ADA PINPOINT PACKS

84_to_100_Percent_Pinpoint_AI_Pack

Made for Grade5_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): 16% of students got this right

25. Each length of the side of square B is twice the length of the side of square A.

John says that this means the area of square B is twice the area of square A.

Is John right?
Justify your answer.

….....

….....

(Total 1 mark)

Question 2 (AO2): 15% of students got this right

21. The diagram shows a triangle.

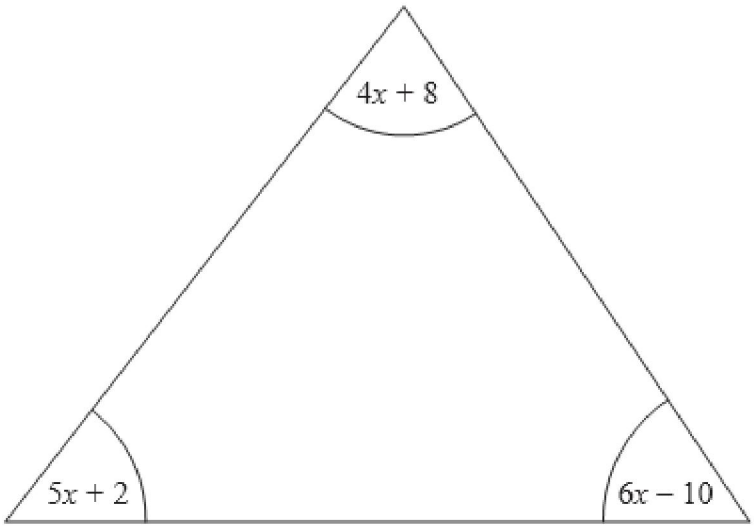


Diagram **NOT** accurately drawn

All the angles are measured in degrees.

Show that the triangle is isosceles.

(Total 5 marks)

Question 3 (AO1): 15% of students got this right

16. Solve the simultaneous equations

$$2x + 3y = 10$$
$$4x - y = -1$$

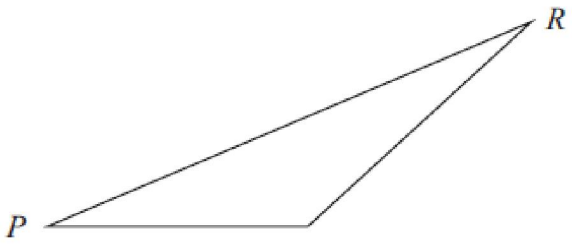
x = ...

y = ...

(Total for Question 16 is 3 marks)

Question 4 (AO3): 15% of students got this right

14. Here is a scale drawing of a field.



Scale: 1 cm represents 3 m.

Harry is going to plant some bushes on the side *PR*.
He is going to plant the first bush at *P*.

The bushes will be 2 m apart.
The cost of each bush is £11.99

Work out the total cost of the bushes on the side *PR*.

£.....

(Total 5 marks)

Question 5 (AO1): 14% of students got this right

26

(b) Work out $(2.85 \times 10^{-7}) \div (8.11 \times 10^{-3})$
Give your answer as an ordinary number correct to 3 significant figures.

.....

(2)

Question 6 (AO1): 14% of students got this right

23 (a) Expand and simplify $(x + 6)(x - 3)$

[2 marks]

23 (b) Solve $(x - 7)(x + 9) = 0$

[1 mark]

Question 7 (AO1): 13% of students got this right

17

(c) Make j the subject of the formula $z = 2j + 9$

.....

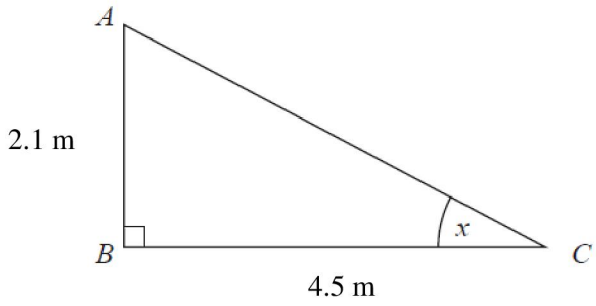
(2)

Question 8 (AO1): 13% of students got this right

26 Factorise $x^2 + 3x - 4$

Question 9 (AO1): 12% of students got this right

27 *ABC* is a right-angled triangle.



