

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

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General Certificate of Secondary Education
June 2005



MATHEMATICS (SPECIFICATION A) 3301/2I
Intermediate Tier
Paper 2 Calculator

Wednesday 15 June 2005 9.00 am to 11.00 am

<p>In addition to this paper you will require:</p> <ul style="list-style-type: none"> • a calculator • mathematical instruments. 	
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For Examiner's Use	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
TOTAL	
Examiner's Initials	

Time allowed: 2 hours

Instructions

- Use blue or black ink or ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this booklet.
- If your calculator does not have a π button, take the value of π to be 3.14 unless otherwise instructed in the question.

Information

- The maximum mark for this paper is 100.
- Mark allocations are shown in brackets.
- Additional answer paper, graph paper and tracing paper will be issued on request and must be tagged securely to this answer booklet.
- You are expected to use a calculator where appropriate.

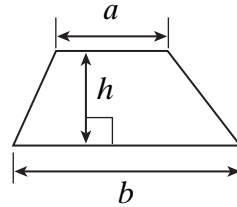
Advice

- In all calculations, show clearly how you work out your answer.

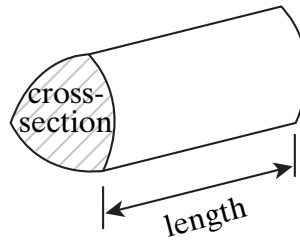
Formulae Sheet: Intermediate Tier

You may need to use the following formulae:

Area of trapezium = $\frac{1}{2}(a+b)h$



Volume of prism = area of cross-section \times length



Answer **all** questions in the spaces provided.

1 (a) Calculate $2.7^2 + \sqrt{3.5}$

.....

Answer (1 mark)

(b) Calculate the cube of 4.2

.....

Answer (1 mark)

(c) A drink in Japan costs 374 yen.
The exchange rate is £1 = 189 yen.
What is the cost in pounds?

.....

.....

Answer £ (2 marks)

2 The ticket prices for a river cruise are

Adult	£7
Child	£5
Family	£20

A family ticket can be used for up to 2 adults and up to 3 children.

(a) How much does a family of 2 adults and 3 children save by buying a family ticket?

.....

.....

Answer £ (2 marks)

(b) A family of 1 adult and 4 children go on the river cruise.
Work out the cheapest price they could pay.

.....

.....

.....

Answer £ (2 marks)



Turn over ►

3 Ali is x cm tall.

- (a) Suki is 5 cm taller than Ali.
Write down an expression in x for Suki's height.

.....

Answer cm (1 mark)

- (b) Ali's sister is 2 cm shorter than Ali.
Write down an expression in x for the height of Ali's sister.

.....

Answer cm (1 mark)

- (c) Ali's father is twice as tall as Ali.
Write down an expression in x for the height of Ali's father.

.....

Answer cm (1 mark)

- (d) Darius has a height, in cm, given by the expression $2x - 65$
He is 115 cm tall.

Solve the equation

$$2x - 65 = 115$$

to find Ali's height.

