ADA PINPOINT PACKS

63_to_92_Percent_Pinpoint_AI_Pack

Made for Grade7to9_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 (AO1): 36% of students got this right

13   There are 14 boys and 12 girls in a class.
Work out the total number of ways that 1 boy and 1 girl can be chosen from the class.

Question 2 (AO1): 34% of students got this right

18. Write as a single fraction in its simplest form $\dfrac{2}{x-4} - \dfrac{1}{x+3}$

....

(Total 3 marks)

_____

Question 3 (AO2): 34% of students got this right

8 When a drawing pin is dropped it can land point down or point up.

Lucy, Mel and Tom each dropped the drawing pin a number of times.

The table shows the number of times the drawing pin landed point down and the number of times the drawing pin landed point up for each person.

	Lucy	**Mel.**	**Tom**
point down	31	53	16
point up	14	27	9

Stuart is going to drop the drawing pin twice.

(*b*) Use all the results in the table to work out an estimate for the probability that the drawing pin will land point up the first time and point down the second time.

Question 4 (AO2): 33% of students got this right

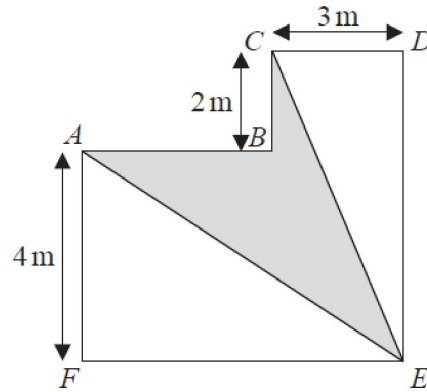10   In 2016 the population of the UK was 6.5×10^7

Laura wants to calculate an estimate for the population of the UK in 2020.

She assumes that the population increases by 0.6% each year.

(*a*)   Using Laura's assumption, calculate an estimate for the population of the UK in 2020.

Question 5 (AO3): 31% of students got this right

4   The diagram shows a shape *ABCDEF*.

All the corners of the shape are right angles.
The perimeter of the shape is 30 m.

Work out the area of *ABCE* shown shaded on the diagram.

....

(Total for Question 4 is 5 marks)

Question 6 (AO1): 30% of students got this right

10   Jim thinks of a number.

$\dfrac{2}{3}$ of Jim's number is 48.

Work out of $\dfrac{5}{6}$ Jim's number.

Question 7 (AO1): 30% of students got this right

17 Here are the first 5 terms of a quadratic sequence.

$$1 \qquad 3 \qquad 7 \qquad 13 \qquad 21$$

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

Question 8 (AO1): 29% of students got this right
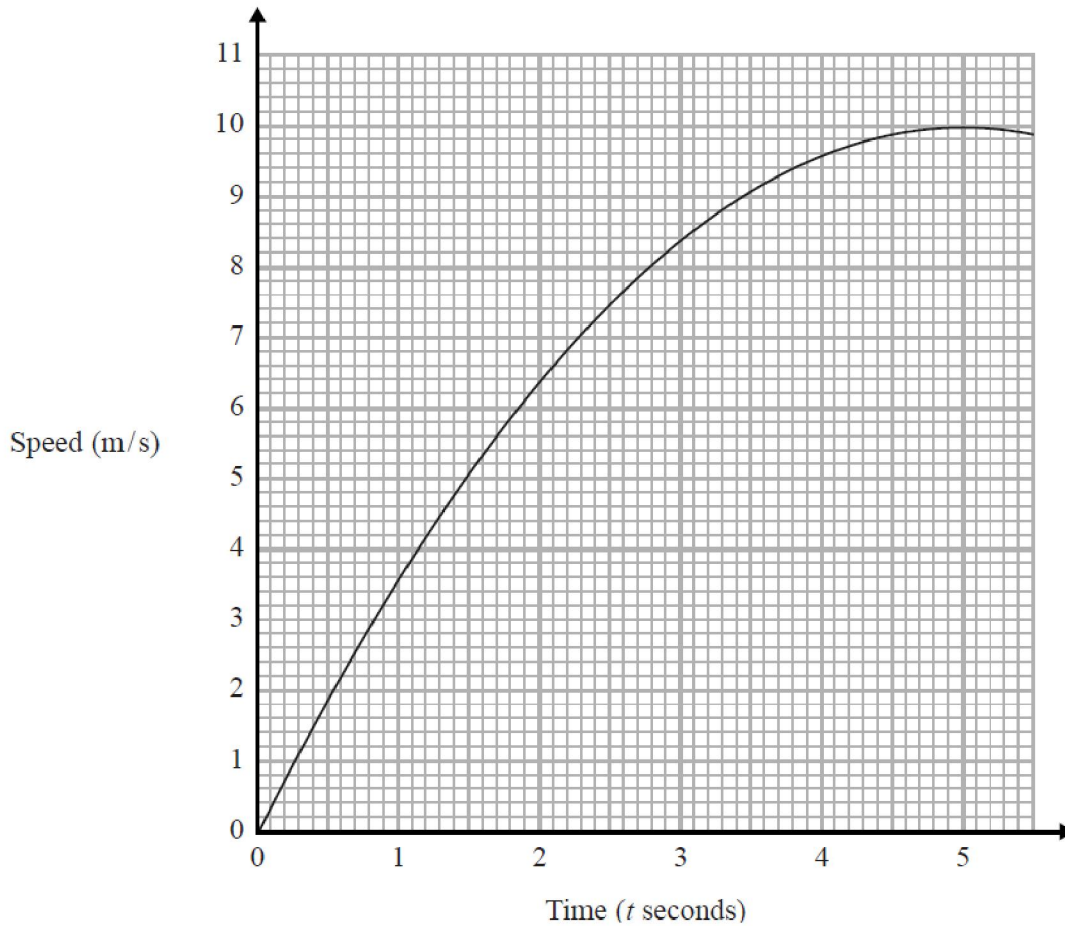
22 Here are the first five terms of a sequence.

$$4 \qquad 11 \qquad 22 \qquad 37 \qquad 56$$

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

(Total for Question 22 is 3 marks)

_____

Question 9 (AO2): 28% of students got this right

17 c Here is a speed-time graph showing the speed, in metres per second, of an object
t seconds after it started to move.

Speed (m/s)

Time (t seconds)

(a) Use 3 strips of equal width to find an estimate for the area under the graph
between $t = 1$ and $t = 4$

(c) Explain whether your answer in part (a) gives an underestimate or an overestimate for
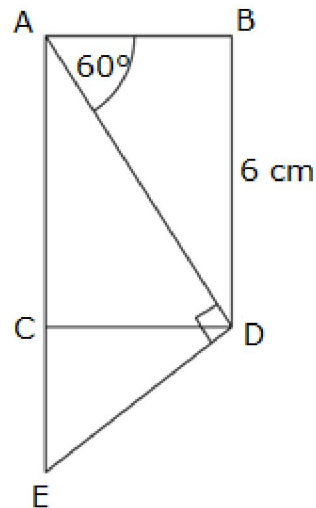the area under the graph.

....

....

....