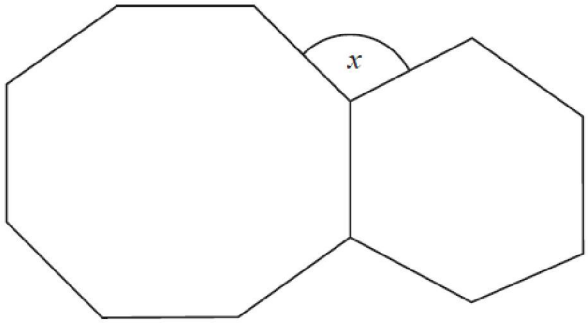
Work out the size of the angle marked *x*.
Give your answer correct to 1 decimal place.

.....

(Total for Question 27 is 2 marks)

Question 10 (AO3): 12% of students got this right

25



The diagram shows a regular octagon and a regular hexagon.

Find the size of the angle marked x
You must show all your working.

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

20 The density of apple juice is 1.05 grams per cm^3.

The density of fruit syrup is 1.4 grams per cm^3.

The density of carbonated water is 0.99 grams per cm^3.

25 cm^3 of apple juice are mixed with 15 cm^3 of fruit syrup and
280 cm^3 of carbonated water to make a drink with a volume of 320 cm^3.

Work out the density of the drink.
Give your answer correct to 2 decimal places.

(Total for Question 20 is 4 marks)

Question 12 (AO1): 11% of students got this right

20. The total cost of 3 apples and 4 pears is £1.84

The total cost of 5 apples and 2 pears is £1.76

Work out the cost of one apple and the cost of one pear.

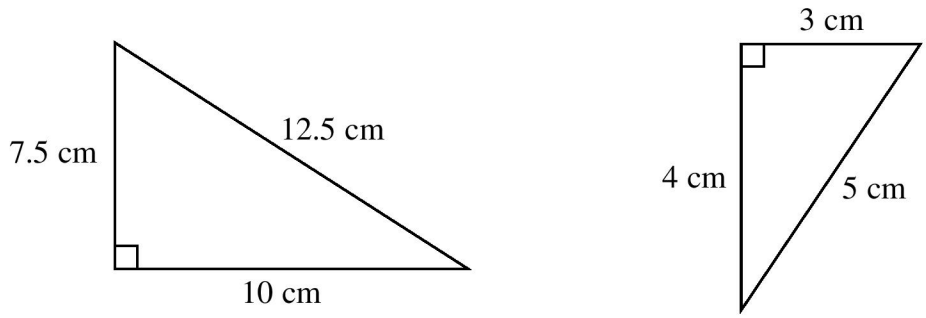
Cost of one apple .....p

Cost of one pear .....p

(Total 4 marks)

Question 13 (AO2): 10% of students got this right

21

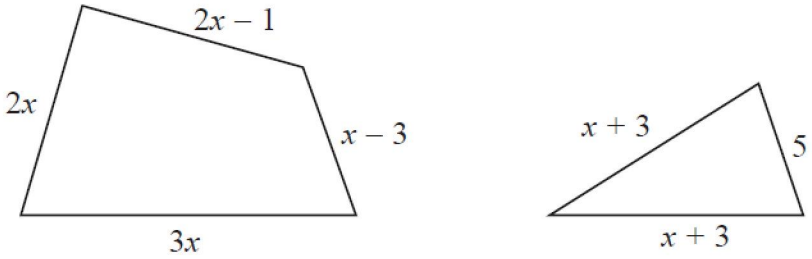


Show that these two triangles are mathematically similar.

(Total for Question 21 is 2 marks)

Question 14 (AO3): 10% of students got this right

30



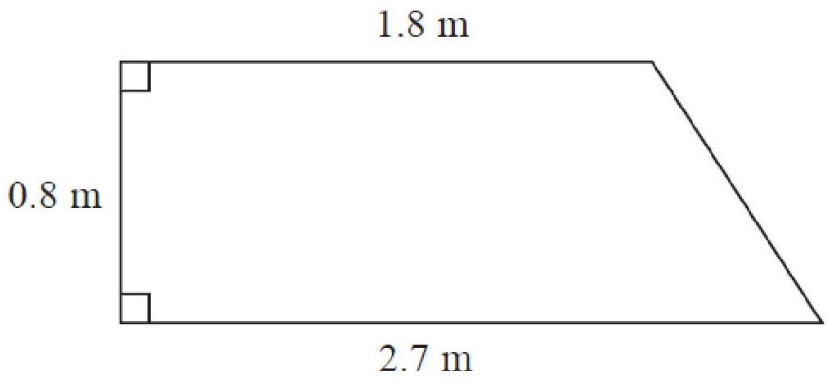
In the diagram all measurements are in centimetres.

