ADA PINPOINT PACKS

17_to_62_Percent_Pinpoint_AI_Pack

Made for Grade4to6_Paper3

AO1,2_and_3

ALL_Strands

Calc_Only

Created by A.D.A:

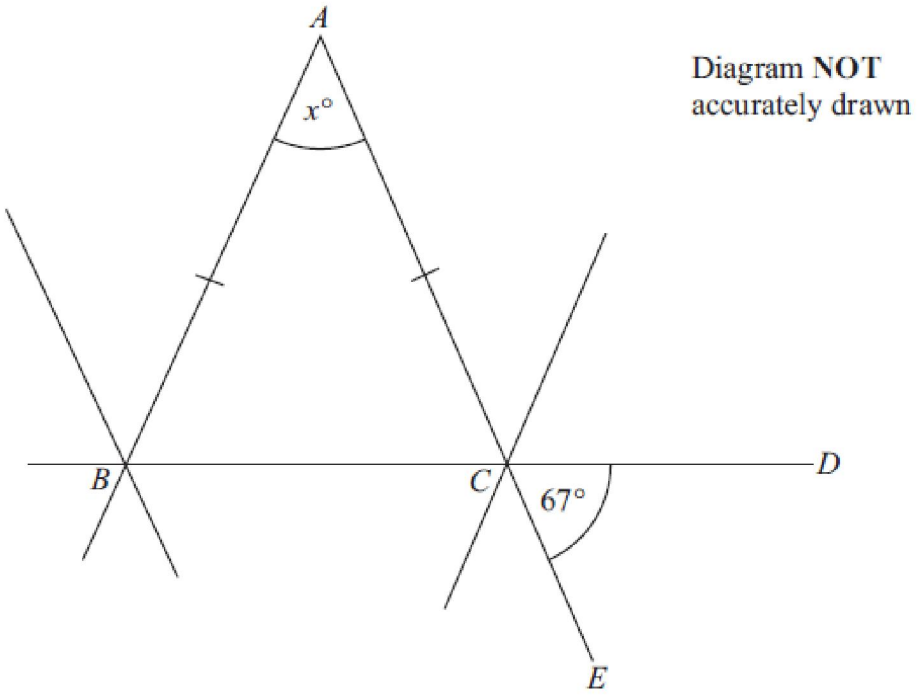
Pinpoints Automatic Differention Algorithmn

Designed and Programmed by

Tom Quilter, Anne Mcateer + Jon Hargreaves ... All maths teachers.

Question 1 (AO2): 81% of students got this right

3. The diagram shows part of the design of a stained glass window.



ABC is an isosceles triangle. *BCD* and *ACE* are straight lines. Angle *DCE* = 67°.

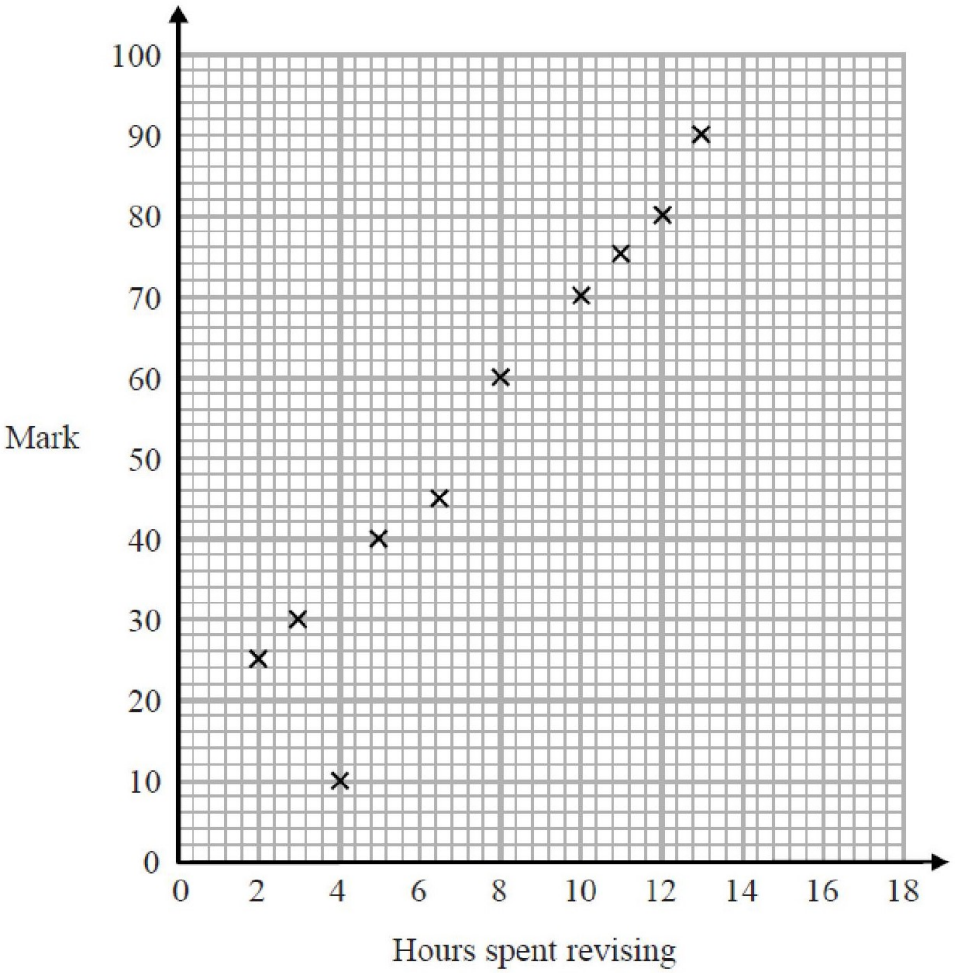
Work out the size of the angle marked $x°$. Give reasons for your answer.

