ADA PINPOINT PACKS

0_to_52_Percent_Pinpoint_AI_Pack

Made for Grade4to5

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 (AO1): 89% of students got this right

1. $-2 < n \leq 3$
n is an integer.

(a) Write down all the possible values of n.

.....

(2)

Question 2 (AO1): 85% of students got this right

1 (*a*) Write 168 as a product of its prime factors.
You must show your working.

Question 3 (AO2): 83% of students got this right

5 Maryam is trying to expand and simplify $(n - 2)^2$

Here is her working.

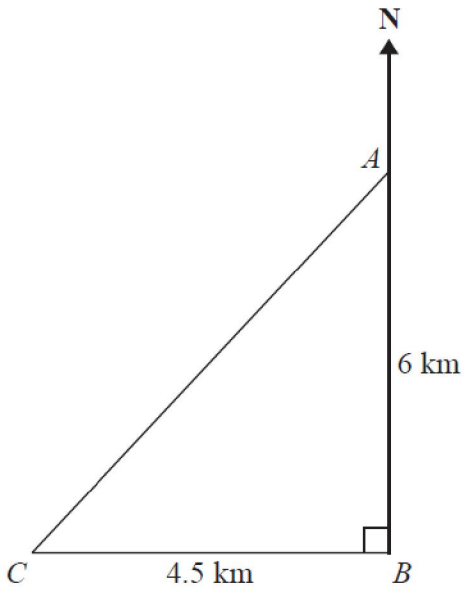
$$\begin{aligned}(n-2)^2 &= (n-2)(n-2)\\ &= n^2 - 2n - 2n - 4\\ &= n^2 - 4n - 4\end{aligned}$$

Maryam's answer is wrong.

(*a*) Find Maryam's mistake.

Question 4 (AO1): 80% of students got this right

4. The diagram shows the positions of three turbines A, B and C.



A is 6 km due north of turbine B.
C is 4.5 km due west of turbine B.

(a) Calculate the distance AC.

..... km
(3)

Question 5 (AO1): 79% of students got this right

7. (*a*) Expand $2(t - 3)$

.....
(1)

(*b*) Expand $2x(3x - 6)$

.....
(1)

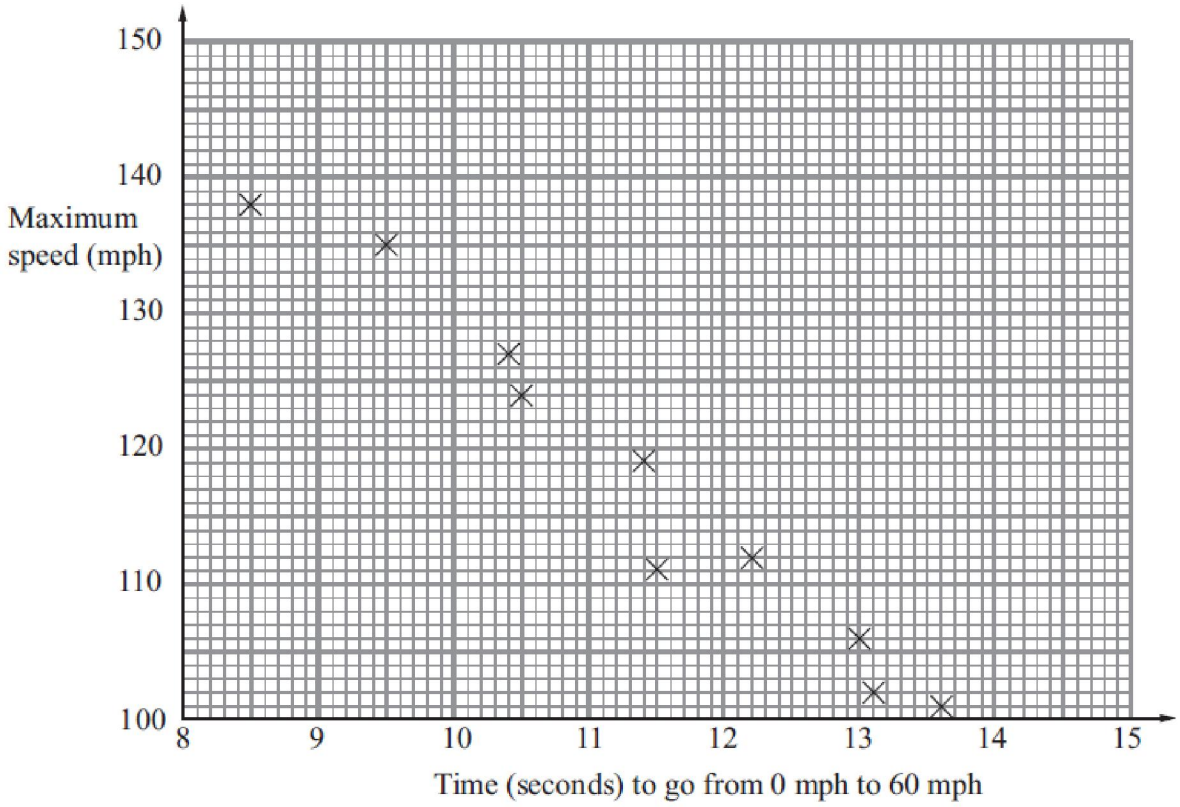
(*c*) Expand and simplify $(y + 2)(y + 3)$