The perimeter of the quadrilateral is twice the perimeter of the triangle.

Work out the perimeter of the quadrilateral.

Question 15 (AO3): 10% of students got this right

25 The diagram shows part of a wall in the shape of a trapezium.



Karen is going to cover this part of the wall with tiles.
Each rectangular tile is 15 cm by 7.5 cm.

Tiles are sold in packs.
There are 9 tiles in each pack.

Karen divides the area of the wall by the area of a tile to work out an estimate for the number of tiles she needs to buy.

(*a*) Use Karen's method to work out an estimate for the number of packs of tiles she needs to buy.

Question 16 (AO1): 10% of students got this right

30. (a) Factorise $x^2 - 169$

.....

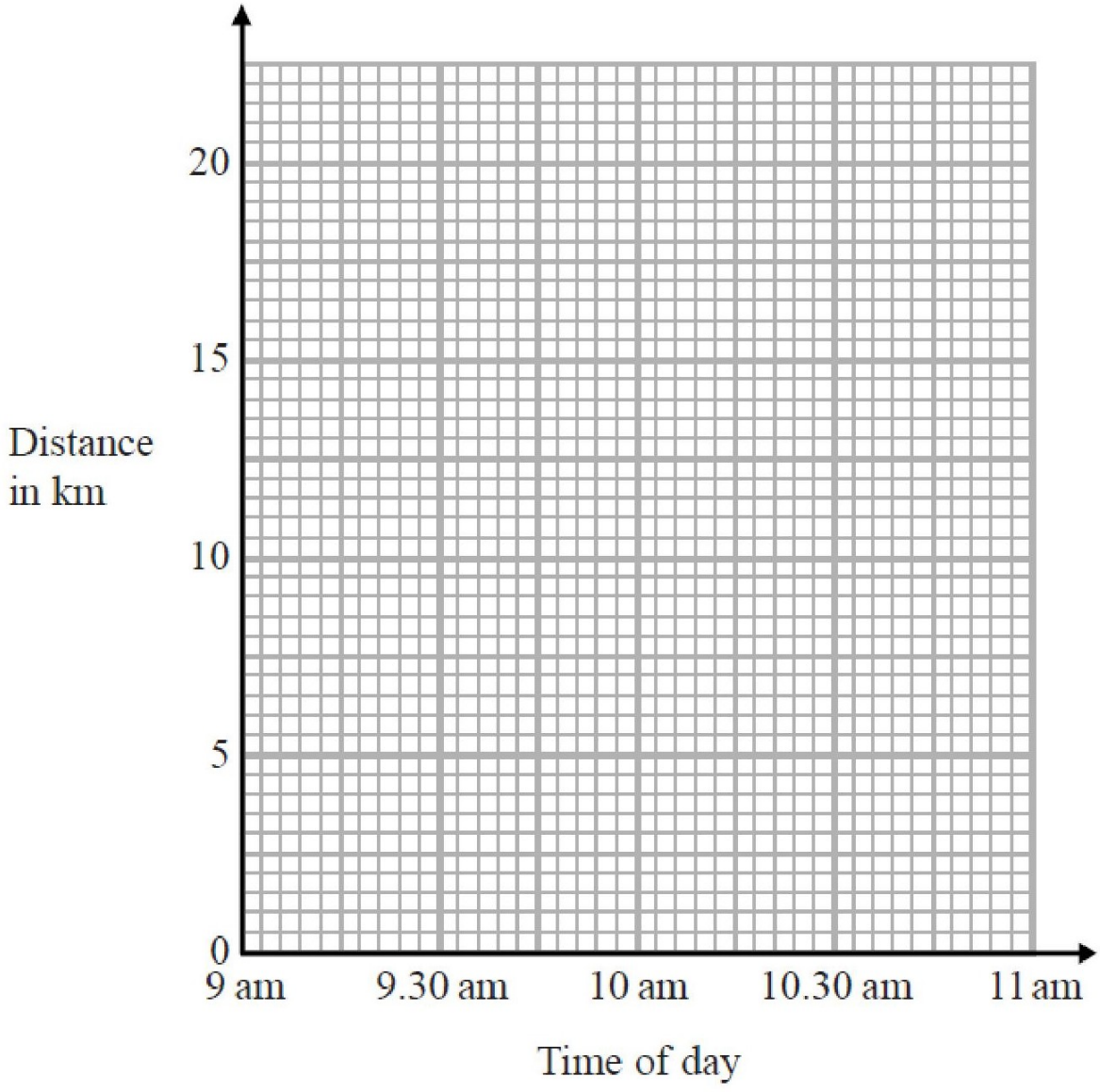
(1)

Question 17 (AO1): 9% of students got this right

24 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 18 (AO3): 9% of students got this right

18. Fleur buys two larger trays of plants, tray A and tray B.
These plants will also have flowers that are red or yellow or white or blue.

