

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

VS ATTACON TO THE TOTAL CONTROL OF THE TOTAL CONTRO





MATHEMATICS Paper 4 (Extended) 0580/41

May/June 2011

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials:

Electronic calculator

Mathematical tables (optional)

Geometrical instruments Tracing paper (optional)

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 130.

This document consists of 16 printed pages.



1 A school has a sponsored swim in summer and a sponsored walk in winter. In 2010, the school raised a total of \$1380.

The ratio of the money raised in summer: winter = 62:53.

(a) (i) Show clearly that \$744 was raised by the swim in summer.

Answer (a)(i)

[1]

(ii) Alesha's swim raised \$54.10. Write this as a percentage of \$744.

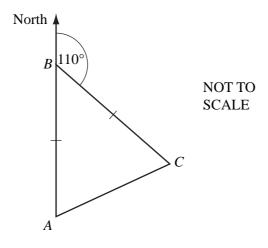
Answer(a)(ii) %[1]

(iii) Bryan's swim raised \$31.50. He received 75 cents for each length of the pool which he swam.

Calculate the number of lengths Bryan swam.

Answer(a)(iii) [2]

(b) The route for the **sponsored walk in winter** is triangular.



(i) Senior students start at A, walk North to B, then walk on a bearing 110° to C. They then return to A.

AB = BC.

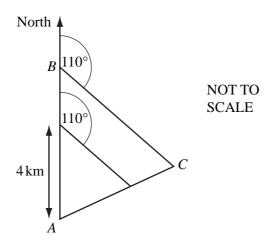
Calculate the bearing of A from C.

[3] Answer(b)(i)

**www.xtrapapers.com

For iner's

(ii)



 $AB = BC = 6 \,\mathrm{km}$.

Junior students follow a **similar** path but they only walk 4 km North from A, then 4 km on a bearing 110° before returning to A.

Senior students walk a total of 18.9 km.

Calculate the distance walked by junior students.

Answer(b)(ii)	km	[3]	ı

(c) The total amount, \$1380, raised in 2010 was 8% less than the total amount raised in 2009.

Calculate the total amount raised in 2009.

Answer(c) \$ _____ [3]

[3]

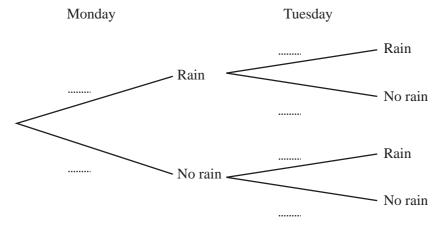
2 In this question give all your answers as fractions.

The probability that it rains on Monday is $\frac{3}{5}$.

If it rains on Monday, the probability that it rains on Tuesday is $\frac{4}{7}$.

If it does not rain on Monday, the probability that it rains on Tuesday is $\frac{5}{7}$.

(a) Complete the tree diagram.



- **(b)** Find the probability that it rains
 - (i) on both days,

(ii) on Monday but not on Tuesday,

$$Answer(b)(ii)$$
 [2]

(iii) on only one of the two days.

(c) If it does not rain on Monday and it does not rain on Tuesday, the probability that it does not rain on Wednesday is $\frac{1}{4}$.

Calculate the probability that it rains on at least one of the three days.

Answer(c) [3]

3 (a) p varies inversely as (m+1).

When
$$p = 4$$
, $m = 8$.

Find the value of p when m = 11.

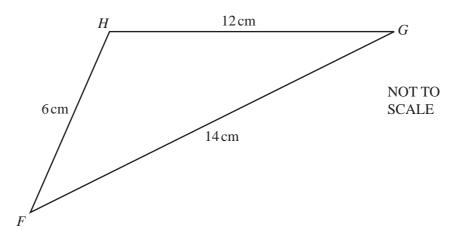
$$Answer(a) p =$$
 [3]

(b) (i) Factorise $x^2 - 25$.

(ii) Simplify $\frac{2x^2 + 11x + 5}{x^2 - 25}$.

(c) Solve the inequality 5(x-4) < 3(12-x).

4 (a)



The diagram shows triangle FGH, with FG = 14 cm, GH = 12 cm and FH = 6 cm.

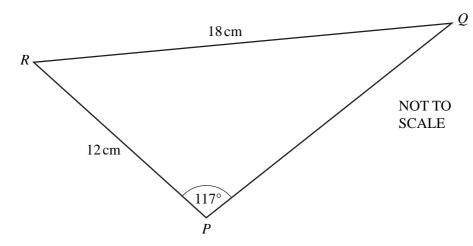
(i) Calculate the size of angle *HFG*.

$$Answer(a)(i) Angle HFG =$$
 [4]

(ii) Calculate the area of triangle *FGH*.

