

**Task:**

You want to enlarge a photo to make a poster. The poster will have the same length-width ratio as the photo. The photo is 7 inches by 5 inches. You want the poster to have an area that is at least 250% as large as there are of the photo. Find the minimum dimensions of the poster, round the dimensions to the nearest tenth of an inch.

**Solution:**

Area of the photo:

$$7 \text{ inches} \times 5 \text{ inches} = 35 \text{ square inches}$$

The poster is 250% larger, area of the poster:

$$2.5 \times 35 \text{ square inches} = 70 \text{ square inches}$$

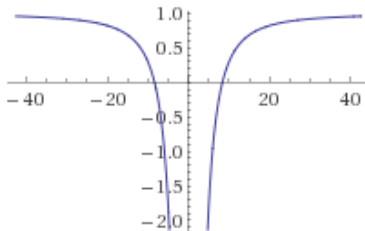
Area of the poster equals the multiplication of its dimensions  $a$  and  $b$ :

$$a \text{ inches} \times b \text{ inches} = 70 \text{ square inches}$$

$$a = 70/b$$

To find the minimum dimensions we should find the minimum of the function:

$$y = a + b = \frac{70}{b} + b, b > 0, y' = 1 - \frac{70}{b^2}$$



In the interval  $b > 0$  there is a minimum:

$$1 - \frac{70}{b^2} = 0, b > 0$$

$$b^2 = 70$$

$$b = \sqrt{70} = 8.4 \text{ inch}$$

$$a = \frac{70}{b} = \frac{70}{\sqrt{70}} = 8.4 \text{ inch}$$

$$\text{Control: } a \cdot b = 70.56 \text{ square inches } \delta = \frac{a \cdot b - 70}{70} = 0.008$$

**Answer:**  $b = 8.4$  inch,  $a = 8.4$  inch