HW01-6.1 #15 A cow is tethered by a 130-ft rope to the inside corner of an L-shaped building, as shown. Find the area that the cow can graze. (Round ans. to nearest whole number.) Assume $a = 30$ ft, $b = 40$ ft, $c = 130$ ft, $d = 50$ ft, and $e = 90$ ft.

**Diagram:**
- **Grazing Area**
- All dimensions are in ft.

**Solution:**
1. I see 4 "Quarter-Circles" I, II, III, IV.
2. The Area of a circle is $A = \pi r^2$.
   - The Area of a Quarter-Circle is: $A_q = \pi r^2 / 4$.
3. All we need to do is find the 4 radii.
   - # III is easy: $130$ ft = $r_3$
   - # IV $r_4 = 130 - 50 = 80$ ft (c - d)
   - # II $r_2 = 130 - 46 = 84$ ft (c - b)
   - # I $r_1 = 130 - 40 - 30 = 60$ ft (c - b - a)
4. $A_I + A_{II} + A_{III} + A_{IV} = \frac{\pi}{4}(r_1^2 + r_2^2 + r_3^2 + r_4^2)$
   - I just factored out a $\frac{\pi}{4}$ from each of the area formulas.
   - $= \frac{\pi}{4}(60^2 + 90^2 + 130^2 + 80^2) = \frac{\pi}{4}(35000) = 8750\pi$ ft$^2$
   - $\approx 27488.93572$ ft$^2 \approx 27489$ ft$^2$
5. The grazing area is approximately 27489 ft$^2$. 