

# MOUNT HOLYOKE COLLEGE

## Light, Universe and Everything *i42*

2002 Fall Semester

Sample Solution

**Bad:** I measured the scale bar with my old ruler left over from high school and got 46 mm. Since that's 1000 feet, I divided. and got 21.739, so I used one foot is 30.48 cm to convert. To do that I multiplied 21.739 times 304.8 and got 6626.09. So one foot on the map is 6626.09 "real" feet.

**Better** By equation 7u.1.1 the scale factor is defined as

$$S = \frac{\text{Map}}{\text{real}}.$$

By measurement the 1000 foot scale bar on the map is 1.813 in,  
Using the magic ones

$$1 = \frac{12 \text{ in}}{\text{ft}} = \frac{5280 \text{ ft}}{\text{mi}},$$

I found

$$S = \frac{1.813 \text{ in}}{10^3 \text{ ft}} \times \frac{\text{ft}}{12 \text{ in}} = 1.5 \times 10^{-4} = \frac{1}{6.62 \times 10^3}$$

Distances on the map are reduced by the factor  $6.62 \times 10^3$ . This is comparable to the number of feet in a mile, which is similar to the scale ratio between a person (who would hold the map) and the campus.