Tick your teacher
- o Miss Cheng
- o Dr. Pearce
- o Ms Rimando
- o Miss Sindel

PERTH MODERN SCHOOL

YR11 MATHEMATICS SPECIALIST – 2018

TEST 2 – Counting (8%)

PERTH MODERN SCHOOL
Exceptional schooling. Exceptional students.

NAME: _____ **DATE:** Wednesday 4/4/2018

[To achieve full marks and to allow assessment of outcomes, working and reasoning should be shown.]
[A maximum of 2 marks will be deducted for incorrect rounding, units, etc.]

This is a *Calculator Assumed* Assessment **Mark_____/37**

Reading: 5 minutes Working: 40 minutes

1. A committee of four students are to be formed from five boy candidates and six girl candidates. How many ways that this can be done if [6 marks = 1, 2, 3]
   (a) there is no restriction.

   (b) it contains same number of students from both genders.

   (c) it contains at least one student from each gender.

2. [7 marks = 4, 3]

(a) Find the value for m if ${}^{9}C_{m} = 4 \times {}^{7}C_{m-1}$.

(b) Prove that ${}^{n}P_{r} = n \times {}^{n-1}P_{r-1}$.

3. Fifty-three students' names are printed on a list. Explain the reason why at least three names begin with the same letter. [2 marks]

4. Three-digit numbers are constructed using digits 0, 1, 2, 3, 4, 5. Each digit is used at most once. How many such numbers are [6 marks = 2, 2, 2]

   (a) constructed?

   (b) Even numbers?

   (c) Multiples of 5?

5. A bag contains 17 identical cubes except for their colour, with four coloured orange, six coloured blue and seven coloured white. [6 marks = 2, 2, 2]

(a) How many different arrangements of coloured cubes are possible when three cubes are drawn from the bag and placed in a line? [2 mark]

(b) How many different combinations of coloured cubes are possible when three cubes are drawn from the bag? [2 marks]

(c) Determine the least number of cubes that should be removed from the bag to ensure that the resulting selection contains at least three cubes of one colour. Justify your answer. [2 marks]

6. [6 marks = 2, 4]

(a) A triangle *PQR* has sides $\overrightarrow{QP} = a, \overrightarrow{QR} = b$. Determine the vector $\overrightarrow{QM}$ where *M* is the midpoint of side PR.

(b) Two forces are applied to a body. One has magnitude 200 N and acts due south. Another has magnitude 240 N and acts on a bearing of 65º. Draw a diagram to demonstrate this scenario and find the magnitude and resultant of the two forces. [4 marks]

(c) Fifteen dots are evenly spaced on the circumference of a circle. How many combinations of three dots can we pick from these 15 that do *not* form an equilateral triangle? [3 marks]