



- 1** An ice cream van sells 7 flavours of ice cream and 4 different toppings.

Nadia chooses one flavour and one topping.

Work out the number of different combinations Nadia can choose.

(2 marks)

For each of the 7 flavours there are 4 possible toppings

$$7 \times 4 = 28 \text{ different combinations}$$

28

- 2** Ola is choosing an outfit.

She has 3 shirts: red (R), blue (B) and green (G).

She has 2 pairs of shorts: black (K) and white (W).

List all the possible outfits Ola can choose. One outfit, RK, has been done for you.

(2 marks)

Pair each shirt with each pair of shorts in turn

Red: RK, RW. Blue: BK, BW. Green: GK, GW

There are 6 outfits in total

RK, RW, BK, BW, GK, GW

- 3** A bistro menu has 5 starters, 8 main courses and 4 desserts.

Callum chooses one starter, one main course and one dessert.

Work out the number of different three-course meals Callum can choose.

(2 marks)

Multiply the number of choices at each stage

$$5 \times 8 \times 4 = 160 \text{ different meals}$$

160

- 4 A cafe sells 3 hot drinks: tea (T), coffee (C) and hot chocolate (H).
It sells 2 cakes: flapjack (F) and brownie (B).
Noah chooses one hot drink and one cake.
List all the possible combinations Noah can choose.

(2 marks)

Pair each drink with each cake in turn

Tea: TF, TB. Coffee: CF, CB. Hot chocolate: HF, HB

There are 6 combinations in total

TF, TB, CF, CB, HF, HB

- 5 Imani has 5 tops, 4 pairs of trousers and 3 pairs of shoes.
She chooses one top, one pair of trousers and one pair of shoes.
Work out the number of different outfits she can choose.

(2 marks)

Tops 5, trousers 4, shoes 3

$$= 5 \times 4 \times 3$$

60 outfits

- 6 There are 9 boys and 12 girls in a drama club.
One boy and one girl are to be chosen to present the end of term show.
Work out the number of different ways the pair can be chosen.

(2 marks)

Each of the 9 boys can be paired with any of the 12 girls

$$9 \times 12 = 108 \text{ different pairs}$$

108

- 7 Bag A contains three cards numbered 1, 2 and 3.
Bag B contains two cards numbered 5 and 7.
Erin takes one card from bag A and one card from bag B.
Write down all the possible pairs of cards Erin can take.

(2 marks)

Pair each card from bag A with each card from bag B

1 with 5, 1 with 7, 2 with 5, 2 with 7, 3 with 5, 3 with 7

There are 6 possible pairs

- 8 A pizzeria offers x different pizzas and 6 different side orders.
There are 54 different ways to choose one pizza and one side order.
Work out the value of x .

(2 marks)

The number of combinations is $x \times 6$

$$x \times 6 = 54, \text{ so } x = 54 \div 6 = 9$$

9

- 9 Ali throws a fair coin 3 times.
Each throw lands on heads (H) or tails (T).
List all the possible outcomes of the 3 throws. One outcome, HHH, has been done for you.

(2 marks)

Work systematically, starting with outcomes beginning H
HHH, HHT, HTH, HTT, then THH, THT, TTH, TTT

There are 8 outcomes in total

HHH, HHT, HTH, HTT, THH, THT, TTH, TTT

- 10 A 3-digit code is made using the digits 1, 2, 3, 4 and 5.
A digit cannot be used more than once in a code.
Work out the number of different codes.

(2 marks)

1st digit: 5 choices

2nd digit: 4 choices (one used)

3rd digit: 3 choices

$$= 5 \times 4 \times 3$$

60 codes

- 11 A locker code is made up of one letter followed by two digits.
The letter is chosen from the 26 letters A to Z.
Each digit is chosen from 0 to 9, and digits may repeat.
Work out the number of different codes that are possible.

(2 marks)

There are 26 choices for the letter, 10 for the first digit and
10 for the second digit

$$26 \times 10 \times 10 = 2600 \text{ different codes}$$

2600

- 12 A locker code is a letter followed by a prime number.

The letter is chosen from P, Q and R.

The prime number is chosen from 3 and 7.

List all the possible locker codes.

(2 marks)

Pair each letter with each prime in turn

P: P3, P7. Q: Q3, Q7. R: R3, R7

There are 6 possible codes

P3, P7, Q3, Q7, R3, R7

- 13 A cafe sells 6 different sandwiches and 3 different desserts, and also sells n different drinks.

A meal deal is one sandwich, one drink and one dessert.

There are 108 different meal deals.

Work out the value of n .