Answer(a)(ii) cm² [2]

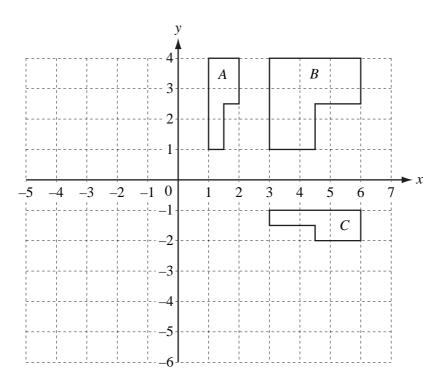
(b)



The diagram shows triangle PQR, with RP = 12 cm, RQ = 18 cm and angle $RPQ = 117^{\circ}$. Calculate the size of angle *RQP*.

> Answer(b) Angle RQP =[3]

5



(a	On the	grid	above,	draw	the	image	of
•	/		0					

(i)	shape A after translation by the vector	$\begin{pmatrix} -3 \\ -2 \end{pmatrix}$,
-----	---	--

[2]

[2]

(ii) shape A after reflection in the line
$$x = -1$$
.

(b) Describe fully the **single** transformation which maps

(i) shape A onto shape B,

Answer(b)(i) [3]

(ii) shape A onto shape C.

Answer(b)(ii) [3]

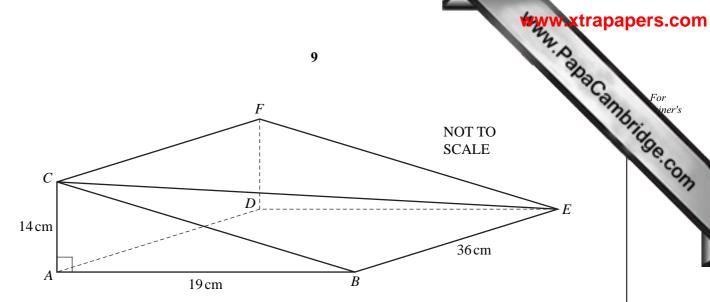
(c) Find the matrix representing the transformation which maps shape A onto shape B.

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

(d) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$.

Answer(d) [3]

6



In the diagram, ABCDEF is a prism of length 36 cm. The cross-section ABC is a right-angled triangle. $AB = 19 \,\mathrm{cm}$ and $AC = 14 \,\mathrm{cm}$.

Calculate

(a) the length BC,

(b) the total surface area of the prism,

Answer(b)
$$cm^2$$
 [4]

(c) the volume of the prism,

Answer(c)
$$cm^3$$
 [2]

(d) the length CE,

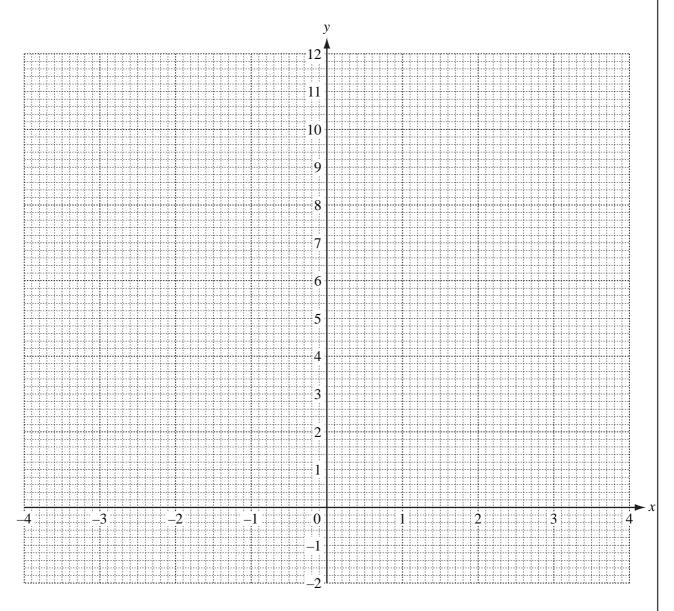
(e) the angle between the line CE and the base ABED.

(a) Complete the table of values for the equation $y = \frac{4}{x^2}$, $x \neq 0$.

Comple	ete the ta	ble of va	lues for	the equat	10	$\frac{4}{x^2}$	- , <i>x</i> ≠	0.		***	w xtra	For iner's
х	-4	-3	-2	-1	-0.6		0.6	1	2	3	4	Se. COM
у	0.25	0.44			11.11			4.00		0.44		

[3]

(b) On the grid, draw the graph of $y = \frac{4}{x^2}$ for $-4 \le x \le -0.6$ and $0.6 \le x \le 4$.



y wv	Axtra	pa	pers	s.co	m
2					

(c) Use your graph to solve the equation $\frac{4}{x^2} = 6$.

Original

(d) By drawing a suitable tangent, estimate the gradient of the graph where x = 1.5.

Answer(d) [3]

(e) (i) The equation $\frac{4}{x^2} - x + 2 = 0$ can be solved by finding the intersection of the graph of $y = \frac{4}{x^2}$ and a straight line.

Write down the equation of this straight line.

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

- (ii) On the grid, draw the straight line from your answer to **part** (e)(i). [2]
- (iii) Use your graphs to solve the equation $\frac{4}{x^2} x + 2 = 0$.

$$Answer(e)(iii) x =$$
 [1]

The table below shows the marks scored by a group of students in a test. 8

e table below	v shows the	e marks sco	ored by a g	12 roup of stu	idents in a 1	test.	100	W Xtra	For iner's
Mark	11	12	13	14	15	16	17	18	Montage iner's
Frequency	10	8	16	11	7	8	6	9	Se.Co

(a) Find the mean, median and mode.

