ADA PINPOINT PACKS
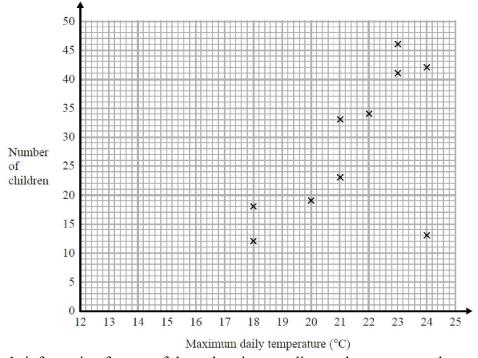
41_to_61_Percent_Pinpoint_AI_Pack

Made for Grade4to6

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): 58% of students got this right

3a 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.

Johan's information for one of these days is an outlier on the scatter graph.
(a) Give a possible reason for this.

....

....

....

(1)

Question 2 (AO2): 58% of students got this right

16.   (*a*) Solve $5(f-3) = f + 10$

....
(3)

Question 3 (AO3): 57% of students got this right

12. There are only

   4 mint biscuits
and 1 toffee biscuit in a tin.

There are only

   5 mint sweets
and 3 strawberry sweets in a packet.

Michael's mum lets him take one biscuit from the tin and one sweet from the packet.

Michael takes a biscuit at random from the tin.
He also takes a sweet at random from the packet.

Work out the probability that either the biscuit is mint or the sweet is mint, but not both.

....

(Total 3 marks)

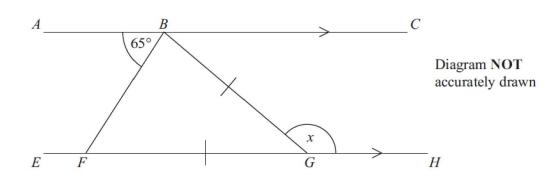# Question 4 (AO2): 56% of students got this right

11. Gail invests in an account that pays compound interest of 5% per annum.

How many years does it take to double the money in her investment?

(Total 2 marks)

_____

Question 5 (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 6 (AO3): 55% of students got this right

6   Only blue vans and white vans are made in a factory.

The ratio of the number of blue vans to the number of white vans is 4 : 3

For blue vans,

the number of small vans : the number of large vans = 3 : 5

(*b*) Work out the fraction of the number of vans made in the factory that are blue and large.

Question 7 (AO3): 54% of students got this right
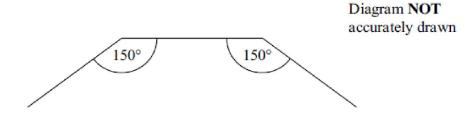
5. Coventry Estates sells houses.

In February they sold twice as many houses as in January.
In March they sold 10 more houses than in February.
In April they sold half as many houses as in March.

Coventry Estates sold a minimum of 123 houses from 1st January to 30th April.

Find the least number of houses sold in January.

Question 8 (AO1): 53% of students got this right

4.   The diagram shows 3 sides of a regular polygon.

Diagram **NOT**
accurately drawn

150°   150°

Each interior angle of the regular polygon is 150°.
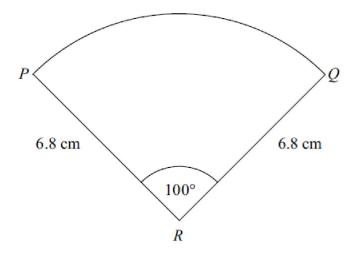
Work out the number of sides of the regular polygon.

....

(Total 3 marks)

_____

Question 9 (AO1): 52% of students got this right

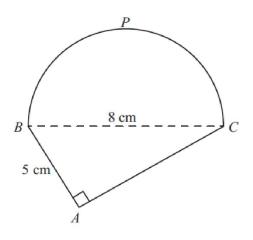**12.** The diagram shows a sector of a circle of radius 6.8 cm.

PQ is an arc of the sector.
Angle *PRQ* = 100°.

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

.... cm

(Total 3 marks)

Question 10 (AO3): 51% of students got this right

10. Here is a shape.

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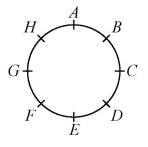*BC* = 8 cm.
AB = 5 cm.