The table gives, for each tray, the probabilities that a flower will be red or yellow or white or blue.

	Colour	red	yellow	white	blue
Tray A	**Probability**	0.1	0.2	0.4	0.3
Tray B	**Probability**	0.3	0.3	0.1	0.3

There are
200 plants in tray A
500 plants in tray B

Fleur picks a plant at random from all the plants in the two trays.

(c) What is the probability that this plant will have a white flower?

.....

(2)

(Total 6 marks)

Question 19 (AO1): 8% of students got this right

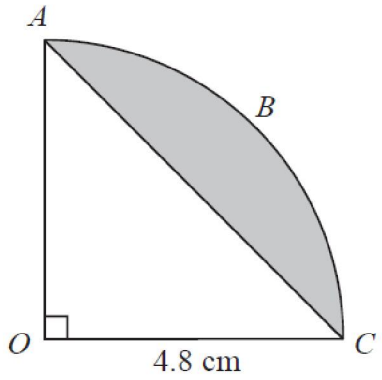
26. Solve $x^2 + 3x - 10 = 0$

x =.....

(Total 2 marks)

Question 20 (AO3): 7% of students got this right

28



The arc *ABC* is a quarter of a circle with centre *O* and radius 4.8 cm.
AC is a chord of the circle.

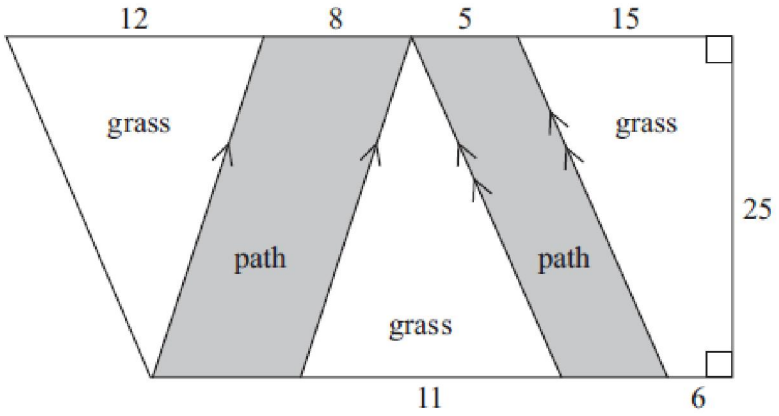
Work out the area of the shaded segment.
Give your answer correct to 3 significant figures.

Question 21 (AO3): 7% of students got this right

21. David is planning his garden.

There will be two paths in the garden.
The rest of the garden will be grass.

The diagram shows David's plan for his garden.



All measurements on the diagram are given in feet.
Work out the total area of the grass.

(Total 4 marks)

Question 22 (AO1): 7% of students got this right

20. Solve the simultaneous equations

$2x - y = 13$

$x - 2y = 11$

x = ...

y = ...

(Total 3 marks)

Question 23 (AO2): 6% of students got this right

28. The distance from the Earth to the Sun is 1.496×10^{11} metres.
The speed of light is 3×10^{8} metres per second.

(a) Show that, correct to 3 significant figures, light will take 0.139 hours to travel from the Sun to the Earth.

(3)

1 googol is 1×10^{100}

Danesh says,

> When I multiply 1.496×10^{11} by 6.68×10^{9}
> I get nearly 1 googol because $1.496 \times 10^{11} \times 6.68 \times 10^{9} = 9.99 \times 10^{99}$

Is Danesh correct?

(b) Give a reason for your answer.

.....

