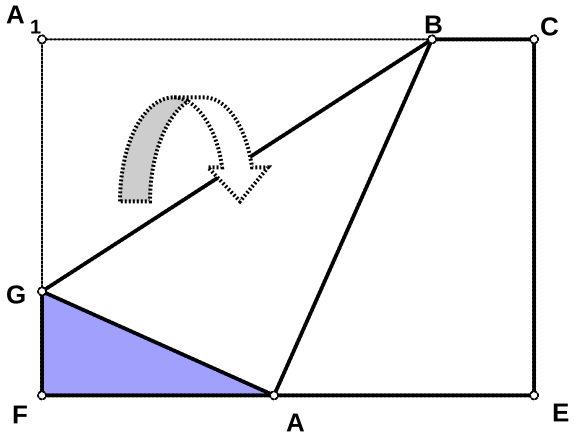
Triangulation Problem

Using an A4 piece of paper with a 'landscape' orientation fold the top left corner of the page so that it just touches the bottom of the page as shown below.



A triangle is formed and is labelled ΔAFG in the diagram.

Measure the lengths $\overline{GF}$ and $\overline{AF}$, hence determine the area of your triangle.

1. Let $\overline{GF}$ be represented by *x*. Fold the paper using the method outlined above for the following values of *x*. Record your measurements for the length $\overline{AF}$ and the corresponding area for each of the triangles.

x (Length $\overline{GF}$)	Length $\overline{AF}$	Area of Triangle.
1 cm		
2cms		
3cms		
4cms		
5cms		
6cms		
8cms		
9cms		
10cms		

2. Which measurement of *x* gave the maximum area of the triangle?

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3. Draw a scatter-plot of x against area on the axis provided below.
4. Use your graph to estimate the value of x that will provide a maximum area for the triangle.

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5. Determine an expression for the hypotenuse of the triangle in terms of x. Refer to your paper folding for assistance.

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6. Determine an expression for the area of the triangle A(x).

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7. Find A'(x)

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8. Solve A'(x)=0 and hence find the maximum possible area for the triangle.

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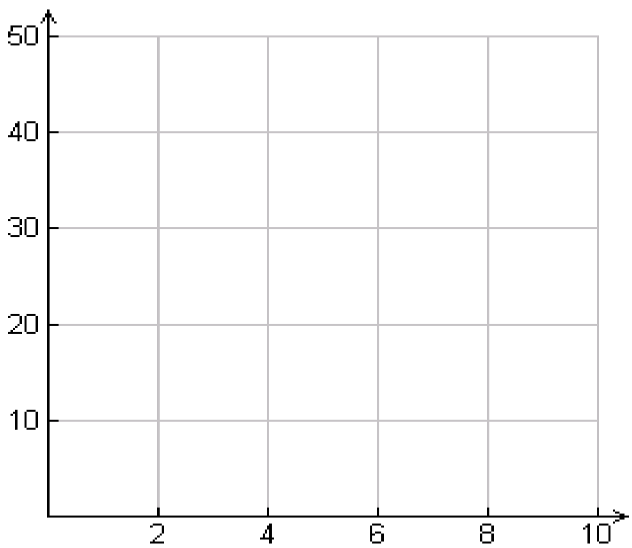

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Generalising the solution.

9. Let h be the height of the paper and w the width. Determine an expression for A(x) in terms of h, w and x. State any restrictions on h, w and x.

10. Find A'(x)

11. Calculate the maximum area of the triangle in terms of h, w and x and the corresponding value of x for which the maximum occurs.

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