

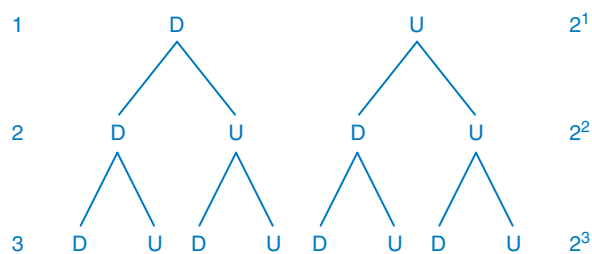
Checkpoint: Assess Your Understanding, pages 718–720

8.1

1. A garage door remote has 10 code switches. Each switch can be positioned up or down to create a wireless code. How many codes are possible?

Use a tree diagram.

Switch



This pattern continues.

For 10 switches, there are 2^{10} or 1024 possible codes.

2. Multiple Choice A restaurant offers a meal combo that consists of a beverage, a main course, and a dessert. There are 5 beverages, 6 main courses, and 4 desserts. How many meal combos are available?

- A. 15 B. 30 C. 20 **D. 120**

3. Morse code uses arrangements of 5 characters to represent the digits 0 through 9. Each character is either a dot or a dash. How many arrangements of 5 characters are possible?

0	— — — — —
1	• — — — —
2	• • — — —
3	• • • — —
4	• • • • —
5	• • • • •
6	— • • • •
7	— — • • •
8	— — — • •
9	— — — — •

There are 5 characters.
There are 2 choices for each character: dot or dash
So, the number of arrangements of 5 characters is: $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$

8.2

4. Multiple Choice How many 5-letter permutations of YUKON can be created?

- A. 6 B. 24 **C. 120** D. 3125

5. A family of six is to be seated in a row for a photo. The mother and father must be at either end. How many ways can the family be arranged?

There are 4 children. The number of ways to arrange 4 children is: $4! = 24$
There are 2 ways to arrange the mother and father: MF and FM
So, the number of ways the family can be arranged is: $2 \cdot 24 = 48$

6. An under-10 house-league soccer team has 11 players. Seven players are on the field at a time. How many ways can 7 starters be chosen from the members of the team?

Use the formula: ${}_nP_r = \frac{n!}{(n-r)!}$ Substitute: $n = 11, r = 7$

$$\begin{aligned} {}_{11}P_7 &= \frac{11!}{(11-7)!} \\ &= \frac{11!}{4!} \\ &= 1\,663\,200 \end{aligned}$$

There are 1 663 200 ways starters can be chosen.

7. Solve each equation for n or r .

a) ${}_n P_2 = 42$

$${}_n P_2 = \frac{n!}{(n-2)!}$$

$$42 = \frac{n!}{(n-2)!}$$

$$42 = n(n-1)$$

$$0 = n^2 - n - 42$$

$$0 = (n-7)(n+6)$$

$$n = 7 \text{ or } n = -6$$

Since n cannot be negative,

$$n = 7$$

b) ${}_7 P_r = 840$

$${}_7 P_r = \frac{7!}{(7-r)!}$$

$$840 = \frac{5040}{(7-r)!}$$

$$(7-r)! = \frac{5040}{840}$$

$$(7-r)! = 6$$

Since $3! = 6$, then

$$7-r = 3$$

$$r = 4$$

8.3

8. **Multiple Choice** How many ways can 2 pennies, 3 nickels, and 5 quarters be arranged in a row?

A. 30

B. 2520

C. 5040

D. 3 628 800

9. What is the number of permutations of all the letters in the name of each provincial park?

a) VERMILION

There are 9 letters.

2 are Is.

Number of permutations:

$$\frac{9!}{2!} = 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3$$

$$= 181\,440$$

b) OPAPISKAW

There are 9 letters.

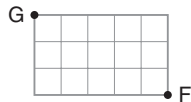
2 are Ps and 2 are As.

Number of permutations:

$$\frac{9!}{2!2!} = \frac{9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 2 \cdot 4 \cdot 3}{2}$$

$$= 90\,720$$

10. How many ways are there to get from F to G travelling along grid lines and moving only to the left or up?



Total number of grid squares travelled: 8

Squares travelled left: 5; squares travelled up: 3

So, the number of ways to get from F to G is:

$$\frac{8!}{5!3!} = \frac{8 \cdot 7 \cdot 8}{6}$$

$$= 56$$