

Name:

Exam Style Questions

Product Rule for Counting



Equipment needed: Pen and Calculator

### Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Video Tutorial

[www.corbettmaths.com/contents](http://www.corbettmaths.com/contents)

Video 383



Answers and Video Solutions



1. Benjamin picks a 4 digit pin for his debit card.



Each digit is a number is 0 to 9.  
Benjamin can repeat digits.

His pin starts with 9 4

9	4		
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(a) How many possible codes are there?

$$00 \rightarrow 99 \quad 100$$

or

$$10 \times 10 = 100$$

100

.....  
(1)

Megan creates a 4-digit code for her debit card.

The first digit is 2

The 4-digit code is **odd**.

(b) How many possible codes are there?

1<sup>st</sup>    2<sup>nd</sup>    3<sup>rd</sup>    4<sup>th</sup>

$$1 \times 10 \times 10 \times 5 = 500$$

500

.....  
(2)

2. In a school there are 20 students in Year 4 and 18 students in Year 5.  
The headteacher wants to interview one Year 4 student and one Year 5 student.



The headteacher says,

“There are 360 different ways to choose one Year 4 student and one Year 5 student.”

Show the headteacher is correct.

$$20 \times 18 = 360$$

(1)

3. A coach is designing a new football strip.



He has a choice of 4 different pairs of socks, 3 different pairs of shorts and 11 different shirts.

How many different strips are possible?

$$\begin{array}{ccccccc} \text{socks} & & \text{shorts} & & \text{shirts} & & \\ 4 & \times & 3 & \times & 11 & = & 132 \end{array}$$

$$12 \times 11 = 132$$

132

(2)

4. Ethan picks a 3-digit number.



The first digit is greater than 2

The last digit is a factor of 25

3 4 5 6 7 8 9  
1 5 25

How many different 3-digit numbers could he pick?

$$\begin{array}{ccc} \text{1st} & \text{2nd} & \text{3rd} \\ 7 & \times 10 & \times 2 = 140 \end{array}$$

140

.....  
(2)

5. Erin wants to buy a rug and a mirror.



In the furniture shop there are 16 different rugs and some different types of mirror.

There are 144 different ways to choose one rug and one mirror.

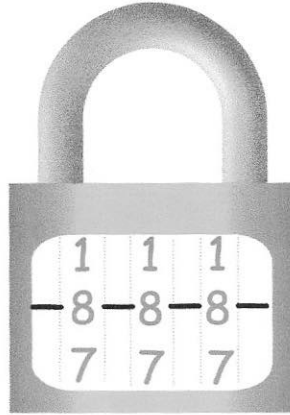
How many different types of mirror are there?

$$144 \div 16 = 9$$

9

.....  
(2)

6. There are three dials on a combination lock.  
Each dial can be set to 1, 2, 3, 4, 5, 6, 7 or 8.



- (a) Work out the total number of different three digit numbers that can be used.

$$8 \times 8 \times 8 = 512$$

$$\begin{array}{r} 512 \\ \hline \end{array} \quad (2)$$

- (b) Work out the total number of different three digit numbers that can be used that have three different digits.

$$8 \times 7 \times 6 = 336$$

$$\begin{array}{r} 336 \\ \hline \end{array} \quad (2)$$

7. Jacob picks a 5-digit **even** number.



The first digit is a prime number. 2, 3, 5, 7

The third digit is odd.

The fourth digit is 8

How many different 5-digit number could he pick?

1<sup>st</sup>    2<sup>nd</sup>    3<sup>rd</sup>    4<sup>th</sup>    5<sup>th</sup>

$$4 \times 10 \times 5 \times 1 \times 5 = 1000$$

1000

.....  
(3)

8. A supermarket offers a lunchtime special offer.



For £5, a customer can buy a sandwich, snack and a drink.

There are 14 sandwiches to choose from.

There are 6 snacks to choose from.

There are  $y$  drinks to choose from.

In total, there are 1092 different ways to choose a sandwich, a snack and a drink.

Work out the value of  $y$ .

$$14 \times 6 \times y = 1092$$

$$84y = 1092$$

$$y = 13$$

13

.....  
(2)

9. Orla picks a 4-digit **even** number.



The first digit is greater than 6

~~8~~ ~~9~~

The second digit is half of the first digit.

4

The third digit is less than 6

5 4 3 2 1 0

How many different numbers could she pick?

1<sup>st</sup>      2<sup>nd</sup>      3<sup>rd</sup>      4<sup>th</sup>

$$1 \times 1 \times 6 \times 5 = 30$$

30

(3)

10. Jackson makes 4-digit numbers using all of these cards.



How many different numbers greater than 6000 can Jackson make?

$$3 \times 3 \times 2 \times 1$$

or

7 - - -

$$3 \times 2 \times 1 = 6$$

8 - - -

$$3 \times 2 \times 1 = 6$$

9 - - -

$$3 \times 2 \times 1 = 6$$

$$6 + 6 + 6 = 18$$

18

(3)

11. At Corbett's Cafe there are



- 7 starters
- 16 main dishes
- 11 desserts

A meal voucher allows a customer to pick one starter, one main dish and one dessert for £10

(a) How many different ways are there to choose a meal?

$$7 \times 16 \times 11 = 1232$$

$$\begin{array}{r} 1232 \\ \hline \end{array} \quad (2)$$

Three of the starters and four of the main dishes contain fish.  
A different customer uses their meal voucher but they **do not like fish**.