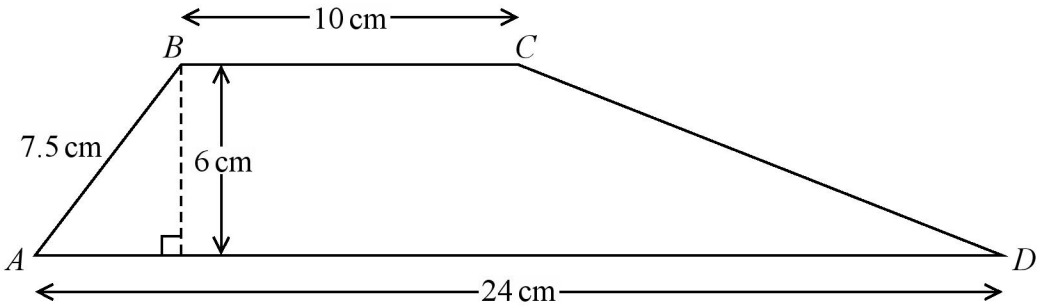
.....

(1)

(Total for Question 28 is 4 marks)

Question 24 (AO3): 6% of students got this right

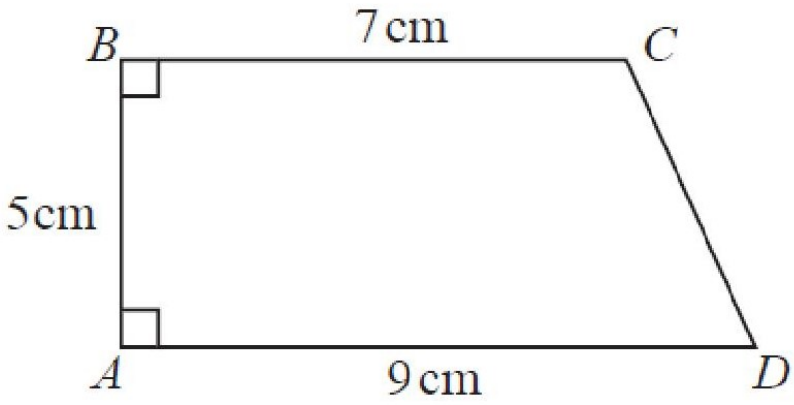
22 *ABCD* is a trapezium.



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

Question 25 (AO3): 5% of students got this right

28 *ABCD* is a trapezium.

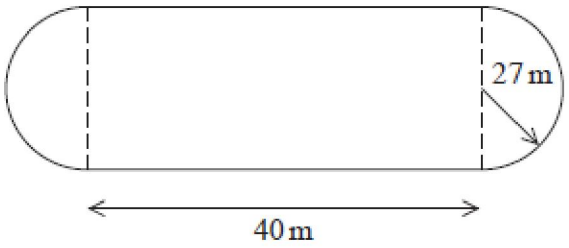


A square has the same perimeter as this trapezium.

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

Question 26 (AO3): 4% of students got this right

26. The diagram shows a cycle track.



The track has two straight sides each of length 40 m.
Each end of the track is a semicircle of radius 27 m.

The diameter of each wheel of Ian's bike is 590 mm.
Ian is going to ride his bike around the track once.

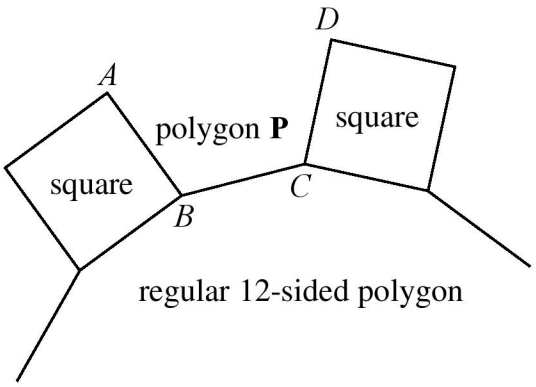
Calculate how many complete revolutions each wheel of his bike will make.

.....

(Total for Question 26 is 5 marks)

Question 27 (AO2): 3% of students got this right

19 In the diagram, *AB*, *BC* and *CD* are three sides of a regular polygon **P**.



Show that polygon **P** is a hexagon.
You must show your working.

(Total for Question 19 is 4 marks)

Question 28 (AO2): 2% of students got this right

21 $100^a \times 1000^b$ can be written in the form 10^w

(*c*) Show that $w = 2a + 3b$

Answers to Qn 1 (AO2): 16% of students got this right

		25.	No with reason	1	C1 for No and e.g. the area of B will be 22 = 4 times greater than the area of A, or may use values to give a counter example.

