



## Problem of the Week

### Problem B and Solution

#### Fields of Flowers

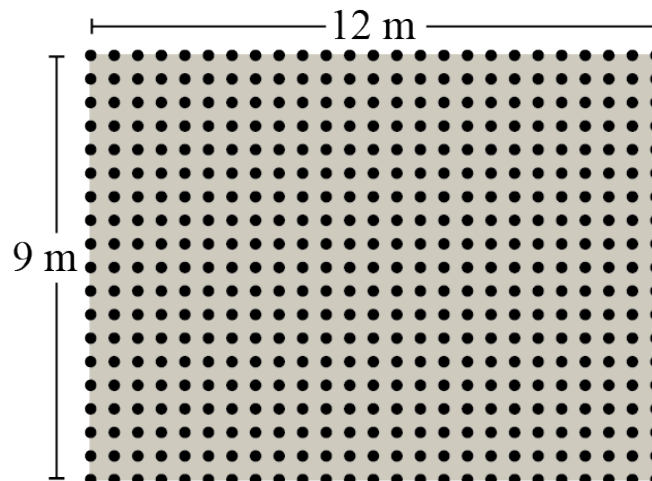
#### Problem

Sadie has garden beds that are 11 m by 14 m. She wants to grow giant sunflowers in one of her garden beds and dwarf sunflowers in another garden bed.

- (a) Sadie spaces the giant sunflower seeds 50 cm apart, in rows that are 50 cm apart, leaving a 100 cm border on all sides of the garden bed. How many giant sunflower seeds can she plant in one garden bed?
- (b) In another garden bed, Sadie plants dwarf sunflower seeds. She spaces the seeds 25 cm apart, in rows that are 25 cm apart, leaving a 100 cm border on all sides of the garden bed. How many dwarf sunflowers can she plant in this garden bed?
- (c) All of Sadie's sunflowers have germinated and matured, but then in a cold early frost one evening, she loses 20% of the giant sunflowers and 10% of the dwarf sunflowers. If Sadie sells all the surviving sunflowers at \$5.00 each for the giants and \$3.00 each for the dwarfs, which crop will provide the greater income?

#### Solution

- (a) Since 100 cm is equal to 1 m, the border around Sadie's garden bed is 1 m on each side. That means the planting area inside the garden is 9 m by 12 m. If she plants rows of seeds starting right on the edge of the planting area, and plants them 50 cm (or  $\frac{1}{2}$  m) apart, then in each row she can plant 2 seeds per metre, plus 1 more seed at the end of the row. So, along the 9 m width she can plant  $9 \times 2 + 1 = 18 + 1 = 19$  seeds. Along the 12 m length she can plant  $12 \times 2 + 1 = 24 + 1 = 25$  seeds. Thus, Sadie can plant a total of  $19 \times 25 = 475$  giant sunflower seeds in one garden bed, as shown.





- (b) As in part (a), we can conclude that the planting area inside this garden bed is also 9 m by 12 m. If Sadie plants rows of seeds starting right on the edge of the planting area, and plants them 25 cm (or  $\frac{1}{4}$  m) apart, then in each row she can plant 4 seeds per metre, plus 1 more seed at the end of the row. So, along the 9 m width she can plant  $9 \times 4 + 1 = 36 + 1 = 37$  seeds. Along the 12 m length she can plant  $12 \times 4 + 1 = 48 + 1 = 49$  seeds. Thus, Sadie can plant a total of  $37 \times 49 = 1813$  dwarf sunflower seeds in this garden bed.
- (c) After the loss of 20% of the giant sunflowers, Sadie will have 80% of 475, or  $0.8 \times 475 = 380$  flowers left. These giant sunflowers will provide an income of  $380 \times \$5.00 = \$1900$ .

After the loss of 10% of the dwarf sunflowers, Sadie will have 90% of 1813, or  $0.9 \times 1813 \approx 1632$  flowers left. These dwarf sunflowers will provide an income of  $1632 \times \$3.00 = \$4896$ . Thus, the income from the dwarf sunflowers is more than double that of the giant sunflowers.