(b) How many different meal combinations can they choose?

$$4 \times 12 \times 11 = 528$$

$$\begin{array}{r} 528 \\ \hline \end{array} \quad (2)$$

12. In a gym there are



- 7 exercise classes on a Monday
- 14 exercise classes on a Wednesday
- 12 exercise classes on a Friday

Max is going to attend either

- a class on Monday and a class on Wednesday
- or a class on Monday and a class on Friday
- or a class on Monday, Wednesday and Friday.

Show there are 1358 different ways to pick which exercise classes he is going to attend.

$$7 \times 14 = 98$$

$$7 \times 12 = 84$$

$$7 \times 14 \times 12 = 1176$$

$$98 + 84 + 1176 = \underline{\underline{1358}}$$

(3)

13. James is creating a 6-digit code to lock his iPad.



He only uses the digits 1, 2, 3, 4, 5 and 6.  
He uses each digit once.

(a) How many possible codes can James create?

$$6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$$

.....720  
(2)

Kelvin also creates a 6-digit code.

He picks his digits from the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.

The first digit is positive.

For the first two digits of his code he uses a multiple of 15.

For the middle two digits of the code, he repeats the same digit. 00, 11, 22, 33 ... etc (10)

For the last two digits, Kelvin uses an even number between 25 and 45.

26 28 30 32 34 36 38 40 42 44

(b) How many possible codes can Kelvin create?

(10)

$$\begin{array}{ccc} \text{1st \& 2nd} & \text{3rd \& 4th} & \text{5th \& 6th} \\ \hline 6 & \times & 10 & \times & 10 \end{array}$$

.....600  
(2)

14. Walter creates a 5 digit even number using the following digits.  
He uses each digit once.



1                      4                      6                      7                      8

Work out how many different numbers Walter can create.

$$4 \times 3 \times 2 \times 1 \times 3 = 72$$

or

1 _ _ _ 4	$3 \times 2 \times 1 = 6$	4 _ _ _ 8	$3 \times 2 \times 1 = 6$	7 _ _ _ 4	
1 _ _ _ 6	$3 \times 2 \times 1 = 6$	4 _ _ _ 6	$3 \times 2 \times 1 = 6$	7 _ _ _ 8	(18)
1 _ _ _ 8	$3 \times 2 \times 1 = 6$		(12)	7 _ _ _ 6	
(18)		6 _ _ _ 4	$3 \times 2 \times 1 = 6$	8 _ _ _ 4	(12)
		6 _ _ _ 8	$3 \times 2 \times 1 = 6$	8 _ _ _ 6	
			(12)		
					72
					.....
					(2)

$18 + 18 + 12 + 12 + 12 = 72$

15. An ice hockey league has 10 teams.



Each team plays six matches against each of the other team.

Work out the total number of matches played.

If they play each other once:

$$9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 45$$

Six times:

$$45 \times 6 = 270$$

270  
.....  
(2)

16. In a class, there are twelve girls and ten boys.  
 Four of the girls and two of the boys are left handed.



8 right handed girls      8 right handed boys  
 The teacher picks one girl and one boy at random.

What percentage of the possible pairings of students are **both** the students right handed?

$$12 \times 10 = 120$$

$$8 \times 8 = 64$$

$$\frac{64}{120} = 0.5\bar{3}$$

$$53\frac{1}{3}\%$$

.....  
 (3)

17. Chris makes 5-digit numbers using all of the cards below.



How many different numbers less than 70000 can he make?

$$4 \times 4 \times 3 \times 2 \times 1$$

or

$$5 \text{ --- } (24)$$

$$4 \times 3 \times 2 \times 1$$

$$3 \text{ --- } (24)$$


$$2 \text{ --- } (24)$$

$$1 \text{ --- } (24)$$

$$24 \times 4 = 96$$

$$96$$

.....  
 (3)

18. In Year 10 there are 60 girls.  
 Two of the girls are going to be chosen at random to go on a trip.

Work out the number of different pairs that can be chosen.

$$60 \times 59 = 3540$$

$$3540 \div 2 = 1770$$

1770

.....  
(2)

19. How many odd numbers greater than 40,000 can be created using these digits



1   2   6   7   8

using each digit only once?

6 - - - 1   (6)

$$1 \times 3 \times 2 \times 1 \times 1 = 6$$

6 - - - 7   (6)

8 - - - 1   (6)

8 - - - 7   (6)

7 - - - 1   (6)

$$5 \times 6 = 30$$

30

.....  
(3)

20. A pizza parlour sells 10 different pizza toppings.



Grace orders a pizza with 3 different pizza toppings.

How many different pizzas can Grace order?

$$\frac{10 \times 9 \times 8}{3 \times 2 \times 1} = 120$$

120

.....  
(4)