(1)

Question 10 (AO3): 27% of students got this right

19.

Diagram **NOT** accurately drawn

6 cm

ABCD is a rectangle.
ACE is a straight line.

BD = 6 cm
Angle *ACB* = 60°
Angle *ADE* = 90°

Determine the length of *AE*.
Show all steps in your calculations.

.... cm

(Total 4 marks)

Question 11 (AO1): 26% of students got this right

12 Marie has 25 cards.
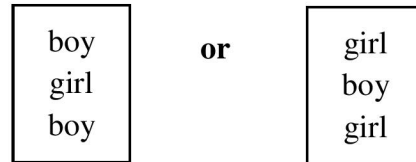   Each card has a different symbol on it.

    Marie gives one card to Shelley and one card to Pauline.

    (*a*) In how many different ways can Marie do this?

    There are 12 boys and 10 girls in David's class.
    David is going to pick three different students from his class and write their names in a
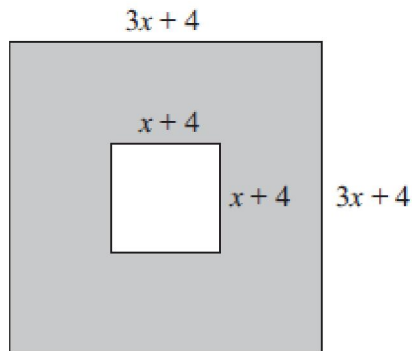   list in order.

    The order will be

    | boy
girl
boy | **or** | girl
boy
girl |

    (*b*) How many different lists can David write?

Question 12 (AO3): 25% of students got this right

13. A machine part is made by cutting a small square from the centre of a large square piece of steel.

   The dimensions of the machine part are shown on the diagram.
   All measurements are in cm.

   The perimeter of the small square is two thirds of the perimeter of the large square.
   Work out the length of a side of the small square.

Question 13 (AO3): 24% of students got this right

9   Francesco carried out a survey about the ages of the people in his office.

The table shows information about his results.

Age (*a* years)	Cumulative frequency
$20 < a \leqslant 30$	10
$20 < a \leqslant 40$	26
$20 < a \leqslant 50$	58
$20 < a \leqslant 60$	66
$20 < a \leqslant 70$	70

Draw a cumulative frequency graph for this information.

Francesco says,

"More than 60% of the people in the office are between 35 and 55 years old."

(*c*)   Use your graph to determine if Francesco is correct.

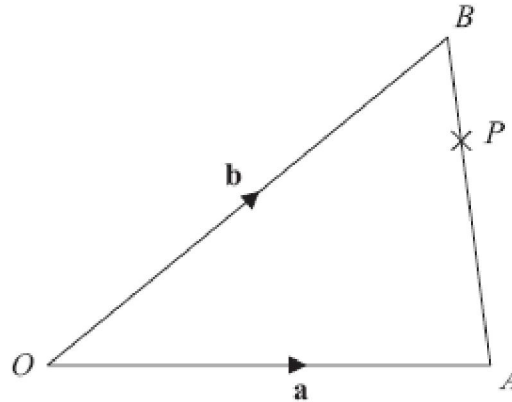# Question 14 (AO1): 23% of students got this right

17.

Diagram **NOT**
accurately drawn

OAB is a triangle.

$\overrightarrow{OA}$ = **a**

$\overrightarrow{OB}$ = **b**

(a) Find $\overrightarrow{AB}$ in terms of **a** and **b**.

....
(1)

P is the point on *AB* such that *AP* : *PB* = 3 : 1

(b) Find $\overrightarrow{OP}$ in terms of **a** and **b**.
Give your answer in its simplest form.

....
(3)

(Total 4 marks)

Question 15 (AO3): 22% of students got this right

14   *ABC* and *ABD* are two right-angled triangles.
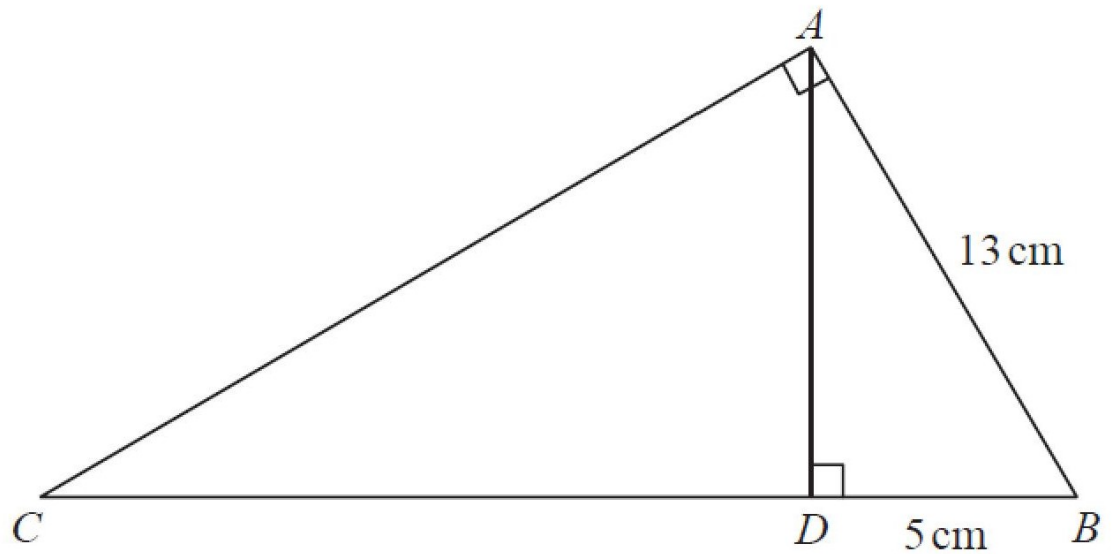
Angle *BAC* = angle *ADB* = 90°

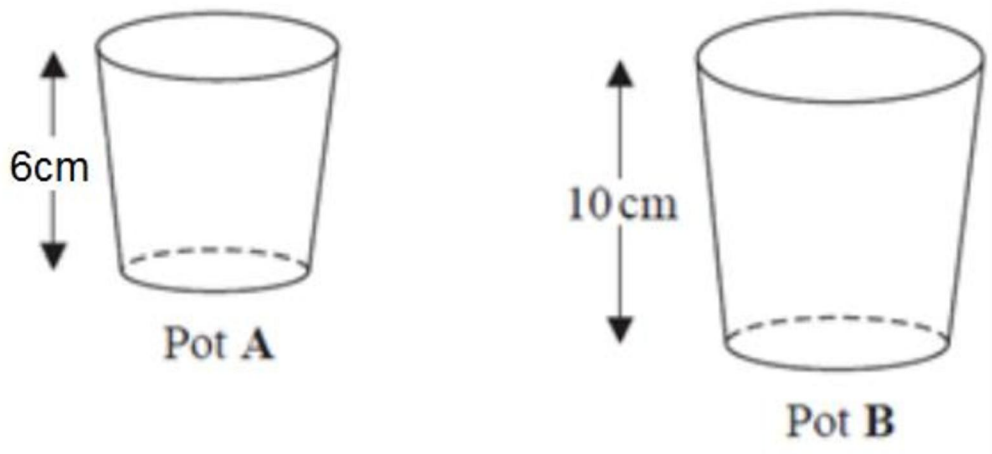*AB* = 13 cm
DB = 5 cm

Work out the length of *CB*.