Answers to Qn 2 (AO2): 15% of students got this right

21.			"**two** angles are **equal** so the triangle is **isosceles**"	5	M1 for $6x - 10 + 4x + 8 + 5x + 2$ or $15x$ M1 for $6x - 10 + 4x + 8 + 5x + 2 = 180$ or $15x = 180$ or ($x =$) $180 \div 15$ A1 $x = 12$ M1 (ft from '12' if M2 scored) for $5 \times$ '12' $+ 2$ or $6 \times$ '12' $- 10$ or $62(^o)$ or $4 \times$ '12' $+ 8$ or $56(^o)$ C1 both base angles as 62 and two angles are equal so the triangle is isosceles NB. $x = 12$ with no working scores M0M0A0 ; correct value of x from clear trial and improvement could gain M1M1A1 **OR** M1 $5x + 2 = 6x - 10$ or $2 + 10 = 6x - 5x$ A1 $x = 12$ M1 $5 \times 12 + 2$ or $6 \times 12 - 10$ or $62(^o)$ or $4 \times 12 + 8$ or $56(^o)$ M1 checking their angles add to 180^o, "62"+"62"+"56" = 180 C1 both base angles as 62 and two angles are equal so the triangle is isosceles **OR** M1 $4x + 8 = 5x + 2$ oe or $4x + 8 = 6x - 10$ A1 $x = 6$ **or** $x = 9$ M1 (dep) for substituting 'x' into one of the angles oe M1 for showing their angles do not sum to 180^o C0

Answers to Qn 3 (AO1): 15% of students got this right

16		$\frac{1}{2}$, 3	M1 M1 A1	For a correct method to eliminate one variable (condone one arithmetic error) (dep) for substituting found value in one of the equations or correct method after starting again (condone one arithmetic error) cao

Answers to Qn 4 (AO3): 15% of students got this right

Question		Working	Answer	Mark	Notes
14.			131.89	5	B2 for $PR = 21$ m ($\pm$ 0.6 m) or at least 3 bushes 0.5 to 0.9 cm apart on PR (B1 for $PR = 7$cm ($\pm$ 0.2 cm) or at least 3 bushes 1.8 to 2.2 cm apart on PR) M1 "21" $\div$ 2 or for indication of 10 or 11 bushes (may be on diagram) M1 (dep on 2 marks earned previously) for '11' $\times$ 11.99 A1 cao

Answers to Qn 5 (AO1): 14% of students got this right

26 (b) Work out $(2.85 \times 10^{-7}) \div (8.11 \times 10^{-3})$
Give your answer as an ordinary number correct to 3 significant figures.

$\frac{0.000000285}{0.00811}$ **= 0.0000351**

Answers to Qn 6 (AO1): 14% of students got this right

23 (a) Expand and simplify $(x + 6)(x - 3)$ **[2 marks]**

$x^2 - 3x + 6x - 20$

Answer $x^2 + 3x - 18$

23 (b) Solve $(x - 7)(x + 9) = 0$ **[1 mark]**

Answer 7 and –9

Answers to Qn 7 (AO1): 13% of students got this right

17 (c) Make j the subject of the formula

$z - 9 = 2j$

$\frac{z-9}{2} = j$

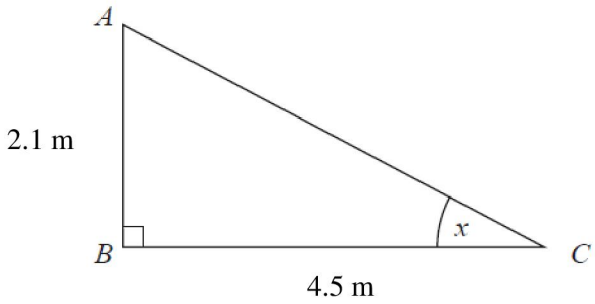
$j = \frac{z-9}{2}$

Answers to Qn 8 (AO1): 13% of students got this right

Paper 1MA1: 3F			
Question	**Working**	**Answer**	**Notes**
26		$(x-1)(x+4)$	M1 $(x \pm 1)(x \pm 4)$ A1 $(x-1)(x+4)$ oe

Answers to Qn 9 (AO1): 12% of students got this right

27 *ABC* is a right-angled triangle.