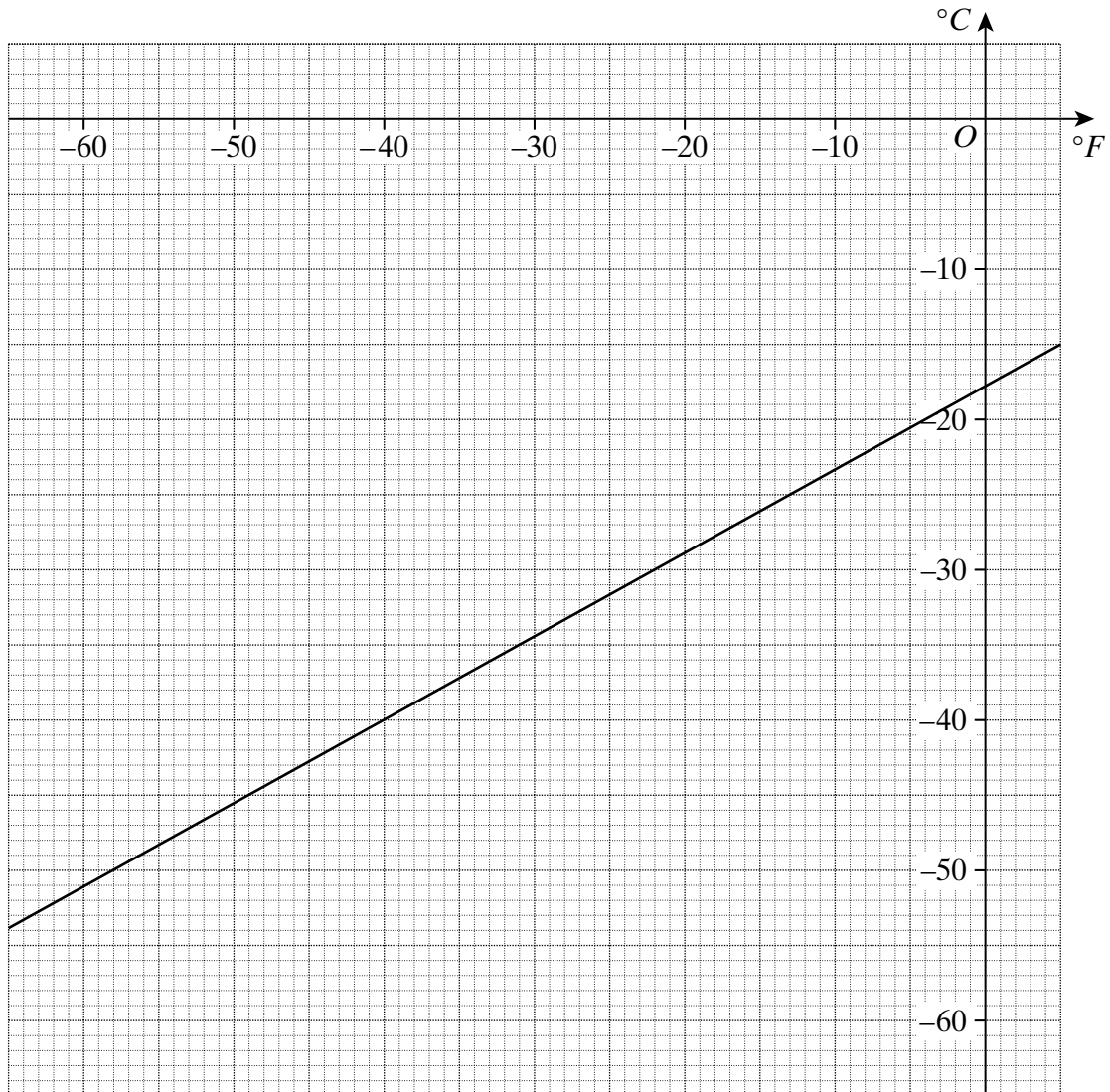
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Answer cm (2 marks)

- 4 The graph is used to convert negative temperatures between $^{\circ}\text{F}$ and $^{\circ}\text{C}$.



- (a) Use the graph to convert -10°F into $^{\circ}\text{C}$.

.....

Answer $^{\circ}\text{C}$ (1 mark)

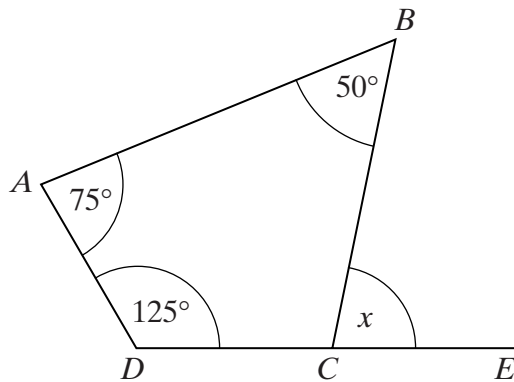
- (b) Use the graph to convert -50°C into $^{\circ}\text{F}$.

.....

Answer $^{\circ}\text{F}$ (1 mark)

Turn over ►

- 5 (a) $ABCD$ is a quadrilateral.
The side DC is extended to E .



Not drawn accurately

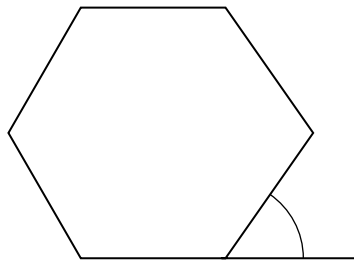
Work out the value of x .

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.....

Answer degrees (3 marks)

- (b) Calculate the size of the exterior angle of a regular hexagon.



