OFFICIAL USE ONLY	An Investigation Number 8-1	NAME

Difficult digits

Instructions

- Work alone
- Follow the questions carefully

All solutions are to be written on this paper.

1 List all two-digit numbers that can be made from the digits 2 and 3. Digits can be repeated. How many are there? **This question has already been completed for you.**

2	2	3	3						
2	3								
3	2								

No. of numbers = 4

This question has already been completed for you.

0 marks are allocated.

2 List all three-digit numbers that can be made from the digits 5 and 9. Digits can be repeated. How many are there? **You will not need all the spaces below.**

No. of numbers =

3 List all four-digit numbers that can be made from the digits 4 and 7. Digits can be repeated. How many are there? **You will not need all the spaces below.**

No. of numbers =

4 List all two-digit numbers that can be made from the digits 1, 5 and 9. Digits can be repeated. How many are there? **You will not need all the spaces below.**

No. of numbers =

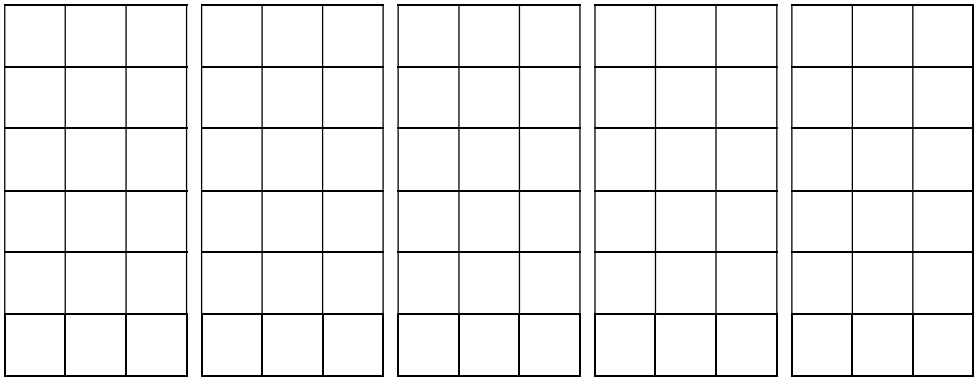
For each of questions 2, 3 and 4;

Score the maximum of **2 marks** if you find all the possible answers with no errors.

If you find more than half the possible answers and/or make mistakes, or your answers demonstrate a pattern that could be used to find all the possible answers, **1 mark**.

No attempt or insufficient attempt, **0 marks**.

5 List all three-digit numbers that can be made from the digits 6, 7 and 9. Digits can be repeated. How many are there? **You will not need all the spaces below.**



Complete this table by writing how many digits can be used in each place.

No. of different digits	×	No. of different digits	×	No. of different digits
	×		×	

