GCSE (1 – 9)

The Product Rule for Counting

Instructions

• Use black ink or ball-point pen.
• Answer all questions.
• Answer the questions in the spaces provided
  – there may be more space than you need.
• Diagrams are NOT accurately drawn, unless otherwise indicated.
• You must show all your working out.

Information

• The marks for each question are shown in brackets
  – use this as a guide as to how much time to spend on each question.

Advice

• Read each question carefully before you start to answer it.
• Keep an eye on the time.
• Try to answer every question.
• Check your answers if you have time at the end
1  There are 12 boys and 15 girls in a class.
   One boy and one girl will be selected to represent the class on the student council.
   Work out the total number of ways of choosing a boy and a girl.

   \[ 12 \times 15 \]

   \[ 180 \]
   (Total for question 1 is 2 marks)

2  There are 17 boys and 14 girls in a choir.
   One boy and one girl will be selected to sing a duet.
   Work out the total number of ways of choosing a boy and a girl.

   \[ 17 \times 14 \]

   \[ 238 \]
   (Total for question 2 is 2 marks)

3  There are 14 boys and \( x \) girls in a choir.
   One boy and one girl will be selected to sing a duet.
   Taylor says there are 152 different ways of choosing a boy and a girl.

   Could Taylor be correct?
   You must show your working.

   \[ 14 \times x = 152 \]
   \[ x = \frac{152}{14} \approx 10.857 \ldots \]

   Taylor cannot be correct. 152 is not divisible by 14.
   (You cannot have 0.857 or a girl)

   (Total for question 3 is 2 marks)
4. There are 5 starters and 6 main courses in a restaurant.

Work out the total number of ways of choosing a starter and a main course.

\[ 5 \times 6 \]

30

(Total for question 4 is 2 marks)

5. There are 4 starters, 7 main courses and 4 desserts in a restaurant.

Work out the total number of ways of choosing a starter, a main course and a dessert.

\[ 4 \times 7 \times 4 \]

112

(Total for question 5 is 2 marks)

6. There are 5 starters, 6 main course and \( x \) desserts in a restaurant.

Riley says there are 130 different ways of a starter, a main course and a dessert.

Could Riley be correct?
You must show your working.

\[ 30x = 130 \]
\[ x = \frac{130}{30} = 4.33 \]

Riley cannot be correct. \( x \) would have to be a whole number.

(Total for question 6 is 2 marks)
7 A meal deal includes a sandwich and a drink. There are 5 sandwiches and 7 drinks to choose from.

Work out the total number of ways of choosing a sandwich and a drink.

$$5 \times 7$$

35

(Total for question 7 is 2 marks)

8 Mr Idris has 5 pairs of trousers, 9 shirts and 3 ties.

Work out the total number of ways of choosing a pair of trousers, a shirt and a tie.

$$5 \times 9 \times 3$$

135

(Total for question 8 is 2 marks)

9 There are 8 sandwiches and $x$ drinks to choose from for lunch.

Pat says there are 96 different ways to choose a sandwich and a drink.

Could Pat be correct?
You must show your working.

$$8x = 96$$

$$x = 12$$

Pat could be correct. $x$ could be 12.

(Total for question 9 is 2 marks)
10. There are 52 cards in a deck. Peter is going to give one card to Casper and one card to Kelly. How many different ways are there of going this?

\[52 \times 51\]

\[
\underline{2652}
\]

(Total for question 10 is 2 marks)

11. There are 52 cards in a deck. Angel is going to give one card to Ben and one card to Chris and one card to Dylan. How many different ways are there of going this?

\[52 \times 51 \times 50\]

\[
\underline{132600}
\]

(Total for question 11 is 2 marks)
12  There are 52 cards in a deck.
   Tom is going to give two cards to Jay.

   How many different pairs of cards could Jay get?

   $\frac{52 \times 51}{2} = 1326$

   (Total for question 12 is 2 marks)

13  There are 30 students in a class.
   Two students are going to be selected to receive a prize.

   How many different pairs of two students could be selected?

   $\frac{30 \times 29}{2} = 435$

   (Total for question 13 is 2 marks)
14  There are 10 teams in a football league.
    Two teams are going to be chosen at random to play a match.

    Work out the number of different matches that could take place.

    \[
    \begin{array}{c}
    10 \times 9 \\
    \hline
    2
    \end{array}
    \]

    45  
    (Total for question 14 is 2 marks)

15  There are 8 teams in a competition.
    Each team will play every other team once.

    Work out the total number of games played.

    \[
    \begin{array}{c}
    8 \times 7 \\
    \hline
    2
    \end{array}
    \]

    28  
    (Total for question 15 is 2 marks)
There are 10 people in a room.
Each person shakes each other person's hand once.

Work out the number handshakes that take place.

\[
\begin{align*}
10 \times 9 & \\
\hline & \\
2 & 
\end{align*}
\]

(Total for question 16 is 2 marks)

There are 20 people in a room.
Each person shakes each other person's hand once.

Work out the number handshakes that take place.

\[
\begin{align*}
20 \times 19 & \\
\hline & \\
2 & 
\end{align*}
\]

(Total for question 17 is 2 marks)