(Total 4 marks)

Question 2 (AO2): 79% of students got this right

1 The scatter diagram shows information about 10 students.

For each student, it shows the number of hours spent revising and the mark the student achieved in a Spanish test.



One of the points is an outlier.

(*a*) Write down the coordinates of the outlier.

For all the **other** points

(*b*) (i) draw the line of best fit,

(ii) describe the correlation.

A different student revised for 9 hours.

(*c*) Estimate the mark this student got

The Spanish test was marked out of 100

Lucia says

Question 3 (AO1): 77% of students got this right

7 Work out $(13.8 \times 10^{7}) \times (5.4 \times 10^{-12})$
Give your answer as an ordinary number.

Question 4 (AO1): 76% of students got this right

16 (i) Find the value of $\sqrt[5]{3.2 \times 10^{11}}$

(ii) Find the value of $10^{\frac{3}{4}}$
Give your answer correct to 1 decimal place.

Question 5 (AO1): 73% of students got this right

6.

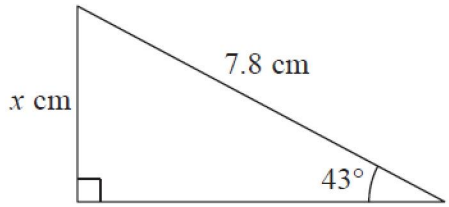


Diagram **NOT** accurately drawn

Work out the value of x.
Give your answer correct to 3 significant figures.

x = ...

(Total 3 marks)

Question 6 (AO1): 70% of students got this right

4. Solve the simultaneous equations

$$4x + 3y = -7$$

$$3x - 4y = 26$$

x =.....

y =.....

(Total 4 marks)

Question 7 (AO1): 70% of students got this right

5 There are some green counters, some yellow counters, some blue counters and some red counters in a bag.

The table shows the probabilities that a counter taken at random from the bag will be green or yellow or red.

Colour	Green	Yellow	Blue	Red
Probability	0.16	0.4		0.24

Mary takes at random a counter from the bag.

(*a*) Work out the probability that the counter will be blue.

RETEST QUESTION

Mary puts the counter back into the bag.
There are 125 counters in the bag.

(*b*) Work out the number of green counters in the bag.

.....

(2)

(Total for Question 5 is 4 marks)

Question 8 (AO1): 68% of students got this right

2. Make w the subject of the formula $P = \frac{w-3}{2}$

.....

(Total 2 marks)

Question 9 (AO1): 67% of students got this right

3 A coin is thrown 50 times.

The coin lands on heads 30 times.

Circle the relative frequency of landing on heads.

[1 mark]

30 3 : 5 30% $\frac{3}{5}$

Question 10 (AO2): 65% of students got this right

7. There are 10 boys and 20 girls in Mrs Brook's class.
Mrs Brook gave all the class a test.

The mean mark for all the class is 60.
The mean mark for the girls is 56.

Work out the mean mark for the boys.

.....

(Total 3 marks)

Question 11 (AO1): 64% of students got this right

15. Simplify $\frac{x+1}{2} + \frac{x+3}{3}$

.....

(Total 3 marks)

Question 12 (AO1): 63% of students got this right

15. Here is a right-angled triangle.

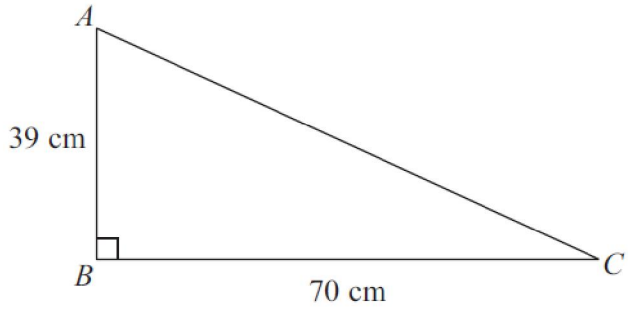


Diagram **NOT** accurately drawn

Work out the length of AC.
Give your answer correct to 1 decimal place.

..... cm

(Total for Question 15 is 3 marks)

Question 13 (AO2): 61% of students got this right

8. Here are the first four terms of an arithmetic sequence.

3 10 17 24

(*a*) Find, in terms of *n*, an expression for the *n*th term of this arithmetic sequence.

.....

(2)

(*b*) Is 150 a term of this sequence?

You must explain how you get your answer.

.....

.....

.....

.....

.....

(2)

(Total for Question 8 is 4 marks)

Question 14 (AO3): 59% of students got this right

2. Sophia pays £222 for a plane ticket.
She also pays 100 euros airport tax.

The exchange rate is £1 = 1.38 euros.

What percentage of the total cost of the ticket and the airport tax does Sophia pay for the airport tax?