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

$\tan x = \frac{2.1}{4.5}$

x = 25.0°

Answers to Qn 10 (AO3): 12% of students got this right

Paper 1MA1: 2F			
Question	**Working**	**Answer**	**Notes**
25		105	P1 for process to find the exterior angle or interior angle of a hexagon or octagon P1 for process to find the both exterior angles or both interior angles A1 for 105 from correct working

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

Paper: 1MA1/3F				
Question	**Working**	**Answer**	**Mark**	**Notes**
20		1.01	P1	fruit syrup 15 × 1.4 (= 21) or water 280 × 0.99 (= 277.2) or apple juice 25 × 1.05 (= 26.25)
			P1	(dep P1) for complete process to find the total mass e.g. “277.2” + “26.25” + “21” (= 324.45) or a weighted density eg 15 × 1.4 ÷ 320 (= 0.065625) or 280 × 0.99 ÷ 320 (= 0.86625) or 25 × 1.05 ÷ 320 (= 0.08203125)
			P1	(dep P2) for complete process to find the density eg “324.45” ÷ 320 (=1.01..) or “0.065625” + “0.86625” + “0.08203125” (= 1.0139..)
			A1	1.01 to 1.014

Answers to Qn 12 (AO1): 11% of students got this right

20.		a = cost(p) of an apple p = cost(p) of a pear $3a + 4p = 184$ $5a + 2p = 176$ $7a = 2 \times 176 - 184 = 168$	24, 28	4	B1 $3a + 4p = 184$ and $5a + 2p = 176$ (or equivalent) M1 correct process to eliminate a or p M1(dep on M1): substitute found value of a or p to find other variable A1 cao

Answers to Qn 13 (AO2): 10% of students got this right

Paper: 1MA1/3F				
Question	**Working**	**Answer**	**Mark**	**Notes**
21		Shown (supported)	M1	method to divide a pair of corresponding sides, eg 7.5 ÷ 3 (= 2.5) or 3 ÷ 7.5 (= 0.4), or states scale factor is 2.5 or 0.4 or method to work out the size of an angle, eg $\tan^{-1}\left(\frac{7.5}{10}\right)$ (= 36.8 to 36.9)
			C1	shows or states that all sides are enlarged by the same factor or works out a pair of corresponding angles and states that the two triangles have the same angles

Answers to Qn 14 (AO3): 10% of students got this right

Paper 1MA1: 3F			
Question	**Working**	**Answer**	**Notes**
30		48	P1 process to start solving problem, eg forms an appropriate equation P1 complete process to isolate terms in x A1 for $x = 6.5$ oe B1 ft (dep P1) for correct perimeter for their x

Answers to Qn 15 (AO3): 10% of students got this right

Paper 1MA1: 3F			
Question	**Working**	**Answer**	**Notes**
25(a)	160 tiles 18 packs	18	M1 a full method to find the area of the trapezium M1 a full method to convert all areas to consistent units M1 for the area of the trapezium ÷ area of a tile M1 for communication of the number of whole packs required A1

Answers to Qn 16 (AO1): 10% of students got this right

30(a)		$(x+13)(x-13)$	B1	cao

Answers to Qn 17 (AO1): 9% of students got this right

Paper 1MA1: 2F			
Question	**Working**	**Answer**	**Notes**
24 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 for correct graph from 9.00 am to 9.36 am C1 for graph drawn from "(9.36, 9)" to (10.45, "9" + 8)
b		4.5	M1 for 18×0.25 A1 cao

Answers to Qn 18 (AO3): 9% of students got this right

Question		Working	Answer	Mark	Notes
18.	(c)		$\frac{13}{70}$	2	M1 for $200 \times 0.4 + 500 \times 0.1$ oe A1 for $\frac{130}{700}$ oe or a decimal answer in the range 0.185 to 0.186 or 0.19

Answers to Qn 19 (AO1): 8% of students got this right

		26.	$-2, 5$	2	M1 $(x + 2)(x - 5)$ A1

Answers to Qn 20 (AO3): 7% of students got this right

Paper 1MA1: 2F			
Question	**Working**	**Answer**	**Notes**
28	$\frac{1}{4} \times \pi \times 4.8^2$ $\frac{1}{2} \times 4.8 \times 4.8$ $\frac{1}{4} \times \pi \times 4.8^2 - \frac{1}{2} \times 4.8 \times 4.8$	6.58	B1 for use of formula for area of a circle P1 for complete process to find area of shaded region A1 for 6.56 – 6.58

Answers to Qn 21 (AO3): 7% of students got this right

Question		Working	Answer	Mark	Notes
21.		Some area examples: ½ × 12 × 25 = 150 8× 25 = 200 ½ × 11 × 25 = 137.5 5 × 25 = 125 ½ × 21 × 25 = 262.5 ½ × 44 × 25 = 550 ½ × 70 × 25 = 875 40 × 25 = 1000	550 ft^2	4	M1 Using the correct dimensions to calculate an area M1 Complete method to find the area of the grass A1 cao C1 (dep on a previous M mark) correct units communicated