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

.... cm
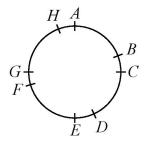
(Total 5 marks)

Question 11 (AO2): 50% 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.

Four of the points are moved, as shown in the diagram below.

Hasmeet walks once round the circle again.

(*b*) Has the mean distance that Hasmeet walks between one point and the next point changed?

You must give a reason for your answer.
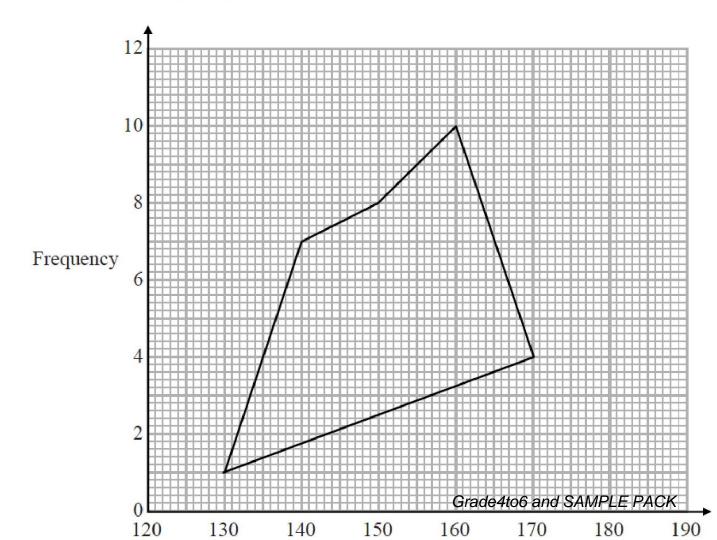
Question 12 (AO2): 50% of students got this right

4 The grouped frequency table gives information about the heights of 30 students.

Height (*h* cm)	Frequency
$130 < h \le 140$	1
$140 < h \le 150$	7
$150 < h \le 160$	8
$160 < h \le 170$	10
$170 < h \le 180$	4

(*a*) Write down the modal class interval.

This incorrect frequency polygon has been drawn for the information in the table.

Question 13 (AO2): 49% of students got this right

2   In London, 1 litre of petrol costs 108.9p
     In New York, 1 US gallon of petrol costs $2.83.

          1 US gallon = 3.785 litres
          £1 = $1.46

     In which city is petrol better value for money, London or New York?
     You must show your working.

Question 14 (AO1): 48% of students got this right

13. (a) Expand and simplify $(x + 2)(2x - 3)(3x + 1)$

....

(3)

(b) Simplify $n^4 \div n^{\frac{1}{2}}$

....

(1)

(Total for Question 13 is 4 marks)

Question 15 (AO1): 47% of students got this right

2   Solve the simultaneous equations

$$3x + y = -4$$
$$3x - 4y = 6$$

(Total for Question 2 is 3 marks)

_____

Question 16 (AO2): 46% of students got this right

RETEST QUESTION

11   (*b*) Determine the value of 4^{-3}

....
(1)

(*c*) Simplify $(3x^3)^2$

....
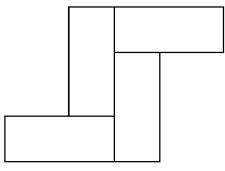**(2)**

Question 17 (AO2): 45% of students got this right

6   Here is a rectangle.

The length of the rectangle is 7 cm longer than the width of the rectangle.
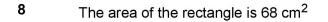
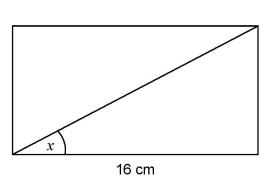4 of these rectangles are used to make this 8-sided shape.

The perimeter of the 8-sided shape is 70 cm.

Work out the area of the 8-sided shape.

Question 18 (AO3): 45% of students got this right

8   The area of the rectangle is 68 cm^2

Not drawn
accurately

16 cm

Work out the size of angle x.