Give your answer correct to 1 decimal place.

.....%

(Total for Question 2 is 3 marks)

Question 15 (AO3): 58% of students got this right

***5** James bought x candy bars at the store.
Lily bought twice as many candy bars than James.
Harry bought 3 candy bars more than James.

One candy bar costs £2.
In total, they paid £46.

Determine how many candy bars each person bought.
Show all steps in your calculations.

(Total 5 marks)

Question 16 (AO1): 57% of students got this right

12 (*b*) Work out $\sqrt[3]{\dfrac{4.3 \times \tan 39°}{23.4 - 6.06}}$

Give your answer correct to 3 significant figures.

Question 17 (AO1): 55% of students got this right

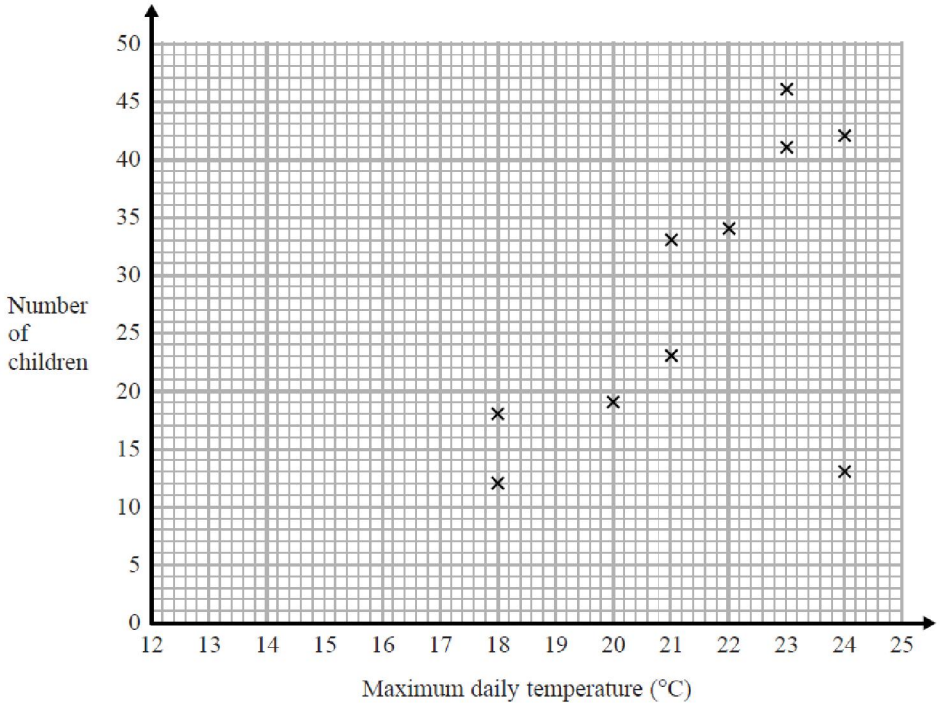
15. (*a*) Expand and simplify $(2x + 1)(x - 3)(x + 5)$

.....

(3)

Question 18 (AO1): 53% of students got this right

3d Johan records the maximum daily temperature each day for 10 days.
He also records the number of children going to a park for each of these days.
He draws this scatter graph for his information.



It would not be sensible to use the scatter graph to predict the number of children going to the park on a day when the maximum daily temperature was 15°C.

(d) Give a reason why.

.....

.....

.....

(1)

Question 19 (AO1): 52% of students got this right

9

Construct the perpendicular bisector of the line segment *CD* using a ruler and compasses.
Show all your construction lines.

(Total 2 marks)

Question 20 (AO2): 51% of students got this right

4 Belts are made in sizes Small, Medium, Large and Extra Large.

Jenny needs to order more belts in June.
The modal size of belts sold is Small.
Jenny is going to order $\frac{3}{4}$ of the belts in size Small.
The manager of the shop tells Jenny she should **not** order so many Small belts.

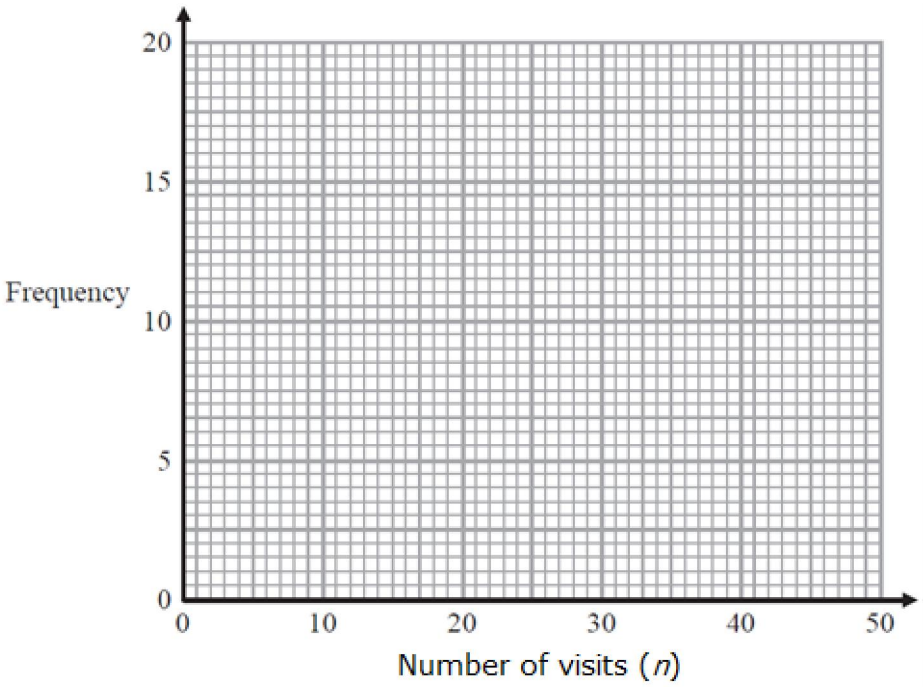
(*b*) Who is correct, Jenny or the manager?
You must give a reason for your answer.

