2.3 Systematic Listing: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A vending machine sells 2 types of drink (cola, lemonade) and 3 types of snack (crisps, chocolate bar, biscuits). A customer buys one drink and one snack.
List all the different drink-and-snack combinations that the customer could buy.

(Total for Question 1 is 2 marks)

2 Jamila lists the outcomes of rolling two fair coins as: HH, HT, HH, TT.
Give one reason why Jamila's list is not a correct systematic list of all the outcomes.

(Total for Question 2 is 1 mark)

3 A market stall sells jam in 5 flavours (strawberry, raspberry, blackcurrant, apricot, plum) and jars in 2 sizes (small, large). A customer buys one jar of jam.
List all the different flavour-and-size combinations that the customer could buy.

(Total for Question 3 is 2 marks)

4 Work out how many different outcomes there are when a 6-sector spinner numbered 1 to 6 is spun once and a coin is flipped once.

(Total for Question 4 is 1 mark)

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5 A boutique sells jackets in two colours (Blue, Red) and hats in three styles (Cap, Beanie, Bobble). Two of the six possible jacket-and-hat combinations are already known: Blue Cap and Red Bobble. Using a table with jacket colour as rows and hat style as columns, complete the table to show the remaining four combinations, then state the total number of different outfits possible.

(Total for Question 5 is 2 marks)

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6 A school uniform shop sells jumpers in 3 colours (navy, grey, black) and trousers in 2 colours (black, grey). A pupil buys one jumper and one pair of trousers.

(a) List all the different jumper-and-trousers combinations possible. **(2)**

(b) Ahmed says you do not need to list every combination to find the total number possible. Use multiplication to work out the total number of combinations. **(2)**

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(Total for Question 6 is 4 marks)

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7 Work out how many different 3-course meals can be made if you choose one starter from {soup, salad}, one main from {fish, chicken, vegetarian} and one dessert from {cake, fruit}.

(Total for Question 7 is 1 mark)

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8 A gym locker code is made from 2 digits. Each digit is chosen from 1 to 9 and digits may be repeated.
Work out the total number of different codes possible.

(Total for Question 8 is 2 marks)

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9 Two ordinary fair 6-sided dice are rolled together and the two scores are added to give a total.

Dice 2 \ Dice 1	1	2	3	4	5	6
1	2					
2		4				
3			6			
4				8		
5					10	
6						12

(a) Complete the sample space diagram to show all 36 possible totals. **(2)**

(b) Use your diagram to find the probability that the total is greater than 8. **(2)**

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(Total for Question 9 is 4 marks)

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10 A shop sells 3 different tops, 3 different pairs of trousers. An outfit has one top, one pair of trousers. How many different outfits are possible?

(Total for Question 10 is 2 marks)

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11 A shop sells 2 different tops, 4 different pairs of trousers and 3 pairs of shoes. An outfit has one top, one pair of trousers and one pair of shoes. How many different outfits are possible?

(Total for Question 11 is 2 marks)

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12 Four different books - a maths book (M), an atlas (A), a dictionary (D) and a thesaurus (T) - are placed in a row on a shelf.
Show that there are 24 different possible orders in which the four books could be arranged.

(Total for Question 12 is 2 marks)

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13 A birthday card shop lets a customer choose 1 of 5 card designs, 1 of 3 envelope colours and 1 of 2 ribbon styles.
Work out the total number of different card packages possible.

(Total for Question 13 is 2 marks)

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14 Two fair four-sided spinners are each numbered 1 to 4. Both spinners are spun once. List all the possible ordered outcomes (first spinner, second spinner) for which the difference between the two numbers is exactly 2.

(Total for Question 14 is 3 marks)

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15 Farah has 4 different books: a novel (N), a biography (B), a comic (C) and a dictionary (D). She chooses 2 of the books and places them in order on a shelf, so the order matters (for example, NB is different from BN).
List all the different possible arrangements of 2 books, and state the total number of arrangements.

(Total for Question 15 is 3 marks)

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16 Amelia has 3 different ornaments: a vase (V), a candle (C) and a photo frame (F). She chooses 2 of the ornaments and places them in order on a windowsill, so the order matters (for example, VC is different from CV).
List all the different possible arrangements of 2 ornaments, and state the total number of arrangements.

(Total for Question 16 is 3 marks)

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17 A garden design app lets a user choose 1 of 5 patio styles, 1 of 4 planting themes and 1 of 2 fence types. The pergola fence type cannot be chosen together with the wildflower planting theme.
Work out the total number of different garden designs possible.

(Total for Question 17 is 3 marks)

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18 Zara was asked to list all the ways to choose 2 different toppings for a pizza from mushroom (M), pepper (P), onion (O) and olives (L), where the order the toppings are chosen in does not matter. Her working is shown below:

MP, MO, ML, PM, PO, PL, OM, OL, OM, LM

She has concluded there are 10 different pizzas. Explain what is wrong with Zara's list, and work out the correct number of different pizzas.

