

Cambridge International Examinations

Cambridge International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	
MATHEMATICS			0580/02
Paper 2 (Extended)		For Examination	on from 2015
SPECIMEN PAPER		1 hou	ır 30 minutes
Candidates answer on	the Question Paper.		
Additional Materials:	Electronic calculator	Geometrical instruments	

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 an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

Answer all questions.

If working is needed for any question it must be shown below that question.

Tracing paper (optional)

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 π , 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 70.

 $The \ syllabus \ is \ approved \ for \ use \ in \ England, \ Wales \ and \ Northern \ Ireland \ as \ a \ Cambridge \ International \ Level \ 1/Level \ 2 \ Certificate.$



1	Use your calculator to find	$\sqrt{\frac{45 \times 5.75}{3.1 + 1.5}} \; .$

Answer	 [2]

2 The mass of a carbon atom is 2×10^{-27} g.

How many carbon atoms are there in 6 g of carbon?



3 Write the following in order of size, largest first.

sin 158° cos 158°

cos 38°

sin 38°

4 Express 0.123 as a fraction in its simplest form.

Answer [3]

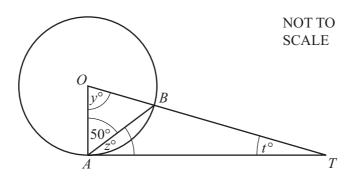
		3			
5	A circle has a radius of 50 cm.				
	(a) Calculate the area of the circle in cm ² .				
	(b) Write your answer to part (a) in m ² .	Answer(a)	•••••••••••••••••••••••••••••••••••••••	cm^2	[2]
		Answer(b)		m^2	[1]
6			NOT TO SCALE		

The front of a house is in the shape of a hexagon with two right angles. The other four angles are all the same size.

Calculate the size of one of these angles.

Answer [3]

7



TA is a tangent at A to the circle, centre O. Angle $OAB = 50^{\circ}$.

Find the value of

(a) y,

$$Answer(a) y =$$
 [1]

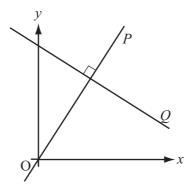
(b) z,

$$Answer(b) z =$$
 [1]

(c) t.

$$Answer(c) t =$$
 [1]

8 This is a sketch of two lines P and Q.



The two lines P and Q are perpendicular.

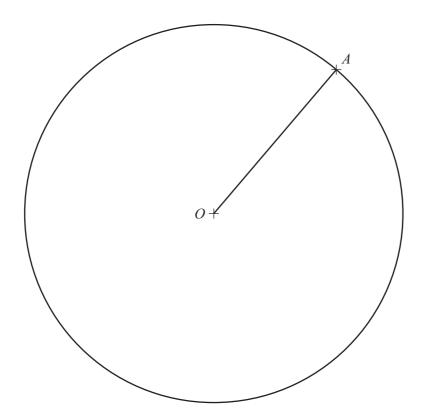
The equation of line P is y = 2x.

Line Q passes through the point (0, 10).

Work out the equation of line Q.

Answer [3]

9



The point A lies on the circle centre O, radius 5 cm.

- (a) Using a straight edge and compasses only, construct the perpendicular bisector of the line OA.[2]
- **(b)** The perpendicular bisector meets the circle at the points C and D.

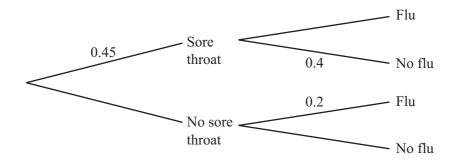
Measure and write down the size of the angle AOD.

$$Answer(b) \text{ Angle } AOD =$$
 [1]

10 In a flu epidemic 45% of people have a sore throat.

If a person has a sore throat the probability of **not** having flu is 0.4.

If a person does not have a sore throat the probability of having flu is 0.2.



Calculate the probability that a person chosen at random has flu.

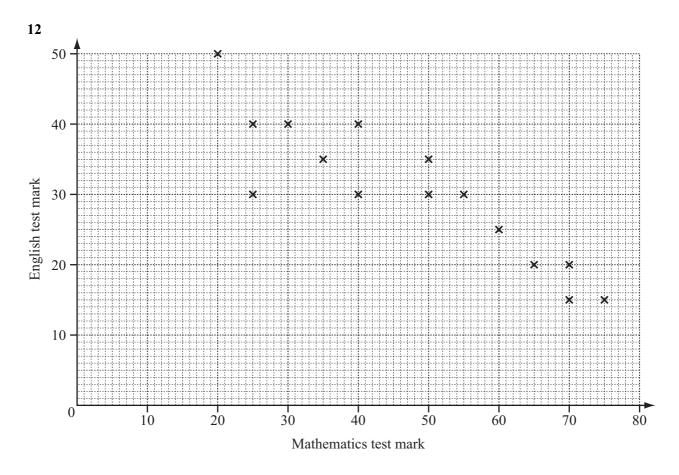
Answer	[4]

11 Work out.

(a)
$$\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}^2$$

(b)
$$\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}^{-1}$$

Answer(b)
$$\left[2\right]$$



The scatter diagram shows the marks obtained in a Mathematics test and the marks obtained in an English test by 15 students.

(a) Describe the correlation.

Answer(a)	- 11	П
11.10	L *	٦.

[1]

(b) The mean for the Mathematics test is 47.3. The mean for the English test is 30.3.