.....
(2)

(Total 4 marks)

Question 6 (AO1): 77% of students got this right

8. The scatter graph shows some information about 10 cars.
It shows the time, in seconds, it takes each car to go from 0 mph to 60 mph.
For each car, it also shows the maximum speed, in mph.



(a) What type of correlation does this scatter graph show?

.....
(1)

The time a car takes to go from 0 mph to 60 mph is 11 seconds.

(b) Estimate the maximum speed for this car.

..... mph
(2)

(Total 3 marks)

Question 7 (AO2): 75% of students got this right

5. The diagram shows a circular pond with a path around it.

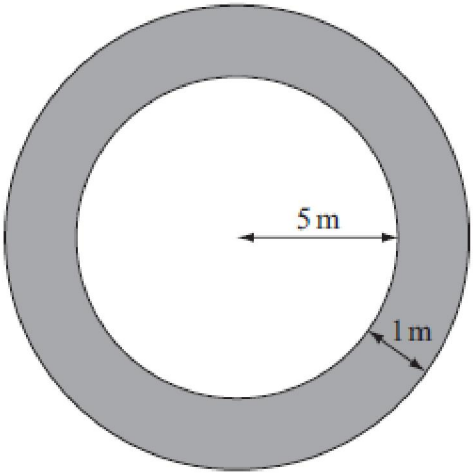


Diagram **NOT** accurately drawn

The pond has a radius of 5m.
The path has a width of 1m.

Work out the area of the path.
Give your answer correct to 3 significant figures.

..... m^2

(Total 3 marks)

Question 8 (AO1): 73% of students got this right

6.

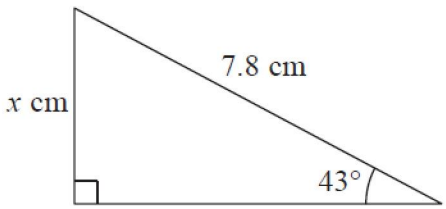


Diagram **NOT** accurately drawn

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

x = ...

(Total 3 marks)

Question 9 (AO1): 71% of students got this right

6. (a) Simplify $p^5 \times p^4$

.....
(1)

(b) Simplify $q^5 \div q^2$

.....
(1)

(c) Simplify $12tu^6 \div 6tu^5$

.....
(2)

(d) Simplify $(9w^2y^6)^{\frac{1}{2}}$

.....
(2)

Question 10 (AO1): 70% of students got this right

4. (c) Solve $x^2 - 3x - 10 = 0$

$x =$ .....

(3)

Question 11 (AO3): 69% of students got this right

9. The diagram shows a large tin of pet food in the shape of a cylinder.

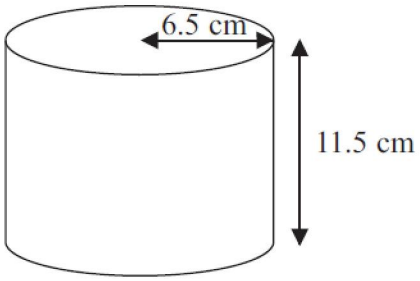


Diagram **NOT** accurately drawn

The large tin has a radius of 6.5 cm and a height of 11.5 cm.

A pet food company wants to make a new size of tin.

The new tin will have a radius of 5.8 cm.
It will have the same volume as the large tin.

