

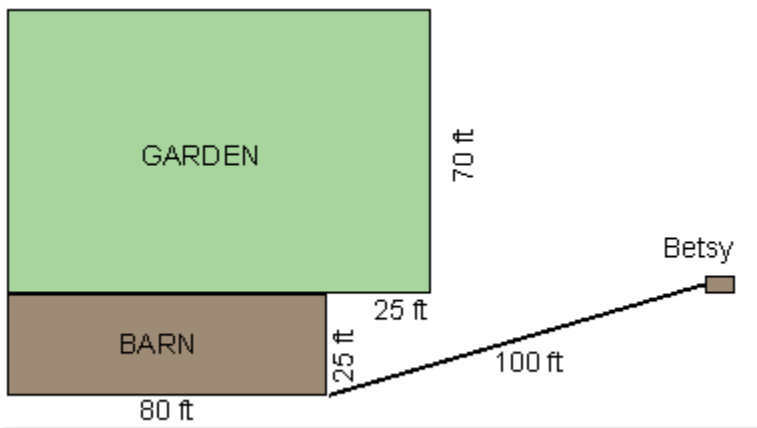
## Geometry: Farm Owner / Manager

### Idaho Farm Owner

**Job Description:** Operate farms, ranches, greenhouses, nurseries, timber tracts, or other agricultural production establishments which produce crops, horticultural specialties, livestock, poultry, finfish, shellfish, or animal specialties. May plant, cultivate, harvest, perform post-harvest activities, and market crops and livestock; may hire, train, and supervise farm workers or supervise a farm labor contractor; may prepare cost, production, and other records. May maintain and operate machinery and perform physical work.

### Problem:

Betsy is tethered to the barn at one corner by a 100 ft rope. A fence keeps her out of the garden. Find, to the nearest square foot, the area in which Betsy can graze.



Area of triangle = base x height / 2

Area of circle =  $\pi r^2$

Area of sector = Area of circle x sector angle / 360°

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Job Description: See problem page for details

**See problem for details.**

### Solution:

Break the diagram into 4 different areas. Begin with exact values and calculate the approximation at the end.

1. Area of Section I is contained in a right isosceles triangle.

Area of Section I:

$$(25 \text{ ft} \times 25 \text{ ft}) \div 2 = 312.50 \text{ ft}^2$$

2. Area of Section II is contained in a sector of a circle with a sector angle of  $45^\circ$ , a radius of 100 ft - diagonal of Section I isosceles triangle:

$$100 \text{ ft} - \sqrt{25^2 + 25^2} \text{ ft} = 100 \text{ ft} - \sqrt{1250} \text{ ft} = 100 \text{ ft} - 35.3553 \text{ ft} = 64.6447 \text{ ft}$$

$$\text{Area of Section II: } \pi(64.6447 \text{ ft})^2 \div 360^\circ / 45^\circ = 13128.5 \text{ ft}^2 \div 8 = 1,641.1 \text{ ft}^2$$

3. Area of section III is contained in a sector of a circle with a sector angle of  $225^\circ$  and a radius of 100 ft.

$$\text{Area of Section III: } \pi(100 \text{ ft})^2 \div 360^\circ / 225^\circ = 19,635 \text{ ft}^2$$

4. Area of Section IV is contained in a sector of a circle with a sector angle of  $90^\circ$  and a radius of 100 ft -  $80 \text{ ft} = 20 \text{ ft}$ .

Area of Section IV:

$$\pi(20 \text{ ft})^2 \div 360^\circ / 90^\circ = 1,256.64 \text{ ft}^2 \div 4 = 314.16 \text{ ft}^2$$

5. Area in which Betsy can graze = sum of areas of Sections I - IV  
 $(312.50 + 1,641.1 + 19,635 + 314.16) \text{ ft}^2 = 21,903 \text{ ft}^2$

