2.3 Systematic Listing: 2-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 120 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A shop sells 4 different tops, 3 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 1 is 2 marks)

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2 Coins of the following values are available: 1p, 5p, 10p. Any coin can be used as many times as you like. Work out the number of different ways to make exactly 16p.

(Total for Question 2 is 3 marks)

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3 Here are 3 digit cards: 4, 6, 9. Use the cards to make 3-digit numbers. Each digit can be used once only. How many different 3-digit numbers can be made?

(Total for Question 3 is 2 marks)

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4 A cafe offers 5 different flavours of ice cream. A customer chooses 2 different ones. The order does not matter. How many different choices are there?

(Total for Question 4 is 3 marks)

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5 Coins of the following values are available: 1p, 5p, 10p, 20p. Any coin can be used as many times as you like. Work out the number of different ways to make exactly 24p.

(Total for Question 5 is 3 marks)

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6 Here are 3 digit cards: 3, 6, 7. Use the cards to make 3-digit numbers. Digits may be used more than once. How many different 3-digit numbers can be made?

(Total for Question 6 is 2 marks)

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

(Total for Question 7 is 2 marks)

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8 A cafe offers 6 different toppings. A customer chooses 2 different ones. The order does not matter. How many different choices are there?

(Total for Question 8 is 3 marks)

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9 A shop sells 5 different tops, 4 different pairs of trousers. An outfit has one top, one pair of trousers. How many different outfits are possible?

(Total for Question 9 is 2 marks)

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10 Here are 3 digit cards: 6, 7, 8. Use the cards to make 2-digit numbers. Digits may be used more than once. How many different 2-digit numbers can be made?

(Total for Question 10 is 2 marks)

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11 A cafe offers 7 different colours of paint. A customer chooses 3 different ones. The order does not matter. How many different choices are there?

(Total for Question 11 is 3 marks)

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12 Here are 3 digit cards: 3, 6, 9. Use the cards to make 2-digit numbers. Each digit can be used once only. How many different 2-digit numbers can be made?

(Total for Question 12 is 2 marks)

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13 A shop sells 4 different tops, 5 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 13 is 2 marks)

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14 A cafe offers 5 different fruits. A customer chooses 2 different ones. The order does not matter. How many different choices are there?

(Total for Question 14 is 3 marks)

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15 Here are 3 digit cards: 2, 6, 8. Use the cards to make 3-digit numbers. Digits may be used more than once. How many different 3-digit numbers can be made?

(Total for Question 15 is 2 marks)

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16 A furniture shop sells armchairs in 5 different fabrics and 3 different colours. A customer chooses one fabric and one colour.
Without listing them, work out the total number of different armchairs possible.

(Total for Question 16 is 2 marks)

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17 A voucher code uses 3 characters, each chosen from the letters A, B and C. A letter may be used more than once in a code.
Work out the total number of different voucher codes possible.

(Total for Question 17 is 2 marks)

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18 A garden centre sells plant pots in 4 sizes (small, medium, large, extra-large) and 3 colours (terracotta, grey, white).

(a) List all the different size-and-colour combinations possible. **(2)**

(b) A pot is chosen at random from all the possibilities in part (a). Find the probability that it is a large, grey pot. **(2)**

(Total for Question 18 is 4 marks)

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19 A box contains 4 counters, numbered 1, 2, 3 and 4. Two counters are drawn from the box one after another, without replacement, and the two numbers are added together to give a total.

(a) List all the possible pairs of counters that could be drawn, showing which counter is drawn first each time. **(2)**

(b) Use your list to find the probability that the total of the two counters drawn is 5. **(2)**

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(Total for Question 19 is 4 marks)

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20 A sticker book lets a child choose 1 of 6 animal stickers and 1 of 4 sticker borders.
Work out the total number of different animal-and-border stickers possible.

(Total for Question 20 is 2 marks)

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21 From five people, a president and a secretary are to be chosen. How many different ways can this be done?

(Total for Question 21 is 2 marks)

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22 Olivia chooses two different fruits from apple, banana, cherry and date to make a smoothie. Order does not matter. How many choices are there?

(Total for Question 22 is 2 marks)

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23 List all ordered pairs of numbers shown on two six-sided dice that add to 7.

(Total for Question 23 is 3 marks)

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24 A padlock code is made from 3 digits, each chosen from 0 to 9. Digits may be repeated. Work out how many different codes are possible.

(Total for Question 24 is 2 marks)

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25 Yusuf wants to make exactly 45p using only 20p, 10p and 5p coins. He may use more than one of each coin, or none of some of them.
List all the different ways he could make exactly 45p, showing the number of each coin used each time.

(Total for Question 25 is 3 marks)

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26 A gate code is 4 digits long, using 4 different digits chosen from 1, 2, 3, 4, 5 and 6. The order of the digits matters and no digit is repeated.
Without listing them, work out the total number of different gate codes possible.

