



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

			2 hours 30 minutes	
Paper 4 (Exten	ided)	May/June 2		
MATHEMATIC	es		0580/04, 0581/04	
CENTRE NUMBER		CANDIDATE NUMBER		
CANDIDATE NAME				

Geometrical instruments

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 soft pencil for any diagrams or graphs.

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

Electronic calculator

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 130.

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This document consists of 19 printed pages and 1 blank page.



[Turn over

1

Ma	Marcus receives \$800 from his grandmother.							
(a)	Не	decides to spend \$150 and to divide the remaining \$650 in the ratio						
	Cal	savings: holiday = 9:4. culate the amount of his savings.						
		Answer(a) \$	[2]					
(b)	(i)	He uses 80% of the \$150 to buy some clothes.	[-]					
(6)	(1)	Calculate the cost of the clothes.						
		Answer(b)(i) \$	[2]					
	(ii)	The money remaining from the \$150 is $37\frac{1}{2}$ % of the cost of a day trip to Cairo.						
		Calculate the cost of the trip.						
		Answer(b)(ii) \$	[2]					
(c)	(i)	Marcus invests \$400 of his savings for 2 years at 5% per year compound interest.						
		Calculate the amount he has at the end of the 2 years.						
		Answer(c)(i) \$	[2]					
	(ii)	Marcus's sister also invests \$400, at $r\%$ per year simple interest. At the end of 2 years she has exactly the same amount as Marcus.						
		Calculate the value of r .						
		Calculate the value of 7.						
			[2]					
		Answer(c)(ii) r =	[3]					

2 A normal die, numbered 1 to 6, is rolled 50 times.



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The results are shown in the frequency table.

Score	1	2	3	4	5	6
Frequency	15	10	7	5	6	7

Answer(a)	Γ1
Aliswel (u)	1

(b) Find the median score.

$$Answer(b)$$
 [1]

(c) Calculate the mean score.

$$Answer(c)$$
 [2]

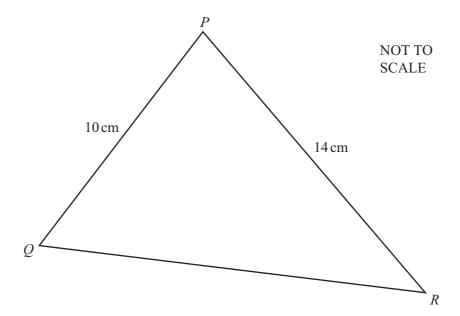
(d) The die is then rolled another 10 times.

The mean score for the 60 rolls is 2.95.

Calculate the mean score for the extra 10 rolls.

 $Answer(d) \qquad [3]$

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In triangle PQR, angle QPR is acute, PQ = 10 cm and PR = 14 cm.

(a) The area of triangle PQR is 48 cm^2 .

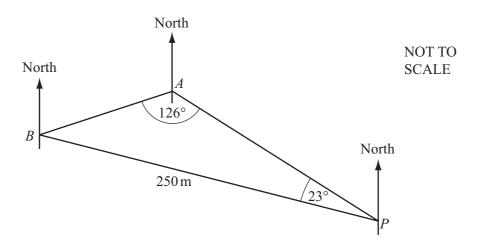
Calculate angle *QPR* and show that it rounds to 43.3°, correct to 1 decimal place. You must show all your working.

Answer (a)

[3]

(b) Calculate the length of the side QR.

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The diagram shows three straight horizontal roads in a town, connecting points P, A and B.

PB = 250 m, angle $APB = 23^{\circ}$ and angle $BAP = 126^{\circ}$.

(a) Calculate the length of the road AB.

Answer(a) AB = m [3]

(b) The bearing of A from P is 303° .

Find the bearing of

(i) B from P,

 $Answer(b)(i) \qquad \qquad [1]$

(ii) *A* from *B*.

Answer(b)(ii) [2]

5 (a) The table shows some values for the equation $y = \frac{x}{2} - \frac{2}{x}$ for $-4 \le x \le -0.5$ and $0.5 \le x \le 4$.

