CANDIDATE
NAME

CENTRE
NUMBER

CANDIDATE
NUMBER

MATHEMATICS											0580/42

Paper 4 (Extended)									May/June  2010

													2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials:		Electronic calculator				Geometrical instruments
							Mathematical tables (optional)		Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO NOT WRITE IN ANY BARCODES.

Answer all questions.
If working is needed for any question it must be clearly shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures.  Give answers in degrees to one decimal place.
For $\pi$ use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [  ] at the end of each question or part question.

The total of the marks for this paper is 130.

1    Alberto and Maria share $240 in the ratio  3 : 5.

   (a)  Show that Alberto receives $90 and Maria receives $150.

   *Answer(a)*

[1]

   (b)  (i)  Alberto invests his $90 for 2 years at $r$ % per year simple interest.
            At the end of 2 years the amount of money he has is $99.
            Calculate the value of $r$.

*Answer(b)*(i) $r =$ .......................................... [2]

   (ii)  The $99 is 60% of the cost of a holiday.
        Calculate the cost of the holiday.

*Answer(b)*(ii) $ .......................................... [2]

   (c)  Maria invests her $150 for 2 years at 4% per year compound interest.
        Calculate the exact amount Maria has at the end of 2 years.

*Answer(c)* $ .............................................. [2]

   (d)  Maria continues to invest her money at 4% per year compound interest.
        After 20 years she has $328.67.

   (i)  Calculate exactly how much more this is than $150 invested for 20 years at 4% per year
        simple interest.

*Answer(d)*(i) $ .......................................... [3]

   (ii)  Calculate $328.67 as a percentage of $150.

*Answer(d)*(ii) ..................................... % [2]

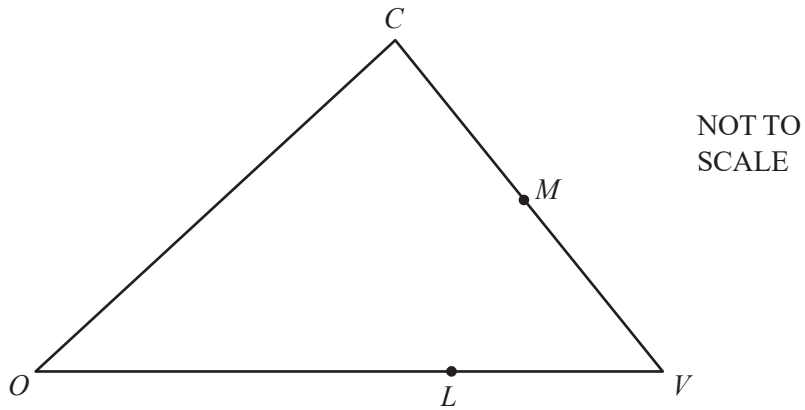2 (a) $\mathbf{p} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and $\mathbf{q} = \begin{pmatrix} 6 \\ 3 \end{pmatrix}$.

(i) Find, as a single column vector, $\mathbf{p} + 2\mathbf{q}$.

*Answer(a)*(i) [2]

(ii) Calculate the value of $|\mathbf{p} + 2\mathbf{q}|$.

*Answer(a)*(ii) ............................................... [2]

(b)

C

NOT TO SCALE

M

O

L

V

In the diagram, $CM = MV$ and $OL = 2LV$.
$O$ is the origin. $\overrightarrow{OC} = \mathbf{c}$ and $\overrightarrow{OV} = \mathbf{v}$.

Find, in terms of $\mathbf{c}$ and $\mathbf{v}$, in their simplest forms
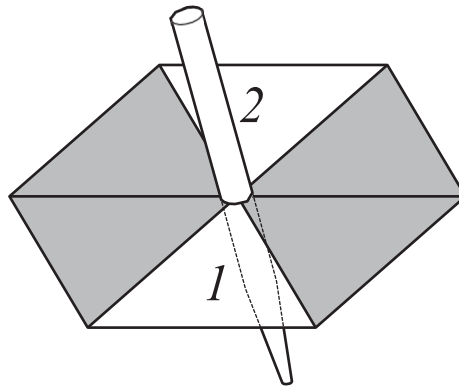
(i) $\overrightarrow{CM}$,

*Answer(b)*(i) ............................................... [2]

(ii) the position vector of $M$,

*Answer(b)*(ii) ............................................... [2]

(iii) $\overrightarrow{ML}$.

*Answer(b)*(iii) ............................................... [2]

3



The diagram shows a spinner with six numbered sections.
Some of the sections are shaded.
Each time the spinner is spun it stops on one of the six sections.
It is equally likely that it stops on any one of the sections.

(a)  The spinner is spun once.

Find the probability that it stops on

(i)    a shaded section,

*Answer(a)*(i)   ...............................................   [1]

(ii)  a section numbered 1,

*Answer(a)*(ii)   ...............................................   [1]

(iii) a shaded section numbered 1,

*Answer(a)*(iii)   ...............................................   [1]

(iv) a shaded section or a section numbered 1.

*Answer(a)*(iv)   ...............................................   [1]

(b) The spinner is now spun twice.

Find the probability that the total of the two numbers is

(i) 20,

*Answer(b)*(i) ................................................ [2]

(ii) 11.

*Answer(b)*(ii) ................................................ [2]

(c) (i) The spinner stops on a shaded section.

Find the probability that this section is numbered 2.

*Answer(c)*(i) ................................................ [1]

(ii) The spinner stops on a section numbered 2.

Find the probability that this section is shaded.

*Answer(c)*(ii) ................................................ [1]

(d) The spinner is now spun until it stops on a section numbered 2.
The probability that this happens on the $n$th spin is $\frac{16}{243}$.

Find the value of $n$.

*Answer(d) n =* ................................................ [2]