Question 21 (AO3): 50% of students got this right

9. The frequency table contains information about 50 students and the number of times they visited the local park this year.

Number of visits (n)	Frequency
$0 < n \leq 10$	12
$10 < n \leq 20$	21
$20 < n \leq 30$	9
$30 < n \leq 40$	6
$40 < n \leq 50$	2

(a) Draw a frequency polygon, on the grid below, using this information.



(2)

*(b) Kate claims that at least a quarter of the students visited the park more than 20 times.

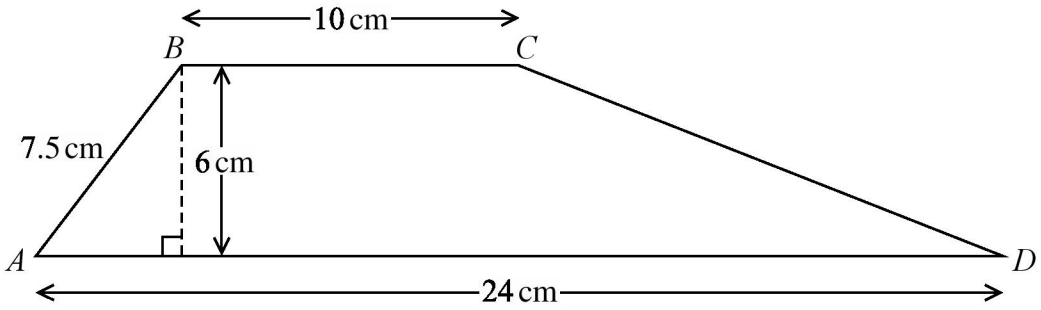
Is Kate's claim correct?
Explain your answer.

(2)

(Total 4 marks)

Question 22 (AO3): 49% of students got this right

7 *ABCD* is a trapezium.



Work out the size of angle *CDA*.
Give your answer correct to 1 decimal place.

Question 23 (AO1): 46% of students got this right

RETEST QUESTION

11 $a = 3b - 9$

(*d*) Make b the subject of this formula.

.....

(2)

(Total 7 marks)

Question 24 (AO2): 45% of students got this right

***11.** Saphia is organising a conference.
People at the conference will sit at circular tables.

Diagram **NOT** accurately drawn

Each table has a diameter of 140 cm.
Each person needs around 60 cm around the circumference of the table.

There are 12 of these tables in the conference room.
A total of 90 people will be at the conference.

Are there enough tables in the conference room?

(Total for Question 11 is 4 marks)

Question 25 (AO1): 44% of students got this right

7. (*a*) $A = \{p, r, a, g, u, e\}$

$B = \{p, a, r, i, s\}$

$C = \{b, u, d, a, p, e, s, t\}$

List the members of the set

(i) $A \cap B$

.....

(ii) $B \cup C$

.....

(2)

Question 26 (AO1): 42% of students got this right

16. $x = 0.0\dot{1}\dot{5}$

Prove algebraically that x can be written as $\frac{1}{66}$

(Total 3 marks)

Question 27 (AO3): 41% of students got this right

12. The surface area of Earth is 510 072 000 km^2.
The surface area of Jupiter is 6.21795×1010 km^2.

The surface area of Jupiter is greater than the surface area of Earth.
How many times greater?
Give your answer in standard form.

.....

(Total 3 marks)

Question 28 (AO3): 40% of students got this right

***13.** Axel and Lethna are driving along a motorway.

They see a road sign.
The road sign shows the distance to Junction 8
It also shows the average time drivers will take to get to Junction 8

To Junction 8
30 miles 26 minutes

The speed limit on the motorway is 70 mph.

Lethna says,

'We will have to drive faster than the speed limit to go 30 miles in 26 minutes.'

Is Lethna right?
You must show how you got your answer.