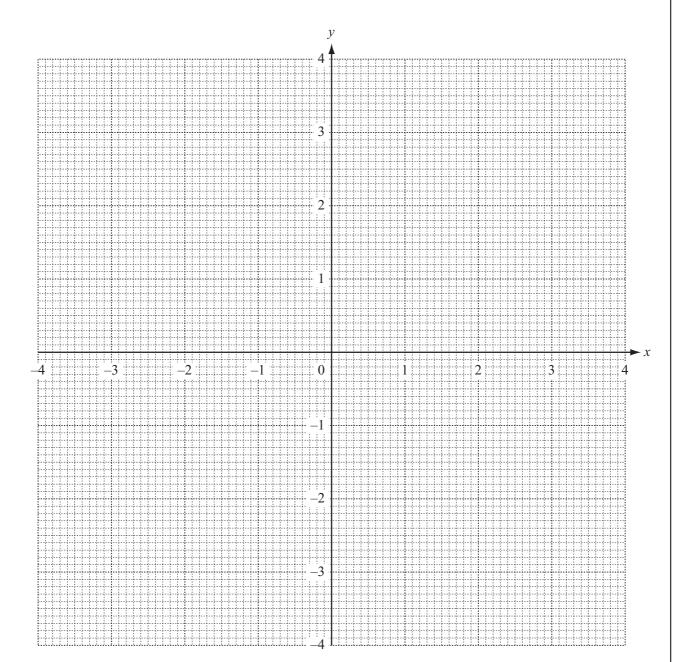
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х	-4	-3	-2	-1.5	-1	-0.5	0.5	1	1.5	2	3	4
у	-1.5	-0.83	0	0.58			-3.75		-0.58	0	0.83	1.5

(i) Write the missing values of y in the empty spaces.

[3]

(ii) On the grid, draw the graph of $y = \frac{x}{2} - \frac{2}{x}$ for $-4 \le x \le -0.5$ and $0.5 \le x \le 4$.



[5]

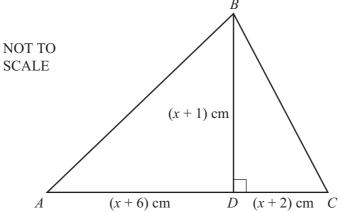
	7	
(b) Us	e your graph to solve the equation $\frac{x}{2} - \frac{2}{x} = 1$.	
(c) (i)	Answer(b) $x =$ or $x =$ By drawing a tangent, work out the gradient of the graph where $x = 2$.	[2]
(ii)	Answer(c)(i)	[3]
	Answer(c)(ii)	[1]
(d) (i)	On the grid, draw the line $y = -x$ for $-4 \le x \le 4$.	[1]
(ii)	Use your graphs to solve the equation $\frac{x}{2} - \frac{2}{x} = -x$.	
	Answer(d)(ii) x =	[2]

(e) Write down the equation of a straight line which passes through the origin and does not intersect the graph of $y = \frac{x}{2} - \frac{2}{x}$.

> Answer(e) [2]

6 (a)

B Examiner's Use



In triangle ABC, the line BD is perpendicular to AC.

AD = (x + 6) cm, DC = (x + 2) cm and the height BD = (x + 1) cm.

The area of triangle ABC is $40 \,\mathrm{cm}^2$.

(i) Show that $x^2 + 5x - 36 = 0$.

Answer (a)(i)

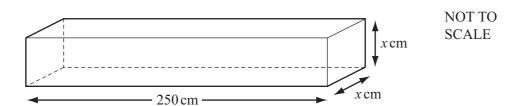
[3]

(ii) Solve the equation $x^2 + 5x - 36 = 0$.

(iii) Calculate the length of BC.

Answer(a)(iii) BC = cm [2]

(b)	Am	mira takes 9 hours 25 minutes to complete a long walk.					
	(i)	Show that the time of 9 hours 25 minutes can be written as $\frac{113}{12}$ hours.					
		Answer (b)(i)					
			[1]				
	(ii)	She walks $(3y + 2)$ kilometres at 3 km/h and then a further $(y + 4)$ kilometres at 2 km/h.					
		Show that the total time taken is $\frac{9y+16}{6}$ hours.					
		Answer(b)(ii)					
			[2]				
((iii)	Solve the equation $\frac{9y+16}{6} = \frac{113}{12}$.					
·		6 12					
	(iv)	Answer(b)(iii) y = Calculate Amira's average speed, in kilometres per hour, for the whole walk.	[2]				
•	(1V <i>)</i>	Calculate Allina's average speed, in knomenes per nour, for the whole walk.					
		Answer(b)(iv) km/h	[3]				
		$Answer(b)(iv) \qquad km/h$	ارا				



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A solid metal bar is in the shape of a cuboid of length of 250 cm. The cross-section is a square of side x cm.