Not drawn accurately

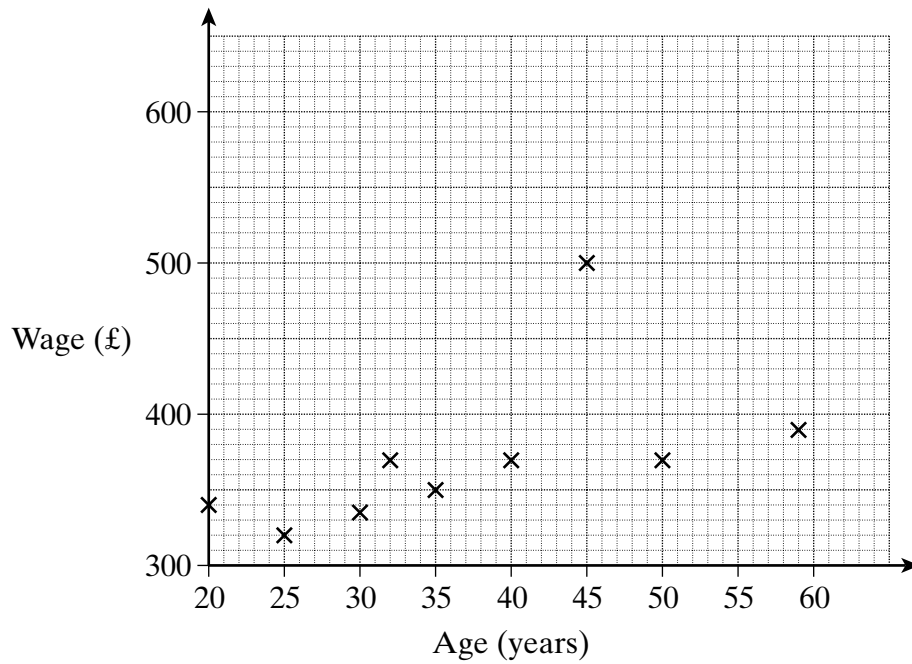
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Answer degrees (2 marks)

6 The ages and weekly wages of the 9 employees in a small company are shown.



(a) Write down one way in which the graph is misleading.

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.....

(1 mark)

(b) The manager, who is 45 years old, has his weekly wage increased from £500 to £600.

(i) Will this alter the median wage of the 9 employees?

Explain your answer.

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.....

(1 mark)

(ii) Will this alter the modal wage of the 9 employees?

Explain your answer.

.....

.....

(1 mark)

Turn over ►

7 The properties of 4 quadrilaterals are shown in the table.

Shape	Lines of symmetry	Order of rotational symmetry	Diagonals of equal length
A	4	4	Yes
B	2	2	Yes
C	2	2	No
D	0	2	No

Complete these statements by filling in the letter in each case.

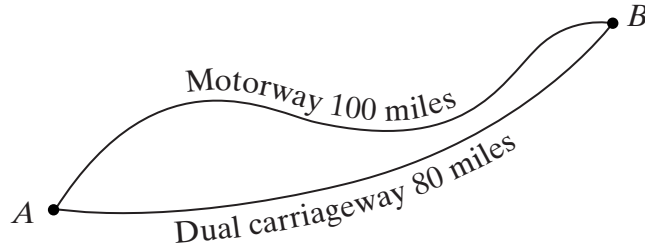
A square is described by shape

A parallelogram is described by shape

A rectangle is described by shape

(3 marks)

- 8 Two towns, *A* and *B*, are connected by a motorway of length 100 miles and a dual carriageway of length 80 miles as shown.



Jack travels from *A* to *B* along the motorway at an average speed of 60 mph.
Fred travels from *A* to *B* along the dual carriageway at an average speed of 50 mph.
What is the difference in time between the two journeys?
Give your answer in minutes.

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.....
.....
.....

Answer minutes (4 marks)

TURN OVER FOR THE NEXT QUESTION

9 The number of goals scored in 15 hockey matches is shown in the table.

Number of goals	Number of matches
1	2
3	1
5	5
6	3
9	4

Calculate the mean number of goals scored.

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.....

.....

Answer goals (3 marks)

10 Work out the value of $\frac{2}{5} + \frac{1}{4}$

.....

