

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

NAME			
CENTRE NUMBER		CANDIDATE NUMBER	
MATHEMATICS			0580/21
Paper 2 (Extended)			May/June 2011
			1 hour 30 minutes
Candidates answer of	n the Question Paper.		
Additional Materials:	Electronic calculator	Geometrical instruments	3

Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Mathematical tables (optional)

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.

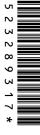
For π , use either your calculator value or 3.142.

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.





	2					
1	A concert hall has 1540 seats.					
	Calculate the number of people in the hall when 55% of the seats are occupied.					
		Answer	[1]			
2	Shade the required region on each Venn diagram.					
	\mathcal{E} A B	\mathcal{E} A \mathcal{E} E				
	$A \cup B'$	$(A \cap B)'$	[2]			
3	Calculate $81^{0.25} \div 4^{-2}$.					
		,	F03			
		Answer	[2]			
4	(a) Find m when $4^m \times 4^2 = 4^{12}$.					
		4	[1]			
		Answer(a) m =	[1]			
	(b) Find <i>p</i> when $6^p \div 6^5 = \sqrt{6}$.					

Answer(b) p =

[1]

© UCLES 2011 0580/21/M/J/11

(a) Calculate the number of times the hummingbird bear	ita ita zzinaa i	n one hour	
()	us us wings i	ii one nour.	
	Answer(a)		[1]
(b) Write your answer to part (a) in standard form.			
	Answer(b)		[1]
2cm 6cm		NOT TO SCALE	
The diagram shows eggs of height 2 cm and 6 cm.	are mathema	atically similar.	
Calculate the mass of the large egg.			
	Answer		g [2]
Find the length of the straight line from Q (-8, 1) to R (4	., 6).		
	A company makes solid chocolate eggs and their shapes The diagram shows eggs of height 2 cm and 6 cm. The mass of the small egg is 4 g. Calculate the mass of the large egg.	A company makes solid chocolate eggs and their shapes are mathema. The diagram shows eggs of height 2 cm and 6 cm. The mass of the small egg is 4 g. Calculate the mass of the large egg.	(b) Write your answer to part (a) in standard form. Answer(b) NOT TO SCALE A company makes solid chocolate eggs and their shapes are mathematically similar. The diagram shows eggs of height 2 cm and 6 cm. The mass of the small egg is 4 g. Calculate the mass of the large egg.

Answer QR =

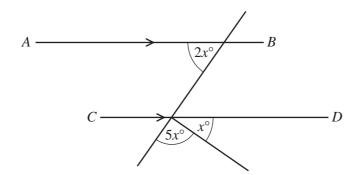
[3]

8 Calculate the radius of a sphere with volume 1260 cm³. [The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

For Examiner's Use

Answer	cm	[3]

9



NOT TO SCALE

AB is parallel to CD. Calculate the value of x.

$$Answer x = [3]$$

10 Solve the simultaneous equations.

$$3x + y = 30$$
$$2x - 3y = 53$$

$$Answer x =$$

$$y =$$
 [3]

11	A rectangular photograph measures 23.3 cm by 19.7 cm, each correct to 1 decimal place. Calculate the lower bound for					
	(a)	the perimeter,				
			Answer(a)	cm [2]		
	(b)	the area.				
	(-)					
			Answer(b)	cm ² [1]		
12	A tr	rain leaves Barcelona at 21 28 and takes 10 hours and	33 minutes t	to reach Paris.		
	(a)	Calculate the time the next day when the train arrives	s in Paris.			
			Answer(a)	[1]		
			Answer (u)	[1]		
	(b)	The distance from Barcelona to Paris is 827 km.				
		Calculate the average speed of the train in kilometres	s per hour.			
			Answer(b)	km/h [3]		
			<u> </u>			

13	The scale on a map is 1: 20 000.							
	(a) Calculate the actual distance between two points which are 2.7 cm apart on the map. Give your answer in kilometres.							
	(b)	A field has an area of $64400\mathrm{m}^2$. Calculate the area of the field on the map i		Answer(a)			km	[2]
			1	Answer(b)			cm ²	[2]
14		we the equation $2x^2 + 3x - 6 = 0$. we all your working and give your answers of	correct to 2	decimal pla	ces.			