The volume of the cuboid is 4840 cm³.

Answer (a)

[2]

(b) The mass of 1 cm³ of the metal is 8.8 grams. Calculate the mass of the whole metal bar in kilograms.

Answer(b) kg [2]

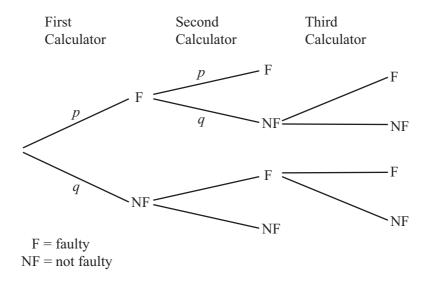
(c) A box, in the shape of a cuboid measures 250 cm by 88 cm by h cm.120 of the metal bars fit exactly in the box.Calculate the value of h.

Answer(c) h = [2]

(d)	One metal bar, of volume 4840 cm ³ , is melted down to make 4200 identical small spheres.						
	All	the metal is used.					
	(i)	Calculate the radius of each sphere. Show that your answer rounds to 0.65 cm, correct to 2 decimal places. [The volume, V , of a sphere, radius r , is given by $V = \frac{4}{3}\pi r^3$.] Answer(d)(i)					
	(ii)	Calculate the surface area of each sphere, using 0.65 cm for the radius. [The surface area, A , of a sphere, radius r , is given by $A = 4\pi r^2$.]					
		$Answer(d)(ii) \qquad \qquad cm^2 [1]$					
((iii)	Calculate the total surface area of all 4200 spheres as a percentage of the surface area of the metal bar.					
		<i>Answer(d)</i> (iii) % [4]					

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The tree diagram shows a testing procedure on calculators, taken from a large batch.

Each time a calculator is chosen at random, the probability that it is faulty (F) is $\frac{1}{20}$.

(a) Write down the values of p and q.

$$Answer(a) p = \qquad \text{and } q = \qquad [1]$$

(b) Two calculators are chosen at random.

Calculate the probability that

(i) both are faulty,

(ii) exactly one is faulty.

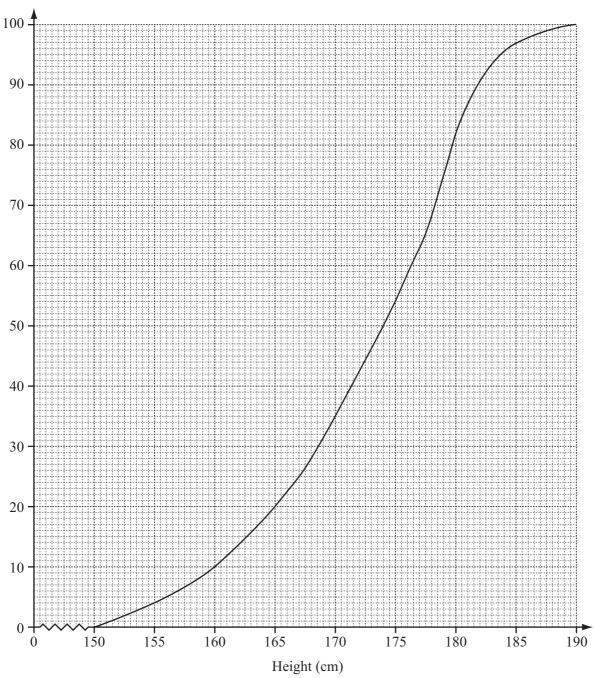
(c)	If exactly one out of two calculators tested is faulty, then a third calculator is chosen at random.					
	Calculate the is faulty.	e probability that exactly one of the first	two calculator	rs is faulty and the third	l one	
			Answer(c)		[2]	
(d)	The whole ba	atch of calculators is rejected if the first two chosen are both faulty if a third one needs to be chosen and it i	is faulty.			
	Calculate the	e probability that the whole batch is reject	ted.			
			Answer(d)		[2]	
(e)	In one month	n, 1000 batches of calculators are tested in	n this way.			
	How many b	patches are expected to be rejected?				
			Answer(e)		[1]	

9 The heights of 100 students are measured.

The results have been used to draw this cumulative frequency diagram.