[3 marks]

_____

_____

_____

_____

_____

Answer _____ degrees

Question 19 (AO2): 45% of students got this right
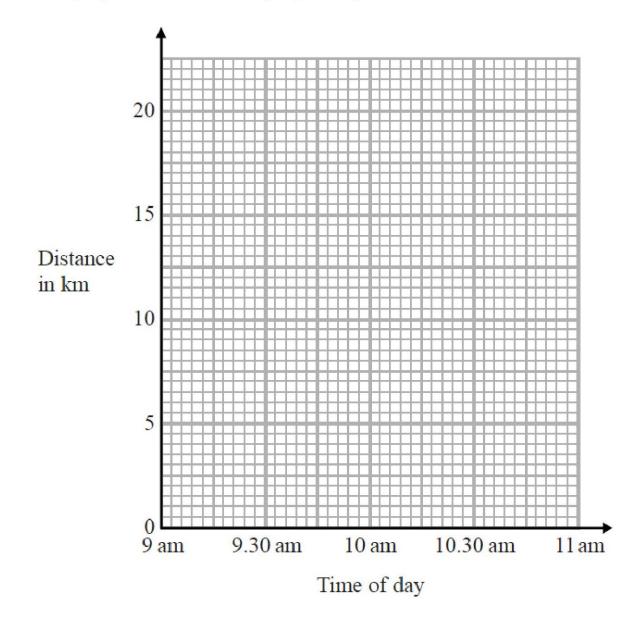
4 There are only red counters, blue counters and green counters in a bag.

number of red counters : number of blue counters : number of green counters = 1 : 3 : 7

Jamie takes at random a counter from the bag and records the colour of the counter.

He then puts the counter back in the bag.

Jamie does this a number of times.

He records a total of 68 blue counters.

(*b*) Work out an estimate for the total number of times Jamie takes a counter from the bag.

Question 20 (AO2): 44% of students got this right

5   At 9 am, Bradley began a journey on his bicycle.

From 9 am to 9.36 am, he cycled at an average speed of 15 km/h.
From 9.36 am to 10.45 am, he cycled a further 8 km.

(*a*) Draw a travel graph to show Bradley's journey.

From 10.45 am to 11 am, Bradley cycled at an average speed of 18 km/h.

(*b*) Work out the distance Bradley cycled from 10.45 am to 11 am.

Question 21 (AO3): 43% of students got this right

6   Dev invests £1500 for 2 years.

The compound interest rate is 1.6% per year.

6 (a)   Which calculation works out the total value after 2 years?

Circle your answer.

[1 mark]

£1500 × 1.6 × 2   £1500 × 1.6^2

£1500 × 1.016 × 2   £1500 × 1.016^2

6 (b)   Emma invests £1500 for 2 years.

The interest rate is

1.8% for the first year

1.3% for the second year.

Whose investment is worth more after 2 years?

You **must** show your working.

[4 marks]

Answer _____

Question 22 (AO1): 42% of students got this right

14   Prove algebraically that the recurring decimal $0.4\dot{5}\dot{7}$ can be written as $\dfrac{151}{330}$

Question 23 (AO1): 42% of students got this right

13   Write $x^2 + 6x - 7$ in the form $(x + a)^2 + b$ where a and b are integers.

Question 24 (AO1): 41% of students got this right

12 (*a*) Find the reciprocal of 2.5.

Question 25 (AO2): 40% of students got this right

14. Here is a rectangular sheet of metal.
A square hole is cut out of the metal.

$3x + 5$

Diagram **NOT**
accurately drawn

$x + 6$

$x + 6$

$2x + 5$
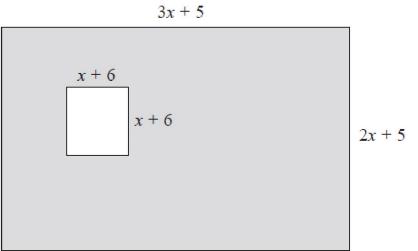
The length of the rectangle is $3x + 5$
The width of the rectangle is $2x + 5$
The square has sides of length $x + 6$
All measurements are in centimetres.

The perimeter of the square hole is $\dfrac{3}{5}$ of the perimeter of the rectangle.

Work out the length of a side of the square hole.

