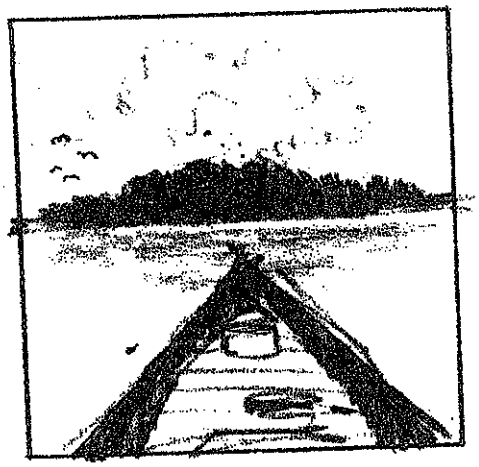
6



TWENTY MATHEMATICAL EXCURSIONS

1. The Diagonal Intruder

All the rectangular-shaped hotels in the city are agitated; the diagonal intruder is on the loose. The intruder enters the hotel at a corner and works his way along a main diagonal entering all the rooms (unit squares or unit cubes) in his path. The good news is that he doesn't take anything; he just follows the straight and narrow path to the opposite corner.

THE QUESTIONS

1. How many rooms are entered by the intruder if the hotel is a rectangle measuring 15 by 42?

2. How many rooms are entered if the hotel is a three-dimensional rectangular box measuring 12 by 20 by 30?

A BEGINNING

For the 4-by-6 rectangle pictured in figure 6.1, the intruder enters eight unit squares. Notice that when the diagonal passes through the corner of a unit square only, it does not enter the square. The same is true for the three-dimensional hotel. If the diagonal passes through a corner or along an edge of a unit cube, it does not enter the cube.

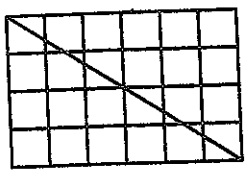


Fig. 6.1