4.1 Permutations and Combinations: Bridge and Extension: 10-minute Pack

Total Marks

Calculator allowed · about 10 minutes

Name: _____ Date: ____ / ____ / _____

This is extension material beyond standalone Edexcel 9MA0 requirements. The narrower links are binomial coefficients, binomial expansion and binomial distributions. Answer all 20 questions and show your counting method. Give exact answers; equivalent exact forms are accepted. nPr counts ordered selections and nCr counts unordered selections, without replacement. Use each question's stated assumptions.

1 The same five distinct books A, B, C, D and E are placed in a straight row, each used once. How many orders have A and B separated by at least one book?

(Total for Question 1 is 3 marks)

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2 Four identical red counters and three identical blue counters fill a straight row of seven positions. How many different colour patterns have no two blue counters adjacent? All counters are used.

(Total for Question 2 is 3 marks)

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3 A panel of 4 is selected without replacement from 4 distinct artists and 5 distinct scientists, with disjoint categories. Order does not matter. How many panels contain at least one person from each category?

(Total for Question 3 is 3 marks)

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Mark scheme · 4.1 Permutations and Combinations: Bridge and Extension: 10-minute Pack

Question 1

Count all 5! orders.	**M1**
Subtract 2 x 4! adjacent orders, or insert A and B into separate gaps around C, D, E.	**M1**
72 orders; accept 5! - 2 x 4!.	**A1**

Answer: 72

Question 2

Identify 5 gaps around the red counters.	**M1**
Choose 3 distinct gaps, one blue in each.	**M1**
10 patterns; accept 5C3.	**A1**

Answer: 10

Question 3

Count all panels as 9C4.	**M1**
Remove all-artist and all-scientist panels, 4C4 + 5C4.	**M1**
120 panels; accept an equivalent sum of mixed-category cases.	**A1**

Answer: 120

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