.... cm

(Total 5 marks)

Question 26 (AO1): 40% of students got this right

20.   Here are the first 4 terms of a quadratic sequence.
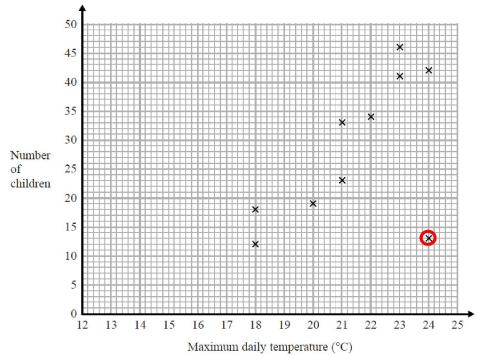
            7   18   33   52

Find an expression, in terms of n, for the nth term of the sequence.

(Total 3 marks)

_____

Answers to Qn 1 (AO1): 58% of students got this right

3a 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.

Johan's information for one of these days is an outlier on the scatter graph.
(a) Give a possible reason for this.

Perhaps this was a school day
OR   Might have been raining despite high temp.
OR   Park might have closed early that day
OR   Similar

(1)

Answers to Qn 2 (AO2): 58% of students got this right

16 (a) Solve $5(f - 3) = f + 10$

$$5f - 15 = f + 10$$
$$4f - 15 = 10$$
$$4f = 25$$
$$f = \frac{25}{4} = 6\frac{1}{4}$$

$$f = 6.25$$

Answers to Qn 3 (AO3): 57% of students got this right

			12.	$\frac{17}{40}$	3	M1 $\frac{4}{5} \times \frac{3}{8}$ or $\frac{1}{5} \times \frac{5}{8}$ or $\frac{12}{40} \times \frac{5}{40}$
						M1 $\frac{4}{5} \times \frac{3}{8} + \frac{1}{5} \times \frac{5}{8}$
						A1 $\frac{17}{40}$ oe

Answers to Qn 4 (AO2): 56% of students got this right

11.	Years	Value at end of year	15	2	M1 for writing an equation e.g. $1.05^n = 2$ or for a correct method to find total value up to the end of at least year 5 or for at least 3 trials of n into 1.05^n or using $n \log 1.05 = \log 2$
	1	1.05			
	2	1.1025			A1 for 15 years
	3	1.157625			
	4	1.21550625			
	5	1.276281563			
	6	1.340095641			
	7	1.407100423			
	8	1.477455444			
	9	1.551328216			
	10	1.628894627			
	11	1.710339358			
	12	1.795856326			
	13	1.885649142			
	14	1.979931599			
	15	2.078928179			

Answers to Qn 5 (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 <u>$x = 130$</u> **and** full appropriate reasons related to method shown

(C1 (dep on M1) for any one appropriate reason related to method shown)

eg <u>alternate angles</u>;
base <u>angles</u> in an <u>isosceles triangle</u> are <u>equal</u>;
<u>angles</u> in a <u>triangle</u> add up to <u>180°</u>;
<u>angles</u> on a straight <u>line</u> add up to <u>180°</u>;
<u>exterior angle</u> of triangle = <u>sum</u> of <u>two interior opposite angles</u>;
<u>co-interior angles</u> add up to <u>180°</u> (<u>allied angles</u>)

NB Any reasons stated **must** be used |

9

Answers to Qn 6 (AO3): 55% of students got this right

Question	Working	Answer	Mark	Notes
6 (b)	$\dfrac{4}{7}\times\dfrac{5}{8}$	$\dfrac{20}{56}$	P1	for start to process e.g. $\dfrac{5}{8}$
			P1	for correct process to multiply fractions, e.g. $\dfrac{4}{7}\times\dfrac{5}{8}$
			A1	ft from (a), e.g. $\dfrac{5}{14}$, $\dfrac{20}{56}$, $\dfrac{1120}{3136}$

Answers to Qn 7 (AO3): 54% of students got this right

Question		Working	Answer	Mark	Notes
5		Jan x Feb $2x$ Mar $2x + 10$ Apr $\frac{1}{2}(2x + 10)$ $x + 2x + 2x + 10 + \frac{1}{2}(2x + 10) > 123$ $6x + 15 \geq 123$	18	5	M1 for a method to express all 4 months' amounts algebraically (at least 3 correct, ft) M1 for an expression for total with at least 3 correct terms added M1 for a correct inequality stated algebraically M1 for an inequality reduced to $ax > b - c$ A1 cao NB: accept inequalities written as equations SC T&I is 5 marks for 18, otherwise 0 marks