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			15			
(a) l	Find					
((i) the median he	ight,				
	.,		4 10	gwar(a)(i)		om [1]
	••> 4 1		An	swer(a)(i)		cm [1]
(1	ii) the lower quan	rtile,				
			An	swer(a)(ii)		cm [1]
(i	ii) the inter-quart	tile range,				
			An	swer(a)(iii)		cm [1]
(i	v) the number of	students with a he	ight greater than 1	77 cm.		
			An	swer(a)(iv)		[2]
b) [The frequency tabl	e shows the inform	nation about the 10	0 students who	were measured.	
	Height (h cm)	$150 < h \le 160$	$160 < h \le 170$	$170 < h \le 13$	$80 180 < h \le 1$.90
	Frequency			47	18	
((i) Use the cumu	lative frequency di	agram to complete	the table abov	e.	[1]
(ii) Calculate an e	estimate of the mea	n height of the 100	students.		
			Answer	(h)(ii)		cm [A
			Answer	(<i>U)</i> (11)		cm [4]

		16				
10		f(x) = 2x - 1	$g(x) = x^2 + 1$	h(x) =	= 2 ^x	
	(a) Fin	nd the value of				
	(i)	$f\left(-\frac{1}{2}\right)$,				
				Answer(a)(i)		[1]
	(ii)	g(-5),				
				Answer(a)(ii)		[1]
	(iii)	h(-3).				
			A	nswer(a)(iii)		[1]
	(b) Fin	and the inverse function $f^{-1}(x)$).			
			,	a		50 3
			Answei	$r(b) f^{-1}(x) =$		[2]
	(c) g(x Fin	z = z. ad x in terms of z.				
			4	ngwar(a) v =		[2]
			Α	nswer(c) x =		[2]
	(d) Fin	and $gf(x)$, in its simplest form.				

Answer(d) gf(x) =[2]

(e) h(x) = 512. Find the value of x.

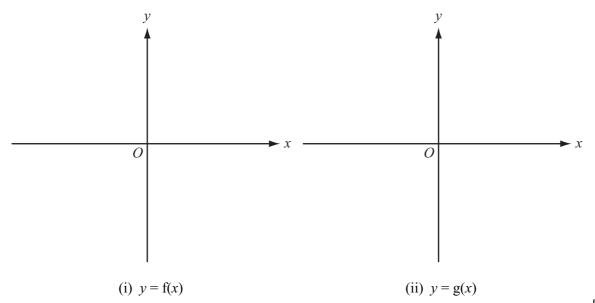
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Answer(e) x = [1]

(f) Solve the equation 2f(x) + g(x) = 0, giving your answers correct to 2 decimal places.

 $Answer(f) \quad x = \qquad \qquad \text{or } x = \qquad \qquad [5]$

- (g) Sketch the graph of
 - (i) y = f(x),
 - **(ii)** y = g(x).



[3]

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				•	
			•	• •	
		•	• •	• • •	
•	,	• •	• • •	• • • •	
Diagra	am 1	Diagram 2	Diagram 3	Diagram 4	
		ns in a sequence are by the number of dot	1, 3, 6 and 10.	ve.	
(a) Wr	rite down t	the next four terms i	in the sequence.		
			Answer(a) , ,	2	[2]
(b) (i)			ntive terms 3 and 6 is 9. Itive terms 6 and 10 is 16.		
	Comple	te the following stat	ements using different pair	rs of terms.	
	The sun	n of the two consecu	utive terms and	is	

(ii) What special name is given to these sums?

Answer(b)(ii) _____[1]

[1]

(c) (i) The formula for the *n*th term in the sequence 1, 3, 6, 10... is $\frac{n(n+1)}{k}$, where *k* is an integer.

The sum of the two consecutive terms and is . . .

Find the value of k.

Answer(c)(i) k = [1]

(ii)	Test your formula when $n = 4$, showing your working .					
	Answer (c)(ii)					
		[1]				
(iii)	Find the value of the 180th term in the sequence.					
	Answer(c)(iii)	[1]				
(d) (i)	Show clearly that the sum of the <i>n</i> th and the $(n + 1)$ th terms is $(n + 1)^2$.					
	Answer $(d)(i)$					
		[3]				
(ii)	Find the values of the two consecutive terms which have a sum of 3481.					
	Answer(d)(ii) and	[2]				

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