(Total for Question 26 is 2 marks)

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27 A password consists of two different letters chosen from {A, B, C} followed by one digit chosen from {1, 2, 3, 4}. Work out how many passwords are possible.

(Total for Question 27 is 3 marks)

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28 Priya chooses two scoops of ice cream from 5 flavours.

(a) If the order of scoops matters (first scoop then second) and the same flavour can be chosen twice, how many ordered pairs of scoops are possible? **(2)**

.....

(b) If the order of scoops does not matter but the same flavour can be chosen twice (so scoops like strawberry + vanilla and vanilla + strawberry are the same), how many different unordered selections are possible? **(2)**

.....

(Total for Question 28 is 4 marks)

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29 How many different 3-digit codes are possible using the digits 1 to 5 if no digit is repeated within a code?

(Total for Question 29 is 3 marks)

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30 How many 4-character codes can be made if each character is chosen from the set {A, B, C, D} and repetition of characters is allowed?

(Total for Question 30 is 2 marks)

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31 Using the digits 3, 4, 5 and 7, each digit used at most once within a number, list all the two-digit numbers greater than 40 that can be formed, then state how many there are.

(Total for Question 31 is 2 marks)

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32 A sandwich shop lets customers choose 2 fillings for a sandwich from cheese, ham, tuna and egg. The same filling may be chosen twice (a double portion), and the order in which the fillings are chosen does not matter. Work out how many different sandwiches are possible.

(Total for Question 32 is 2 marks)

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33 In a school choir competition, gold, silver and bronze medals are awarded in order to 3 of the 8 semi-finalists. Work out how many different ways the three medals could be awarded.

(Total for Question 33 is 2 marks)

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34 Ali must select a committee of 3 people from 6 people. How many different committees are possible? (Order of selection does not matter.)

(Total for Question 34 is 2 marks)

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35 A cafe lunch deal lets a customer choose one main course from soup, sandwich, salad and jacket potato, and one drink from juice, tea, coffee, water and hot chocolate.

(a) Work out the total number of different lunch deals possible. **(1)**

.....

(b) Kwame will not choose soup, and will not choose hot chocolate. Work out how many different lunch deals Kwame could choose. **(2)**

.....

(c) The cafe advertises 'over 15 different lunch deals available'. Using your answer to part (a), determine whether this claim is correct. Give a reason. **(1)**

.....

(Total for Question 35 is 4 marks)

36 A quiz team of 4 people is to be chosen from a group of 5 women and 3 men, so that the team contains exactly 2 women and 2 men. Work out how many different teams are possible.

(Total for Question 36 is 4 marks)

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Mark scheme · 2.3 Systematic Listing: 2-hour Pack

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

Question 1

multiplies the numbers of choices or lists systematically **M1**
36 cao **A1**
Answer: 36

Question 2

organised listing of combinations **M1**
complete list or method with at most one omission **M1**
6 cao **A1**
Answer: 6

Question 3

a systematic list or method such as products of choices **M1**
6 cao **A1**
Answer: 6

Question 4

systematic listing, or starts to count pairs without repeats **M1**
method that avoids double counting **M1**
10 cao **A1**
Answer: 10

Question 5

organised listing of combinations **M1**
complete list or method with at most one omission **M1**
10 cao **A1**
Answer: 10

Question 6

a systematic list or method such as products of choices **M1**
27 cao **A1**
Answer: 27

Question 7

multiplies the numbers of choices or lists systematically **M1**
8 cao **A1**
Answer: 8

Question 8

systematic listing, or starts to count pairs without repeats **M1**
method that avoids double counting **M1**
15 cao **A1**
Answer: 15

Question 9

multiplies the numbers of choices or lists systematically **M1**
20 cao **A1**
Answer: 20

Question 10

a systematic list or method such as products of choices **M1**
9 cao **A1**
Answer: 9

Question 11

systematic listing, or starts to count pairs without repeats **M1**
method that avoids double counting **M1**
35 cao **A1**
Answer: 35

Question 12

a systematic list or method such as products of choices **M1**
6 cao **A1**
Answer: 6

Question 13

multiplies the numbers of choices or lists systematically **M1**
60 cao **A1**
Answer: 60

Question 14

systematic listing, or starts to count pairs without repeats **M1**
method that avoids double counting **M1**
10 cao **A1**
Answer: 10

Question 15

a systematic list or method such as products of choices **M1**
27 cao **A1**
Answer: 27

Question 16

5 x 3 seen **M1**
15 cao **A1**
Answer: 15

Question 17

3 x 3 x 3 seen **M1**
27 cao **A1**
Answer: 27

Question 18

(a) systematic list or table shown, at least 8 correct combinations **B1**
(a) all 12 combinations correct with no repeats or omissions **B1**
(a) Answer: small+terracotta, small+grey, small+white, medium+terracotta, medium+grey, medium+white, large+terracotta, large+grey, large+white, extra-large+terracotta, extra-large+grey, extra-large+white (12 combinations)
(b) identifies 1 favourable outcome out of 12 total **M1**
(b) 1/12 oe cao **A1**
(b) Answer: 1/12

