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| --- | --- |
|  | Name: ……………………………….. |

**Year 11 Mathematics Specialist**

**Test 2 – 2019**

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| --- | --- | --- | --- |
| **Total Time:** | ***55****minutes* |  | |
| **Total Reading:** | *3**minutes* |
| **Total Working:** | *58 minutes* |
| **Weighting:** | 5 *% of the year.* |
| **Equipment:** | *SCSA Formula Sheet; ½ page notes (A4 one side), CAS calculator; Scientific Calculator* | | |
|  | | | |
| **SECTION 1: CALCULATOR FREE** | | | |
| **Time:** | ***22*** *minutes* | **Marks for Section 1:** | ***20*** *marks* |
| **Reading:** | *2**minute* | **Equipment Allowed:** | *Nil* |
| **Working:** | *20minutes* |  |  |

**1. [3 marks: 1, 1, 1]**

Express each of the following as the product of consecutive factors, fully simplifying your answer.

a. 5!

b. 

c. 

**2. [3 marks: 1, 2]**

Given 10! = 3 628 800, state the value of:

a. 9!

b. 11!

**3. [3 marks]**

Find the integer n if nPn-7 = 720.

**4. [2 marks]**

A person had 6 books in her briefcase but not enough room for all of them on a shelf. She calculated that there were  possible arrangements. How many books did she place on the shelf?

**5. [2 marks]**

Show that:

10C8 = 10C2

**6. [2 marks]**

In a large group of children there are 23 who dislike cabbage and 14 who dislike peas. If 6 children dislike both cabbage and peas, how many dislike at least one of them?

**7. [2 marks: 1, 1]**

Circle the entries in Pascal’s Triangle below that show:

a. 

b. 3C2

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

1 5 10 10 5 1

1 6 15 20 15 6 1

1 7 21 35 35 21 7 1

**8. [2 marks]**

Pigeonhole Elementary School has 400 students. Show that at least two of them were born on the same day of the year.

**~ END OF SECTION 1 ~**

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| --- | --- | --- | --- |
| Name: | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | Date: *\_\_\_\_\_\_\_\_\_\_\_* |
| **SECTION 2: CALCULATOR ASSUMED** | | | |
| **Time:** *37minutes* | | **Equipment Allowed:** *Curriculum Council Formula sheets,*  *CAS calculator, 1 page of notes (A4 one side)* | |
| **Marks for Section 2:**  *32marks* | |  | |

**9. [3 marks]**

There are 50 baskets of apples. Each basket contains no more than 24 apples. Show that there are at least 3 baskets containing the same number of apples.

**10. [4 marks: 2, 2]**

A strand of DNA consists of the following sequence of bases:

A A G G C A A A T T T

a. How many different sequences can be made with these 11 bases?

b. If base C is replaced with another T, how many sequences are possible?

**11. [2 marks]**

Eleven points lie on a circle. How many inscribed octagons is it possible to form using these points as vertices?

**12. [8 marks: 1, 1, 2, 2, 2]**

A committee of 6 students is to formed from 10 Year 10s, 11 Year 11s and 12 Year 12s. How many different committees can be made if each committee must have:

1. 2 Year 12s
2. 3 Year 11s
3. 2 Year 12s and 3 Year 11s
4. 2 Year 12s or 3 Year 11s
5. 2 Year 12s or 3 Year 11s, but not both

**13. [2 marks]**

How many subsets, excluding the empty set but including the set of all 6 elements, are there of the set A = {m, n, q, r, 2, 3}?

**14. [4 marks: 1, 3]**

In a class of students undergoing a computer course the following were observed.   
Out of a total of 50 students:

30 know Pascal,

18 know Fortran,

26 know COBOL,

9 know both Pascal and Fortran,

16 know both Pascal and COBOL,

8 know both Fortran and COBOL,

47 know at least one of the three languages.

Hence, determine:

a. How many students know none of these languages.

b. How many students know all three languages.

**15. [9 marks: 1, 2, 3, 3]**

Five digit numbers can be made using the digits 1, 2, 3, 4, and 5. Each digit can only be used once.

1. How many 5 digit numbers are possible?
2. How many odd 5 digit numbers are possible?
3. How many 4 digit odd numbers are possible greater than 4000?
4. How many odd numbers are possible greater than 4000?

**~ END OF TEST ~**