



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

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CANDIDATE NAME							
CENTRE NUMBER					CANDIDATE NUMBER		
MATHEMATICS							0580/21
Paper 2 (Extende	ed)				Oc	tober/Nove	ember 2011
						1 hour	30 minutes
Candidates answ	ver on the	Question Pa	aper.				
Additional Materi		ectronic ca		ontional)	Geometrical instrumer		

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 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 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.



International Examinations

1	Use your calculator to find	$\sqrt{\frac{45 \times 5.75}{3.1 + 1.5}}$
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Answer	[2]
	 L-1

2 Work out $2(3 \times 10^8 - 4 \times 10^6)$, giving your answer in standard form.

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

sin 158° cos 158°

cos 38°

sin 38°

Write down all the working to show that $\frac{\frac{3}{5} + \frac{2}{3}}{\frac{3}{5} \times \frac{2}{3}} = 3\frac{1}{6}$

Answer

[3]

		3		
5	A circle has a radius of 50 cm.			
	(a) Calculate the area of the circle in cm ² .			
		Answer(a)	cm	n ² [2]
	(b) Write your answer to part (a) in m ² .			
		Answer(b)	m	n^2 [1]
6				
			NOT TO	
			SCALE	
	The front of a house is in the shape of a hexag	gon with two right an	igles.	
	The other four angles are all the same size.			
	Calculate the size of one of these angles.			

NOT TO SCALE

For Examiner's Use

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]

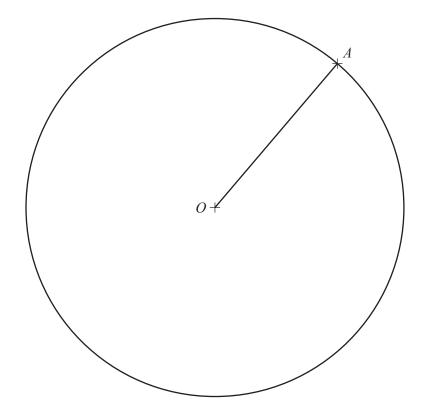
8 Seismic shock waves travel at speed v through rock of density d. v varies **inversely** as the **square root** of d.

v = 3 when d = 2.25.

Find v when d = 2.56.

Answer v = [3]

For Examiner's Use



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.

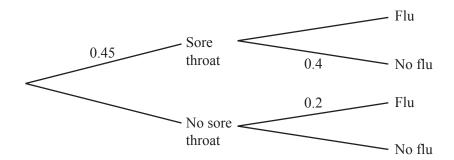
$$Answer(b) \text{ Angle } AOD =$$
 [1]

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.

For Examiner's Use



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

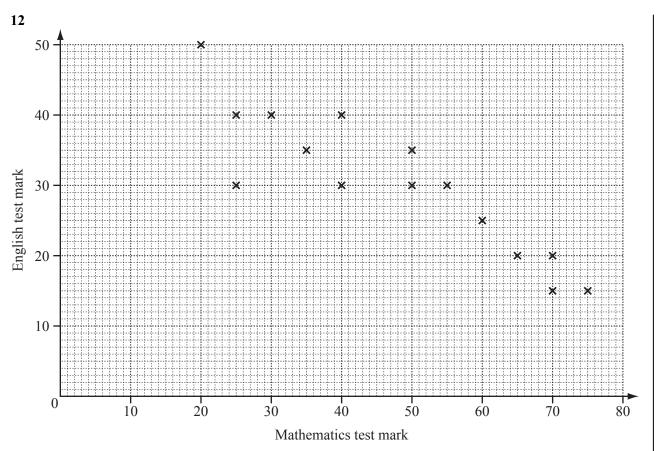
Answer	 [4]

11 Work out.

(a)
$$\left(\begin{array}{cc} 2 & 1 \\ 4 & 3 \end{array}\right)^2$$

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

$$Answer(b) \qquad \qquad \boxed{ [2]}$$



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	١.

Answer(a) [1]

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

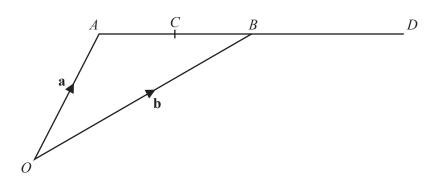
[1] Plot the mean point (47.3, 30.3) on the scatter diagram above.

- (c) (i) Draw the line of best fit on the diagram above.
 - [1]
 - One student missed the English test. (ii) 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]





A and B have position vectors **a** and **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,

1	[2]
Answer(a)	 4

(b) the vector \overrightarrow{CD} .

$$Answer(b)$$
 [2]

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

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

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

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

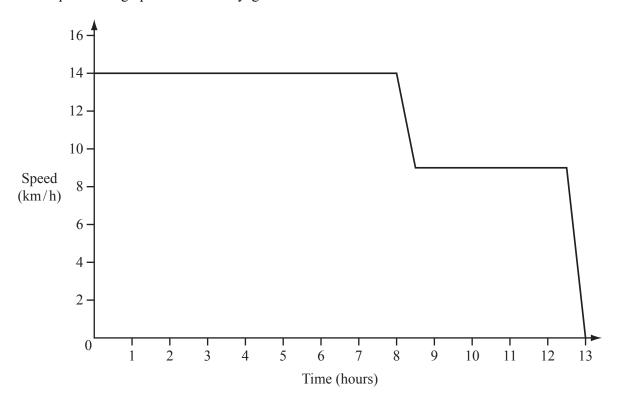
$$Answer(b) g =$$
 [3]

15 A container ship travelled at 14 km/h for 8 hours and then slowed down to 9 km/h over a period of 30 minutes.

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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.



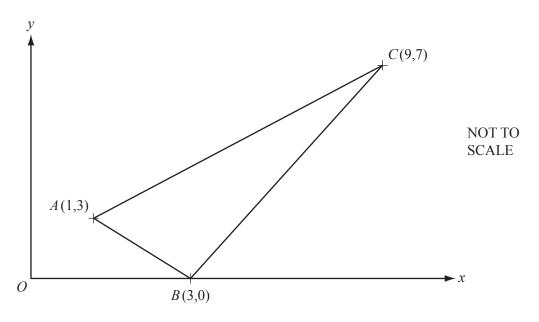
(a) Calculate the total distance travelled by the ship.

Answer(a) km [4]

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

Answer(b) _____ km/h [1]

For Examiner's Use



The co-ordinates of A, B and C are shown on the diagram, which is not to scale.

(a) Find the length of the line AB.

$$Answer(a) AB =$$
 [3]

(b) Find the equation of the line AC.

Answer(b) [3]

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

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

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

(a) Work out fg(1).

Answer(a) [2]

(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

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

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(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)
$$U_1 =$$
 and $U_2 =$ [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 *n*th term, V_n .

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

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