

Sample Format for Homework Assignments

The following pages will show how a typical assignment should be completed, whether solving the problem by hand or using Mathcad. Always show the formulas when applicable and highlight the answer. Briefly identify the steps involved in the solution.

Drawings should be used when appropriate. Use a straight edge, compass and/or template when drawing figures. Label all pertinent elements of the drawing.

The question that is answered in the next two pages is:¹

1. The distance measured between two points on a map to a scale of 1:62,500 is 29.05 mm. The distance measured between the images of these same two points on a vertical photograph taken with a lens having a 152.14 mm focal length is 54.81 mm. Both points lie at an elevation of 240 ft. as determined from the map. Compute the flying height for the photograph.

The first page is the hand solution while the second is the Mathcad solution.

¹ Moffitt, F., 1967. Photogrammetry, 2nd edition, International Textbook Company, Scranton, PA.

SAMPLE HOMEWORK

NAME

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1) GIVEN: $S_M = 1:62,500$
 $ab_M = 29.05 \text{ mm}$
 $f = 152.14 \text{ mm}$
 $ab_P = 54.81 \text{ mm}$
 $h = 240 \text{ ft}$

FIND H.

SOLUTION: $S_P = \frac{f}{H-h} \Rightarrow H = \frac{f}{S_P} + h$

$$S_P = \frac{ab_P}{AB} \Rightarrow AB = \frac{ab_P}{S_P}$$

$$S_M = \frac{ab_M}{AB} \Rightarrow AB = \frac{ab_M}{S_M}$$

$$\therefore \frac{ab_P}{ab_M} = \frac{S_P}{S_M} \Rightarrow S_P = \frac{ab_P}{ab_M} S_M = \frac{54.81 \text{ mm}}{29.05 \text{ mm}} \left(\frac{1}{62,500} \right)$$

$$= \frac{1}{33,125.8}$$

then,

$$H = \frac{f}{S_P} + h = \left(\frac{152.14 \text{ mm}}{\frac{1}{33,125.8}} \right) \left(\frac{1''}{25.4 \text{ mm}} \right) \left(\frac{1'}{12''} \right) + 240'$$

$$= \underline{\underline{16,775'}}$$

Sample Format for Using Mathcad in Assignments

Given:	$S_m := \frac{1}{62500}$	Scale of map
	$ab_m := 29.05\text{mm}$	Distance on map
	$f := 152.14\text{mm}$	Focal length of camera
	$ab_p := 54.81\text{mm}$	Distance on photo
	$h := 240\text{ft}$	Elevation of two points

What is H?

Solution:

$$S_p := \left(\frac{ab_p}{ab_m} \right) \cdot S_m$$

$$S_p^{-1} = 33125.8$$

Scale of photo is 1:33,125.8

$$H := \frac{f}{S_p} \cdot \left(\frac{1\text{in}}{25.4\text{mm}} \right) \cdot \left(\frac{1\text{ft}}{12\text{in}} \right) + 240\text{ft}$$

$$H = 16775 \text{ ft}$$