HIGHER

6.3 The Product Rule for Counting: Test Pack

Total Marks

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Ayesha has 4 different T-shirts and 3 different skirts.
Work out the number of different outfits she can make by choosing one T-shirt and one skirt.

(Total for Question 1 is 1 mark)

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2 Priya is choosing a meal at a restaurant. The menu has 3 starters, 5 main courses and 2 desserts. She chooses exactly one starter, one main course and one dessert.

(a) Work out the number of different three-course meals Priya could choose. **(2)**

.....

(b) The restaurant adds one extra starter to the menu. Work out the new number of different three-course meals possible. **(1)**

.....

(Total for Question 2 is 3 marks)

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3 A phone case company lets a customer choose a case colour (6 choices), a pattern (4 choices) and a strap (2 choices). Every combination of colour, pattern and strap is available.
How many different phone cases can be made?

- ☐ A) 12
- ☐ B) 24
- ☐ C) 48
- ☐ D) 96

(Total for Question 3 is 1 mark)

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4 A sandwich shop offers 3 types of bread, 5 fillings and 4 drinks.
Work out the number of different meal combinations possible by choosing one bread, one filling and one drink.

(Total for Question 4 is 2 marks)

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5 A 4-digit PIN is chosen at random, using digits 0 to 9. Digits may be repeated. Sam tries to guess the PIN in one attempt.

(a) Work out the total number of possible PINs. **(2)**

.....

(b) Work out the probability that Sam guesses the correct PIN on his first attempt. **(2)**
Give your answer as a fraction.

.....

(Total for Question 5 is 4 marks)

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6 Using each of the digits 2, 3, 4, 5 and 9 at most once, how many different 3-digit numbers can be made that are odd? A number cannot start with 0.

(Total for Question 6 is 4 marks)

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7 A code has 3 digits chosen from the digits 1 to 8. Digits can be repeated. How many different codes are possible?

(Total for Question 7 is 2 marks)

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8 Using each of the digits 1, 2, 6 and 7 at most once, how many different 3-digit numbers can be made? A number cannot start with 0.

(Total for Question 8 is 3 marks)

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9 A locker code has 2 letters chosen from A, B, C, D, E, F, G and H, followed by 2 digits from 0 to 9. Letters and digits can be repeated. How many different codes are there?

(Total for Question 9 is 3 marks)

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10 A PIN code has 4 digits, each from 0 to 9. The first digit cannot be 0, so that the PIN does not start with 0, but digits may otherwise repeat.
Work out the number of possible PIN codes.

(Total for Question 10 is 2 marks)

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11 A small vending machine sells 2 types of drink and 3 types of snack. Each purchase is one drink and one snack.

(a) By listing all the possible outcomes systematically, show that there are 6 different purchases possible. **(2)**

(b) A second vending machine sells 5 types of drink and 8 types of snack. Use the product rule to work out the number of different purchases possible from this machine. **(2)**

(Total for Question 11 is 4 marks)

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12 A cafe menu has 4 starters, 5 main courses and 3 desserts. One of the starters is tomato soup. A 'complete meal' is one starter, one main course and one dessert, chosen by a customer.

(a) Work out the number of different complete meals possible. **(2)**

.....

(b) Work out the number of different complete meals that do not include tomato soup. **(2)**

.....

(Total for Question 12 is 4 marks)

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13 A password is made using 6 different uppercase letters chosen from the 26 letters of the alphabet. No letter is repeated, and the order of the letters matters.
Show that there are more than one million possible passwords.

(Total for Question 13 is 3 marks)

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14 A padlock code has 4 digits. Each digit can be any number from 0 to 9.

(a) The digits may be repeated. Work out the number of different codes possible. **(2)**

.....

(b) The first digit of the code cannot be 0, although the other three digits may still be any digit from 0 to 9 and may repeat. Work out the number of different codes now possible. **(3)**

.....

(Total for Question 14 is 5 marks)

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15 Raffle tickets are made from one colour, chosen from red, blue, green, yellow and purple, together with a 2-digit number from 00 to 99 (the two digits of the number may repeat, giving 100 different numbers).
Work out the number of different raffle tickets that are not red.

(Total for Question 15 is 3 marks)

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Mark scheme · 6.3 The Product Rule for Counting: Test Pack

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

Question 1

12 cao	**B1**

Answer: 12

Question 2

(a) 3 x 5 x 2 oe seen	**M1**
(a) 30 cao	**A1**

(a) Answer: 30

(b) 40 cao, ft from correct method in (a)	**B1**

(b) Answer: 40

Question 3

C (48) cao	**B1**

Answer: C) 48

Question 4

3 * 5 * 4 oe seen	**M1**
60 cao	**A1**

Answer: 60

Question 5

(a) 10 x 10 x 10 x 10 oe seen	**M1**
(a) 10000 cao	**A1**

(a) Answer: 10000

(b) 1 out of their (a) total, ft	**M1**
(b) 1/10000 cao	**A1**

(b) Answer: 1/10000

Question 6

considers the restricted digit first (or equivalent systematic method)	**M1**
product of the choices for each place	**M1**
correct treatment of the restriction	**M1**
36 cao	**A1**

Answer: 36

Question 7

8 x 8 x 8	**M1**
512 cao	**A1**

Answer: 512

Question 8

considers the restricted digit first (or equivalent systematic method)	**M1**
product of the choices for each place	**M1**
24 cao	**A1**

Answer: 24

Question 9

number of letter combinations 64 found	**M1**
100 digit combinations	**M1**
6400 cao	**A1**

Answer: 6400

Question 10

9 x 10 x 10 x 10 oe seen	**M1**
9000 cao	**A1**

Answer: 9000

Question 11

(a) systematic list or table shown, at least 4 correct outcomes	**M1**
(a) cso: all 6 outcomes listed with no repeats or omissions, e.g. D1S1, D1S2, D1S3, D2S1, D2S2, D2S3	**A1**

(a) Answer: 6 (shown by listing)

(b) 5 x 8 oe seen	**M1**
(b) 40 cao	**A1**

(b) Answer: 40

Question 12

(a) 4 * 5 * 3 oe seen	**M1**
(a) 60 cao	**A1**

(a) Answer: 60

(b) 3 * 5 * 3 oe (3 starters remain, excluding tomato soup)	**M1**
(b) 45 cao	**A1**

(b) Answer: 45

Question 13

26 x 25 x 24 x 23 x 22 x 21 oe set up	**M1**
165765600 (or awrt 165800000) seen	**A1**
cso: 165765600 > 1000000, so there are more than one million possible passwords, dependent on both previous marks	**A1**

Answer: 165765600 (more than one million, as required)

Question 14

(a) 10 * 10 * 10 * 10 oe seen	**M1**
(a) 10000 cao	**A1**

(a) Answer: 10000

(b) identifies 9 choices for the first digit	**M1**
(b) (dep) 9 * 10 * 10 * 10 oe	**M1**
(b) 9000 cao	**A1**

(b) Answer: 9000

Question 15

identifies that 4 colours remain once red is excluded (5 - 1)	**M1**
(dep) 4 * 100 oe	**M1**
400 cao	**A1**

Answer: 400

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