Question 16 (AO1): 21% of students got this right

15   Here are two pots.

Pot **A** and pot **B** are mathematically similar.

The area of the base of pot **B** is 160 cm^2.

Work out the area of the base of pot **A**

.... cm^2

(Total for Question 15 is 2 marks)

_____

Question 17 (AO1): 21% of students got this right

20. Solve $3x^2 - 5x - 1 = 0$
Give your solutions correct to 3 significant figures.

....

(Total for Question 20 is 3 marks)

_____

Question 18 (AO1): 20% of students got this right

19 (a)   *ABCD* is a rectangle.

The *x*-axis is a line of symmetry.

Not drawn
accurately

A (−2, 3)   B (6, 3)

D   C
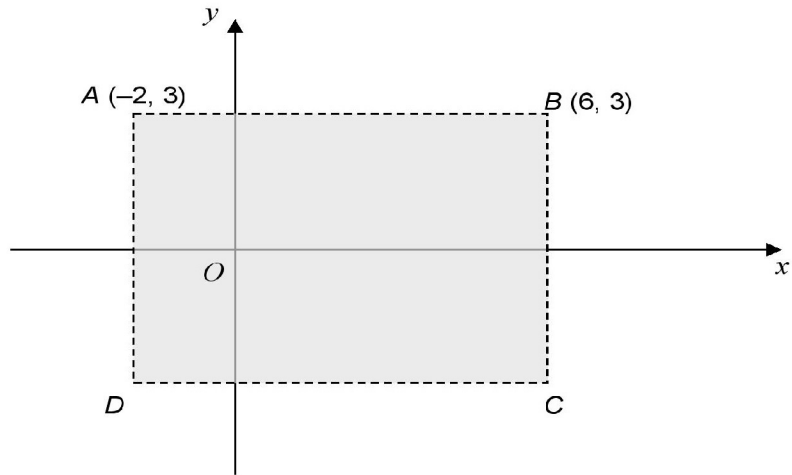
These inequalities describe the shaded region.

$$p < x < q \quad \text{and} \quad r < y < s$$

Write down the values of p, q, r and s.

[2 marks]

p = _____   q = _____

r = _____   s = _____

19 (b)   The grid shows the graph of $y = x + 2$

$y = x + 2$

On the grid, identify the region represented by
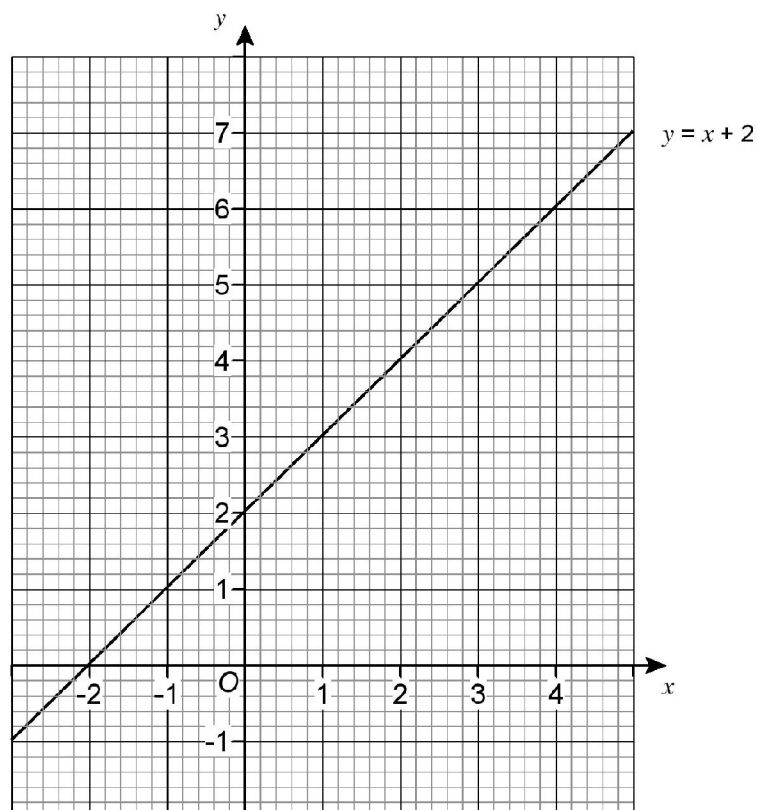
Question 19 (AO2): 18% of students got this right

13
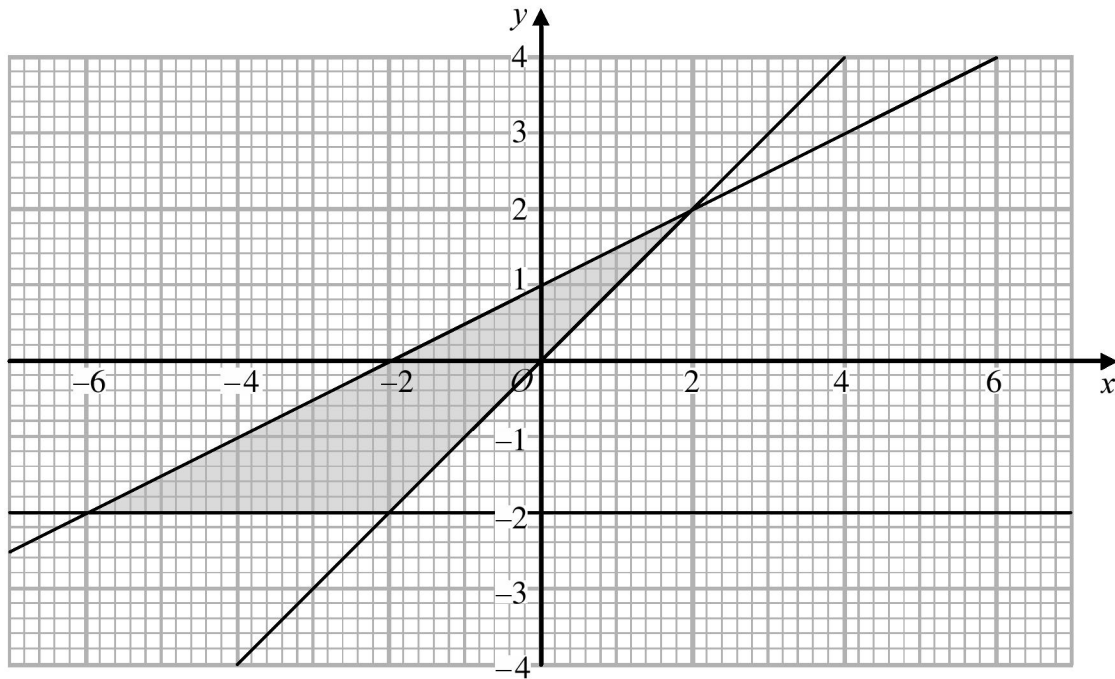
Write down the three inequalities that define the shaded region.

