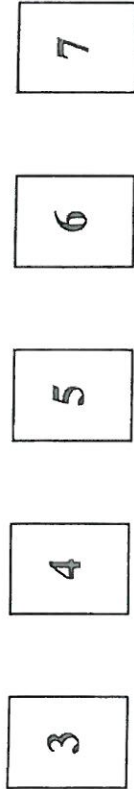


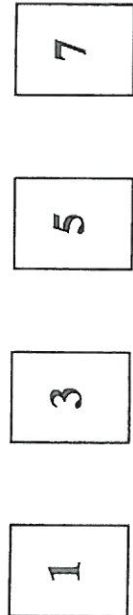
PROBABILITY GAMES of CHANCE

①

There are two packs of cards, one pack is coloured green and the other pack is coloured yellow.
The green pack has five cards numbered:



The yellow pack has four cards numbered:



In a game a player chooses one card from the green pack and one card from the yellow pack.
The player's score is the difference between the two numbers.

For example, if the number on the green card is 4 and the number on the yellow card is 7, the player works out $7 - 4 = 3$ and the player scores 3.

(a) Complete the following table to show all the possible scores.

	7	6	4	2	0
Green pack	6	5	3	1	1
	5	4	2	0	2
	4	3	1	1	3
	3	2	0	2	4
	1	3	5	7	
					Yellow pack

(b) (i) What is the probability that a player scores 2?

$$\frac{5}{20}$$

[2]

(ii) What is the probability that a player does not get a score of 2?

$$\frac{15}{20}$$

[1]

[1]

A player wins a prize by getting a score of 0 or 1.

(c) Vanessa plays the game once.

(i) What is the probability that she wins a prize?

$$\frac{7}{20}$$

[2]

(ii) 300 people each play the game once.

Approximately how many would you expect to win a prize?

$$\frac{15}{20} \times 300 = 105 \text{ winners.}$$

[2]

(iii) It costs 50p to play the game once. The prize for getting a score of 0 or 1 is £1. If the 300 people each play the game once, approximately how much profit do you expect the game to make?

$$\text{paid in } 300 \times 50p = \pounds 150$$

$$\text{paid out } 105 \times \pounds 1 = \pounds 105$$

$$\pounds 150 - \pounds 105 = \pounds 45 \text{ profit.}$$

EXTRA

(a) Write down 839.7 correct to 3 significant figures.

[2]

(b) Write down 0.03426 correct to 2 significant figures.

[1]

[1]

2

In a game, a player throws two fair dice, one coloured red the other blue. The score for the throw is the smaller of the two numbers showing. For example: if the red dice shows 5 and the blue dice shows 2, the score for the throw is 2; if the red dice shows 3 and the blue dice shows 3, the score for the throw is 3.

(a) Complete the following table to show all the possible scores.

Red dice	6	5	4	3	2	1			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			
	1	2	3	4	5	6			

(b) (i) What is the probability that a player scores 1? [2]

$\frac{11}{36}$

(ii) What is the probability that a player scores more than 1? [2]

$\frac{25}{36}$

A player wins a prize by getting a score of 2 or less. [1]

(c) William plays the game once. What is the probability that he wins a prize? [1]

$\frac{20}{36}$

(d) (i) 360 people each play the game once.

Approximately how many would you expect to win a prize?

$360 \div 36 = 10$ groups

No of winners = $10 \times 20 = 200$

[2]

(ii) It costs £1 to play the game once. The prize for winning is £1.50. If the 360 people each play the game once, approximately how much profit do you expect the game to make?

profit = $360 \times 1 = £360$

pay out = $200 \times 1.50 = £300$

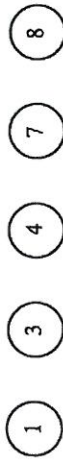
£60 profit.

[2]

3 A black bag contains four discs numbered as shown.



A green bag contains five discs numbered as shown.



In a game a player chooses a disc from the black bag and then a disc from the green bag. The numbers on the discs are multiplied together to obtain the score.

(a) Complete the following table to show all the possible scores.

		1	2	5	6
					Black bag
8	8	16	40	48	
7	7	14	35	42	
4	4	8	20	24	
3	3	6	15	18	
1	1	2	5	6	

(b) (i) What is the probability that a player scores less than 25?

$$\frac{16}{20}$$

(ii) What is the probability that a player scores 25 or more?

$$\frac{4}{20}$$

A player wins a prize by scoring 6 or less.

(c) Denise plays the game once. What is the probability that she wins a prize?

$$\frac{7}{20}$$

(d) (i) 300 people each play the game once. Approximately how many would you expect to win a prize?

$$300 \div 20 = 15 \text{ groups}$$

$$15 \times 7 = 105 \text{ winners}$$

(ii) It costs £2 to play the game once. The prize for winning is £5. If the 300 people each play the game once, approximately how much profit do you expect the game to make?

$$\begin{array}{r} \text{paid in } 300 \times 2 = 600 \\ \text{paid out } 105 \times 5 = 525 \\ \hline 105 \\ \times 5 \\ \hline 525 \\ \hline 675 \text{ profit} \end{array}$$

4 A red bag contains five balls numbered as shown.



A blue bag contains six balls numbered as shown.



