Paper Folding

Student Activity

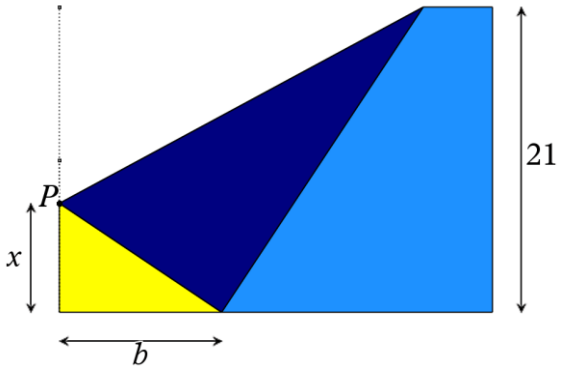
7 8 9 10 **11** 12

TI-Nspire | Investigation | Student | 20 min

Introduction

An A4 piece of paper measures 29.7cm x 21.0cm. The page is oriented in 'landscape' format. The top left corner of the page is folded such that the corner just touches the base of the page. A triangle is formed in the bottom left corner. The height of the triangle is denoted by x and the base b.

The aim of this investigation is to determine the maximum area that can be formed with this triangle.



Forming an Equation

Question: 1.

Determine an expression for the hypotenuse of the triangle in terms of x.

Question: 2.

Determine an expression for the base of the triangle in terms of x and state any domain restrictions.

Question: 3.

Define a function $a(x)$ for the area of the triangle in terms of x.

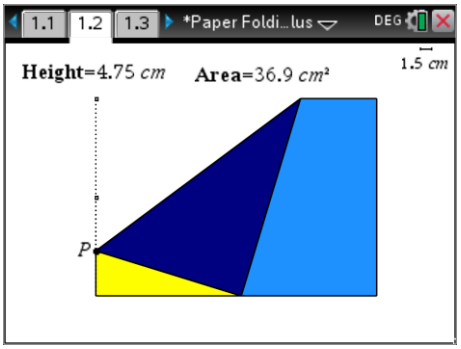
Validating the Equation

Open the TI-Nspire file "Paper Folding".

Navigate to page 1.2

Grab point P and move it up and down. As point P moves up and down the height and area of the triangle is being collected automatically.

Navigate to page 1.3 and graph the function $a(x)$ and confirm that it passes through the data points generated.



Question: 4.

Determine the derivative of the function: $a(x)$.

Question: 5.

Determine the value for x for which the area is a maximum.

Question: 6.

Determine the maximum area of the triangle.

Question: 7.

Suppose the 'height' of the paper is changed from 21cm to h cm. Determine the value of x for which the area of the triangle is a maximum and the corresponding area.

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