(Total for Question 13 is 4 marks)

_____

Question 20 (AO2): 18% of students got this right

14   Cone **A** and cone **B** are mathematically similar.
The ratio of the volume of cone **A** to the volume of cone **B** is 27 : 8

The surface area of cone **A** is 297 cm^2

Show that the surface area of cone **B** is 132 cm^2

Question 21 (AO1): 17% of students got this right

23. (a) Show that the equation $2x^3 + 4x = 3$ has a solution between 0 and 1.

(2)

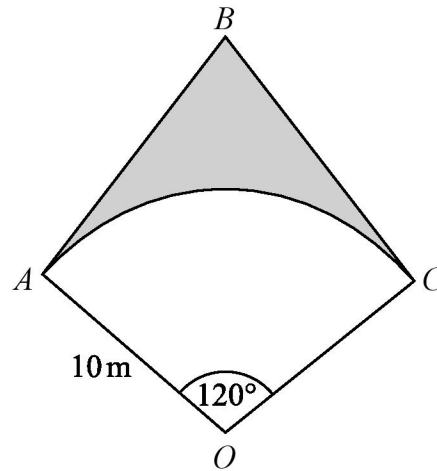(b) Show that $2x^3 + 4x = 3$ can be arranged to give $x = \dfrac{3}{4} - \dfrac{x^3}{2}$

(1)

(c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \dfrac{3}{4} - \dfrac{x_n^3}{2}$ three times to find an estimate for the solution to $2x^3 + 4x = 3$

....

(3)

(Total for Question 23 is 6 marks)

Question 22 (AO3): 16% of students got this right

20

OAC is a sector of a circle, centre *O*, radius 10 m.

BA is the tangent to the circle at point *A*.
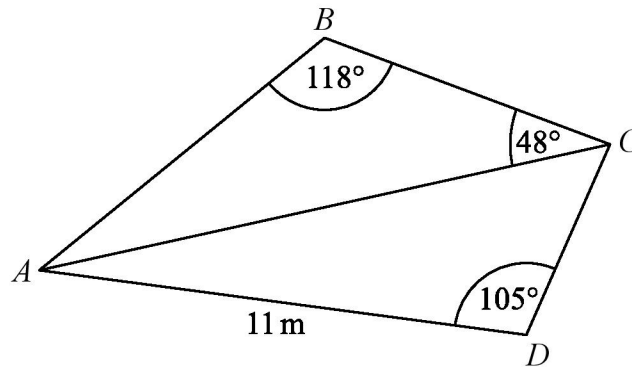*BC* is the tangent to the circle at point *C*.

Angle *AOC* = 120°

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

Question 23 (AO2): 15% of students got this right

17 *ABC* and *ADC* are triangles.

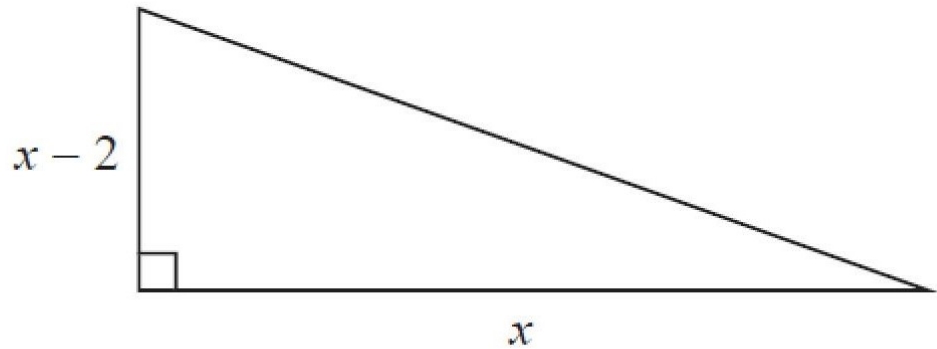The area of triangle *ADC* is 56 m^2

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

Question 24 (AO3): 14% of students got this right

19   Here is a right-angled triangle.

All measurements are in centimetres.
The area of the triangle is 2.5 cm^2.

Find the perimeter of the triangle.
Give your answer correct to 3 significant figures.
You must show all of your working.

Question 25 (AO3): 12% of students got this right

21 The diagram shows 3 identical circles inside a rectangle.
Each circle touches the other two circles and the sides of the rectangle, as shown in the diagram.
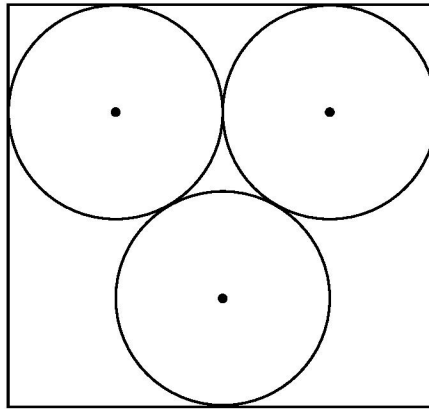
The radius of each circle is 24 mm.

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

(Total for Question 21 is 4 marks)

_____

Question 26 (AO3): 11% of students got this right

20
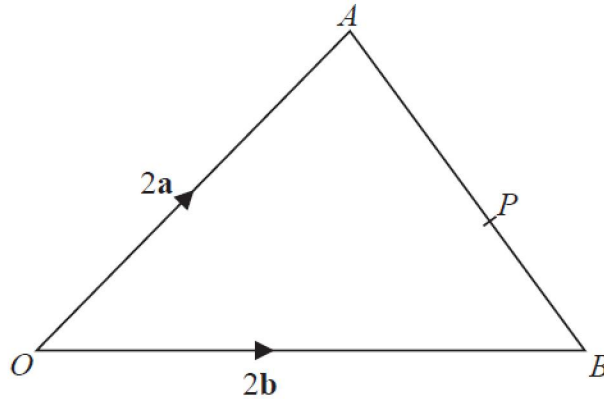
OAB is a triangle.
P is the point on AB such that $AP : PB = 5 : 3$

$\overrightarrow{OA} = 2\mathbf{a}$

$\overrightarrow{OB} = 2\mathbf{b}$

$\overrightarrow{OP} = k(3\mathbf{a} + 5\mathbf{b})$ where k is a scalar quantity.

Find the value of k.

Question 27 (AO3): 10% of students got this right

20 Given are two wheels, **A** and **B**.

Diagram **NOT** accurately drawn
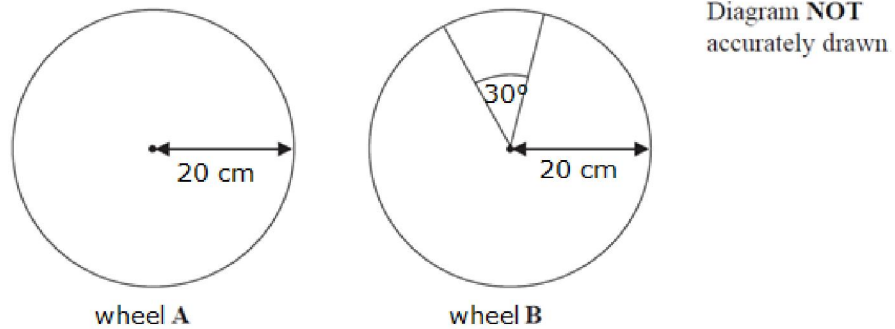
Both wheels have radius 20 cm.