Calculate the height of the new tin.
Give your answer correct to one decimal place.

..... cm

(Total 3 marks)

Question 12 (AO1): 68% of students got this right

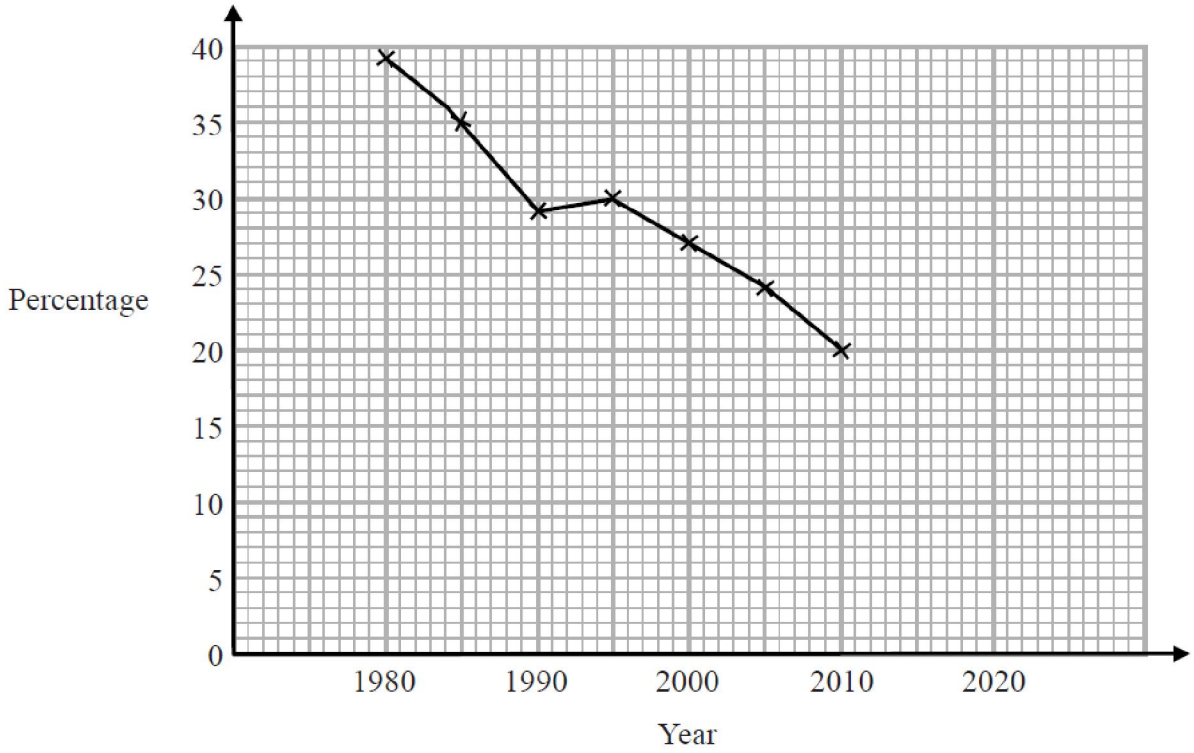
3 Make t the subject of the formula $y = \frac{t}{3} - 2a$

Question 13 (AO1): 67% of students got this right

1 (*b*) Find the highest common factor (HCF) of 168 and 180.

Question 14 (AO2): 65% of students got this right

2 The time series graph shows information about the percentages of the people in a village that used the village shop for the years between 1980 and 2010.



(*a*) Describe the trend in the percentage of the people in the village who used the shop for this period.

(*b*) (i) Use the graph to predict the percentage of the people in the village likely to use the shop in the year 2020.

(ii) Is your prediction reliable?
Explain your answer.

Question 15 (AO1): 64% of students got this right

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

.....

(Total 3 marks)

Question 16 (AO1): 63% of students got this right

15. Here is a right-angled triangle.

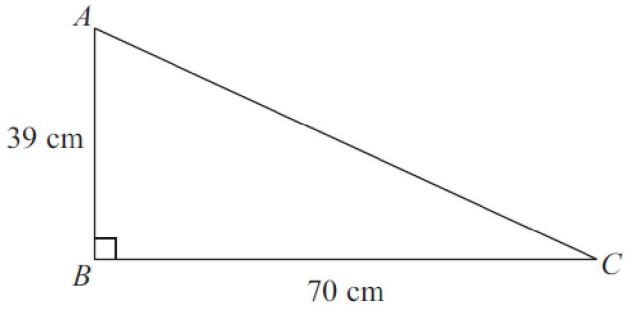


Diagram **NOT** accurately drawn

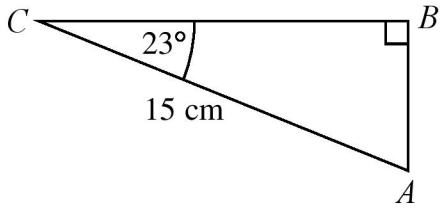
Work out the length of *AC*.
Give your answer correct to 1 decimal place.

