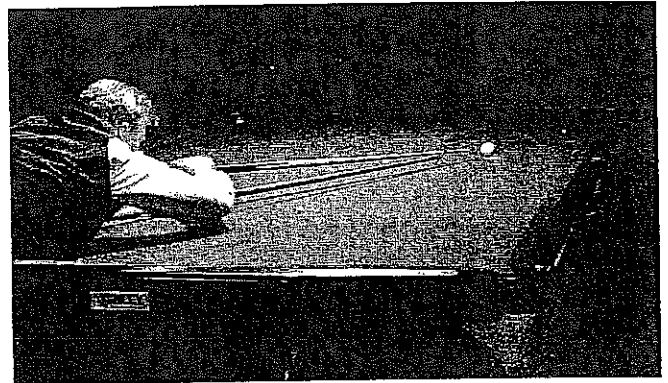
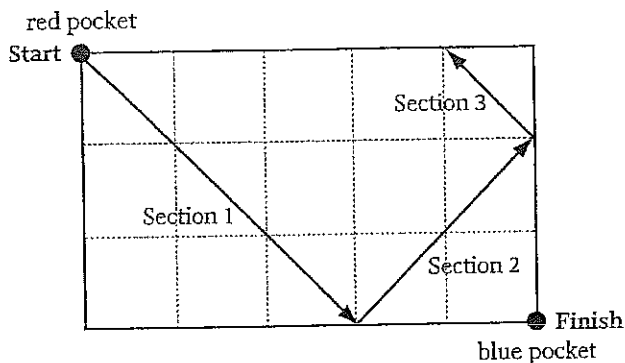


# YEAR 9 : PYTHAGORAS ASSESSMENT TASK

## THE PATH OF A BILLIARD BALL

A billiard table has only two pockets, one red and one blue.



- A player always hits the ball from the top left-hand corner as shown in the diagram.
- The ball is always hit at a  $45^\circ$  angle to the side of the table.
- The ball continues to rebound, as shown in the diagram, at the same angle ( $45^\circ$ ) until it lands in the blue pocket.

### Part 1

#### $3 \times 5$ table

Consider a billiard table that is 5 units long and 3 units wide.

- On 1 cm grid paper draw the billiard table shown above. Continue the path traced out by the ball until it lands in the blue pocket.
- Describe the pattern obtained.
- How many times did the ball rebound?
- Use Pythagoras' theorem to find the following, correct to 2 decimal places:
  - the distance the ball travels in section 1
  - the distance the ball travels in section 2
  - the distance the ball travels in section 3
- Find the total distance travelled by the ball. Use your answers from part **d**, above.
- What difference would it make to your answer in part **e** if you had calculated each section exactly, instead of rounding off?

### Part 2

#### Different-sized tables

- For each of the following table sizes (width  $\times$  length) draw a diagram of the path of the ball.

|     |              |      |              |
|-----|--------------|------|--------------|
| i   | $3 \times 4$ | ii   | $3 \times 5$ |
| iii | $3 \times 6$ | iv   | $3 \times 8$ |
| v   | $3 \times 9$ | vi   | $4 \times 5$ |
| vii | $4 \times 6$ | viii | $5 \times 7$ |
- For which sized tables does the ball land in the blue pocket?
  - For these tables calculate the total distance travelled by the ball.
- What can you conclude about the size of the tables and whether or not the ball lands in the blue pocket?
- Can the total distance travelled by the billiard ball be calculated from the dimensions of the table? If so, explain.