(b) The table below shows the time (*t* minutes) taken by the students to complete the test.

Time (t)	$0 < t \le 10$	$10 < t \le 20$	$20 < t \le 30$	$30 < t \le 40$	$40 < t \le 50$	$50 < t \le 60$
Frequency	2	19	16	14	15	9

(i) Cara rearranges this information into a new table.

Complete her table.

Time (t)	$0 < t \le 20$	$20 < t \le 40$	$40 < t \le 50$	$50 < t \le 60$
Frequency				9

[2]

(ii) Cara wants to draw a histogram to show the information in **part** (b)(i).

Complete the table below to show the interval widths and the frequency densities.

	$0 < t \le 20$	$20 < t \le 40$	$40 < t \le 50$	$50 < t \le 60$
Interval width				10
Frequency density				0.9

[3]

(a)	Some of the students wer	a actual harr	much time the	r anont rorigina	for the test
(C)	Some of the students wer	e askeu now	much time the	v speni revising	TOT THE TEST.
\- /				J	,

revised for 10 students revised for 2.5 hours, 12 students revised for 3 hours and n students revised for 4 hours.

The mean time that **these** students spent revising was 3.1 hours.

Find *n*.

Show all your working.

Answer(c) n =	[4]

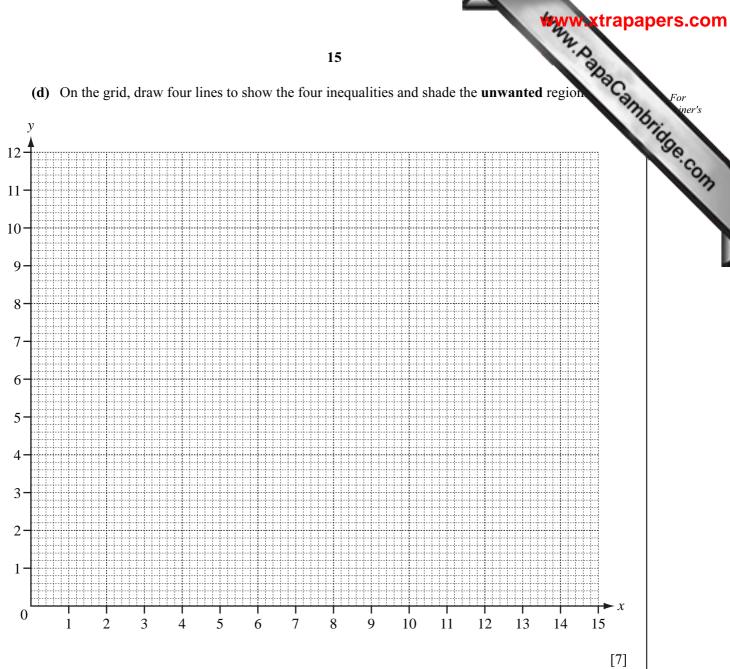
9

Answer(c)

/ww	xtra	pap	ers	.con
1/2				

_		30
Pet	er wants to plant x plum trees and y apple trees.	0
Не	wants at least 3 plum trees and at least 2 apple trees.	
(a)	Write down one inequality in x and one inequality in y to represent these conditions.	
	Answer(a) ,	[2]
(b)	There is space on his land for no more than 9 trees.	
	Write down an inequality in x and y to represent this condition.	
	Answer(b)	[1]
(c)	Plum trees cost \$6 and apple trees cost \$14.	
	Peter wants to spend no more than \$84.	
	Write down an inequality in x and y and show that it simplifies to $3x + 7y \le 42$	

[1]



(e) Calculate the smallest cost when Peter buys a total of 9 trees.

Answer(e) \$ [2]

Question 10 is printed on the next page.

[5]

The first and the *n*th terms of sequences *A*, *B* and *C* are shown in the table below.

(a) Complete the table for each sequence.

irst and the <i>n</i> th		•	16 and <i>C</i> are sho	own in the ta	ble below.	WHAN. P. A.	trapapers BC BINDHIODE	r ner's
	1st term	2nd term	3rd term	4th term	5th term	<i>n</i> th term		CON
Sequence A	1					n^3] `	
Sequence B	4					4 <i>n</i>		
Sequence C	4					$(n+1)^2$	1	

(b)	Find
(\mathbf{v}_{i})	1 1114

(i) the 8th term of sequence A,

Answer(b)(i)	 [1]

(ii) the 12th term of sequence C.

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

(c) (i) Which term in sequence A is equal to 15 625?

Answer(c)(i)	[1]

(ii) Which term in sequence C is equal to 10000?

$$Answer(c)(ii) \qquad [1]$$

(d) The first four terms of sequences D and E are shown in the table below.

Use the results from part (a) to find the 5th and the nth terms of the sequences D and E.

	1st term	2nd term	3rd term	4th term	5th term	nth term
Sequence D	5	16	39	80		
Sequence E	0	1	4	9		

[4]

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.