(Total for Question 13 is 3 marks)

Answers to Qn 1 (AO2): 81% of students got this right

3.		Angle $ACB = 67°$ $x = 180 – (67 + 67)$	46° with reasons	4	B1 for angle $ACB = 67°$, could be marked on the diagram M1 for 180 – ('67' + '67') A1 for $x = 46°$ C1 for vertically opposite angles (or vertically opposite angles) **and** base angles of an isosceles triangle are equal **OR** B1 for angle $ACB = 67°$, could be marked on the diagram M1 for 180 – ('67' + '67') A1 for $x = 46°$ C1 for "angles on a straight line add up to 180^o **and** base angles of an isosceles triangle are equal

Answers to Qn 2 (AO2): 79% of students got this right

Paper 1MA1: 3H			
Question	**Working**	**Answer**	**Notes**
1(a)		(4,10)	B1 cao
1(b)(i)		Line drawn	B1 Straight line drawn passing between (2,20) and (2,30) AND (13,86) and (13,94)
1(b)(ii)		Positive	C1 positive
1(c)		Value between 60 and70	C1 a correct value given
1(d)		Statement	C1 for referring to the danger of extrapolation outside the given range or for a given point Eg line of best fit may not continue or full marks are hard to achieve no matter how much revision is done

Answers to Qn 3 (AO1): 77% of students got this right

Part	Working or answer an examiner might expect to see	Mark	Notes
7	$13.8 \times 5.4 \times 10^{7} \times 10^{-12}$ $= 74.52 \times 10^{-5}$ $= 7.452 \times 10^{-4}$	1	This mark is given for the digits 7452 seen
	0.000 745 2	1	This mark is given for the correct answer only

Answers to Qn 4 (AO1): 76% of students got this right

Paper 1MA1: 2H			
Question	**Working**	**Answer**	**Notes**
16 (i)		200	B1 cao
(ii)		5.6	B1 For 5.6(2...)

Answers to Qn 5 (AO1): 73% of students got this right

6.			5.32	3	M1 $\sin 43°$ used M1 $7.8\sin 43°$ **OR** M1 for $7.8\cos 43°$ (5.704...) **and** $7.8^2 - "5.704"^2$ (28.298) M1 for $\sqrt{"28.298"}$ **OR** M1 for correct statement of Sine Rule eg $\frac{7.8}{\sin 90°} = \frac{x}{\sin 43°}$ M1 for correct expression for x e.g. $x = \frac{7.8\sin 43°}{\sin 90°}$ A1 for awrt 5.32 (5.319587...)

Answers to Qn 6 (AO1): 70% of students got this right

Question		Working	Answer	Mark	Notes
4		$12x + 9y = -21$ $12x - 16y = 104$ $25y = -125$ $y = -5$ $4x + 3 \times -5 = -7$ **OR** $16x + 12y = -28$ $9x - 12y = 78$ $25x = 50$ $x = 2$ $4 \times 2 + 3y = -7$	$x = 2$ $y = -5$	4	M1 for correct process to eliminate either x or y (condone one arithmetic error) A1 for either $x = 2$ or $y = -5$ M1 (dep on 1st M1) for correct substitution of their found value or (indep) for correct process to eliminate the other variable (condone one arithmetic error) A1 cao for both $x = 2$ and $y = -5$ **SC**: B1 for $x = 2$ or $y = -5$ if M0 scored

Answers to Qn 7 (AO1): 70% of students got this right

5 There are some green counters, some yellow counters, some blue counters and some red counters in a bag.

The table shows the probabilities that a counter taken at random from the bag will be green or yellow or red.

Colour	Green	Yellow	Blue	Red
Probability	0.16	0.4		0.24

Mary takes at random a counter from the bag.

(a) Work out the probability that the counter will be blue.

$0.16 + 0.4 + 0.24 = 0.8$

$1 - 0.8$

0.2

(2)

Mary puts the counter back into the bag.
There are 125 counters in the bag.

(b) Work out the number of green counters in the bag.

0.16×125

20

(2)

Answers to Qn 8 (AO1): 68% of students got this right

Question		Working	Answer	Mark	Notes
2			$w = 2P + 3$	2	M1 for a clear intention to multiply **both** sides by 2 or add $\frac{3}{2}$ to both sides as a first step A1 for $w = 2P + 3$ oe

Answers to Qn 9 (AO1): 67% of students got this right

3 A coin is thrown 50 times.

The coin lands on heads 30 times.

Circle the relative frequency of landing on heads.

[1 mark]

30 3 : 5 30% $\frac{3}{5}$

Answers to Qn 10 (AO2): 65% of students got this right

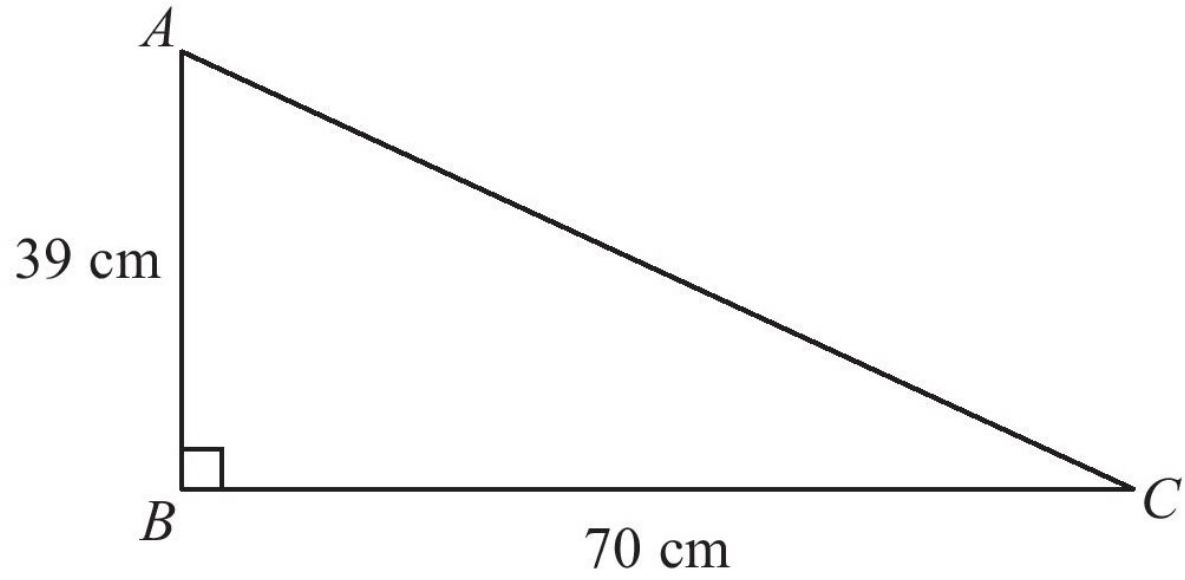
		7.	68	3	M1 for 30 × 60 (= 1800) or 20 × 56 (= 1120) M1 for (“1800” – “1120”) ÷ 10 A1 cao