Answers to Qn 22 (AO1): 7% of students got this right

Question		Working	Answer	Mark	Notes
20		$4x - 2y = 26$ $x - 2y = 11$ $3x = 15$ $2x - y = 13$ $2x - 4y = 22$ $3y = -9$	$x = 5$ $y = -3$	3	M1 for correct process to eliminate one variable (condone one arithmetic error) M1 (dep) for substituting found value in one of the equations or appropriate method after starting again (condone one arithmetic error) A1 for $x = 5$ and $y = -3$

Answers to Qn 23 (AO2): 6% of students got this right

28(a)		Shown	M1	for distance ÷ speed to find time, e.g. $(1.496 \times 10^{11}) \div (3 \times 10^{8})$ (= 498.666)
			M1	(dep) for conversion to hours, e.g. "498.666" ÷ (60 × 60)
			A1	0.1385185185…
(b)		Explanation	C1	Correct explanation, e.g. they have multiplied the indices rather than adding

Answers to Qn 24 (AO3): 6% of students got this right

Part	Working or answer an examiner might expect to see	Mark	Notes
22	$7.5^2 - 6^2$	1	This mark is given for a method to find the third length of the right angled triangle shown
	$7.5^2 - 6^2 = 56.25 - 36 = 20.25$ $\sqrt{20.25} = 4.5$	1	This mark is given for finding the third length of the right angled triangle shown
	$24 - 4.5 - 10 = 9.5$	1	This mark is given for finding a length for a right angled triangle to be able to calculate angle *CDA*
	$\tan CDA = \frac{6}{9.5}$	1	This mark is given for finding the tangent of the angle *CDA*
	angle *CDA* = 32.3°	1	This mark is given for an answer in the range 32.2–32.3

Answers to Qn 25 (AO3): 5% of students got this right

Paper 1MA1: 2F			
Question	**Working**	**Answer**	**Notes**
28		43.5	P1 For process to establish a right-angled triangle with P1 two sides of 5 cm and 9 – 7 = 2 cm P1 For correct application of Pythagoras, P1 eg. 5^2 +"2"^{2} for a complete process to A1 find perimeter, eg. 9 + 7 + 5 + "5.39" (= 26.385...) for process to find area of square, eg. (26.385...÷ 4)^2 for answer in range 43.5 to 43.6

Answers to Qn 26 (AO3): 4% of students got this right

Question	Working	Answer	Mark	Notes
26		134	P1	Process to find the distance around one or both ends of the track, e.g. π × 54 (= 169.6460033) or (π × 54) ÷ 2 (=84.82300165)
			P1	(dep on P1) complete process to find the total length of the track, e.g. 40 × 2 + "169.6460033" (=249.6460033)
			P1	Process to find the circumference of wheel, e.g. π × 590 (=1853.539666 mm) or π ×0.59 (= 1.85353966 m)
			P1	Complete process to find the number of revolutions in consistent units,, e.g. "249.64…" ÷ "1.85…" or unrounded answer of 134.6860863
			A1	cao

Answers to Qn 27 (AO2): 3% of students got this right

Paper: 1MA1/3F				
Question	**Working**	**Answer**	**Mark**	**Notes**
19		Shows polygon is a hexagon	M1	for a complete method to find the interior or exterior angle of the dodecagon eg $180-\frac{360}{12}$, $\frac{180}{12}(12-2)$ oe (= 150), 360 ÷ 12 (=30)
			M1	for a complete method to find the interior angle of polygon **P** eg at *B* or *C*: 360 – "150" – 90 (= 120) or "30" + 90 (= 120) **or** for a complete method to find the interior or exterior angle of the hexagon eg $180-\frac{360}{6}$, $\frac{180}{6}(6-2)$ oe (= 120), 360 ÷ 6 (= 60)
			A1	for 30 and 120 **or** 30 and 60 **or** 120 and 150 **or** 60 and 150
			C1	complete solution, fully supported by accurate figures

Answers to Qn 28 (AO2): 2% of students got this right

Part	Working or answer an examiner might expect to see	Mark	Notes
21 (c)	$100^a = 10^{2a}$, $1000^b = 10^{3b}$	1	This mark is given for writing 100^a or 1000^b as a power of 10
	$10^{2a} \times 10^{3b} = 10^{2a+3b}$ thus $w = 2a + 2b$	1	This mark is given for a correct conclusion