In a game a player chooses a ball from the red bag and then a ball from the blue bag. The numbers on the two balls are added together to obtain a total score.

(a) Complete the following table to show all the possible total scores.

8	9	10	12	14	15
7	8	9	11	13	14
6	7	8	10	12	13
4	5	6	8	10	11
3	4	5	7	9	10
1	2	3	5	7	8
	1	2	4	6	7
					Red bag

(b) (i) What is the probability that a player gets a total score of 14? [2]

$\frac{2}{30}$

(ii) What is the probability that a player does not get a total score of 14? [1]

$\frac{28}{30}$

A player wins a prize by getting a total score of 5 or less.

(c) (i) Tim plays the game once. What is the probability that he wins a prize? [2]

$\frac{6}{30}$

(ii) 150 people each play the game once. Approximately how many would you expect to win a prize? [2]

$\frac{50}{150}$ gwpwm $5 \times 6 = 30$ winners

(iii) It costs 20p to play the game once. The prize for scoring 5 or less is 40p. If the 150 people each play the game once, approximately how much profit do you expect the game to make? [2]

profit $150 \times 20p = £30$
 paid out $30 \times 40p = £12$
 $£28$ profit

(a) A model of a new hotel is made to a scale of 1:250. [2]

(a) The length of the front wall of the model hotel is 30cm long. Calculate the real-life size of the length of this front wall in metres.

(b) The height of the real-life hotel will be 50m. What is the height, in cm, of the model of the hotel? [3]

A red bag contains five balls numbered 1, 3, 4, 5 and 9 respectively. A black bag contains four balls numbered 2, 3, 6 and 8 respectively.

In a game, a player takes one ball at random from each of the two bags. The score for the game is the sum of the numbers on the two balls.

(a) Complete the following table to show all the possible scores.

	9	11	12	13	17
Black bag	6	7	9	10	11
	3	4	6	7	8
	2	3	5	6	7
	1	3	4	5	9
					Red bag

(b) (i) What is the probability that a player scores 7?

$\frac{3}{20}$

(ii) What is the probability that a player does not score 7?

$\frac{17}{20}$

A player wins a prize by getting a score of 6 or less.

(c) Brian plays the game once. What is the probability that he wins a prize?

$\frac{5}{20}$

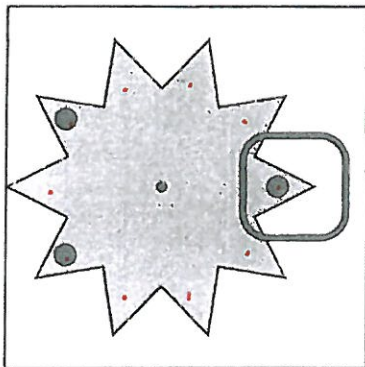
(d) (i) 600 people each play the game once. Approximately how many would you expect to win a prize?

$600 \div 20 = 30$ groups.
 $30 \times 5 = 150$ winners.

(ii) It costs 30p to play the game once. The prize for getting a score of 6 or less is £1. If the 600 people each play the game once, approximately how much profit do you expect the game to make?

paid in $600 \times 30p = 18000p = \pounds 180$
paid out $150 \times \pounds 1 = \pounds 150$
 $\pounds 30$ profit

The diagram shows a game at a fête. When a contestant spins the star it always stops with one of its points vertically downwards. If this point has a black circle on it, the contestant wins. Otherwise the contestant loses.



(a) What is the probability of a contestant winning on one spin of the star?

$$\frac{3}{10}$$

(b) At the fête 1000 contestants each have one spin of the star. How many contestants are expected to win?

$$1000 \div 10 = 100 \text{ groups}$$

$$100 \times 3 = 300 \text{ winners}$$

(c) Each spin costs 10p and each contestant that wins receives a prize of 30p. About how much profit is the game likely to make on 1000 contestants?

$$\text{Profit in } 1000 \times 10p = 10000p = \pounds 100$$

$$\text{paid out } 300 \times 30p = 9000p = \pounds 90$$

$$\pounds 10 \text{ profit.} \quad [3]$$

In one turn of a game at a fête, a contestant spins two spinners. Each spinner is numbered 1 to 5 and these numbers are equally likely to occur. A contestant's score is the sum of the two numbers shown on the spinners.

(i) Complete the following table to show the possible outcomes of a contestant's score on one turn.

	Second spinner				
First spinner	1	2	3	4	5
5	6	7	8	9	10
4	5	6	7	8	9
3	4	5	6	7	8
2	3	4	5	6	7
1	2	3	4	5	6

(ii) What is the probability of scoring 2 on one turn?

$$\frac{1}{25}$$

(iii) Contestants win a prize if they score 8 or more. Jennifer has one turn at the game. What is the probability that she wins a prize?

$$\frac{6}{25}$$

(iv) At the fête, 200 people each have one turn at the game. Approximately how many of them will win a prize?

$$200 \div 25 = 8 \text{ groups}$$

$$8 \times 6 = 48 \text{ winners}$$

[7]