..... cm

(Total for Question 15 is 3 marks)

Question 17 (AO1): 61% of students got this right

7 *ABC* is a right-angled triangle.



Calculate the length of *AB*.
Give your answer correct to 3 significant figures.

(Total for Question 7 is 2 marks)

Question 18 (AO1): 60% of students got this right

1 The table shows information about the heights of 80 children.

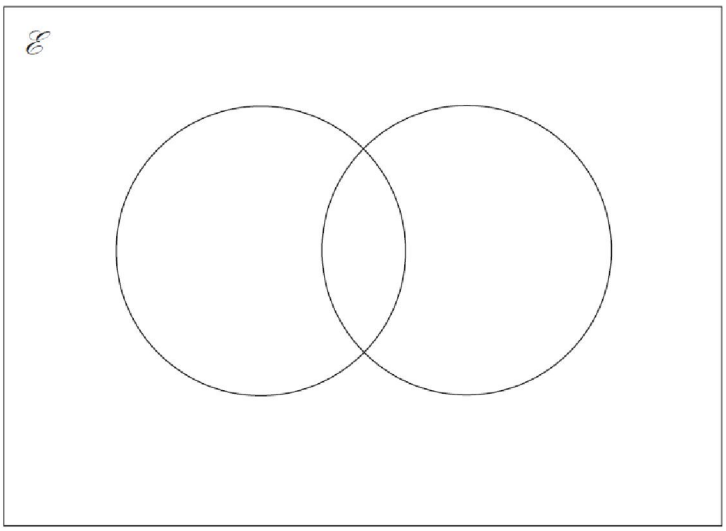
Height (h cm)	**Frequency**
$130 < h \leqslant 140$	4
$140 < h \leqslant 150$	11
$150 < h \leqslant 160$	24
$160 < h \leqslant 170$	22
$170 < h \leqslant 180$	19

(a) Find the class interval that contains the median.

Question 19 (AO1): 59% of students got this right

1 $\mathscr{E}$ = {odd numbers less than 30}
A = {3, 9, 15, 21, 27}
B = {5, 15, 25}

(*a*) Complete the Venn diagram to represent this information.



(4)

A number is chosen at random from the universal set, $\mathscr{E}$.

(*b*) What is the probability that the number is in the set $A \cup B$?

(2)

(Total for Question 1 is 6 marks)

Question 20 (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.

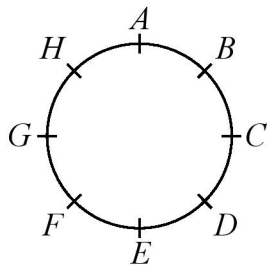
One candy bar costs £2.
In total, they paid £46.

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

(Total 5 marks)

Question 21 (AO2): 57% of students got this right

3 Hasmeet walks once round a circle with diameter 80 metres.



There are 8 points equally spaced on the circumference of the circle.

(*a*) Find the distance Hasmeet walks between one point and the next point.

Question 22 (AO1): 56% of students got this right

9.

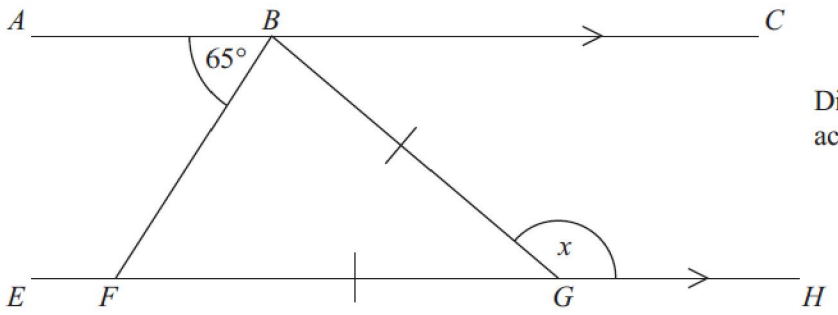


Diagram **NOT** accurately drawn

ABC is parallel to *EFGH*.