The wheels are both made up out of materials that have the same thickness.

A is completely made up out of metal.
B has a 30° sector of plastic and a 330° sector of metal.

The ratio of the cost per cm^2 of the plastic to the cost per cm² of the metal is 2 : 3

Determine the ratio of the cost of the materials for **A** to the cost of the materials for **B**.
Express your answer in its simplest form.
Show all steps in your calculations.

(Total 4 marks)

Question 28 (AO1): 8% of students got this right

23 (*a*) Find the value of the reciprocal of 1.6.
Give your answer as a decimal.

Answers to Qn 1 (AO1): 36% of students got this right

Paper 1MA1: 3H			
Question	Working	Answer	Notes
13		168	M1 product of 14 and 12 A1 cao

Answers to Qn 2 (AO1): 34% of students got this right

Question		Working	Answer	Mark	Notes
18.	(c)	$\dfrac{2(x+3)-(x-4)}{(x-4)(x+3)}$ $=\dfrac{2x+6-x+4}{(x-4)(x+3)}$	$\dfrac{x+10}{(x-4)(x+3)}$	3	M1 for common denominator of $(x-4)(x+3)$ M1 for $\dfrac{2(x+3)}{(x-4)(x+3)}-\dfrac{(x-4)}{(x-4)(x+3)}$ $\dfrac{2(x+3)-(x-4)}{(x-4)(x+3)}$ oe condone missing brackets around $x-4$ A1 for $\dfrac{x+10}{(x-4)(x+3)}$ or $\dfrac{x+10}{x^2-x-12}$

Answers to Qn 3 (AO2): 34% of students got this right

Part	Working or answer an examiner might expect to see	Mark	Notes
8 (b)	$\dfrac{100}{150} \times \dfrac{50}{150} = \dfrac{2}{3} \times \dfrac{1}{3}$	1	This mark is given for a probability of point down multiplied by the probability of point up
	$\dfrac{2}{9}$	1	This mark is given for the correct answer only

Answers to Qn 4 (AO2): 33% of students got this right

Question		Working	Answer	Mark	Notes
10	(a)		6.66×10^7	M1	for $6.5 \times 10^7 \times 1.006^4$
				A1	for 6.66×10^7 or $6.657(\ldots) \times 10^7$

Answers to Qn 5 (AO3): 31% of students got this right
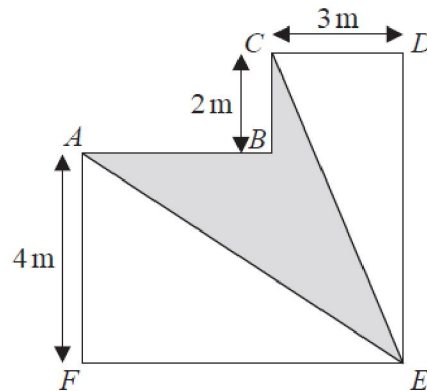
4 The diagram shows a shape *ABCDEF*.

All the corners of the shape are right angles.
The perimeter of the shape is 30 m.

Work out the area of *ABCE* shown shaded on the diagram.

2 Vertical sides: $2 \times (4 + 2) = 12$ cm

2 Horizontal sides: $30 - 12 = 18$ cm

1 Horizontal side: $18 \div 2 = 9$ cm

so $AB = 9 - 3 = 6$ cm

Total area $= 3 \times 6 + 6 \times 4 = 42 \ cm^2$

Area of unshaded triangles $= \frac{4 \times 9}{2} + \frac{3 \times 6}{2} = 27 \ cm^2$

Shaded area $= 42 - 27 = 15 \ cm^2$

....

(Total for Question 4 is 5 marks)

Answers to Qn 6 (AO1): 30% of students got this right

Part	Working or answer an examiner might expect to see	Mark	Notes
10	$\dfrac{3}{2} \times 48 = 72$	1	This mark is given for a method to fins Jim's number
	$\dfrac{5}{6} \times 72 = 60$	1	This mark is given for the correct answer only

Answers to Qn 7 (AO1): 30% of students got this right

| Paper 1MA1: 2H			
Question	Working	Answer	Notes
17		$n^2 - n + 1$ oe	M1 for correct deduction from differences, eg. 2nd M1 difference of 2 implies $1n^2$ or sight of $1^2, 2^2, 3^2, ..$ A1 for sight of $1^2, 2^2, 3^2, ..$ linked with 1, 2, 3, ... for $n^2 - n + 1$ oe

Answers to Qn 8 (AO1): 29% of students got this right

Question 22 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes

	4 11 22 37 56
	
	   7 11 15 19
	
	      4 4 4
	
	2nd differences imply a term in $2n^2$
		M1	This mark is given for a correct start to a method to find nth term

	$2n^2 + n$ gives 3, 10, 21, 36, 55…	M1	This mark is given for a method leading to $2n^2$ and either n or 1
	$2n^2 + n + 1$	A1	This mark is given for the correct answer only

Answers to Qn 9 (AO2): 28% of students got this right

17 c Here is a speed-time graph showing the speed, in metres per second, of an object *t* seconds after it started to move.
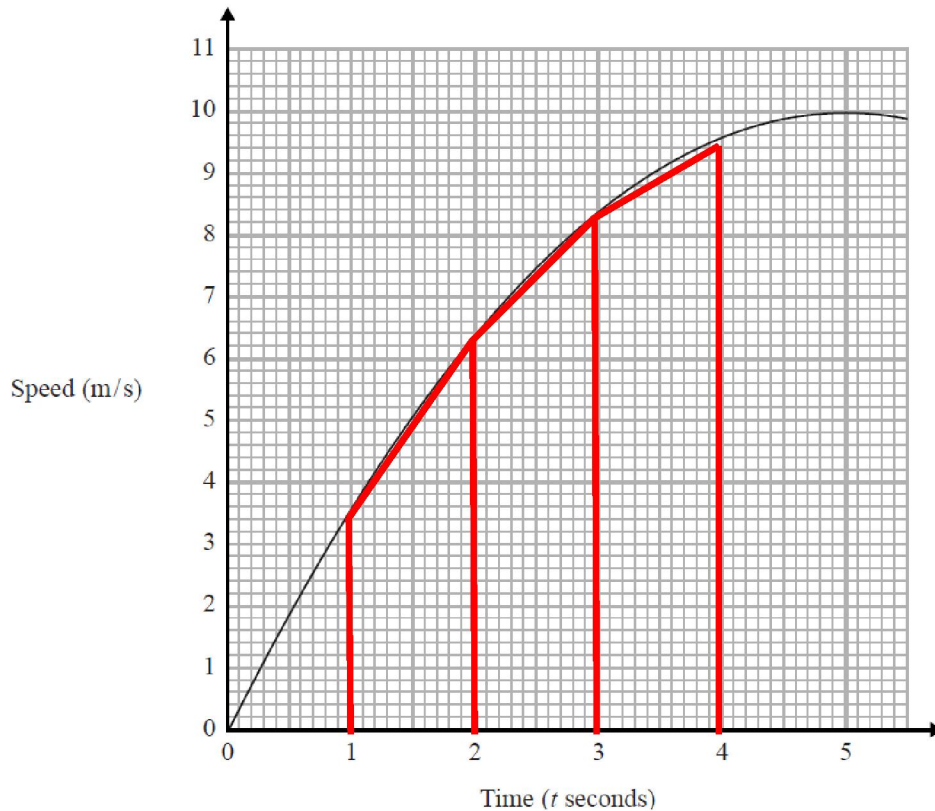
(a) Use 3 strips of equal width to find an estimate for the area under the graph between $t = 1$ and $t = 4$

(c) Explain whether your answer in part (a) gives an underestimate or an overestimate for the area under the graph.

