

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

CANDIDATE NAME				
CENTRE NUMBER		CANDIDATE NUMBER		
MATHEMATICS	3		0580/21	
Paper 2 (Extended)			May/June 2013	
			1 hour 30 minutes	
Candidates ansv	andidates answer on the Question Paper.			

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 a pencil for any diagrams or graphs.

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

Electronic calculator

Tracing paper (optional)

DO NOT WRITE IN ANY BARCODES.

Answer all questions.

Additional Materials:

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.



1	One January day in Munich, the temperature at noon was 3°C
	At midnight the temperature was -8° C.

Write down the difference between these two temperatures.

Answer		°C	ſ11
IIIIIVCI	•••••		[T]

2 (a) Calculate $\sqrt{5.7} - 1.03^2$.

Write down all the numbers displayed on your calculator.

Answer(a) [1]

(b) Write your answer to **part (a)** correct to 3 decimal places.

Answer(b) [1]

3 Pedro and Eva do their homework.

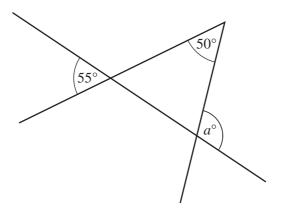
Pedro takes 84 minutes to do his homework.

The ratio Pedro's time : Eva's time = 7 : 6.

Work out the number of minutes Eva takes to do her homework.

Answer min [2]

4



NOT TO SCALE

Use the information in the diagram to find the value of a.

$$Answer\ a = \dots [2]$$

© UCLES 2013

5 Show that $1\frac{1}{2} \div \frac{3}{16} = 8$.

For Examiner's Use

Do not use a calculator and show all the steps of your working.

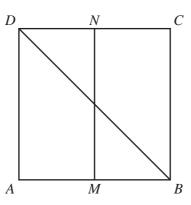
Answer

[2]

6 Factorise completely.

$$12xy - 3x^2$$

7



The diagram shows a square *ABCD*. *M* is the midpoint of *AB* and *N* is the midpoint of *CD*.

(a) Complete the statement.

The line MN is the locus of points inside the square which are

.....[1]

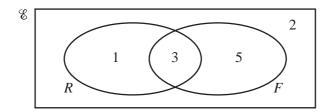
(b) Shade the region inside the square containing points which are nearer to *AB* than to *BC* **and** nearer to *A* than to *B*.

[1]

8	Solve the inequality. $3x - 1 \le 11x + 2$
	Answer [2]
9	An equilateral triangle has sides of length 16.1 cm, correct to the nearest millimetre.
	Find the lower and upper bounds of the perimeter of the triangle.
	Answer Lower bound = cm
	Upper bound = cm [2]
10	Factorise completely. $ap + bp - 2a - 2b$
	Answer [2]
11	Write $(27x^{12})^{\frac{1}{3}}$ in its simplest form.
	Answer [2]

© UCLES 2013 0580/21/M/J/13

12



For Examiner's Use

11 students are asked if they like rugby (R) and if they like football (F). The Venn diagram shows the results.

(a) A student is chosen at random.

What is the probability that the student likes rugby and football?

Answer(a)		[]	1]
-----------	--	----	---	---

(b) On the Venn diagram shade the region $R' \cap F'$.

[1]

13 Martina changed 200 Swiss francs (CHF) into euros (€). The exchange rate was €1 = 1.14 CHF.

Calculate how much Martina received. Give your answer correct to the nearest euro.

14 Bruce invested \$420 at a rate of 4% per year compound interest.

Calculate the **total** amount Bruce has after 2 years. Give your answer correct to 2 decimal places.

Answer \$......[3]

15	A sphere has a volume of 80 cm ³ .				
	Calculate the radius of the sphere. [The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]				
	3 3				
	Answer cm [3]				
16	A water pipe has a circular cross section of radius 0.75 cm. Water flows through the pipe at a rate of 16 cm/s.				
16					
16	Water flows through the pipe at a rate of 16 cm/s.				
16	Water flows through the pipe at a rate of 16 cm/s.				
16	Water flows through the pipe at a rate of 16 cm/s.				
16	Water flows through the pipe at a rate of 16 cm/s.				
16	Water flows through the pipe at a rate of 16 cm/s.				
16	Water flows through the pipe at a rate of 16 cm/s.				
16	Water flows through the pipe at a rate of 16 cm/s.				
16	Water flows through the pipe at a rate of 16 cm/s.				
16	Water flows through the pipe at a rate of 16 cm/s.				