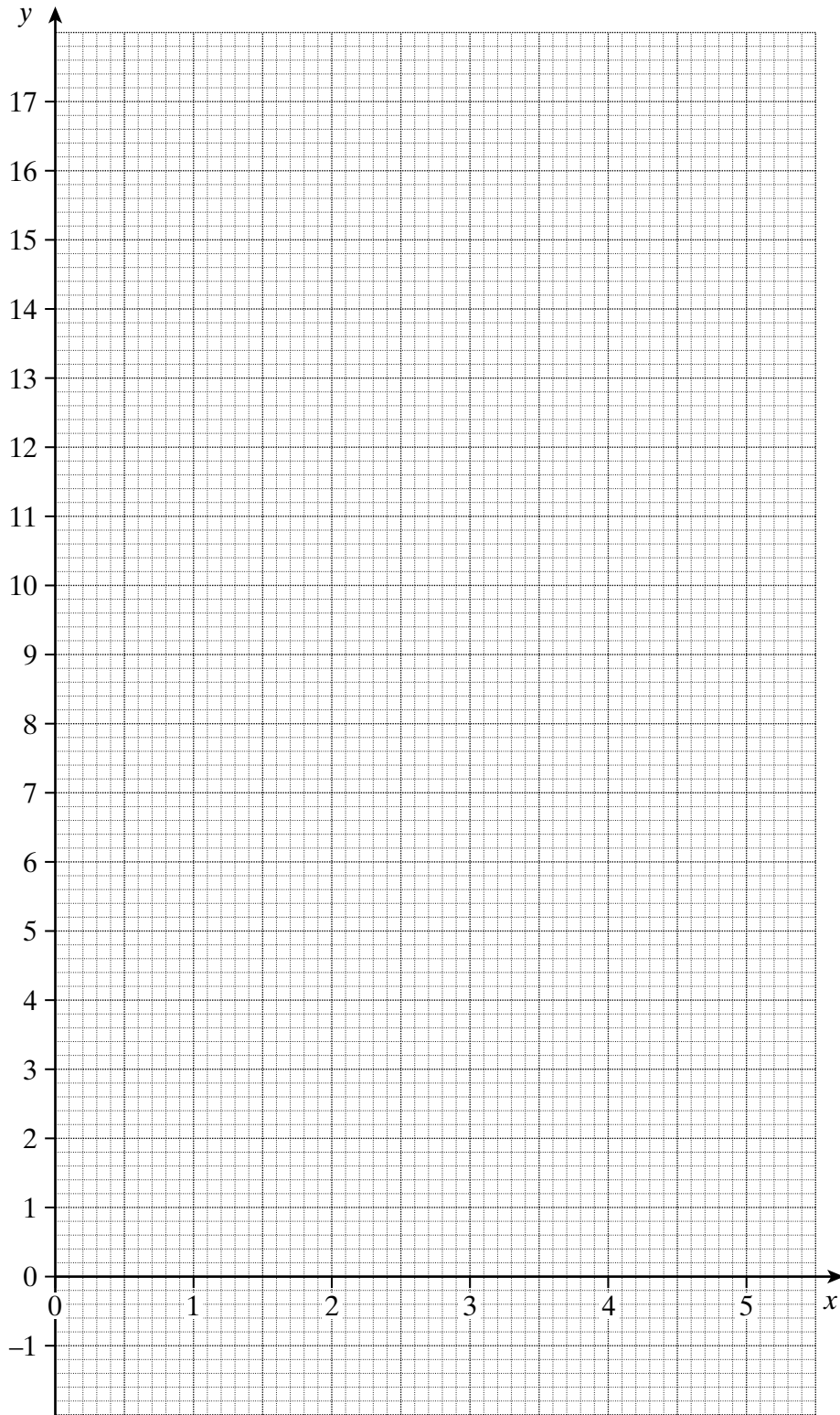
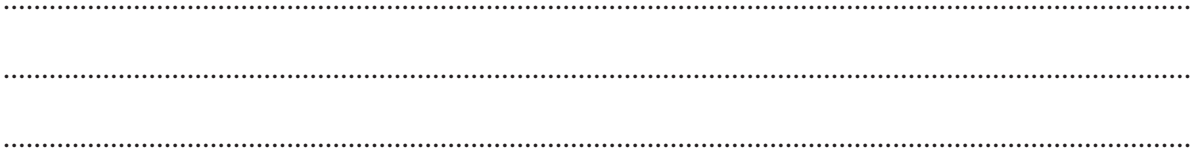
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Answer (2 marks)