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Question 19

(a) systematic list shown, at least 8 correct pairs **B1**

(a) all 12 pairs correct with no repeats or omissions, and no pair with the same counter drawn twice **B1**

(a) Answer: (1,2), (1,3), (1,4), (2,1), (2,3), (2,4), (3,1), (3,2), (3,4), (4,1), (4,2), (4,3) (12 ordered pairs)

(b) identifies the 4 pairs that give a total of 5 out of 12 **M1**

(b) 4/12 oe = 1/3 cao **A1**

(b) Answer: 1/3

Question 20

6 x 4 seen **M1**

24 cao **A1**

Answer: 24

Question 21

5 choices for president then 4 choices for secretary, 5*4 oe **M1**

20 cao **A1**

Answer: 20

Question 22

use combination or 4*3/2 oe **M1**

6 cao **A1**

Answer: 6

Question 23

some correct ordered pairs shown systematically (eg (1,6), (2,5),(3,4)) **M1**

remaining correct ordered pairs shown systematically (eg (4,3),(5,2),(6,1)) **M1**

all six ordered pairs listed: (1,6),(2,5),(3,4),(4,3),(5,2),(6,1) cao **A1**

Answer: (1,6), (2,5), (3,4), (4,3), (5,2), (6,1)

Question 24

recognise 10 choices for each of 3 positions and set up 10^3 oe **M1**

1000 cao **A1**

Answer: 1000

Question 25

systematic strategy shown, e.g. starting with the greatest number of 20p coins and reducing **M1**

at least 5 correct combinations found **A1**

all 9 combinations correct with no repeats: 9x5p; 1x10p+7x5p; 2x10p+5x5p; 3x10p+3x5p; 4x10p+1x5p; 1x20p+5x5p; 1x20p+1x10p+3x5p; 1x20p+2x10p+1x5p; 2x20p+1x5p **A1**

Answer: 9 ways: 9x5p; 1x10p+7x5p; 2x10p+5x5p; 3x10p+3x5p; 4x10p+1x5p; 1x20p+5x5p; 1x20p+1x10p+3x5p; 1x20p+2x10p+1x5p; 2x20p+1x5p

Question 26

6 x 5 x 4 x 3 seen **M1**

360 cao **A1**

Answer: 360

Question 27

number of ways to choose two different letters: 3*2 oe **M1**

multiply by 4 choices for the digit: 6*4 oe **M1**

24 cao **A1**

Answer: 24

Question 28

(a) recognise 5 choices for first scoop and 5 for second, 5*5 oe **M1**

(a) 25 cao **A1**

(a) Answer: 25

(b) use combinations with repetition: C(5+2-1,2) or (5*6)/2 oe **M1**

(b) 15 cao **A1**

(b) Answer: 15

Question 29

recognise 5 choices for first digit, 4 for second, 3 for third (5*4*3) oe **M1**

calculate 5*4*3 oe **M1**

60 cao **A1**

Answer: 60

Question 30

recognise 4 choices for each of 4 positions and set up 4^4 oe **M1**

256 cao **A1**

Answer: 256

Question 31

systematic listing by tens digit (4_, 5_, 7_) showing at least 5 correct numbers oe **M1**

all nine numbers listed: 43, 45, 47, 53, 54, 57, 73, 74, 75 cao, 9 stated **A1**

Answer: 43, 45, 47, 53, 54, 57, 73, 74, 75 (9 numbers)

Question 32

use combinations with repetition, C(4+2-1,2) or (4*5)/2 oe **M1**

10 cao **A1**

Answer: 10

Question 33

recognise 8 choices for gold, 7 for silver, 6 for bronze and multiply, 8*7*6 oe **M1**

336 cao **A1**

Answer: 336

Question 34

use combinations: C(6,3) = 6*5*4 / 3*2*1 oe **M1**

20 cao **A1**

Answer: 20

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Question 35

(a) 20 cao	**B1**
(a) Answer: 20	
(b) 3 remaining mains x 4 remaining drinks, 3*4 oe	**M1**
(b) 12 cao	**A1**
(b) Answer: 12	
(c) correct conclusion with reason, e.g. 'True, since 20 is greater than 15' ft from (a)	**C1**
(c) Answer: True: 20 > 15	

Question 36

use combinations to choose 2 women from 5, C(5,2) = 5*4 / 2*1 oe	**M1**
10 seen	**A1**
use combinations to choose 2 men from 3, C(3,2) = 3*2 / 2*1 oe, and multiply the two results together	**M1**
30 cao	**A1**
Answer: 30	

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