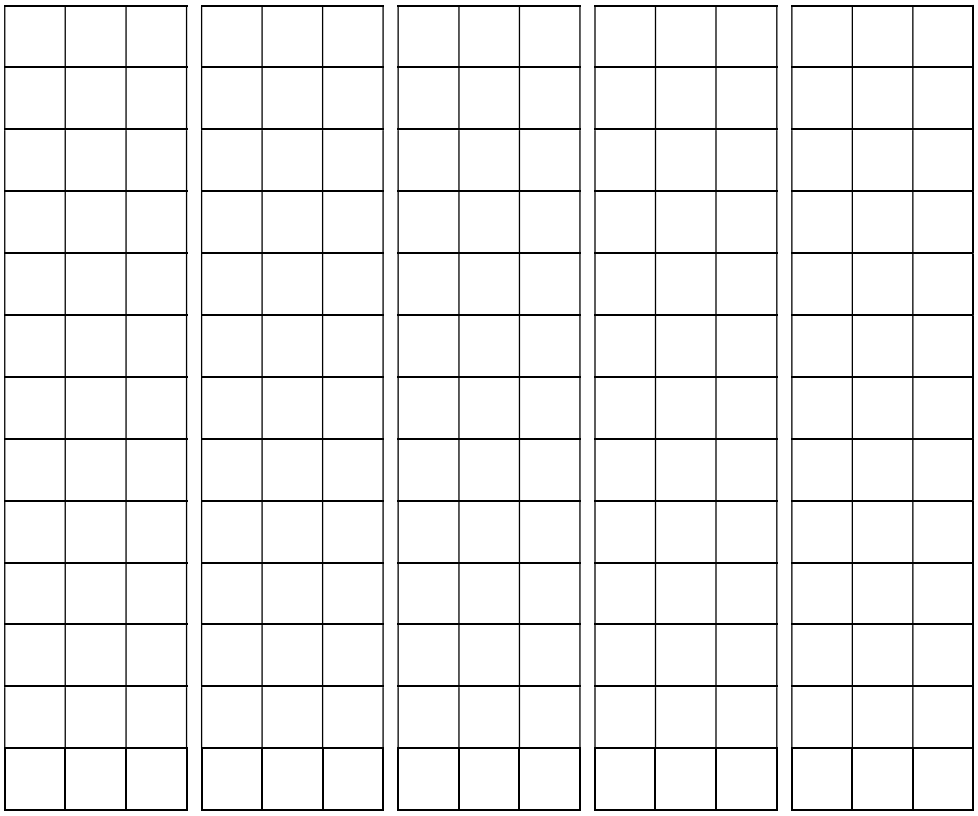
No. of numbers =

Score the maximum of **3 marks** if you find all the possible answers with no errors.

If you find more than half the possible answers and/or make mistakes, or your answers demonstrate a pattern that could be used to find all the possible answers, **1 or 2 marks**.

No attempt or insufficient attempt, **0 marks**.

6 List all three-digit numbers that can be made from the digits 2, 4, 6 and 8. Digits can be repeated. How many are there? **You will not need all the spaces below.**



Complete this table by writing how many digits can be used in each place.

No. of different digits	×	No. of different digits	×	No. of different digits
	×		×	

No. of numbers =

Score the maximum of **3 marks** if you find all the possible answers with no errors.

If you find more than half the possible answers and/or make mistakes, or your answers demonstrate a pattern that could be used to find all the possible answers, **1 or 2 marks**.

No attempt or insufficient attempt, **0 marks**.

7 Complete this table by writing how many digits can be used in each place, multiply these numbers to get "Number of different numbers". The general question for these results is "**How many *n*-digit numbers can be made from *x* different digits?"**

Question	No. of different digits in ten thousands place	×	No. of different digits in thousands place	×	No. of different digits in hundreds place	×	No. of different digits in tens place	×	No. of different digits in units place	=	No. of different numbers
How many different 2-digit numbers can be formed using 2 different digits?		×		×		×	2	×	2	=	4
How many different 2-digit numbers can be formed using 3 different digits?		×		×		×		×		=	
How many different 2-digit numbers can be formed using 4 different digits?		×		×		×		×		=	
How many different 3-digit numbers can be formed using 2 different digits?		×		×		×		×		=	
How many different 3-digit numbers can be formed using 3 different digits?		×		×		×		×		=	
How many different 3-digit numbers can be formed using 4 different digits?		×		×		×		×		=	
How many different 4-digit numbers can be formed using 2 different digits?		×		×		×		×		=	
How many different 4-digit numbers can be formed using 3 different digits?		×		×		×		×		=	
How many different 4-digit numbers can be formed using 4 different digits?		×		×		×		×		=	

Score the maximum of **8 marks** if you find all the possible answers with no errors.
That is, you get **1 mark** for each correct answer.

No attempt or insufficient attempt, **0 marks**.

8 Complete this table by writing the expanded form numbers in index form and the index form numbers in expanded form.

	Expanded Form	Index Form
a)	3 × 3	3^2
b)	$x \times x$	
c)	8 × 8 × 8	
d)	2 × 2 × 2 × 2 × 2 × 2 × 2	
e)	10 × 10 × 10 × 10 × 10	
f)		2^4
g)		3^6
h)		n^3
i)		p^5
j)		$(½)^3$

Score the maximum of **9 marks** if you find all the possible answers with no errors.
That is, you get **1 mark** for each correct answer.

No attempt or insufficient attempt, **0 marks**.

8 Complete this table by writing the expanded form numbers in index form for each of the questions.
Consider this question.
How many *n*-digit numbers can be made from *x* different digits?
This general case follows the same rule as questions with numbers.

Question	Expanded Form	=	Index Form
How many different 3-digit numbers can be formed using 2 different digits?	2 × 2 × 2	=	2^3
How many different 2-digit numbers can be formed using 4 different digits?		=	
How many different 4-digit numbers can be formed using 2 different digits?		=	
How many different 4-digit numbers can be formed using 10 different digits?			
How many different *n*-digit numbers can be formed using *x* different digits?		=	

How many *n*-digit numbers can be made from *x* different digits?	

Score the maximum of **4 marks** if you find all the possible answers with no errors.
That is, you get **1 mark** for each correct answer.

No attempt or insufficient attempt, **0 marks**.

Score a BONUS of **1 mark** if you complete this last table.