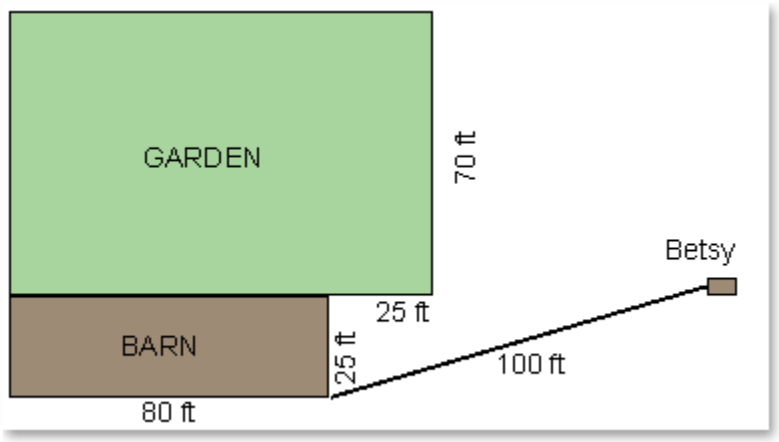
Geometry: Farm Owner / Manager

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 = πr^2

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

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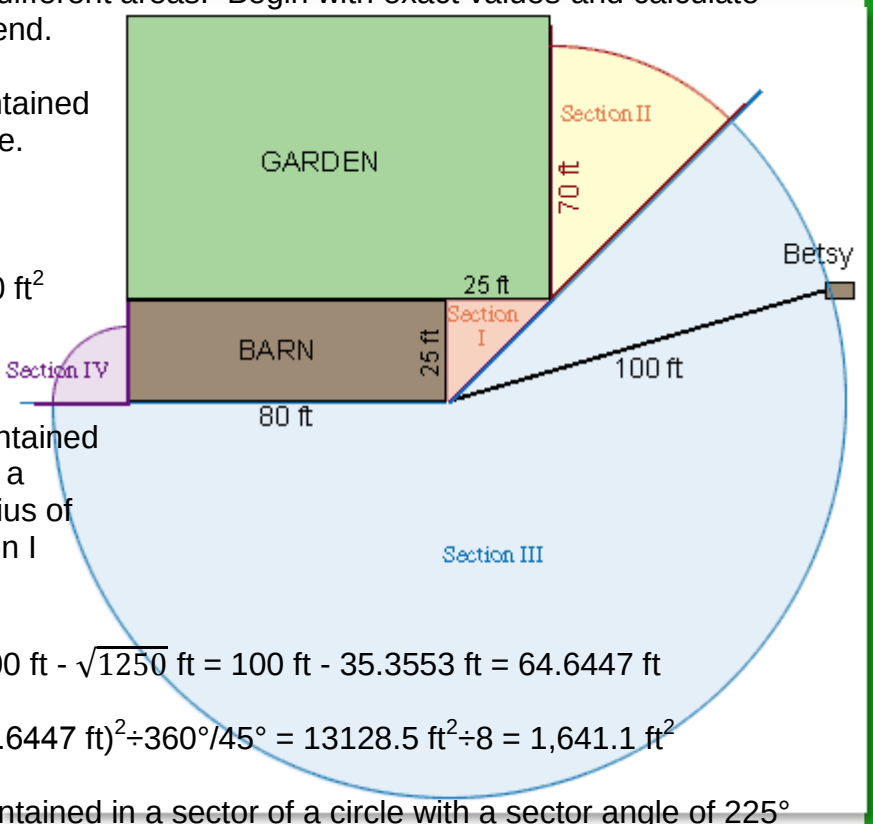
Idaho Farm Owner
Job Description: See problem page for details

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 ft x 25 ft) ÷ 2 = 312.50 ft^2

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

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

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

3. Area of section III is contained in a sector of a circle with a sector angle of 225° and a radius of 100 ft.

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

4. Area of Section IV is contained in a sector of a circle with a sector angle of 90° and a radius of 100 ft - 80 ft = 20 ft.

Area of Section IV:
$\pi(20\ ft)^2 \div 360° / 90° = 1{,}256.64\ ft^2 \div 4 = 314.16\ ft^2$

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