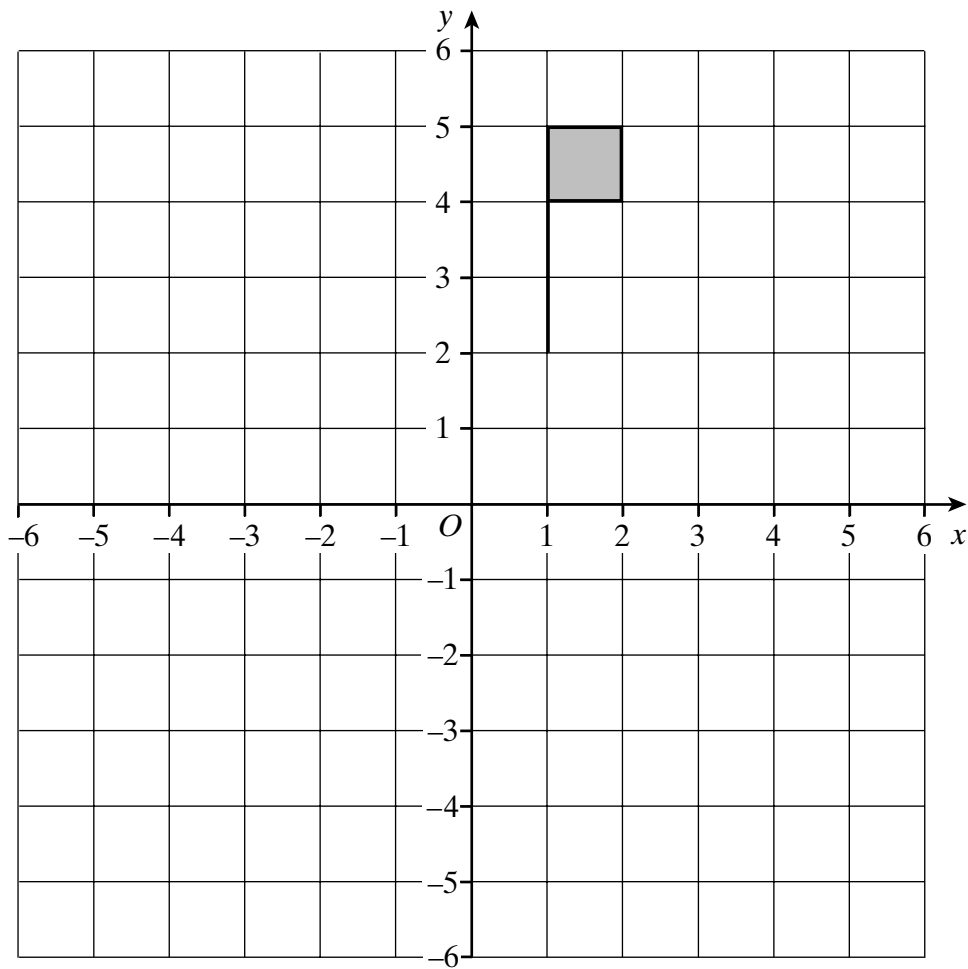
11 On the grid below draw the graph of $y = 3x - 1$ for values of x from 0 to 5.



(3 marks)
Turn over ►



12 The diagram shows a shaded flag.



- (a) Rotate the shaded flag 90° anticlockwise about the origin.
Label this new flag with the letter *A*. (3 marks)
- (b) Reflect the original shaded flag in the line $y = 1$.
Label this new flag with the letter *B*. (2 marks)
- (c) Rotate the original shaded flag by a quarter-turn clockwise about $(0, 2)$.
Label this new flag with the letter *C*. (2 marks)

13 (a) Use the formula $v = u + at$

to find the value of v when $u = -10$, $a = 1.8$ and $t = 3.7$

.....
.....

Answer (2 marks)

(b) Solve the equations

(i) $7x - 3 = 6 + x$

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.....
.....

Answer $x =$ (3 marks)

(ii) $\frac{17 - y}{3} = 4.5$

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.....
.....

Answer $y =$ (3 marks)

(iii) $2(z - 3) = 5 - 3z$

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Answer $z =$ (3 marks)

Turn over 

14 A television has a sale price of £180.
This is a saving of 25% on the original price.
What was the original price?

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.....
.....
.....

Answer £ (3 marks)

15 (a) In 2002 the town of Axon had 35 600 houses.
The ratio of detached houses to other types of houses was 1 : 4
How many detached houses were there?

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.....
.....

Answer (2 marks)

(b) In 2003 the town of Axon had 36 200 houses.
What was the percentage increase in the number of houses from 2002 to 2003?

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.....
.....

Answer % (3 marks)

16 (a) Expand and simplify $4(2x - 1) + 3(x + 6)$

.....

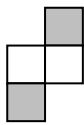
Answer (2 marks)

(b) Expand $x^2(4 - 2x)$

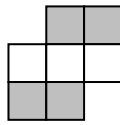
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Answer (2 marks)

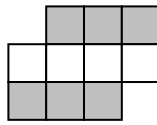
17 Patterns are made from shaded and unshaded squares.



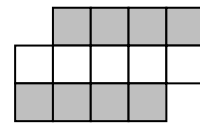
1st pattern



2nd pattern



3rd pattern



4th pattern

(a) How many shaded squares are there in the n th pattern?

.....