Answers to Qn 8 (AO1): 53% of students got this right

Question		Working	Answer	Mark	Notes
4.		$180 - 150 \ (=30)$	12	3	M1 for $180 - 150 \ (= 30)$
		$360 \div \text{``30''}$			M1 for $360 \div \text{``30''}$
					A1 cao
		OR			**OR**
		$\dfrac{N-2}{N} \times 180 = 150$			M1 for $\dfrac{N-2}{N} \times 180 = 150$
		$(N-2)180 = 150N$			M1 for $360 \div \text{``30''}$
		$30N = 360$			A1 cao

Answers to Qn 9 (AO1): 52% of students got this right

12.	$\frac{100}{360} \times \pi \times 6.8 \times 2$	25.5	3	M1 for $\frac{100}{360} \times \pi \times 6.8 \times 2$ (=11.86..)
				M1 for "11.86" + 2 × 6.8 (oe)
				A1 for answer in the range 25.4 – 25.6

Answers to Qn 10 (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 11 (AO2): 50% of students got this right

Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
3 (b)		No (supported)	C1	Mean distance stays the same with reason, eg total distance remains unchanged or same number of points

Answers to Qn 12 (AO2): 50% of students got this right

Paper 1MA1: 2H			
Question	Working	Answer	Notes
4 a		$160 < h \leq 170$	B1 for identifying the correct class interval
b		1. Points should be plotted at mid-interval values 2. The polygon should not be closed	C1 C1 for a correct error identified for a correct error identified

Answers to Qn 13 (AO2): 49% of students got this right

Part	Working an or answer examiner might expect to see	Mark	Notes
2	Cost of 1 litre of petrol in NY = $\$\dfrac{2.83}{3.785} = \$0.7476\ldots$	1	This mark is given for finding out the cost of a litre of petrol in New York in dollars
	Cost of 1 litre of petrol in NY = $\dfrac{0.7476\ldots}{1.46}p = 51.2p$	1	This mark is given for finding out the cost of a litre of petrol in New York in pence
	Petrol; is better value for money in New York (0.51.2 < 108.9p)	1	This mark is given for a correct conclusion supported by working

Answers to Qn 14 (AO1): 48% of students got this right

13	(a)		$6x^3 + 5x^2 - 17x - 6$	M1	for multiplying out two brackets with at least three terms out of four correct
				M1	(dep M1) for a complete method
				A1	cao
	(b)		$n^{\frac{7}{2}}$	B1	oe

Answers to Qn 15 (AO1): 47% of students got this right

Question 2 (Total 3 marks)

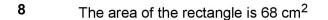| Part	Working or answer an examiner might expect to see	Mark	Notes
	$3x - 3x = 0, \ y - -4y = 5y, \ 4 - 6 = -10$ $5y = -10$	M1	This mark is given for a method to eliminate one variable
	$y = -2$ $3x - 2 = -4 \quad \text{or} \quad 3x + 8 = 6$	M1	This mark is given for substituting one found value in one of the equations
	$3x = -2$ $x = -\dfrac{2}{3}, \ \ (y = -2)$	A1	This mark is given for a correct pair of answers only

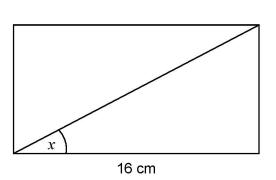# Answers to Qn 16 (AO2): 46% of students got this right

11	(b)		0.015625 or $\frac{1}{64}$	1	B1 cao
	(c)		$9x^6$	2	M1 for either 9 or x^6 in a two term product A1 cao

Answers to Qn 17 (AO2): 45% of students got this right

Part	Working or answer an examiner might expect to see	Mark	Notes
6	Width = x Length = $x + 7$	1	This mark is given for forming expressions for the length and width of the rectangle
	$x + x + 7 + x + x + 7 + 7 + x + x + 7 + x + x + 7 + 7 = 70$ $8x + 42 = 70$	1	This mark is given for forming an equation for the width of the shape
	$x = \dfrac{70 - 42}{8}$	1	This mark is given for finding an expression for x
	width = 3.5, length = 10.5	1	This mark is given for finding values for the width and the length of the shape
	$4 \times 3.5 \times 10.5 = 147$	1	This mark is given for finding the area of the shape

Answers to Qn 18 (AO3): 45% of students got this right

8 The area of the rectangle is 68 cm^2

Not drawn
accurately

16 cm

Work out the size of angle x.