Answers to Qn 11 (AO1): 64% of students got this right

	15.	$\frac{3(x+1)}{6}+\frac{2(x+3)}{6}=\frac{3x+3+2x+6}{6}$	$\frac{5x+9}{6}$	3	M1 Use of common denominator of 6 (**or** any other multiple of 6) and at least one numerator correct, e.g. $\frac{3(x+1)}{6}$ or $\frac{2(x+3)}{6}$ M1 $\frac{3(x+1)}{6}+\frac{2(x+3)}{6}$ (oe) A1 cao

Answers to Qn 12 (AO1): 63% of students got this right

15 Here is a right-angled triangle.



Work out the length of AC.
Give your answer correct to 1 decimal place.

Pythagoras: $c^2 = a^2 + b^2$

$c = \sqrt{(39)^2 + (70)^2}$

$c \approx 80.1311425103$

$c = \underline{80.1 \text{ cm}}$ (1 d.p.)

Answers to Qn 13 (AO2): 61% of students got this right

8 Here are the first four terms of an arithmetic sequence.

3 10 17 24

(a) Find, in terms of n, an expression for the nth term of this arithmetic sequence.

+7

$7n - 4$

$7n-4$

(2)

(b) Is 150 a term of this sequence?

You must explain how you get your answer.

$150 = 7n - 4$

$154 = 7n$

$n = 22$

Yes, 150 is the 22nd term.

Answers to Qn 14 (AO3): 59% of students got this right

2		24.6	P1 P1 A1	Process to use conversion rate, e.g. 100 ÷ 1.38 (= 72.46(37.)) OR 222 × 1.38 (= 306.36) (dep P1) for complete process to find percentage required, e.g. 72.46(37.) ÷ (72.46(37.) +222) ×100 OR 100 ÷ (100 + 306.36) × 100 Answer of 24.6; Accept 25 if supportive working seen

Answers to Qn 15 (AO3): 58% of students got this right

***5** Redlands School sent x students to a revision day. $2x$
St Samuel's School sent twice as many students as Redlands School.
Francis Long School sent 7 fewer students than Redlands School. $x-7$

Each student paid £15 for the revision day.
The students paid a total of £1155

Work out how many students were sent by each school to the revision day.
You must show all your working.

$\frac{1155}{15} = 77$

$x + 2x + x - 7 = 77$

$4x - 7 = 77$

$4x = 84$

$x = 21$

Redlands: 21

St. Sam's: 42

Francis Long: 14

Answers to Qn 16 (AO1): 57% of students got this right

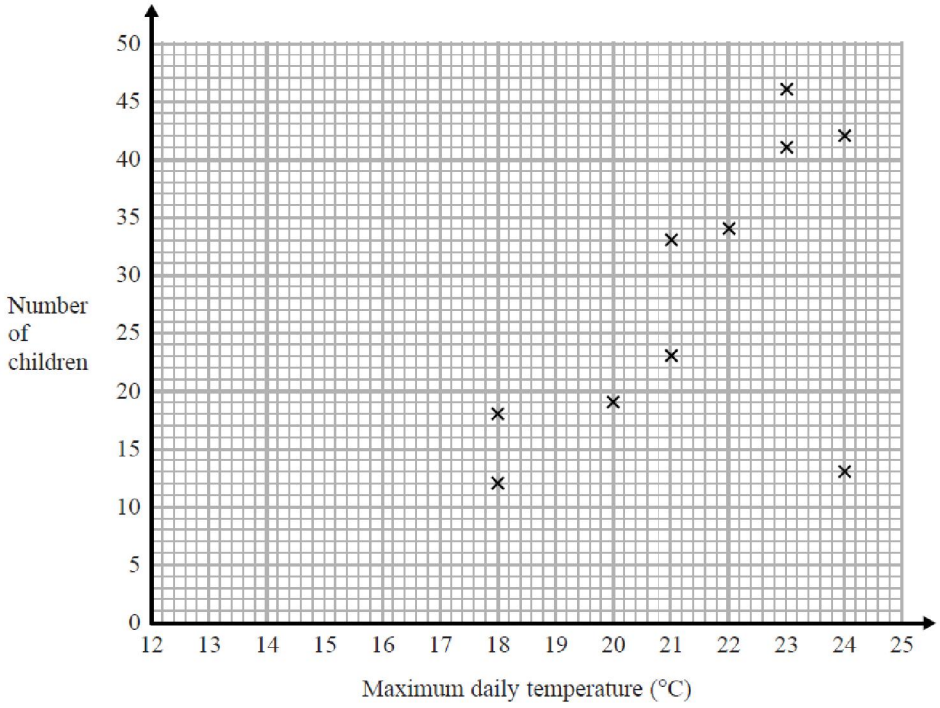
Paper 1MA1: 2H			
Question	**Working**	**Answer**	**Notes**
12 b		0.586	B1 for 3.48207..... or 17.34 or 0.200811... B1 for 0.585 to 0.586