Answer (1 mark)

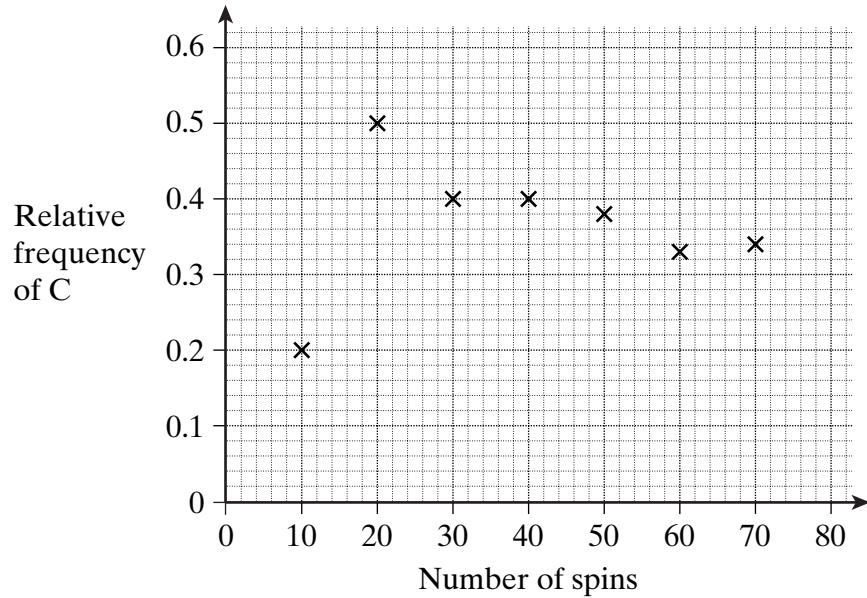
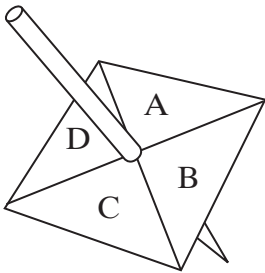
(b) How many unshaded squares are there in the n th pattern?

.....

.....

Answer (1 mark)

- 18 Julie has a square-shaped spinner with the letters A, B, C and D on it. She spins the spinner and records the letter on which the spinner lands. She plots the relative frequency of the letter C after every 10 spins.



- (a) How many times did the letter C occur in the first 40 spins?

.....

Answer (2 marks)

- (b) After 80 spins the letter C occurred 30 times. Plot the relative frequency for 80 spins on the diagram.

.....
 (2 marks)

- (c) Is the spinner biased? Give a reason for your answer.

.....

 (1 mark)

19 Annie invests £3000 for 5 years in a savings account that pays 4% compound interest per year.

How much will she have in the account at the end of 5 years?

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.....

Answer £ (3 marks)

20 Astronomers measure distances in the solar system in astronomical units (AU).

One AU is 150 000 000 kilometres.

The distance from the Sun to Pluto is 39.5 AU.

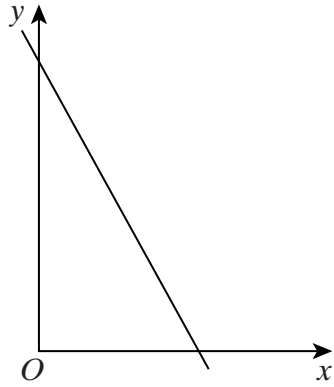
How many kilometres is the Sun from Pluto?

Give your answer in standard form to a sensible degree of accuracy.

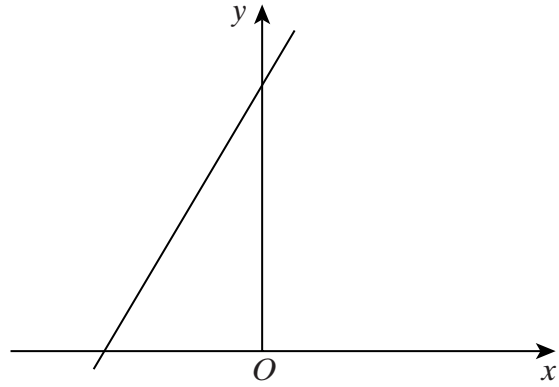
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Answer km (3 marks)

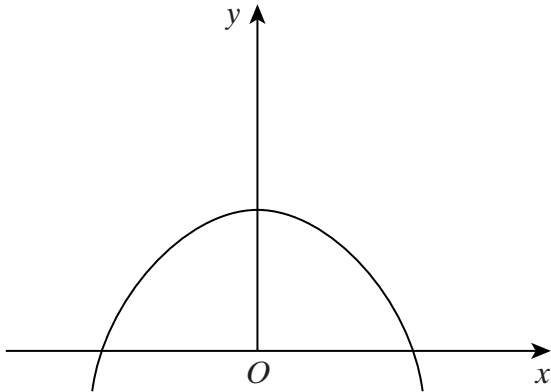
21 (a) Four graphs are sketched.