Since the trapezia are below the curve this is an underestimate

(1)

_____

Answers to Qn 10 (AO3): 27% of students got this right

19

E
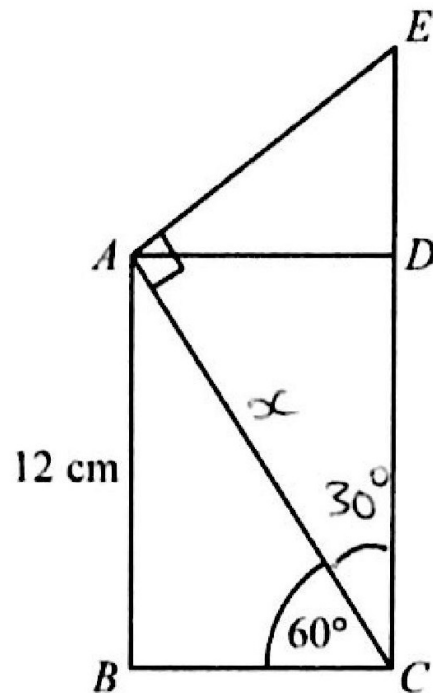
Diagram **NOT** accurately drawn

A

D

12 cm

x

30°

60°

B

C

ABCD is a rectangle.
CDE is a straight line.

AB = 12 cm
Angle *ACB* = 60°
Angle *EAC* = 90°

Calculate the length of *CE*.
You must show all your working.

$$\sin 60° = \frac{12}{x}$$

$$x = \frac{12}{\sin 60} = 13.856\ldots$$

$$\cos 30° = \frac{13.856\ldots}{CE}$$

$$CE = 13.856\ldots$$

Answers to Qn 11 (AO1): 26% of students got this right

Paper 1MA1: 2H			
Question	**Working**	**Answer**	**Notes**
12 (a)	25 × 24	600	P1 for process to find number of ways A1 cao
(b)	12 × 10 × 11 10 × 12 × 9 1320 + 1080	2400	P1 for process to find number of lists with boy then girl then boy or the number of lists with girl then boy then girl P1 for complete process to find the total number of lists A1 cao

Answers to Qn 12 (AO3): 25% of students got this right

Question		Working	Answer	Mark	Notes
13		$4(x + 4) = 4x + 16$ $4(3x + 4) = 12x + 16$ $4x + 16 = \frac{2}{3}(12x + 16)$ $12x + 48 = 24x + 32$ $12x = 16$	5⅓	5	M1 for a correct expression for at least one perimeter. M1 for "$4x + 16$" $= \frac{2}{3}$ "$(12x + 16)$" oe M1 for $12x + 48 = 24x + 32$ or $4x + 16 = 8x + \frac{32}{3}$ oe A1 for $\frac{4}{3}$ B1 ft for "$\frac{4}{3}$" $+ 4$ OR M2 for $x + 4 = \frac{2}{3}(3x + 4)$ M1 for $3x + 12 = 6x + 8$ or $x + 4 = x + \frac{8}{3}$ oe A1 for $\frac{4}{3}$ B1 ft for "$\frac{4}{3}$" $+ 4$ T&I B4 for 5.33 or better

Answers to Qn 13 (AO3): 24% of students got this right

| Question		Working	Answer	Mark	Notes
9	(c)		Yes with justification	M1	for taking readings from graph at 35 **and** 55 years
				M1	for a correct calculation from their readings eg "44"÷70 (= 63%) or 60% of 70 = 42
				C1	for a correct conclusion and calculation from their readings, e.g. "44"÷70 (= 63%) or 60% of 70 = 42% (< "44")

Answers to Qn 14 (AO1): 23% of students got this right

17.	(a)		$\mathbf{b} - \mathbf{a}$	1	B1 for $\mathbf{b} - \mathbf{a}$ or $-\mathbf{a} + \mathbf{b}$
	(b)	$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ $\overrightarrow{AP} = \frac{3}{4} \times (\mathbf{b} - \mathbf{a})$ $\overrightarrow{OP} = \mathbf{a} + \frac{3}{4} \times (\mathbf{b} - \mathbf{a})$ OR $\overrightarrow{OP} = \overrightarrow{OB} + \overrightarrow{BP}$ $\overrightarrow{BP} = \frac{1}{4} \times (\mathbf{a} - \mathbf{b})$ $\overrightarrow{OP} = \mathbf{b} + \frac{1}{4} \times (\mathbf{a} - \mathbf{b})$	$\frac{1}{4}(\mathbf{a} + 3\mathbf{b})$	3	B1 for $\frac{3}{4} \times$ '$(\mathbf{b} - \mathbf{a})$' M1 for $(\overrightarrow{OP} =) \overrightarrow{OA} + \overrightarrow{AP}$ or $(\overrightarrow{OP} =) \overrightarrow{OA} + \frac{3}{4}\overrightarrow{AB}$ or $\mathbf{a} \pm \frac{3}{4} \times$ '$(\mathbf{b} - \mathbf{a})$' A1 for $\frac{1}{4}(\mathbf{a} + 3\mathbf{b})$ or $\frac{1}{4}\mathbf{a} + \frac{3}{4}\mathbf{b}$ **OR** B1 for $\frac{1}{4} \times$ '$(\mathbf{a} - \mathbf{b})$' M1 for $(\overrightarrow{OP} =) \overrightarrow{OB} + \overrightarrow{BP}$ or $(\overrightarrow{OP} =) \overrightarrow{OB} + \frac{1}{4}\overrightarrow{BA}$ or $\mathbf{b} \pm \frac{1}{4} \times$ '$(\mathbf{a} - \mathbf{b})$' A1 for $\frac{1}{4}(\mathbf{a} + 3\mathbf{b})$ or $\frac{1}{4}\mathbf{a} + \frac{3}{4}\mathbf{b}$

Answers to Qn 15 (AO3): 22% of students got this right

Paper 1MA1: 2H			
Question	**Working**	**Answer**	**Notes**
14		33.8	P1 for recognition of similar triangles or equal ratio of sides
			P1 for process to find *CB*, eg.
			A1 $\frac{5}{13} = \frac{13}{CB}$
			for 33.8