Answers to Qn 17 (AO1): 55% of students got this right

15.	(*a*)		$2x^3 + 3x^2 - 28x - 15$	3	M1 Correct expansion of any 2 brackets (condone 1 error) M1 Correct expansion of previos product by remaining bracket (condone 1 error) A1

Answers to Qn 18 (AO1): 53% of students got this right

3d Johan records the maximum daily temperature each day for 10 days.
He also records the number of children going to a park for each of these days.
He draws this scatter graph for his information.



It would not be sensible to use the scatter graph to predict the number of children going to the park on a day when the maximum daily temperature was 15°C.

(d) Give a reason why.

15° lies outside the range of temperatures for this data
OR extrapolation is unreliable

(1)

Answers to Qn 19 (AO1): 52% of students got this right

9			Correct line drawn	2	M1 for two pairs of relevant arcs drawn A1 correct line drawn (with arcs) SC B1 Correct line no arcs visible

Answers to Qn 20 (AO2): 51% of students got this right

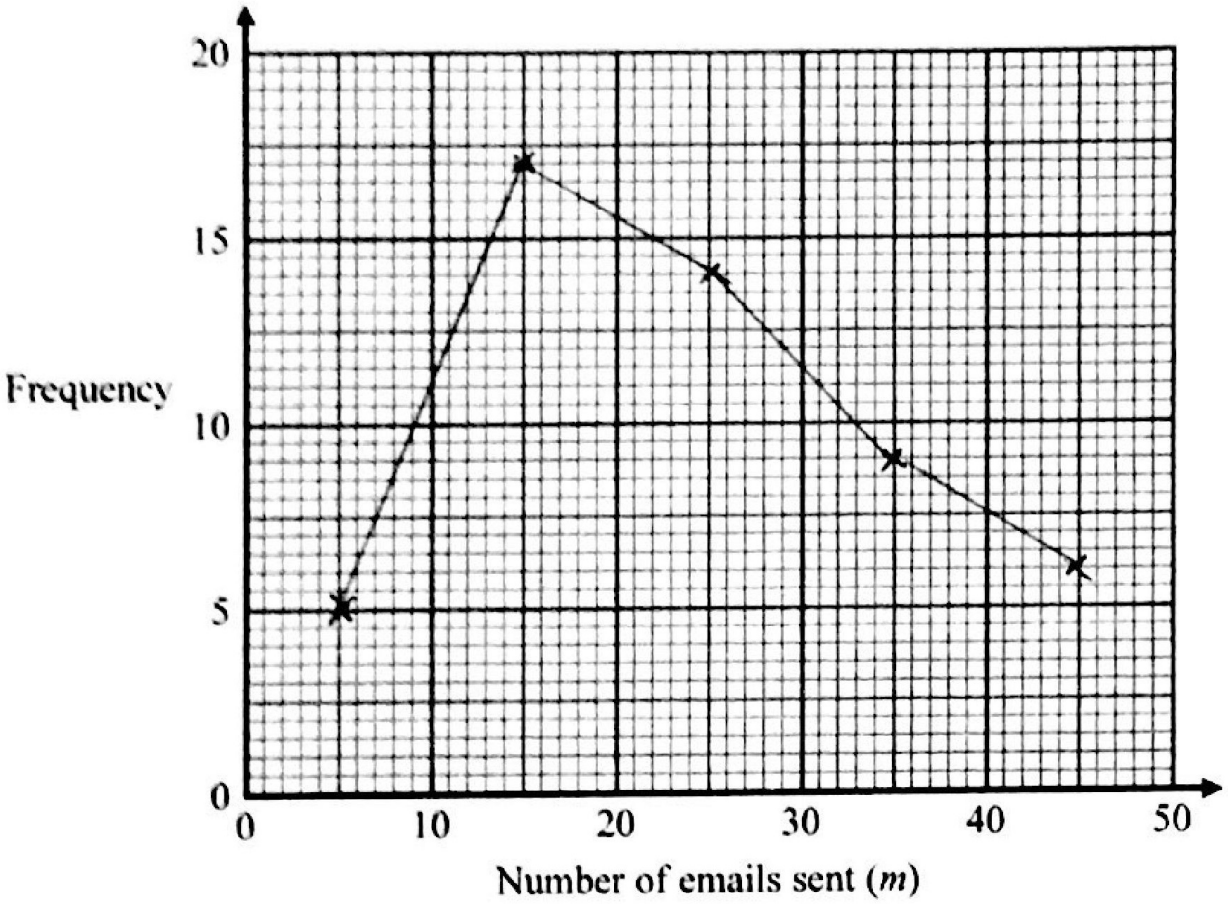
Paper 1MA1: 3H			
Question	**Working**	**Answer**	**Notes**
4(b)		Manager with reasons	M1 for strategy to compare number of small size sold to number ordered C1 clear comparison that small size is not ¾ and so Jenny is not correct or the manager is correct