GB = *GF*
Angle *ABF* = 65°

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

(Total 4 marks)

Question 23 (AO3): 54% of students got this right

7. The diagram shows Diana's suitcase.
The suitcase is in the shape of a cuboid.

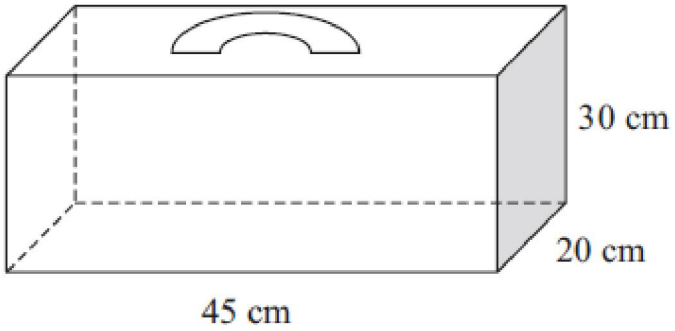


Diagram **NOT** accurately drawn

Diana has a walking stick that folds.
The folded walking stick has a length of 60 cm.

Diana wants to put the folded walking stick in the suitcase.

Will the folded walking stick fit in the suitcase?

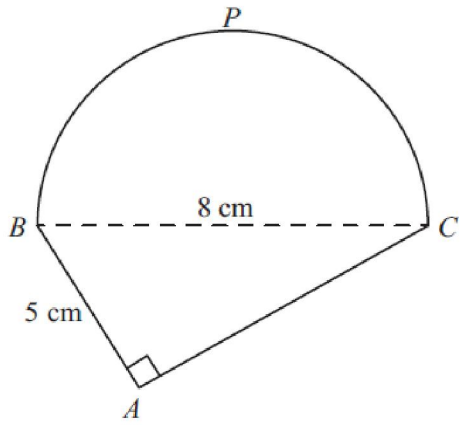
(Total 4 marks)

Question 24 (AO1): 53% of students got this right

16 (*b*) Show that the equation $x^3 - 3x^2 + 3 = 0$ can be rearranged to give $x = \sqrt[3]{3x^2 - 3}$

Question 25 (AO3): 51% of students got this right

10. Here is a shape.



BPC is a semicircle.
ABC is a right-angled triangle.
BC = 8 cm.
AB = 5 cm.

Work out the perimeter of the shape.
Give your answer correct to 3 significant figures.

..... cm

(Total 5 marks)

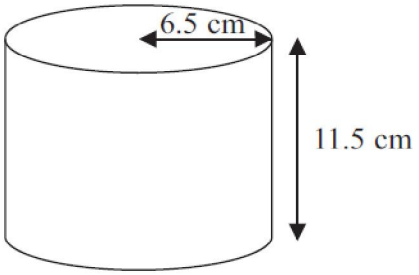
Question 26 (AO1): 50% of students got this right

8. Solve $x + 2y = 3$

$x - y = 6$

Question 27 (AO3): 49% of students got this right

14. The diagram shows a large tin of pet food in the shape of a cylinder.



The large tin has a radius of 6.5 cm and a height of 11.5 cm.

A pet food company wants to make a new size of tin.

The new tin will have a radius of 5.8 cm.
It will have the same volume as the large tin.

Calculate the height of the new tin.
Give your answer correct to one decimal place.

..... cm

(Total 3 marks)

Answers to Qn 1 (AO1): 89% of students got this right

1.	(*a*)		–1, 0, 1, 2, 3	2	B2 for all 5 values and no extras (ignore repeats) (B1 for 4 correct values and no extras or all 5 correct values and one incorrect value)

Answers to Qn 2 (AO1): 85% of students got this right

Question	Working	Answer	Mark	Notes
1 (a)		$2^3 \times 3 \times 7$	M1	for continual prime factorisation (at least two consecutive steps correct) **or** for at least two stages of a factor tree correct
			M1	for a fully correct factor tree **or** list of 2, 2, 2, 3, 7
			A1	for $2 \times 2 \times 2 \times 3 \times 7$ **or** $2^3 \times 3 \times 7$