Answers to Qn 16 (AO1): 21% of students got this right
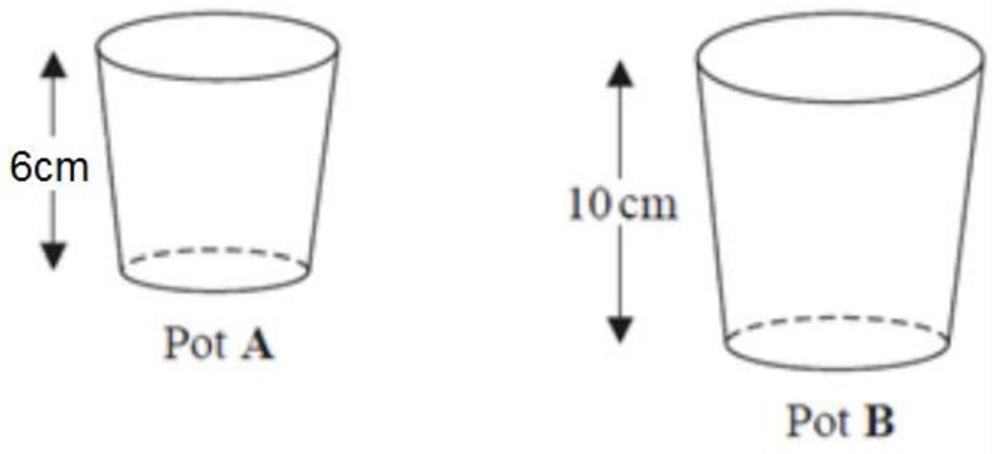
15 Here are two pots.

Pot **A** and pot **B** are mathematically similar.

The area of the base of pot **B** is 160 cm^2.

Work out the area of the base of pot **A**

Length SF = $\dfrac{10}{6} = \dfrac{5}{3}$

Area SF = $\left(\dfrac{5}{3}\right)^3 = \dfrac{125}{27}$

Area of base of pot A = $160 \div \dfrac{125}{27} = 34.56 cm^2$

(Total for Question 15 is 2 marks)

Answers to Qn 17 (AO1): 21% of students got this right

20 Solve $3x^2 - 5x - 1 = 0$

Give your solutions correct to 3 significant figures.

$$a = 3 \quad b = -5 \quad c = -1$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

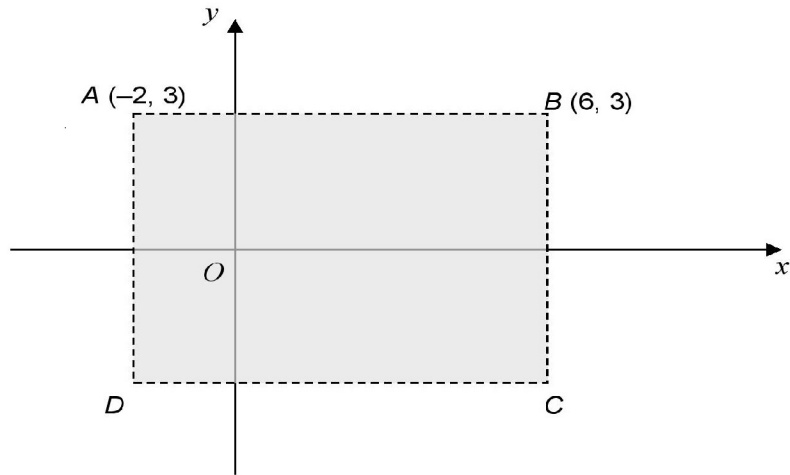$$= \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(-1)}}{2(3)}$$

$$x = 1.85 \qquad x = -0.180$$

Answers to Qn 18 (AO1): 20% of students got this right

19 (a)   *ABCD* is a rectangle.

The *x*-axis is a line of symmetry.

Not drawn
accurately

These inequalities describe the shaded region.

p $< x <$ q   and   r $< y <$ s

Write down the values of p, q, r and s.

[2 marks]

p = **-2**   q = **6**

r = **-3**   s = **3**

19 (b)   The grid shows the graph of $y = x + 2$

On the grid, identify the region represented by
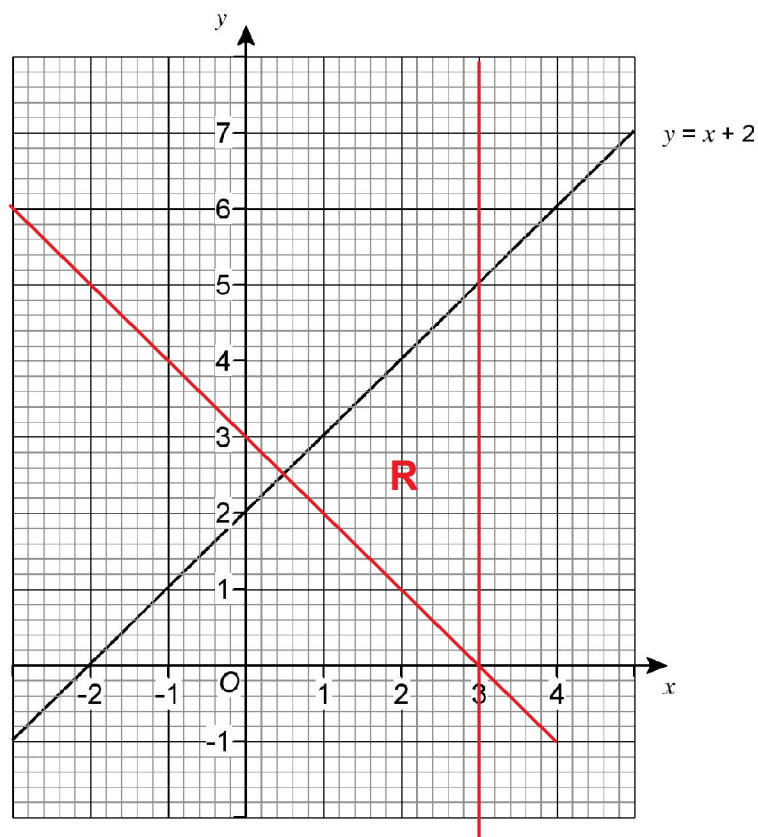
Answers to Qn 19 (AO2): 18% of students got this right

Question 13 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$y \geq -2, \; y \leq -2 \;$ or $\; y = -2$	M1	This mark is given for y and -2 indicated in an equality or inequality
	$y \geq x, \; y \leq x \;$ or $\; y = x,$	M1	This mark is given for y and x indicated in an equality or inequality
	$y \leq \frac{1}{2}x + 1, \; y \geq \frac{1}{2}x + 1 \;$ or $\; y = \frac{1}{2}x + 1,$	M1	$y = \frac{1}{2}x + 1$ indicated in an equality or inequality
	$y \geq -2, \; y \geq x \;$ and $\; y \leq \frac{1}{2}x + 1$	A1	This mark is given for three correct inequalities