(Total for Question 18 is 2 marks)

19 A drama club has 9 members. Two of the members are to be chosen to perform a duet at the end-of-term show. The order in which they are chosen does not matter. Work out how many different pairs of performers could be chosen.

(Total for Question 19 is 2 marks)

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Mark scheme · 2.3 Systematic Listing: Test Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

systematic list or table shown, at least 4 correct combinations **B1**

all 6 combinations listed with no repeats or omissions **B1**

Answer: cola+crisps, cola+chocolate bar, cola+biscuits, lemonade+crisps, lemonade+chocolate bar, lemonade+biscuits (6 combinations)

Question 2

correct reason oe, e.g. HH has been written twice / TH has been left out **B1**

Answer: HH is repeated and TH is missing (any valid correct reason about a repeat or omission)

Question 3

systematic list or table shown, at least 6 correct combinations **B1**

all 10 combinations listed with no repeats or omissions **B1**

Answer: strawberry+small, strawberry+large, raspberry+small, raspberry+large, blackcurrant+small, blackcurrant+large, apricot+small, apricot+large, plum+small, plum+large (10 combinations)

Question 4

12 cao **B1**

Answer: 12

Question 5

all four missing combinations correctly identified: Blue Beanie, Blue Bobble, Red Cap, Red Beanie oe **M1**

6 cao **A1**

Answer: Blue Beanie, Blue Bobble, Red Cap, Red Beanie; total 6

Question 6

(a) systematic list or table shown, at least 4 correct combinations **B1**

(a) all 6 combinations correct with no repeats or omissions **B1**

(a) Answer: navy+black, navy+grey, grey+black, grey+grey, black+black, black+grey (6 combinations)

(b) 3 x 2 seen or correct process **M1**

(b) 6 cao **A1**

(b) Answer: 6

Question 7

12 cao **B1**

Answer: 12

Question 8

9 x 9 seen **M1**

81 cao **A1**

Answer: 81

Question 9

(a) at least 18 correct totals entered **M1**

(a) all 36 totals correct, ranging from 2 to 12 **A1**

(a) Answer: Totals range from 2 (1+1) to 12 (6+6), forming the standard addition grid

(b) correctly identifies the 10 outcomes giving a total of 9, 10, 11 or 12 **M1**

(b) 10/36 oe = 5/18 cao **A1**

(b) Answer: 5/18

Question 10

multiplies the numbers of choices or lists systematically **M1**

9 cao **A1**

Answer: 9

Question 11

multiplies the numbers of choices or lists systematically **M1**

24 cao **A1**

Answer: 24

Question 12

correct systematic reasoning shown, e.g. 4 choices for the first position, 3 remaining for the second, 2 for the third, 1 left for the last **M1**

4 x 3 x 2 x 1 correctly evaluated to give 24 (cso) **A1**

Answer: 24 (shown by 4 x 3 x 2 x 1 = 24)

Question 13

5 x 3 x 2, or 5 x 3 (=15) seen **M1**

30 cao **A1**

Answer: 30

Question 14

at least two correct ordered pairs identified systematically, e.g. (1,3),(2,4) **M1**

remaining correct ordered pairs identified systematically, e.g. (3,1),(4,2) **M1**

all four ordered pairs listed: (1,3),(3,1),(2,4),(4,2) cao, no extras **A1**

Answer: (1,3), (3,1), (2,4), (4,2)

Question 15

systematic list showing at least 8 correct arrangements **B1**

all 12 arrangements correct with no repeats or omissions: NB, NC, ND, BN, BC, BD, CN, CB, CD, DN, DB, DC **B1**

correct total of 12 stated **B1**

Answer: NB, NC, ND, BN, BC, BD, CN, CB, CD, DN, DB, DC - total 12 arrangements

Question 16

systematic list showing at least 4 correct arrangements **B1**

all 6 arrangements correct with no repeats or omissions: VC, VF, CV, CF, FV, FC **B1**

correct total of 6 stated **B1**

Answer: VC, VF, CV, CF, FV, FC - total 6 arrangements

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Question 17

finds the total number of combinations with no restriction: 5 x 4 x 2 (= 40)	**M1**
correctly identifies the number of combinations that must be removed: 5 (one for each patio style, with wildflower theme and pergola fence)	**M1**
35 cao	**A1**

Answer: 35

Question 18

identify that order does not matter, so a pair and its reverse (e.g. MP and PM, or MO and OM) represent the same pizza and should not both be counted, oe; and/or identify that OM has been written twice (an exact repeat)	**C1**
6 cao	**B1**

Answer: 6 different pizzas (Zara double-counted each pair in reverse order and also repeated OM)

Question 19

use combinations, C(9,2) = 9*8 / 2*1 oe	**M1**
36 cao	**A1**

Answer: 36

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