Answers to Qn 3 (AO2): 83% of students got this right

Question	Working	Answer	Mark	Notes
5 (a)		Evaluation	C1	for error correctly identified, can be in the working, e.g. circling

Answers to Qn 4 (AO1): 80% of students got this right

Question		Working	Answer	Mark	Notes
4	(a)		7.5	3	M1 for $4.5^2 + 6^2$ (=5 6.25) M1 for $\sqrt{56.25}$ or $\sqrt{(4.5^2 + 6^2)}$ A1 for 7.5

Answers to Qn 5 (AO1): 79% of students got this right

7 (a) Expand $7(x + 5)$

$7x + 35$

(1)

(b) Expand $3y(4y - 3)$

$12y^2 - 9y$

(1)

(c) Expand and simplify $(t + 2)(t + 4)$

$t^2 + 6t + 8$

(2)

Answers to Qn 6 (AO1): 77% of students got this right

Question		Working	Answer	Mark	Notes
8	(a)		Negative	1	B1 cao
	(b)		117–123	2	M1 for a line of best fit drawn between (9, 130) & (9, 140) and between (13, 100) & (13,110) inc.. A1 for 117 − 123 inclusive

Answers to Qn 7 (AO2): 75% of students got this right

5.		$\pi(6)^2 - \pi(5)^2$ $= 113(.09\ldots) - 78.5(39\ldots)$ $=34.55751919$	34.6	3	M1 for $\pi(6)^2$ (or equivalent) or $\pi(5)^2$ (or equivalent) or 113… or 78.5… M1 for $\pi(6)^2 - \pi(5)^2$ (or equivalent) A1 for 34.5 - 34.6

Answers to Qn 8 (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 9 (AO1): 71% of students got this right

Question		Working	Answer	Mark	Notes
6.	(a)	p^{5+4}	p^9	1	B1 (accept p^{5+4})
	(b)	q^{5-2}	q^3	1	B1 (accept q^{5-2})
	(c)		$2u$	2	B2 (accept $2t^0u$, $2t^0u^1$ oe) (B1 for 2 correct terms from 2, t^0 and u oe eg u^1)
	(d)		$3wy^3$	2	B2 cao (B1 for 2 correct terms from 3, w and y^3 oe) NB: accept w^1 for w.

Answers to Qn 10 (AO1): 70% of students got this right

4.	(c)	$(x - 5)(x + 2) = 0$	5 and -2	3	M1 for $(x \pm 5)(x \pm 2)$ A1 for $(x - 5)(x + 2)$ $(= 0)$ B1 ft (dep on M1) for $x = 5$ and -2

Answers to Qn 11 (AO3): 69% of students got this right

9.			14.4	3	M1 for $\pi \times 6.5^2 \times 11.5$ (= 1526.42...) M1 (dep) for $\frac{'1526.42...'}{\pi \times 5.8^2}$ A1 for 14.4 – 14.5 **OR** M1 for $\frac{5.8}{6.5}$ or $\frac{6.5}{5.8}$ or 0.89(23…) or 1.12(06896…) M1 for $11.5 \div \left(\frac{5.8}{6.5}\right)^2$ or $11.5 \div \left(\frac{6.5}{5.8}\right)^2$ A1 for 14.4 – 14.5

Answers to Qn 12 (AO1): 68% of students got this right

Paper 1MA1: 3H			
Question	**Working**	**Answer**	**Notes**
3		$t = 3(y + 2a)$	M1 adding $2a$ to both sides or multiplying each term by 3 A1 $t = 3(y + 2a)$ or $t = 3y + 6a$

Answers to Qn 13 (AO1): 67% of students got this right

Question	Working	Answer	Mark	Notes
1 (b)		12	M1	for attempt to list factors of 168 **and** 180 with at least 4 of each correct and none incorrect **or** correct prime factorisation of 180, e.g. $2 \times 2 \times 3 \times 3 \times 5$ or $2^2 \times 3^2 \times 5$
			A1	cao

