

Surname	
Other Names	
Candidate's Signature	

GCSE 9 - 1 Questions

The Product Rule for Counting 2

Calculator Allowed

INSTRUCTIONS TO CANDIDATES

Write your name in the space provided.

Write your answers in the spaces provided in this question paper.

Answer ALL questions.

Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

You should have a ruler, compass and protractor where required.

Total Marks :

SOLUTIONS

1) How many multiples of 7 are there from 17 to 107?

21, 28, 35, 42, 49,
56, 63, 70, 77, 84,
91, 98, 105.

Answer 13 [2]

2) A 5p coin is flipped 6 times. How many possible outcomes are there?

EACH TIME THE COIN IS FLIPPED
IT HAS 2 OPTIONS, HEADS OR TAILS.
6 TIMES MEANS TO THE POWER OF 6
AS WE NEED TO KNOW HOW MANY
OUTCOMES.

$$2^6 = 64$$

Answer 64 [2]

3) The Mathsnote website is creating a new logo. It must have the 4 colours of Blue, Green, Black and White, and 4 horizontal bars. How many ways can the new logo be designed.

BLUE GREEN BLACK WHITE SHORTENED TO:

→ BL G BK W
 BL G W BK
 BL BK G W
 BL BK W G
 BL W BK G
 BL W G BK

SO EACH COLOUR IN
 COLUMN 1 HAS 6
 OPTION. 4 COLOURS
 AND 6 OPTION FOR
 EACH GIVES US

$$4 \times 6 = 24$$

Answer 24 [2]

4) If you have 5 baseball caps and 7 t-shirts, and any cap can be worn with any t-shirt, in how many ways can you wear your caps and t-shirts?

$$5 \times 7 = 35$$

Answer 35 [2]

5) A tourist wants to fly from Riyadh to Oslo. She can fly from Riyadh to London, Frankfurt, Istanbul or Moscow. From each of these cities there are three airlines that fly to Oslo. In how many ways can she perform the journey?

4 CITIES AND 3 AIRLINES

$$4 \times 3$$

Answer 12 [2]

6) Nicole goes to buy herself a 3 course meal. She sees that there are 5 starters and 5 desserts. She calculates that there are 175 possible ways to choose a start, main and dessert. How many main meal options are there?

5 STARTER AND 5 DESSERTS

$$\Rightarrow 5 \times 5 = 25$$

$$175 \div 25 = 7$$

Answer 7 [2]

7) Yousef goes into his favourite supermarket and sees they have 6 different companies all selling different flavoured crisps. The flavours each company sell are salt and vinegar, cheese, ketchup, chilli, ready salted and roast chicken. He does not like ketchup flavour and will never select it. How many possible choices, that he likes, does he have?

6 FLAVOURS BUT YOUSEF ONLY LIKES 5
FLAVOURS

6 COMPANIES X 5 FLAVOURS LIKED

Answer 30 [2]

8) Lethabo uses a 4 digit security code for his phone. He wants his age to be the last two digits. Using the digits 0 to 9, and allowing that the digits can be repeated, how many options does Lethabo have for his security code?

— — x x
0 0
0 1
0 2
:
9 8
9 9

is 100 WAYS

Answer 100 [2]

9) Jade needs to create a 5 digit security code to enter her apartment. She wants the first 2 digits to be 84, and the last digit to be odd. Using the digits 0 to 9, and allowing that the digits can be repeated, how many options can she choose?

84 _ _ _

So we can have 000 → 999

which is 1000 options.

We need odd, which is half of them.

$$\therefore 1000 \div 2 = 500$$

Answer 500 [2]

10) Simon has a mixture of boys and girls in his class. He has 12 boys including himself. Simon says to the teacher that there are 172 ways of choosing a boy and a girl combination from the class. Explain how his teacher knows he is wrong?

172 is not divisible by 12.

We get $14 \cdot 3$ we cannot

have 0.3 of a person

\therefore Simon is wrong.

[2]

11) Four friends, Karen, Lina, Martin and Oscar are going to the cinema. They want to sit together in a row. How many possible ways can they arrange themselves in a row?

KLMO

L FIRST 6 WAYS

KLOM

M FIRST 6 WAYS

KMLO

O FIRST 6 WAYS

KMOL

KOLM

KOML

$\therefore 6 \times 4$

6 WAY

Answer 24 [2]

12) How many three digit numbers greater than 651 can be formed using only the even digits 2,4,6,8,0 without repeating the digits?

FIRST NUMBER HAS TO BE 680, THEN

682, 684, 802, 804, 806, 820

824, 826, 840, 842, 846, 860

862, 864

Answer 15 [2]

13) Sophie's Cafe offers a post Covid afternoon tea. Its menu offers a choice of 7 sandwiches, 11 cakes and 4 hot drinks.

a) How many choices of afternoon teas (sandwich, cake, drink) are available?

$$7 \times 4 \times 11$$

Answer 308 [2]

b) How many choices of sandwich and cake are offered?

$$7 \times 11$$

Answer 77 [2]

c) How many choices of cake and drink are offered?

$$11 \times 4$$

Answer 44 [2]

d) How many choices of 2- or 3-option teas are available (assuming that a cake is always ordered)?

$$308 + 77 + 44 =$$

Answer 429 [2]

14) Ruby is a swimmer who like to compete in races. In the Olympic swimming pool where she competes, there are 9 other competitors. She is only concerned with coming first, second or third. How many ways are there for Ruby to come first, second or third in her race?

$$\text{RUBY WINS } \therefore 9 \text{ SWIMMERS 2ND, } 8 \text{ SWIMMERS 3RD}$$

$$9 \times 8 = 72$$

$$\text{RUBY 2ND } \therefore 9 \text{ SWIMMERS FIRST, } 8 \text{ SWIMMERS 3RD}$$

$$9 \times 8 = 72$$

$$\text{RUBY 3RD } \therefore 9 \text{ SWIMMERS FIRST, } 8 \text{ SWIMMERS 2ND}$$

$$9 \times 8 = 72$$

$$72 + 72 + 72 =$$

Answer 216 [2]

15) British vehicle registration plates usually have 2 letters, 2 digits between 01 and 99, and finally 3 letters. How many registration plates are possible?

LETTER	LETTER	DIGITS	LETTER	LETTER	LETTER
26	26	99	26	26	26

$$\therefore 26 \times 26 \times 99 \times 26 \times 26 \times 26$$

$$= 1176256224$$

Answer 1176256224 [2]

16) Sandy has 8 hats, 7 blouses, 4 coats, 9 skirts and 10 pairs of shoes.

a) How many different outfits are possible if she wears one of each of the above items? (She cannot wear odd shoes)?

$$8 \times 7 \times 4 \times 10$$

Answer 2240 [2]

b) If Sandy has the option of wearing one of three scarves and each of the above items, how many different outfits are possible? Explain your answer

$$2240 \times 3$$

Answer 6720 [2]

17) In the first 6 games of the season Mathsnote FC won 2 games drew 2 games and lost 2 games. How many different ways could these results have occurred?

INITIALLY

WW DOLL
 WW DL DL
 WW OLLD
 WW LDDL
 WW LOLD
 WW LLDD

FOR EACH ROW ABOVE THE SECOND WIN
CAN BE IN FOUR OTHER PLACES

WDW DLL
 WDD WLL
 WDD LWL
 WDD LLW

6 ROWS

4 PLACES ON EACH

$$6 \times 4 = 24$$

$$+ \text{ORIGINAL } 6 = 30$$

COLUMN 1 CAN BE WIN DRAW LOSE

3 OPTIONS

$$30 \times 3 = 90$$

Answer 90 [2]