Plot the mean point (47.3, 30.3) on the scatter diagram above. [1]

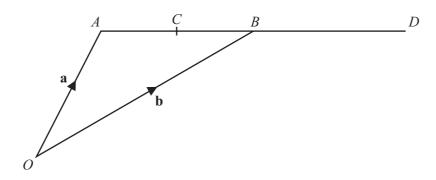
- (c) (i) Draw the line of best fit on the diagram above.
 - (ii) One student missed the English test.

She received 45 marks in the Mathematics test.

Use your line to estimate the mark she might have gained in the English test.

Answer(c)(ii) [1]

13



A and B have position vectors \mathbf{a} and \mathbf{b} relative to the origin O. C is the midpoint of AB and B is the midpoint of AD.

Find, in terms of a and b, in their simplest form

(a) the position vector of C,

Answer(a)	[2]
111151101	 [-]

(b) the vector \overrightarrow{CD} .

$$Answer(b) [2]$$

14

$$T = 2\pi \sqrt{\frac{\ell}{g}}$$

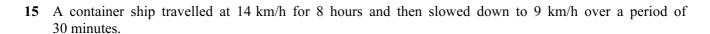
(a) Find T when g = 9.8 and $\ell = 2$.

$$Answer(a) T = [2]$$

(b) Make *g* the subject of the formula.

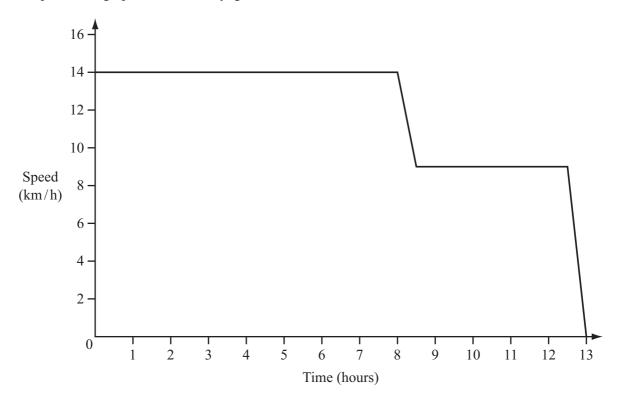
$$Answer(b) g = [3]$$

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It travelled at this speed for another 4 hours and then slowed to a stop over 30 minutes.

The speed-time graph shows this voyage.



(a) Calculate the total distance travelled by the ship.

Answer(a) km [4]

(b) Calculate the average speed of the ship for the whole voyage.

Answer(b) km/h [1]

16 The mass of a radioactive substance is decreasing by 10% a year.

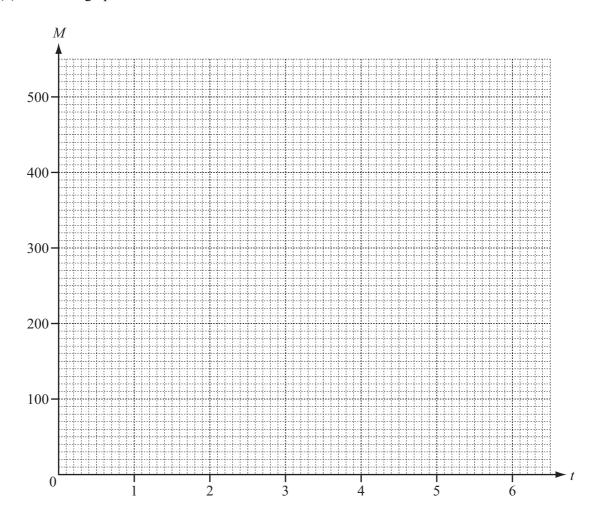
The mass, M grams, after t years, is given by the formula $M = 500 \times 0.9^t$.

(a) Complete this table.

t (years)	0	1	2	3	4	5	6
M (grams)		450			328		266

[2]

(b) Draw the graph of $M = 500 \times 0.9^t$.



[2]

(c) (i) Use your graph to estimate after how long the mass will be 350 grams.

Answer(c)(i) years [1]

(ii) When will the mass of the radioactive substance be zero grams?

Answer(c)(ii) _____ years [1]

$$f(x) = \frac{1}{x+4} \quad (x \neq -4)$$

$$g(x) = x^2 - 3x$$

$$h(x) = x^3 + 1$$

(a) Work out fg(1).

(b) Find $h^{-1}(x)$.

$$Answer(b) h^{-1}(x) =$$
 [2]

(c) Solve the equation g(x) = -2.

Question 18 is printed on the next page.

18	The first	four	terms	of a	sequence	are

$$T_1 = 1^2$$
 $T_2 = 1^2 + 2^2$ $T_3 = 1^2 + 2^2 + 3^2$ $T_4 = 1^2 + 2^2 + 3^2 + 4^2$.

(a) The *n*th term is given by
$$T_n = \frac{1}{6} n(n+1)(2n+1)$$
.

Work out the value of T_{23} .

$$Answer(a) T_{23} =$$
 [2]

(b) A new sequence is formed as follows.

$$U_1 = T_2 - T_1$$
 $U_2 = T_3 - T_2$ $U_3 = T_4 - T_3$

(i) Find the values of U_1 and U_2 .

$$Answer(b)(i) U_1 = \qquad \text{and } U_2 = \qquad [2]$$

(ii) Write down a formula for the *n*th term, U_n .

Answer(b)(ii)
$$U_n =$$
 [1]

(c) The first four terms of another sequence are

$$V_1 = 2^2$$
 $V_2 = 2^2 + 4^2$ $V_3 = 2^2 + 4^2 + 6^2$ $V_4 = 2^2 + 4^2 + 6^2 + 8^2$.

By comparing this sequence with the one in **part** (a), find a formula for the nth term, V_n .

$$Answer(c) V_n =$$
 [2]

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