© UCLES 2013 0580/21/M/J/13

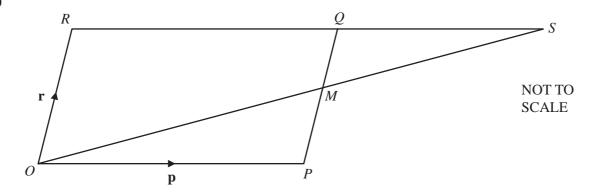
17	Find the equation of the line passing through the points $(0, -1)$ and $(3, 5)$.			
			Answer[3]	
18	(a) Factorise	$x^2 + x - 30$		
10	(a) I actorise	x + x - 30.		
			$Answer(a) \qquad [2]$	
	(I) (I' 1'C	(x-5)(x+4)		
	(b) Simplify	$\frac{(x-5)(x+4)}{x^2+x-30}.$		
			Answer(b)[1]	

19 t varies inversely as the square root of u. t = 3 when u = 4. For Examiner's Use

Find t when u = 49.

$$Answer t = \dots [3]$$

20



OPQR is a parallelogram, with *O* the origin.

M is the midpoint of PQ.

OM and RQ are extended to meet at S.

$$\overrightarrow{OP} = \mathbf{p}$$
 and $\overrightarrow{OR} = \mathbf{r}$.

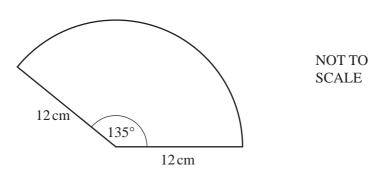
- (a) Find, in terms of **p** and **r**, in its simplest form,
 - (i) \overrightarrow{OM} ,

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

(ii) the position vector of S.

(b) When $\overrightarrow{PT} = -\frac{1}{2}\mathbf{p} + \mathbf{r}$, what can you write down about the position of T?

21



For Examiner's Use

PMT

The diagram shows a sector of a circle of radius 12 cm with an angle of 135°.

Calculate the perimeter of the sector.

Answer	 cm	[3]

22 Write as a single fraction in its simplest form.

$$\frac{2}{x+3} + \frac{3}{x+2}$$

For

Examiner's

Use

23

C6cm NOT TO **SCALE** 5 cm В

The diagram shows a triangular prism of length 12 cm.

Triangle ABC is a cross section of the prism.

Angle $BAC = 90^{\circ}$, AC = 6 cm and AB = 5 cm.

Calculate the angle between the line *CE* and the base *ABED*.

 $12\,\mathrm{cm}$

Answer	 [4]

24
$$\mathbf{A} = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \quad \mathbf{B} = \begin{pmatrix} 4 & 3 \\ 1 & 2 \end{pmatrix}$$

Find

(a) **AB**,

$$Answer(a) \mathbf{AB} = [2]$$

(b) B^{-1} , the inverse of **B**.

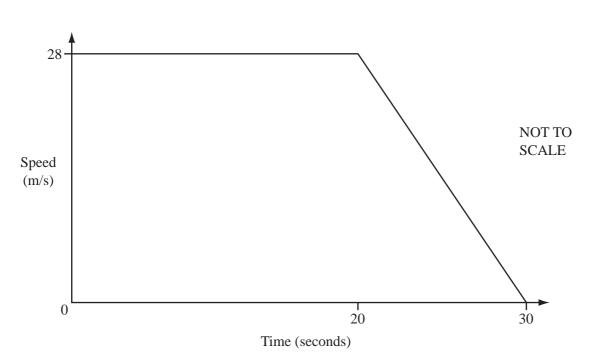
$$Answer(b) \mathbf{B}^{-1} = [2]$$

© UCLES 2013 0580/21/M/J/13

For

Examiner's Use

25



The diagram shows the speed-time graph of a car. It travels at $28\,\text{m/s}$ for 20 seconds and then decelerates until it stops after a further 10 seconds.

(a) Calculate the deceleration of the car.

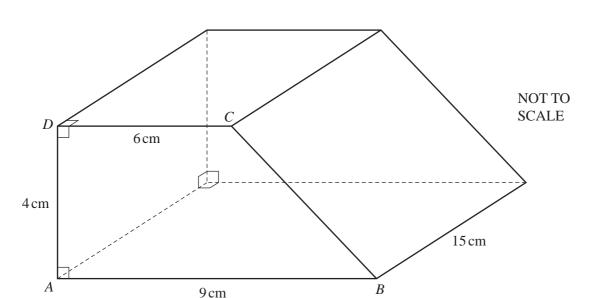
Answer(a) m/s² [1]

(b) Calculate the distance travelled during the 30 seconds.

Answer(b) m [3]

Question 26 is printed on the next page.

26



For Examiner's Use

The diagram shows a solid prism of length 15 cm. The cross section of the prism is the trapezium ABCD. Angle DAB = angle CDA = 90°. AB = 9 cm, DC = 6 cm and AD = 4 cm.

Calculate the **total** surface area of the prism.

Answer cm² [5]

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.