4.1 Permutations and Combinations: Bridge and Extension: Test Pack

Total Marks

Calculator allowed · about 20 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 A visitor chooses exactly one guided walk: one of 4 distinct morning walks or one of 3 distinct afternoon walks. How many choices are possible?

(Total for Question 1 is 2 marks)

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2 How many distinct seven-letter strings use all the letters of BALLOON once each? The two Ls are identical and the two Os are identical; B, A and N are distinct.

(Total for Question 2 is 3 marks)

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3 A panel of 3 is selected without replacement from 4 distinct artists and 5 distinct scientists. Each person belongs to exactly one category. Order does not matter. How many panels contain exactly 2 artists?

(Total for Question 3 is 3 marks)

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4 A fair coin is tossed independently six times. The ordered H/T sequences are equally likely. Use counting to find the probability of exactly two heads.

(Total for Question 4 is 3 marks)

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5 Seven distinct runners compete with no ties. How many ordered podiums (first, second, third) are possible, with no runner occupying more than one place? Express the count using nPr and evaluate it.

(Total for Question 5 is 3 marks)

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Mark scheme · 4.1 Permutations and Combinations: Bridge and Extension: Test Pack

Question 1

Add the two disjoint counts, 4 + 3.	**M1**
7 choices.	**A1**

Answer: 7

Question 2

Use 7! before correcting repeats.	**M1**
Divide by 2!2!.	**M1**
1260 strings; accept 7!/(2!2!).	**A1**

Answer: 1260

Question 3

Choose the two artists using 4C2.	**M1**
Choose one scientist and multiply by 5.	**M1**
30 panels; accept 4C2 x 5C1.	**A1**

Answer: 30

Question 4

Count 64 equally likely ordered sequences.	**M1**
Choose the two head positions using 6C2.	**M1**
15/64; accept 6C2 / 2^6.	**A1**

Answer: 15/64

Question 5

State 7P3.	**B1**
Evaluate 7!/4! or 7 x 6 x 5.	**M1**
210 podiums.	**A1**

Answer: 7P3 = 210

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