer mouse that will appeal to young people. I would like to have each of you create one new design and see how your friends respond to it. Please carry out this project as follows:

1. We need to determine if a mouse designed for your age group should be smaller than one designed for adults:
  - Measure the size of the hands of at least 6 other apprentices, and compute the range and average of the results. It is up to you to decide which dimensions to measure.
  - Compare those dimensions to those of a collection of adults, using whichever statistical measures you think best.
  - One thing we'd like to know is if we should have different sizes for young women and young men. If your measurements indicate that, then decide whether you want to design your mouse for women or men.
2. Draw a sketch of your mouse design.

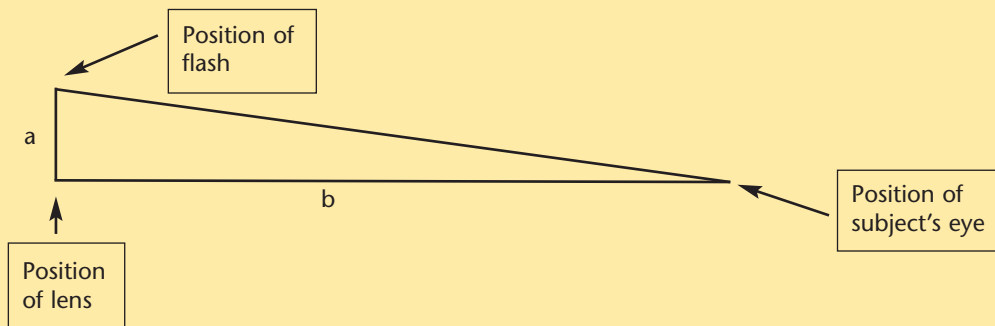
Remember that the most important thing is that it be useable—it needs to be easily moved across a flat surface. Other than that, use your imagination. Maybe you can find a way to give the user a better grip on the mouse for more control. Try using various geometric shapes such as ovals, pentagons, or hexagons.
3. When you have a rough design you like, draw the mouse accurately, with the measurements shown on the drawing. Make a scale drawing showing both a front and side view.
4. Make a model of your mouse with cardboard and white glue or carving foam. (Build layers of cardboard to make the three dimensional shape.)
5. Have several of your friends try your design, and make sure that it works well and is of correct dimensions. Go back to the drawing board if you need to.
6. When all of the apprentice designs have been completed, I will have them reviewed by some of the other employees here. We'll have an award for the design that the reviewers feel is the best.

Photographic “redeye” occurs because the light from a camera flash is reflected straight back towards the flash by the red-colored retina of the eye. If the flash is too close to the lens, that reflected light enters the lens and so it appears as though there are red lights in the subject’s eyes.

Redeye occurs when the angle of flash-eye-lens is too small, as indicated in this diagram



This angle,  $\theta$ , is related to the distance between camera and subject, and the distance between the lens and flash, as shown here:



- Suppose that  $\theta$  needs to be at least two degrees. If the subject is 5 feet away, how far must the flash be from the lens?
- What would  $\theta$  be for a subject which is ten feet away, and a lens-flash distance of 2.5 inches?
- Explain why one way to eliminate redeye is to move the camera closer to the subject.

If you enjoyed this Futures Channel Movie, you will probably also like these:

|   |  |
|---|--|
| <i>The Pterodactyl Flies Again, #1002</i> | A young aeronautical designer creates a flying replica of a prehistoric dinosaur.  |
| <i>Testing the Robotic Hand, #1006</i>    | NASA engineer Larry Li has built a robot's hand that can catch a baseball—or recover an essential tool in the vacuum of space. |
| <i>Models for Movies, #4005</i>           | Building miniature replicas with a full-scale imagination, Greg Jein reproduces every detail of the Star Trek space vessels.   |