Problem

At "Wanna Piece 'a Pizza", they sell only square pizzas. A 15 cm by 15 cm pizza (an individual slice) feeds one person.

a) If each person eats just one individual slice, how many people would a 'medium' 30 cm by 30 cm pizza feed?

b) How many times bigger is the 'large' 45 cm by 45 cm pizza than the individual slice?

c) How many people could be fed with the 'Super Duper' 60 cm by 60 cm pizza?

d) Suppose an individual slice costs \$2.00, a medium \$5.00, a large \$10.00, and a super \$15.00. If you wish to feed 23 people at least one slice each, what pizzas should you buy in order to minimize the cost?
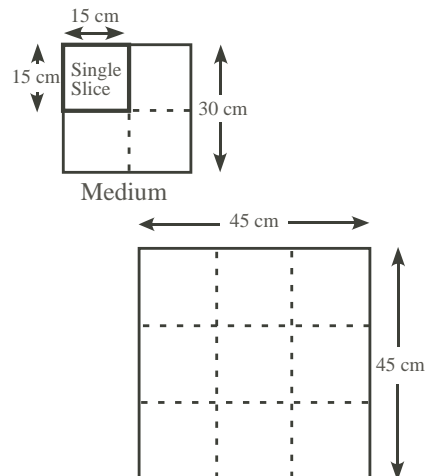
Hints

Hint 1 - a),b),c) Make a sketch.

Hint 2 - d) Would you need two Super Duper pizzas? Would you need three large pizzas?

Hint 3 - d) Does the qustion require that you buy a total of exactly 23 slices of pizza?

Solution

a) Since a 'medium' pizza is 30 cm by 30 cm, it will consist of four individual slices, as shown in the diagram. Thus it will feed four people.

b) A 'large' pizza is 45 cm by 45 cm, so it is 3 slices by 3 slices, or 9 slices of pizza. Thus it is 9 times larger than the individual slice.

c) The 'Super Duper' 60 cm by 60 cm pizza is 4 slices by 4 slices, and thus will feed 16 people.

d) You could feed 23 people at least one slice in many ways. Here are a few possibilities:

1. 23 individual slices at $2 each for $46;

2. 6 medium pizzas at $5 for $30 (i.e., 24 slices, with one extra slice);

3. 5 medium pizzas at $5 plus 3 individual pieces at $2 for $31;

4. 3 large pizzas at $10 for $30 (i.e., 27 slices, with four extra slices);

5. 2 large at $10, 1 medium at $5, and 1 individual at $2 for $27;

6. 1 Super Duper at $15, 1 medium at $5, plus 3 individual at $2 for $26;

7. 1 Super Duper at $15, 2 medium at $5 for $25 (exactly 23 slices);

8. 1 Super Duper at $15, 1 large at $10 for $25 (i.e., 25 slices, so two extra).

Clearly the last choice is the minimum cost for the greatest value since it gives two extra slices. But either of the last two choices is correct. It is worth exploring with the students how we know there is no cheaper way. The KEY IDEA is that the larger the pizza, the lower the cost per piece. Individual slices cost $2 each; the pieces in a medium pizza cost $5 \div 4 = $ 1.25 each; in a large, they cost $10 \div 9 \approx $ 1.11 each; and in a Super Duper, they cost $15 \div 16 \approx 94$ cents each. Thus the least expensive solution has to involve the larger pizzas, as in choice 7 or 8 above.