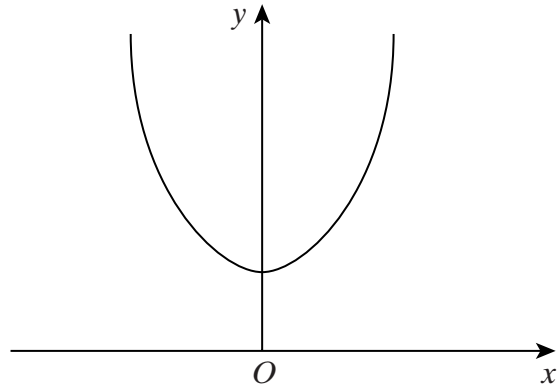
Graph A



Graph B



Graph C



Graph D

Complete the following statements.

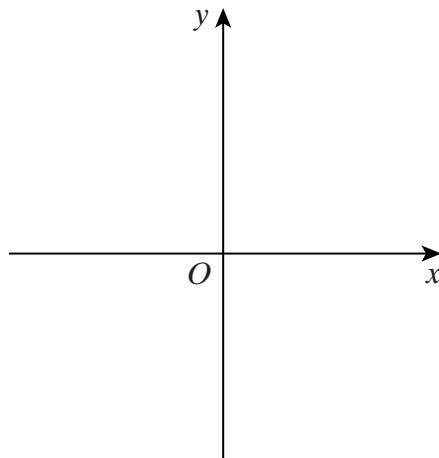
$y = 2x + 4$ matches graph

$y = x^2 + 4$ matches graph

$y + 2x = 4$ matches graph

(3 marks)

(b) Sketch the graph of $y = x^3$ on the axes below.

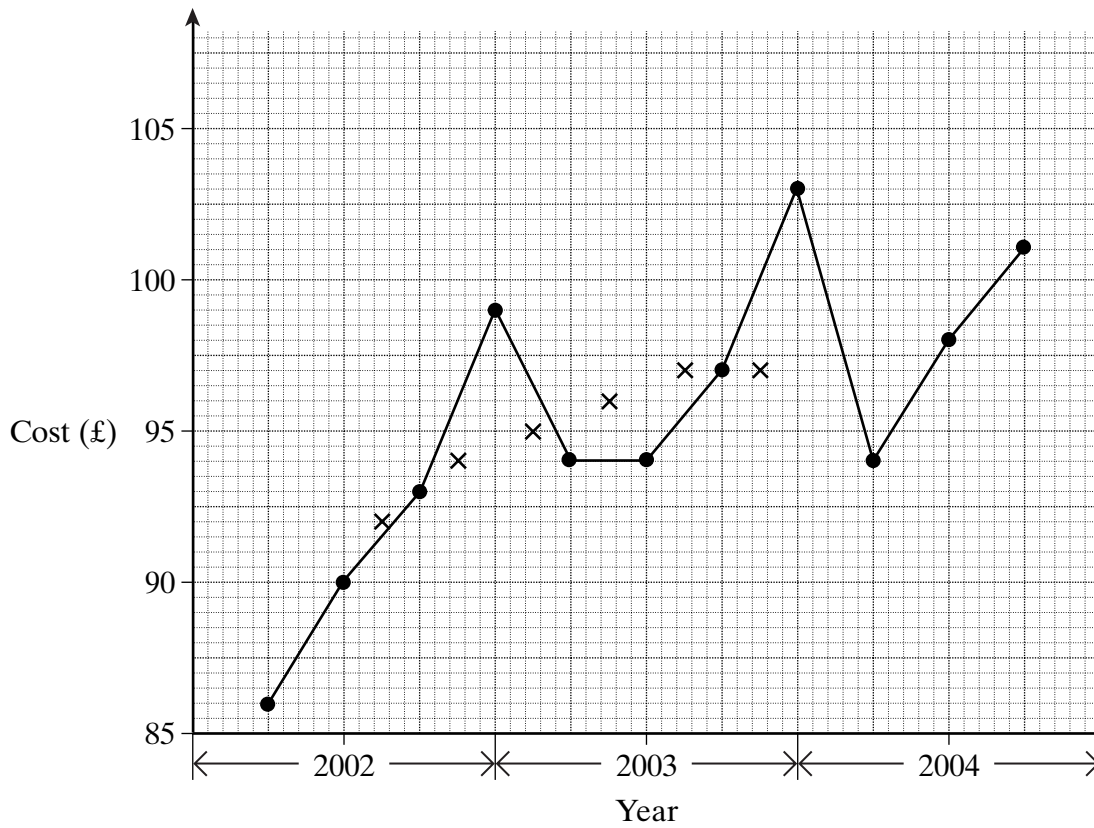


(2 marks)

22 The table shows the cost of the gas at the end of every three months and some four-point moving averages.

Year	2002				2003				2004		
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd
Cost (£)	86	90	93	99	94	94	97	103	94	98	101
Four-point moving average		92	94	95	96	97	97	98	99		

The graph shows the actual cost of the gas and some of the moving averages.