Answers to Qn 20 (AO2): 18% of students got this right

Part	Working or answer an examiner might expect to see	Mark	Notes
14	Lengths ratio = $\sqrt[3]{27} : \sqrt[3]{8} = 3 : 2$	1	This mark is for finding a ratio of the lengths associated with the cone
	Areas ratio = $3^2 : 2^2 = 9 : 4$	1	This mark is for finding a ratio of the areas associated with the cone
	Thus the surface area of cone **B** $= \dfrac{297}{9} \times 4 = 132$	1	This mark is given for the correct conclusion following correct arithmetic

Answers to Qn 21 (AO1): 17% of students got this right

23(a)		shown	M1	Method to find at least one root in [0, 1], e.g. $2x^3 + 4x - 3\ (= 0)$ and $f(0)\ (= -3)$, $f(1)\ (= 3)$ oe or $f(0) = 0$ and $f(1) = 6$
			C1	Since there is a change in sign there must be at least one root in $0 < x < 1$ (as f is continuous), or 0 and 6 are either side of 3.
(b)	$4x = 3 - 2x^3$ $x = \dfrac{3-2x^3}{4}$ $x = \dfrac{3}{4} - \dfrac{x^3}{2}$	shown	C1	for correct steps leading to rearranged equation
(c)	$x_1 = 0.75$ $x_2 = 0.5390625$ $x_3 = 0.671677351$	0.671677351	M1 M1 A1	for one correct iteration for two further iterations for 0.671(677351)

Answers to Qn 22 (AO3): 16% of students got this right

Paper: 1MA1/2H

Question	Working	Answer	Mark	Notes
20		68.5	B1	for angle $OAB = 90°$ or angle $OCB = 90°$, may be seen on diagram
			P1	for a process to find the length of AB or the length of CB (= $10\sqrt{3}$ oe) eg $10 \times \tan 60°$ (= 17.3...) or the length of OB (= 20), eg $10 \div \cos 60°$
			P1	for a process (dep previous P1) to find the area of the triangle OAB (= $50\sqrt{3}$ oe) or area of triangle OCB (= $50\sqrt{3}$ oe) or area of kite $OABC$ (= $100\sqrt{3}$ oe)
			P1	for a process to find the area of the sector OAC e.g. $\frac{1}{3} \times \pi \times 10^2$ (= 104.7...),accept rounded or truncated to 3 significant figures or more
			A1	for $68.4 - 68.6$

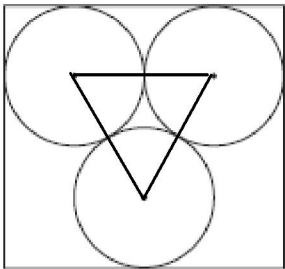# Answers to Qn 23 (AO2): 15% of students got this right

Part	Working or answer an examiner might expect to see	Mark	Notes
17	Area of triangle $ADC = \frac{1}{2} ab \sin C$ $= 0.5 \times 11 \times (CD \times \sin 105°) = 56$	1	This mark is given for finding an equation for the area of triangle ADC
	$CD = \dfrac{56}{0.5 \times 11 \times \sin 105°} = \dfrac{56}{5.312...}$ $= 10.54$	1	This mark is given for finding the length of CD
	$AC^2 =$ $11^2 + (10.54)^2 - 2 \times 11 \times 10.54 \times \cos 105°$ $= 232.0916 + 60.01496$ $= 292.10656$ $AC = 17.091125$	1	This mark is given for using the cosine rule $c^2 = a^2 + b^2 - 2ab \cos C$ to find the length of AC
	$\dfrac{AB}{\sin 48°} = \dfrac{AC}{\sin 118°}$ $\dfrac{AB}{0.743} = \dfrac{17.09}{0.883}$ $AB = \dfrac{17.09 \times 0.743}{0.883}$	1	This mark is given for a method to us the sine rule to find the length of AB
	14.38	1	This mark is given for an answer in the range 14.3 – 14.4

Answers to Qn 24 (AO3): 14% of students got this right

Paper 1MA1: 2H			
Question	Working	Answer	Notes
19		8.63 to 8.65	P1 for a start of process, eg. $0.5x(x-2) = 2.5$ P1 for rearranging to give a quadratic equation, eg $x^2 - 2x - 5 = 0$ oe. P1 for a process to solve the quadratic equation, condoning one sign error in use of formula ($x = 3.449...$ and $x = -1.449...$) P1 for selecting the positive value of x and applying Pythagoras to find the hypotenuse, eg. $\sqrt{(3.449^2 + 1.449^2)}$ (= 3.74...) P1 for complete process to find perimeter A1 for answer in the range 8.63 to 8.65

Answers to Qn 25 (AO3): 12% of students got this right

Question 21 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$24 \times 4 = 96$	P1	This mark is given for a process to find the length of the rectangle
	$48 \sin 60° = 48 \times \dfrac{\sqrt{3}}{2} = 24\sqrt{3}$ or $\sqrt{(48^2 - 24^2)} = 24\sqrt{3}$	P1	This mark is given for a process to find the perpendicular height of an equilateral triangle of side 48 cm
	$24 + 24 + 24\sqrt{3} = 89.569\ldots$	P1	This mark is given for a complete process to find the width of rectangle
	8600 (to 3 significant figures)	A1	This mark is given for a correct answer only

Answers to Qn 26 (AO3): 11% of students got this right

Paper 1MA1: 3H			
Question	Working	Answer	Notes
20		$\dfrac{1}{4}$	P1 starts process eg $\overrightarrow{AB} = 2\mathbf{b} - 2\mathbf{a}$ P1 process to find $\overrightarrow{AP}$ or $\overrightarrow{BP}$ P1 complete process to find $\overrightarrow{OP}$ A1 for $\dfrac{1}{4}$ oe

Answers to Qn 27 (AO3): 10% of students got this right

20	$\pi 20^2 \times 3 = 1200\pi$ $\pi 20^2 \times \frac{30}{360} \times 2 + \pi 20^2 \times \frac{330}{360} \times 3$ $1200\pi : \frac{3500}{3}\pi:$ $36 : 35$ Or $\frac{30}{360} \times 2 + \frac{330}{360} \times 3 = \frac{35}{12}$ $3 : \frac{35}{12}$ $36:35$	36:35	4	M1 method to find relative cost of design A e.g. $\pi 20^2$, $k \times \pi 20^2$ M1 for a complete method to find the relative cost of the wheel for design B e.g. $\pi 20^2 \times \frac{30}{360} \times \frac{2}{5} + \pi 20^2 \times \frac{330}{360} \times \frac{3}{5}$ M1 (dep on M1, M1) for the cost of design A: cost of design B A1 cao Or M1 for method to find fraction of the sectors in design B $\frac{30}{360}, \frac{330}{360}$ M1 for complete method to find the relative cost of the wheel for design B M1 (dep on M1,M1) for the cost of design A: cost of design B A1 cao

Answers to Qn 28 (AO1): 8% of students got this right

Part	Working or answer an examiner might expect to see	Mark	Notes
23 (a)	$\dfrac{1}{1.6} = 0.625$	1	This mark is given for the correct answer only