Answers to Qn 14 (AO2): 65% of students got this right

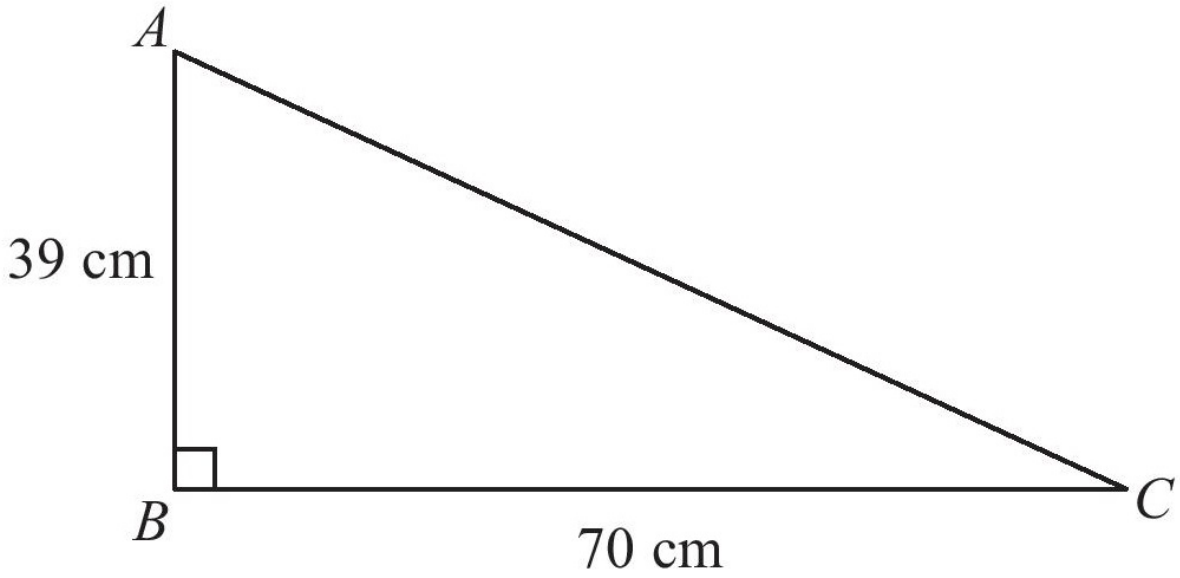
Paper 1MA1: 2H				
Question		Working	Answer	Notes
2	(a)		Trend described	C1 for "percentage of people who use the shop decreases" oe
	(bi)		13 - 17	P1 for process to draw trend line on graph A1 for 13 - 17
	(bii)		No + reason	C1 for comment, eg "no, because 2020 is beyond the time period covered by the given data"

Answers to Qn 15 (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 16 (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 17 (AO1): 61% of students got this right

Question 7 (Total 2 marks)

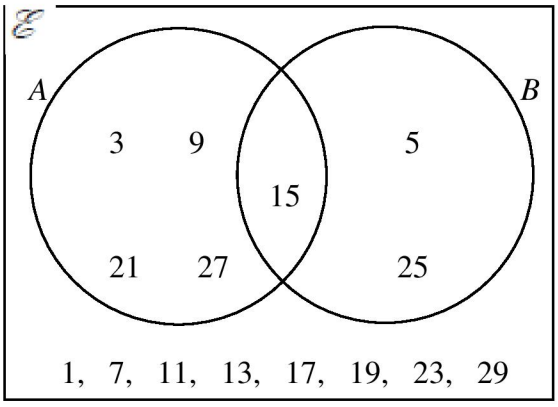
Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{7.5}{3} = 2.5, \quad \frac{12.5}{5} = 2.5, \quad \frac{10}{4} = 2.5$	M1	This mark is given for a method to divide at least a pair of corresponding sides
	All sides are enlarged by the same factor, so triangles are similar	C1	This mark is given for a correct comment

Answers to Qn 18 (AO1): 60% of students got this right

Part	Working or answer an examiner might expect to see	Mark	Notes
1 (a)	$160 < h \leq 170$	1	This mark is given for the correct answer only

Answers to Qn 19 (AO1): 59% of students got this right

Question 1 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		B1	This mark is given for labels on the Venn diagram
		M1	This mark is given for 15 shown in the intersection
		M1	This mark is given for 5 and 25 in only set B or 3, 9, 21 and 27 in only set A or 1, 7, 11, 13, 17, 19, 23, 29 in $(A \cup B)'$
		C1	This mark is given for all numbers correctly placed in the Venn Diagram
(b)	$\frac{7}{a}$ where $a \geq 7$ or $\frac{b}{15}$, where $b \leq 15$	P1	This mark is given for a correct numerator or denominator
	$\frac{7}{15}$	A1	This mark is given for the correct answer only