Answers to Qn 21 (AO3): 50% of students got this right

9 The frequency table gives information about the numbers of emails sent by 51 teachers on Monday.

Number of emails sent (m)	Frequency
$0 < m \leqslant 10$	5
$10 < m \leqslant 20$	17
$20 < m \leqslant 30$	14
$30 < m \leqslant 40$	9
$40 < m \leqslant 50$	6

(a) On the grid below, draw a frequency polygon for this information.



(2)

*(b) Nalini says that at least a quarter of these teachers sent more than 30 emails.

Is Nalini correct?
You must explain your answer.

Answers to Qn 22 (AO3): 49% of students got this right

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
7		32.3	P1	for using Pythagoras to find length of third side of triangle, eg $7.5^2 - 6^2$ or $6^2 + x^2 = 7.5^2$ or uses trigonometry to find angle in triangle, eg $\sin A = \frac{6}{7.5}$ or $\cos B = \frac{6}{7.5}$
			P1	(dep P1) for complete process to find length of third side of triangle eg $\sqrt{7.5^2 - 6^2}$ or $\sqrt{56.25 - 36}$ or $\sqrt{20.25}$ (= 4.5) or uses trigonometry to find base length of triangle, eg $7.5 \times \cos$ "A" or $7.5 \times \sin$ "B" or $\frac{6}{\tan"A"}$
			P1	(dep P2) for $24 - 10 -$ "4.5" (= 9.5)
			P1	(indep) for process to find angle CDA, eg $\tan CDA = \frac{6}{\text{base}}$ from right- angled triangle
			A1	for answer in the range 32.2 to 32.3

Answers to Qn 23 (AO1): 46% of students got this right

11	(d)		$b = \frac{a+9}{3}$	2	M1 for ÷ 3 throughout or adding 9 to both sides as a first step A1 $b = \frac{a+9}{3}$ oe

Answers to Qn 24 (AO2): 45% of students got this right

***11** Saphia is organising a conference.
People at the conference will sit at circular tables.

Diagram **NOT** accurately drawn

Each table has a diameter of 140 cm.
Each person needs 60 cm around the circumference of the table.

There are 12 of these tables in the conference room.
A total of 90 people will be at the conference.

Are there enough tables in the conference room?

circumference = $\pi \times d$

$= \pi \times 140$

$= 439.8$ cm 1dp

$\frac{439.8}{60} = 7.3...$ 7 people fit around each table

$12 \times 7 = 84$

84 people fit around the 12 tables.

There are not enough tables

Answers to Qn 25 (AO1): 44% of students got this right

7.	(*a*) (i)		{p,r,a}	1	B1 Withhold marks for repeats
	(ii)		{p,a,r,i,s,b,u,d,e,t}	1	B1 Withhold marks for repeats

Answers to Qn 26 (AO1): 42% of students got this right

16.		$x = 0.0151515...$ $1000x = 15.151515...$ $10x = 0.151515....$ $990x = 15$ $x = \frac{15}{990} = \frac{1}{66}$ **OR** $100x = 1.51515...$ $x = 0.01515...99x = 1.5$ $x = \frac{1.5}{99}$ $= \frac{15}{990} = \frac{1}{66}$	Proof	3	M1 for ($x =$) $0.0151515(...)$ or $1000x = 5.151515(\ldots)$ or $00x = 1.51515(...)$ or $10x = 0.151515(\ldots)$ M1 for two recurring decimals the difference of which is a rational number C1 (dep on M2 scored) for completing the proof by subtracting and cancelling to give a correct fraction

Answers to Qn 27 (AO3): 41% of students got this right

12		$(6.21795 \times 10^{10}) \div 510\,072\,000$ $= 121.9(03378\ldots)$	1.22×10^{2}	3	M1 for SA Jupiter ÷ SA Earth e.g. $(6.21795 \times 10^{10}) \div 510\,072\,000$ (or equivalent), e.g. $62000 \div 51$ or digits 121 …. or digits 122 A1 for 121 – 122 A1 for $1.21 \times 10^{2} - 1.22 \times 10^{2}$

Answers to Qn 28 (AO3): 40% of students got this right

***13** Axel and Lethna are driving along a motorway.

They see a road sign.
The road sign shows the distance to Junction 8
It also shows the average time drivers will take to get to Junction 8

To Junction 8
30 miles 26 minutes

The speed limit on the motorway is 70 mph.

Lethna says,

'We will have to drive faster than the speed limit to go 30 miles in 26 minutes.'

Is Lethna right?
You must show how you got your answer.

Speed to Junction 8

$S = \frac{D}{T}$ $S = \frac{30 \text{ miles}}{26 \text{ minute}}$ (not hours)

Change 26 minutes to hours

$\frac{26}{60} = 0.43\dot{}$

$S = \frac{30}{0.43\dot{}} = 69.\dot{2}30769\dot{} \text{ mph}$

Lethna is wrong, 69.2 mph < 70 mph