© UCLES 2011 0580/21/M/J/11

7 15 A teacher asks 36 students which musical instruments they play. $P = \{\text{students who play the piano}\}\$ $G = \{ \text{students who play the guitar} \}$ $D = \{ \text{students who play the drums} \}$ The Venn diagram shows the results. 2 8 5 (a) Find the value of x. Answer(a) x =[1] **(b)** A student is chosen at random. Find the probability that this student (i) plays the drums but **not** the guitar, Answer(b)(i)[1] (ii) plays only 2 different instruments. Answer(b)(ii) [1] (c) A student is chosen at random from those who play the guitar. Find the probability that this student plays no other instrument.

Examiner's Use

Answer(c)

- *k* cm

16



The diagram shows a square of side k cm.

The circle inside the square touches all four sides of the square.

(a) The shaded area is $A ext{ cm}^2$.

Show that $4A = 4k^2 - \pi k^2.$

Answer (a)

[2]

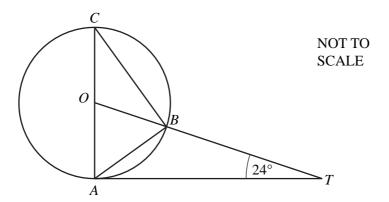
(b) Make k the subject of the formula $4A = 4k^2 - \pi k^2$.

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

© UCLES 2011 0580/21/M/J/11

17

For Examiner's Use



A, B and C are points on a circle, centre O.

TA is a tangent to the circle at A and OBT is a straight line.

AC is a diameter and angle $OTA = 24^{\circ}$.

Calculate

(a) angle AOT,

$$Answer(a)$$
 Angle $AOT =$ [2]

(b) angle ACB,

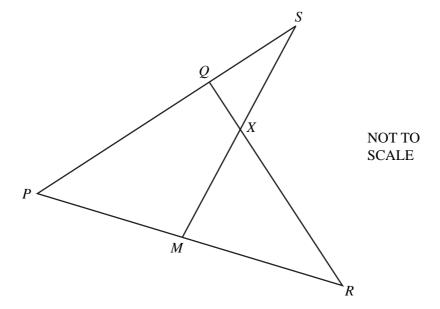
$$Answer(b)$$
 Angle $ACB =$ [1]

(c) angle ABT.

$$Answer(c) \text{ Angle } ABT =$$
 [2]

18

For Examiner's Use



In the diagram, PQS, PMR, MXS and QXR are straight lines.

PQ = 2 QS.

M is the midpoint of PR.

QX : XR = 1 : 3.

$$\overrightarrow{PQ} = \mathbf{q}$$
 and $\overrightarrow{PR} = \mathbf{r}$.

- (a) Find, in terms of q and r,
 - (i) \overrightarrow{RQ} ,

$$Answer(a)(i) \overrightarrow{RQ} =$$
 [1]

(ii) \overrightarrow{MS} .

$$Answer(a)(ii) \overrightarrow{MS} =$$
 [1]

(b) By finding \overrightarrow{MX} , show that X is the midpoint of MS.

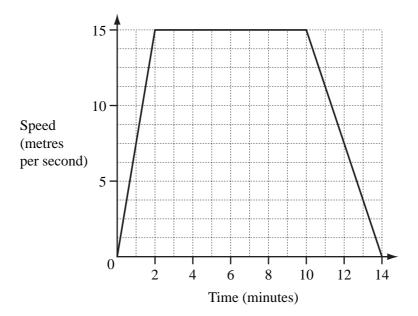
Answer (b)

[3]

© UCLES 2011 0580/21/M/J/11

19

For Examiner's Use



The diagram shows the speed-time graph of a train journey between two stations. The train accelerates for two minutes, travels at a constant maximum speed, then slows to a stop.

(a) Write down the number of seconds that the train travels at its constant maximum speed.

Answer(a) _____ s [1]

(b) Calculate the distance between the two stations **in metres**.

Answer(b) m [3]

(c) Find the acceleration of the train in the first two minutes.

Give your answer in m/s².

Answer(c) m/s^2 [2]

Question 20 is printed on the next page.

• ,	

$$f(x) = x^3$$

$$f(x) = x^3 \qquad g(x) = 2x - 3$$

Examiner's Use

- (a) Find
 - (i) g(6),

Answer(a)(i) [1]

(ii) f(2x).

Answer(a)(ii) [1]

(b) Solve fg(x) = 125.

- Answer(b) x =[3]
- (c) Find the inverse function $g^{-1}(x)$.

 $Answer(c) g^{-1}(x) =$ [2]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.