



Counting choices and outcomes

About 50 minutes No calculator 45 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks]

Two fair dice are rolled. Given that the total is greater than 9, find the probability that the two scores are the same.

A2 Last lesson [2 marks]

A rectangle measures 12 cm by 4 cm, each correct to the nearest cm. Work out the lower bound of its area.

Answer

Answer

- A3** From chapter 11 [2 marks]

A kite string is 40 m long and makes an angle of 30° with the horizontal. The string is held 1.4 m above the ground. How high is the kite above the ground?

A4 From chapter 16 [2 marks]

Work out $4\frac{1}{2} \times 5^{-3}$. Give your answer as a fraction in its simplest form.

Answer

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

A café has 5 sandwiches, 4 drinks and 3 snacks. A lunch is one of each. How many different lunches are there?

Hint Multiply the number of choices at each stage.

- B1** A bike is built from one of 8 frames, one of 5 colours and one of 2 seats. How many different bikes are there? [2 marks]

Answer

EXAMPLE 2

In how many different ways can 3 of 7 different books be put in a row on a shelf?

Hint 7 choices for the first place, then one fewer each time.

B2 In how many different ways can 4 of 9 different photos be hung in a row? [2 marks]

Answer

c Practice

C1 A lock has 3 dials. Each dial shows one of the letters A to F. How many different codes are there? [2 marks]

Answer

C2 In how many different orders can 5 different pens be put in a row? [1 mark]

Answer

C3 A pair of students is chosen from 10 students. The order does not matter. How many different pairs are there? [2 marks]

Answer

C4 Three-digit numbers are made from the digits 1 to 7. Digits may repeat. How many of the numbers are even? [2 marks]

Answer

C5 How many different arrangements are there of the letters in the word TOFFEE? [2 marks]

Answer

C6 A password is 1, 2 or 3 letters long. Each letter is one of A, B, C, D or E, and letters may repeat. How many different passwords are there? [2 marks]

Answer

C7 A club gives each of its 600 members a code of 2 different symbols in order, such as #%. What is the smallest number of symbols the club needs? [2 marks]

Answer

C8 Three-digit numbers are made from the digits 2 to 8. No digit is used twice. How many of the numbers are greater than 600? [2 marks]

Answer

D Exam-style questions

- D1** Ella says, "A team of 3 can be chosen from 6 people in $6 \times 5 \times 4 = 120$ ways." [2 marks]
Explain why Ella is wrong, and work out the correct number of teams.

- D2** Mia makes an ice cream. She chooses one of 3 cones, two different scoops from 8 flavours, and one of 5 toppings. The order of the two scoops does not matter.

- (a) How many different pairs of scoops can she choose? [2 marks]

Answer

- (b) How many different ice creams can she make? [2 marks]

Answer

- (c) One of her scoops must be chocolate. How many different ice creams can she make now? [2 marks]

Answer

Total for D2: 6 marks

- D3** A committee of 4 people is chosen from 6 teachers and 3 parents. The order of the people does not matter.

- (a) How many different committees are possible? [2 marks]

Answer

- (b) How many of the committees have at least one parent? [3 marks]

Answer

- (c) A committee is chosen at random. Work out the probability that it has no parents. Give your answer as a fraction in its simplest form. [2 marks]

Answer

Total for D3: 7 marks

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 How many four-digit whole numbers are greater than 5000 and have four different digits? [3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1 **Hint 1** Start with the first digit. Which digits can it be?
- Hint 2** The first digit is 5, 6, 7, 8 or 9, so there are 5 choices.
 The number 5000 itself has repeated digits.
- Hint 3** The other three places use the 9 digits left, then 8, then
 7: $5 \times 9 \times 8 \times 7 = 2520$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

- I can use the product rule to count choices. ☐ ☐ ☒
- I can count arrangements, with and without repeats. ☐ ☐ ☒
- I can count choices when the order does not matter. ☐ ☐ ☒