 **MATHEMATICS:**

**SPECIALIST 1 & 2**

**SEMESTER 1 2019**

**TEST 1**

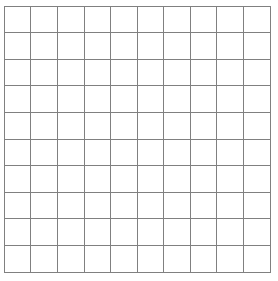
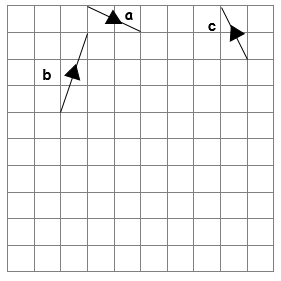
**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Calculator Free**

Time allowed: 15 mins Total marks: 13

**1.** [4 marks:1, 1, 2]

Vectors ,  and **c** are as shown below.



On the grid, sketch and label the vectors p, q and r where:

**p**=**a**+**b**

**q**=**-3a**

**r**=**2c**-**a**+**b**

**2.** [6 marks: 2, 4]

(a) Evaluate

(b) Show that:

**3.** [3 marks]

A bag contains lettered tiles consisting of: 3 E’s, 4 R’s, 6 T’s, 5 Z’s and 2 A’s.

Tilly selects tiles at random from the bag and does not replace them. How many tiles need to be drawn out to guarantee that Tilly has at least 4 of one letter? Justify your answer.

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**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Calculator Assumed**

Time allowed: 45 mins Total marks: 43

**4.** [8 marks: 2, 2, 2, 2]

How many 5 letter words can be formed using the letters from the word ABSOLUTE if:

a) letters cannot be repeated.

b) the word must start with B.

c) the word must start and end with O and L in either order.

d) the word must start and end with a vowel.

**5.** [4 marks]

A 4 digit code is to be made from the numbers 1, 2, 3, 4, 5, 6 and 7 or the numbers 3, 4, 5, 6, 7 and 8. How many different codes are possible?

**6.** [5 marks: 2, 3]

a) How many ways are there of arranging the 8 letters of the word SYLLABUS?

b) Find the number of different arrangements of 4 letters that can be made using the letters of the word SYLLABUS.

**7.** [5 marks: 1, 2, 2]

A committee of five members is to be chosen from a group of 5 teachers and 3 senior school students.

a) How many different committees could be formed?

b) How many committees would contain 3 teachers and 2 students?

c) How many committees contain at least 2 students?

**8.** [4 marks]

How many integers between 1 and 500 inclusive are divisible by 4 or 7?

**9.** [6 marks: 1, 2, 3]

The 4 members of the band U2, (Bono, The Edge, Larry and Adam) their manager (Guy) and their tour manager (Willie) arrange themselves in line for a photograph.

How many arrangements are there in which:

a) Bono is first

b) The Edge and Bono are together

c) The Edge and Bono are together and Guy and Willie are together

**10.** [2 marks]

There are 20 000 students studying at a University, with at least one student from each of the 196 countries in the world. What is the largest number of students certain to be from the same country?

**11.** [5 marks]

Two vectors have magnitudes of 45N and 60N and the angle between their directions is 75°. Sketch a diagram showing these forces and calculate the magnitude of the resultant force and the angle it makes with the smaller force.

**12.** [4 marks: 2, 2]

Jess wants to take her boat on a river from point A on one bank to point B directly opposite on the other bank. The river is 60m wide and flows at 3km/h parallel to the bank. Jess can maintain a rowing speed of 4.5km/h in still water.

If she starts at A and directs her boat towards B when she starts rowing:

a) What would her resultant velocity be?

b) How far away from point B would she end up?