(3 marks)

$$6 \times n \times 3 = 108$$

$$18n = 108$$

$$n = 108 \div 18$$

$n = 6$

- 14 There are 14 netball teams in a league.

Each team plays every other team twice, once at home and once away.

Work out the total number of games played in the league.

(2 marks)

Each of the 14 teams plays a home game against each of the other 13 teams

$14 \times 13 = 182$ games. This already counts each pairing twice, once for each team at home

182

15 Here are three digit cards.

2 5 8

Ravi uses two different cards each time to make two-digit numbers.

List all the two-digit numbers Ravi can make.

(2 marks)

Work systematically by tens digit

Tens digit 2: 25, 28. Tens digit 5: 52, 58. Tens digit 8: 82, 85

There are 6 numbers in total

25, 28, 52, 58, 82, 85

16 8 runners take part in a race.

Gold, silver and bronze medals are awarded to the first, second and third runners.

Work out the number of different ways the three medals can be awarded.

(3 marks)

Gold: 8 runners

Silver: 7 runners left

Bronze: 6 runners left

$$= 8 \times 7 \times 6$$

336 ways

17 There are 12 teams in a hockey league.

Every team plays every other team twice, once at home and once away.

Work out the total number of matches in the league.

(3 marks)

Each team hosts 11 matches

$$= 12 \times 11$$

132 matches

18 There are 20 students in a chess club.

Two of the students are to be chosen to enter a doubles tournament as a pair.

Work out the number of different pairs that can be chosen.

(2 marks)

There are 20 choices for the first student and 19 for the second, giving $20 \times 19 = 380$ ordered selections

Each pair has been counted twice (once in each order), so divide by 2

$$380 \div 2 = 190 \text{ different pairs}$$

190

19 A password has 1 letter from A to F, then 2 digits from 0 to 9, then 1 symbol from &, £ or %.

a. Work out the number of different passwords if digits may be repeated.

b. Work out the number of different passwords if the two digits must be different.

(4 marks)

a)

Letter 6, digit 10, digit 10, symbol 3

$$= 6 \times 10 \times 10 \times 3$$

1800

b) second digit: 9 choices

$$= 6 \times 10 \times 9 \times 3$$

1620

20 A sandwich shop offers a meal deal.

Customers choose one of 8 sandwiches, one of 5 packets of crisps and one of 3 drinks.

Kai says, "There are more than 100 different meal deals."

Show that Kai is correct.

(3 marks)

Multiply the number of choices at each stage: $8 \times 5 \times 3$

$$8 \times 5 = 40 \text{ and } 40 \times 3 = 120$$

$120 > 100$, so Kai is correct

21 Spinner A has three equal sections numbered 1, 2 and 3.

Spinner B has two equal sections numbered 4 and 5.

Both spinners are spun and the two numbers are multiplied together.

List all the possible products.

(2 marks)

Multiply each number on spinner A by each number on spinner B

$$1 \times 4 = 4, 1 \times 5 = 5, 2 \times 4 = 8, 2 \times 5 = 10, 3 \times 4 = 12, 3 \times 5 = 15$$

The possible products are 4, 5, 8, 10, 12 and 15

4, 5, 8, 10, 12, 15

22

A 3-digit number is made using the digits 0 to 9.

The first digit cannot be 0, and no digit can be used more than once.

Work out the number of different 3-digit numbers that can be made.

(3 marks)

1st digit: 9 choices (not 0)

2nd digit: 9 choices (10 - 1 used)

3rd digit: 8 choices

$$= 9 \times 9 \times 8$$

648

23

The passcode for a tablet is a 4 digit number.

The first digit cannot be 0.

Digits may repeat.

a. Work out the number of different passcodes that are possible.

b. Ruby does not know the passcode. She types one 4 digit number at random, with a non-zero first digit. Write down the probability that Ruby types the correct passcode.

(3 marks)

(a) There are 9 choices for the first digit (1 to 9) and 10 choices for each of the other three digits

$$9 \times 10 \times 10 \times 10 = 9000 \text{ passcodes}$$

(b) Exactly one of the 9000 equally likely guesses is correct, so the probability is $\frac{1}{9000}$

24

The code for a padlock is made up of 3 digits.

Each digit is chosen from 1 to 9.

All three digits must be different.

The code must be an odd number.

Work out the number of different codes that are possible.

(4 marks)

The code is odd, so the last digit must be odd: 5 choices (1, 3, 5, 7 or 9)

The first digit can be any of the 8 remaining digits

The second digit can be any of the 7 digits still left

$$5 \times 8 \times 7 = 280 \text{ different codes}$$

280