Key: ● Actual cost
× Moving average

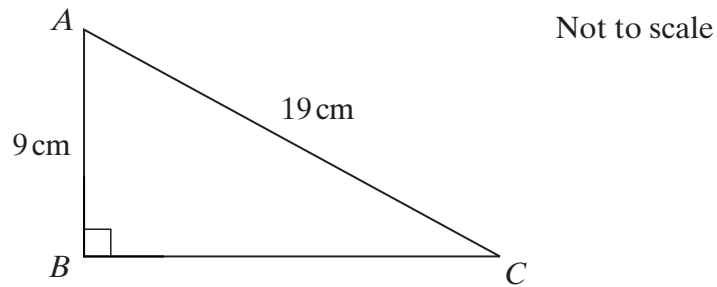
(a) On the graph plot the last two four-point moving averages. (2 marks)

(b) Use the trend to predict the next value of the four-point moving average.
.....

Answer £ (1 mark)

Turn over ►

- 23 (a) ABC is a right-angled triangle.
 $AC = 19\text{ cm}$ and $AB = 9\text{ cm}$.



Calculate the length of BC .

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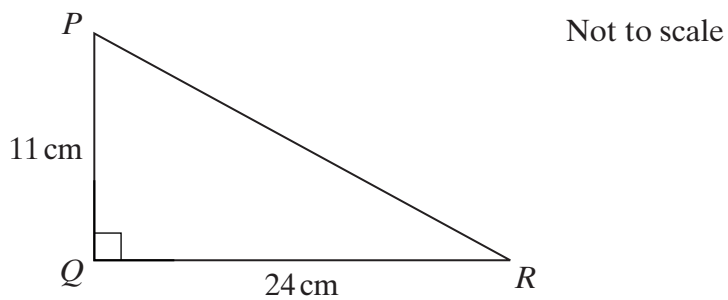
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Answer cm (3 marks)

- (b) PQR is a right-angled triangle.
 $PQ = 11\text{ cm}$ and $QR = 24\text{ cm}$.



Calculate the size of angle PRQ .

.....

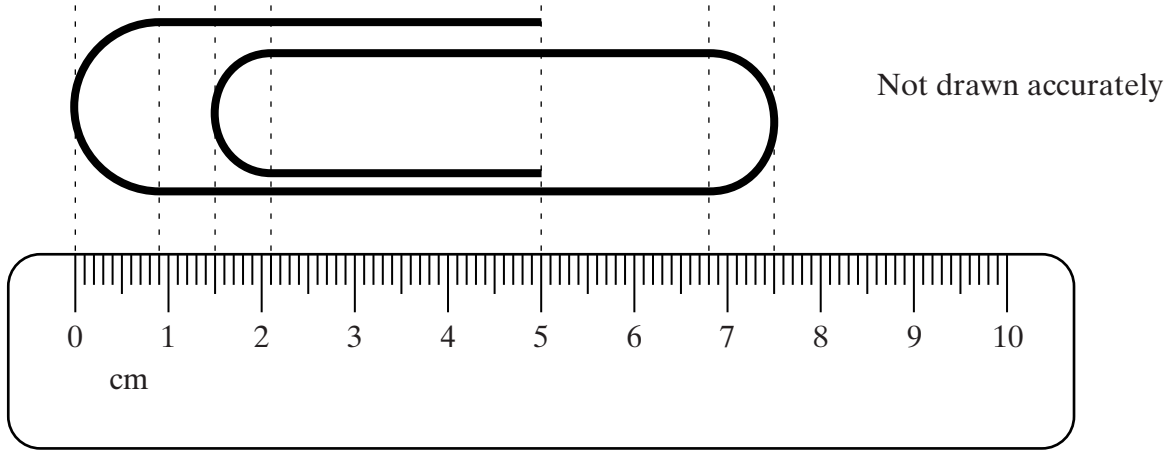
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Answer degrees (3 marks)

- 24 A giant paper clip is placed alongside a centimetre ruler.
The curved ends are semicircles.



Calculate the length of wire used to make the clip.

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Answer cm (5 marks)

END OF QUESTIONS

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