[3 marks]

tan−1(4.25/16)

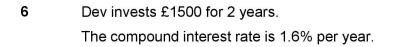Answer 14.88 or 14.9 or 15 degrees

Answers to Qn 19 (AO2): 45% of students got this right

Question	Working	Answer	Mark	Notes
4 (b)		249 or 250	P1	for $68 \div$ " $\frac{3}{11}$ " oe, ft from part (a), accept rounded integer answers
			A1	for 249 or 250, ft from part (a), accept rounded integer answers

Answers to Qn 20 (AO2): 44% of students got this right

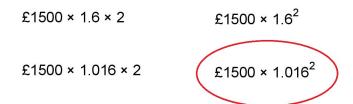| Paper 1MA1: 2H				
Question	Working	Answer		Notes
5 a		graph	M1	for method to start to find distance cycled in 36 mins, eg. line drawn of correct gradient or $15 \times \frac{36}{60}$
			C1 C1	for correct graph from 9.00 am to 9.36 am for graph drawn from "(9.36, 9)" to (10.45, "9" + 8)
b		4.5	M1 A1	for 18×0.25oe cao

Answers to Qn 21 (AO3): 43% of students got this right

6   Dev invests £1500 for 2 years.

       The compound interest rate is 1.6% per year.

6 (a)   Which calculation works out the total value after 2 years?

       Circle your answer.

[1 mark]

£1500 × 1.6 × 2 $£1500 × 1.6^2$

£1500 × 1.016 × 2 $£1500 × 1.016^2$

6 (b)   Emma invests £1500 for 2 years.

       The interest rate is

           1.8% for the first year

           1.3% for the second year.

       Whose investment is worth more after 2 years?

       You **must** show your working.

[4 marks]

[1548.38, 1548.39]

vs

$1500 × 1.018 × 1.013$
[1546.85, 1546.86]

Answer   Dev's

Answers to Qn 22 (AO1): 42% of students got this right

Question	Working	Answer	Mark	Notes
14	$x = 0.4575757\ldots$ $10x = 4.575757\ldots$ $1000x = 457.575757\ldots$ $990x = 453$ **OR** $100x = 45.7575757\ldots$ $99x = 45.3$	$\dfrac{151}{330}$	M1 M1 A1	for $0.4575757\ldots$ or $0.4 +$ $0.05757\ldots$ (dep) for two recurring decimals that when subtracted would give an integer or terminating decimal or for $\dfrac{453}{990}$ conclusion to proof to given fraction

Answers to Qn 23 (AO1): 42% of students got this right

Part	Working an or answer examiner might expect to see	Mark	Notes
13	$x^2 + 6x - 7 = x^2 + 2ax + a^2 + b$	1	This mark is given for a method to complete the square
	$(x + 3)^2 - 16$	1	This mark is given for the correct answer only

Answers to Qn 24 (AO1): 41% of students got this right

Paper 1MA1: 2H			
Question	Working	Answer	Notes
12 a		0.4	B1 For 0.4 oe

Answers to Qn 25 (AO2): 40% of students got this right

14.			12	5	M1 for writing a correct expression for the perimeter of the square or the rectangle e.g. $4(x + 6)$ or $10x + 20$ or for the semi-perimeter
					M1 for equating the two (semi) perimeters correctly
					M1 for resolving the fraction e.g. $20x + 120 = 30x + 60$ or for rearranging the equation to the form. $a = bx + c$
					M1 for $10x + 60 = 120$ or $24 = 2x + 12$ or $x = 6$
					A1 cao

Answers to Qn 26 (AO1): 40% of students got this right

20.				3	M1 for correct deduction from differences, e.g. 2nd difference of 4 implies $2n^2$
					M1 for use of first differences
			$2n^2 + 5n$		A1