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VCE Mathematical Methods ½
Combinations & Permutations [3.3]
Test

32.5 Marks. 1 Minute Reading. 26 Minutes Writing.

### Results:

Test Questions	/ 32.5	





## Section A: Test Questions (32.5 Marks)

**Question 1** (3.5 marks)

Tick whether the following statements are **true** or **false**.

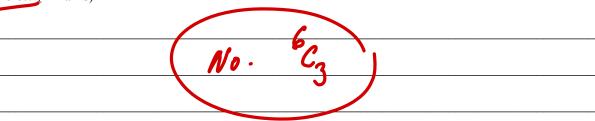
Statement			False
a.	The multiplication principle states that if there are $n$ ways to perform the first task and $m$ ways to perform the second task, then there are $n \times m$ ways to perform both tasks.	<b>/</b>	
b.	In a permutation, order matters.	/	
c.	In a permutation formula, $(n-r)!$ represents the number of missing arrangements due to missing spots.	<b>/</b>	
d.	Combinations are used when order doesn't matter.	<b>/</b>	
e.	The formula for combinations is $\frac{n!}{r!(n-r)!}$ .	<b>/</b>	
f.	Combination is $\frac{nPr}{r!}$ where $r!$ represents the number of different arrangements for the same selection.	<b>/</b>	
g.	The number of ways to choose $k$ objects from a set of $n$ identical objects is ${}^{n}C_{k}$ .		



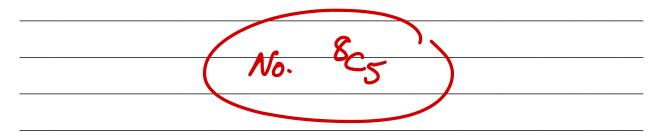
Question 2 (8 marks)

Decide whether or not the order of selection is important, and then write the formula to work out the following:

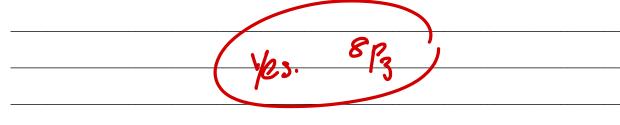
**a.** How many different sets of three colours can be selected from the colours red, orange, yellow, green, blue, and violet? (2 marks)



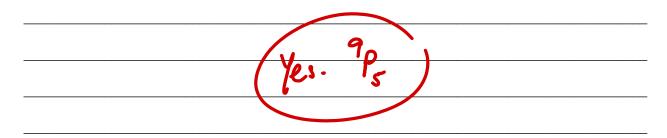
**b.** In how many ways can a team of female basketball players be selected from eight girls? (2 marks)



c. A race has 8 runners. In how many ways can the first three places be decided? (2 marks)



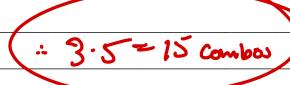
**d.** A secretary has nine letters and only five stamps. How many ways can he select the letters for posting? (2 marks)





Question 3 (1 mark)

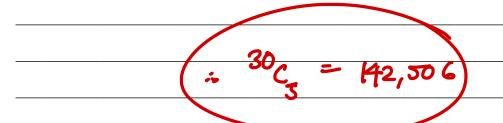
An ice cream shop offers 3 types of cones and 5 different flavours of ice cream. How many possible ice cream cone combinations are there?



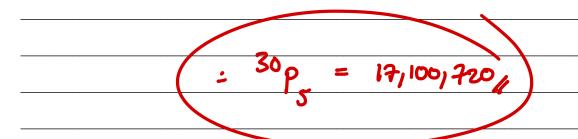


**Question 4** (4 marks)

**a.** A teacher wants to randomly choose five people from the class of 30 to help out at the open-day BBQ. In how many ways can this be done? (2 marks)



**b.** A teacher wants to award prizes for 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> in the class of 30. In how many ways can the prizes be awarded (assuming no two students tie)? (2 marks)





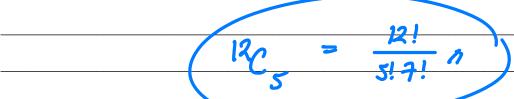
Question 5 (4 marks)

For each of the following, write the answer in factorial notation:

a. In a lottery, you select 6 numbers out of 40. How many ways are there to do this? (2 marks)

 $\frac{40_{C_6} - \frac{40!}{6!34!}}$ 

**b.** A student must select 6 subjects. In how many ways can they do that if there are 13 subjects and 1 is compulsory? (2 marks)





Question 6 (2 marks)

In how many ways can you choose 2 chocolates from a bag containing 6 different chocolates?

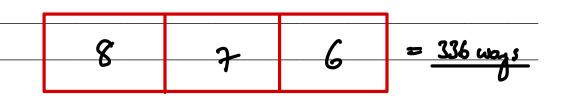
- 6C = 15 chocolates



Question 7 (4 marks)

A bag contains 8 distinct tiles, each labelled with a different letter. The bag contains 3 vowels (A, E, I) and 5 consonants (B, C, D, F, G).

a. Three tiles are randomly drawn and arranged in a row to form a 3-letter code. (2 marks)

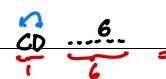


**b.** If the first letter chosen is a vowel (A, E, I, O, U), what is the probability that the resulting 3-letter code contains at least one consonant? (2 marks)



Question 8 (3 marks) Extension.							
How many arrangements of the letters of the word "irrigation" are there?							
IRRICATION =							
$\frac{\text{TRRICATION}}{12395678910} = \frac{10:}{3!2!}$							
<del></del>							





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**Question 9** (3 marks) **Extension.** 

A committee of 8 members is seated in a row. Two particular members, Alex and Bella, refuse to sit next to each other, while another two members, Chris and Dana, insist on sitting together.



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