H/W

You are picking a number out of a hat, which contains the numbers 1 through 100. What are the following events and their probabilities?

- The number has a single digit
- The number has two digits
- The number is a multiple of 4
- The number is not a multiple of 4
- The sum of the number's digits is 5

Permutations: التباديل

A permutation is an ordering of an *n*-tuple. For instance, the *n*-tuple (1, 2, 3) has the following permutations:

(1, 2, 3), (1, 3, 2), (2, 1, 3)

(2, 3, 1), (3, 1, 2), (3, 2, 1)

The number of unique orderings of an n-tuple is *n*-factorial:

$n! = n \times (n - 1) \times (n - 2) \times \cdots \times 2$

How many ways can you rearrange (1, 2, 3, 4)?

Solution

$n=4$

$n! = 4 \times 3 \times 2 = 24$

Sample Space Practice Questions

1. Arthur flips a coin and rolls an ordinary six sided dice.

(a) Complete the table to show all the possible outcomes.

	1	2	3	4	5	6
Tails	T1	T2	T3	T4	T5	T6
Heads	H1	H2	H3	H4	H5	H6

(2)

(b) Find the probability of a tail and a 6.

$\frac{1}{12}$

(1)

(c) Find the probability of a head and a number greater than 2.

H3, H4, H5, H6 — 3, 4, 5, 6

$\frac{4}{12} = \frac{1}{3}$

$\frac{1}{3}$

(1)

(d) Find the probability of a tail and a square number.

1, 4

T1 or T4

$\frac{2}{12} = \frac{1}{6}$

$\frac{1}{6}$

(1)

2. Jordan is playing a game with a fair four sectioned spinner and a fair coin. He flips the coin and spins the spinner.

One possible outcome is (Head, 1), which can be written as (H, 1)

(a) List all the possible outcomes below.

Coin \ Spinner	1	2	3	4
Heads	(H, 1)	(H, 2)	(H, 3)	(H, 4)
Tails	(T, 1)	(T, 2)	(T, 3)	(T, 4)

(2)

(b) Find the probability of a tail and a 3.

$\frac{1}{8}$

(1)

(c) Find the probability of a head and an odd number.

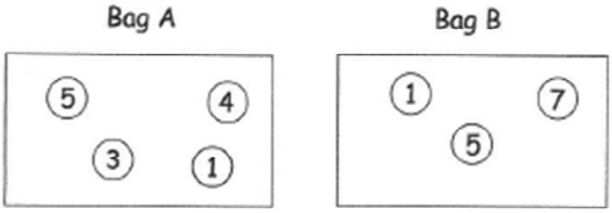
(H, 1) or (H, 3)

$\frac{2}{8} = \frac{1}{4}$

$\frac{1}{4}$

(1)

3. Rebecca has two bags containing counters.
Each counter is labelled with a number.



Rebecca picks a counter at random from bag 1 and then a counter at random from bag 2.

(a) Complete the table to show the possible outcomes of the counters picked.

Bag A \ Bag B	1	5	7
1	1, 1	1, 5	1, 7
3	3, 1	3, 5	3, 7
4	4, 1	4, 5	4, 7
5	5, 1	5, 5	5, 7

(2)

(b) What is the probability that Rebecca picks a 1 from Bag A and a 7 from Bag B?

$\frac{1}{12}$

(1)

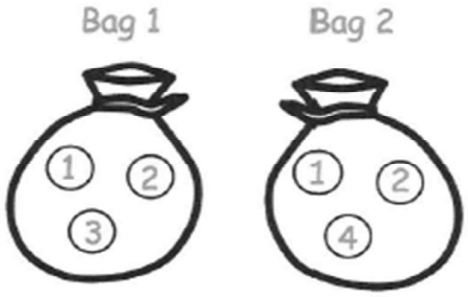
(c) What is the probability that Rebecca picks counters with the same number on them from each bag?

$\frac{2}{12} = \frac{1}{6}$

$\frac{1}{6}$

(1)

4. Two bags, 1 and 2, each contain three counters that are equal size.



In bag 1, the counters are labelled 1, 2 and 3.
In bag 2, the counters are labelled 1, 2 and 4.
A counter is drawn at random from bag 1 and a counter is drawn at random from bag 2.
The two numbers are added together to give a score.

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

Bag 2 \ Bag 1	+	1	2	3
	1	2	3	4
	2	3	4	5
	4	5	6	7

(1)

(b) Find the probability of scoring a 4

$\frac{2}{9}$

.....

(1)

(c) Find the probability of less than 5

$\frac{5}{9}$

.....

(2)

5. Two fair six sided dice are rolled.

The numbers on the two dice are **multiplied** together to give a score.

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

Dice 2 \ Dice 1	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

(2)

(b) Find the probability of a score of 12

$\frac{4}{36}$ $\frac{1}{9}$

.....

(1)

(c) Find the probability of a score of 10 or more

$\frac{19}{36}$

.....

(2)

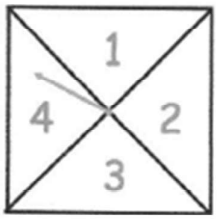
(d) Find the probability of an even number

even 27 odd 9 $\frac{27}{36}$ $\frac{3}{4}$

.....

(2)

6. Jordan is playing a game with a fair four sectioned spinner and a fair coin.



He spins the spinner and flips the coin.

If the coin lands on heads, his score is **one more** than the number on the spinner.
If the coin lands on tails, his score is the number on the spinner **doubled**.

(a) Complete the table to show all the possible shows that Jordan can get.

Coin \ Spinner	1	2	3	4
Heads	2	3	4	5
Tails	2	4	6	8

(2)

(b) Write down the probability that Jordan gets a score of

(i) 4

$\frac{2}{8}$ $\frac{1}{4}$

(1)

(ii) 5 or more

$\frac{3}{8}$

(2)

(iii) a prime number

2, 3, 5, 7 $\frac{4}{8}$ $\frac{1}{2}$

(2)