Answers to Qn 20 (AO3): 58% of students got this right

*5 Redlands School sent x students to a revision day.
St Samuel's School sent twice as many students as Redlands School. $2x$
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 21 (AO2): 57% of students got this right

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
3 (a)		31.4	P1	for working with circumference formula, eg $\pi \times 80$ (=251. …) oe
			A1	for answer in the range 31.4 to 31.5 accept 10π

Answers to Qn 22 (AO1): 56% of students got this right

9.			$x = 130$ + correct reasons	4	M1 for angle $BFG = 65$ may be seen on diagram M1 (dep) for correct method to calculate x, eg (x=) 65 + 65 (=130) **or** (x=) 180 − (180 – 2 × 65) (=130) C2 for x = 130 **and** full appropriate reasons related to method shown (C1 (dep on M1) for any one appropriate reason related to method shown) eg alternate angles; base angles in an isosceles triangle are equal; angles in a triangle add up to 180°; angles on a straight line add up to 180°; exterior angle of triangle = sum of two interior opposite angles; co-interior angles add up to 180° (allied angles) NB Any reasons stated **must** be used

Answers to Qn 23 (AO3): 54% of students got this right

7.		$\sqrt{45^2+20^2} = \sqrt{2425}$ $= 49.24...$ $\sqrt{30^2+20^2} = \sqrt{1300}$ $= 36.05...$ $\sqrt{45^2+30^2} = \sqrt{2925}$ $= 54.08...$ $\sqrt{45^2+20^2+30^2}$ $= \sqrt{3325}$ $= 57.66281297$ **OR** $30^2 + 20^2 + 45^2$ $= 900 + 400 + 2025$ $= 3325$ $\sqrt{'3325'} = 57.66281297$	No with working	4	M1 for $45^2 + 20^2$ or $20^2 + 30^2$ or $45^2 + 30^2$ M1 for $\sqrt{'45^2+20^2'}$ or $\sqrt{'20^2+30^2'}$ or $\sqrt{'45^2+30^2'}$ M1 for $\sqrt{'45^2+20^2+30^2'}$ (= $\sqrt{3325}$) C1 for No AND 57.6 – 57.7 < 60 oe **OR** M2 for $30^2 + 20^2 + 45^2$ (= 900 + 400 + 2025 = 3325) M1 for $\sqrt{'3325'}$ C1 for No AND 57.6 – 57.7 < 60 oe

Answers to Qn 24 (AO1): 53% of students got this right

Question	Working	Answer	Mark	Notes
16 (b)		Shown	C1	for at least $x^3 = 3x^2 - 3$ and no incorrect steps.

Answers to Qn 25 (AO3): 51% of students got this right

Question		Working	Answer	Mark	Notes
10.			23.8	5	M1 for $8^2 - 5^2$ or $AC^2 + 5^2 = 8^2$ M1 for $\sqrt{(8^2 - 5^2)}$ (=6.24(4..)) with least one of 8^2 or 5^2 correctly evaluated. M1 for 8π (=25.13 to 25.13(2…)) or $8\pi \div 2$ or 4π (=12.56(6…)) using $\pi = 3.14$ or better M1 for 5 + their AC + their arc PBC A1 for 23.7 – 23.9

Answers to Qn 26 (AO1): 50% of students got this right

Question		Working	Answer	Mark	Notes
8		$2y - -y = 3 - 6$ or $x + 2x = 3 + 12$	$x = 5, y = -1$	3	M1 for a complete method to eliminate one variable (condone one arithmetic error) A1 $x = 5$ A1 $y = -1$ NB: Candidates showing no working score 0 marks

Answers to Qn 27 (AO3): 49% of students got this right

Question		Working	Answer	Mark	Notes
14			14.4	3	M1 for $\pi \times 6.5^2 \times 11.5$ (= 1526.42...) M1 (dep) for $\frac{'1526.42...'}{\pi \times 5.8^2}$ A1 for 14.4 - 14.5 **OR** M1 for $\frac{5.8}{6.5}$ or $\frac{6.5}{5.8}$ or 0.89(23…) or 1.12(06896…) M1 for $11.5 \div \left(\frac{5.8}{6.5}\right)^2$ or $11.5 \div \left(\frac{6.5}{5.8}\right)^2$ A1 for 14.4 – 14.5