PROBABILITY TREES WITH REPLACEMENT

TASK 1   **Card selection**

Angelo is selecting cards randomly from a normal pack of 52 cards.

He picks a card, notes its suit (heart, diamond, club or spade) and then returns the card to the pack. He then takes a second card, repeating the process.

1 Complete the tree diagram showing all probabilities on the branches and all possible outcomes.

2 Find the probability that Angelo chooses:

   a two hearts

   b two red cards

   c one red and one black card, in any order

3 If Angelo selects 3 cards, what is the probability they are all spades?

4 If he picks 10 cards, what is the probability they are all spades?

5 What is the pattern emerging in your last two answers?

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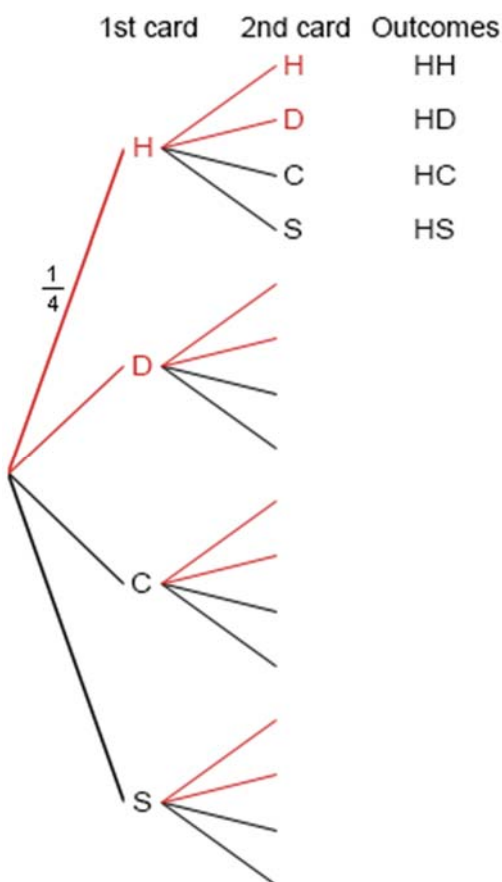
Coin flips

Gemma found a biased coin in her magic kit. It is weighted so that heads is three times more likely than tails.

1 When she flips the coin once, what is the probability of:

   a getting a head

   b getting a tail

2 Complete the tree diagram, showing all probabilities on the branches and all possible outcomes, when flipping the coin three times.
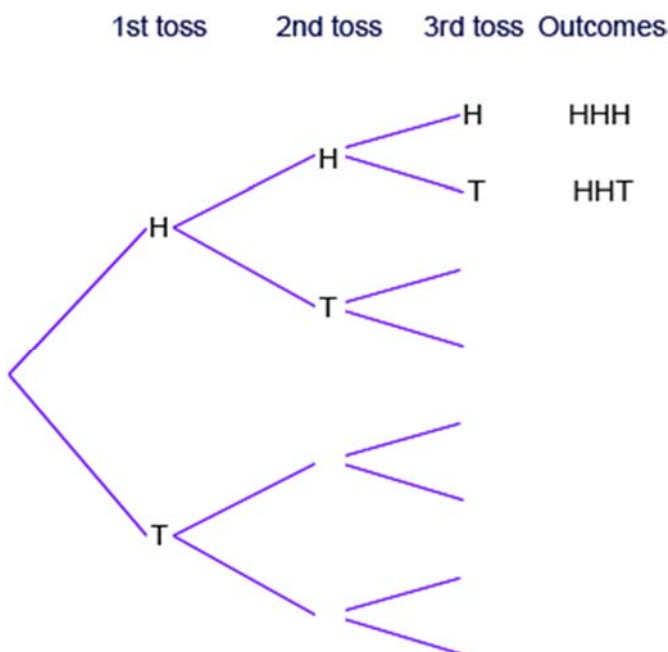
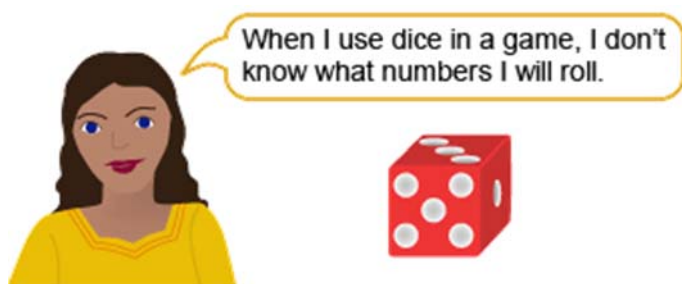**3** Use your tree diagram to calculate:

   a P(HHH)

   b P(TTT)

   c P(HHT)

   d P(2 heads and 1 tail in any order)

1st toss   2nd toss   3rd toss Outcomes

H — H — H   HHH
H — H — T   HHT
H — T
T

CHALLENGE   **Roll a six**

When I use dice in a game, I don't know what numbers I will roll.

Milu is rolling a 6-sided die.

She needs to roll a 6 to be able to begin playing a board game. She keeps rolling until she rolls a 6.

1   What is the probability she rolls a 6 on her first attempt?

2   What is the probability she doesn't roll a 6 until her second attempt?

3   What is the probability she doesn't roll a 6 until her third attempt?

4   Can you see a pattern in your last three answers?

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Use this pattern (and index notation) to write the probability she doesn't roll a 6 until her:

a   10th roll

b   25th roll