Name: _____

Higher Maths GCSE
NON - CALCULATOR SAMPLE

Envision Tuition

MATHEMATICS TUTORS

Date:

Time: 90 Minutes

Total marks available: 80

Total marks achieved: _____

ENVISION TUITION

Questions

Q1.

AB is a line segment.

A is the point (3, 6, 7)
The midpoint of the line *AB* has coordinates (0, −3, 3)

Find the coordinates of point *B*.

(..... , ... , ...)

(Total for question = 2 marks)

Q2.

Here are the first four terms of a number sequence.

6 10 14 18

Write an expression, in terms of *n*, for the *n*th term of this sequence.

.....

(Total for Question is 2 marks)

Q3.

(a) Write 60 800 000 in standard form.

. . . . . .

(1)

(b) Write 1.7×10^{-4} as an ordinary number.

. . . . . .

(1)

(Total for Question is 2 marks)

Q4.

Babajan makes breakfast cereal.
She mixes nuts, raisins and oats in the ratio 3 : 2 : 5 by weight.

On Monday, Babajan uses 60 grams of nuts.

(a) Work out the weight of raisins and the weight of oats she uses to make the breakfast cereal.

raisins ..... grams

oats ..... grams

(3)

On Tuesday, Babajan makes 300 grams of the breakfast cereal. 500 grams of nuts cost £8

(b) Work out the cost of the nuts used to make 300 grams of the breakfast cereal.

£ .....

(3)

(Total for question = 6 marks)

Q5.

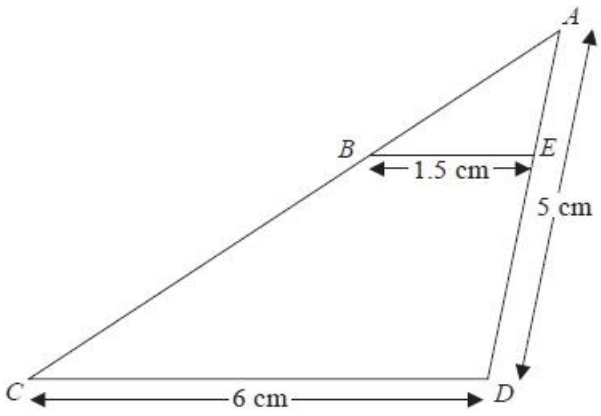


Diagram **NOT** accurately drawn

ABC and *AED* are straight lines.
BE and *CD* are parallel.
BE = 1.5 cm.
CD = 6 cm.
AD = 5 cm.

Calculate the length of *ED*.

..... cm

(Total for question = 3 marks)

Q6.

A box exerts a force of 140 newtons on a table.
The pressure on the table is 35 newtons/m^2.

Calculate the area of the box that is in contact with the table.

$$p = \frac{F}{A}$$

p = pressure
F = force
A = area

.....

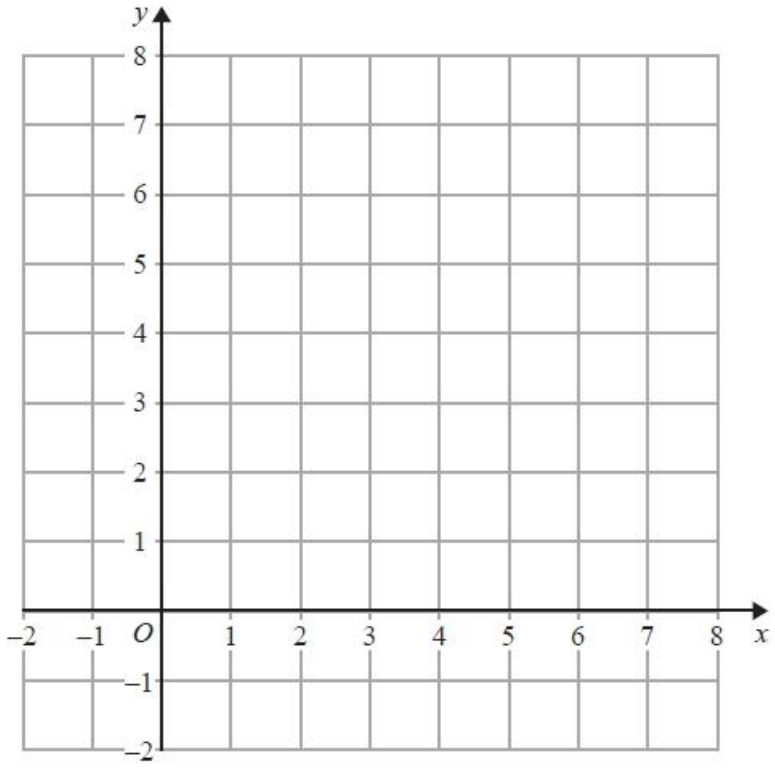
(Total for question is 3 marks)

Q7.

On the grid show, by shading, the region that satisfies all three of the inequalities

$x + y < 7$ $y < 2x$ $y > 3$

Label the region **R**.



(Total for question = 4 marks)

Q8.

There are 1200 students at a school.

Kate is helping to organise a party.
She is going to order pizza.

Kate takes a sample of 60 of the students at the school.
She asks each student to tell her **one** type of pizza they want.

The table shows information about her results.

Pizza	Number of students
ham	20
salami	15
vegetarian	8
margherita	17

Work out how much ham pizza Kate should order.
Write down any assumption you make **and** explain how this could affect your answer.

.....

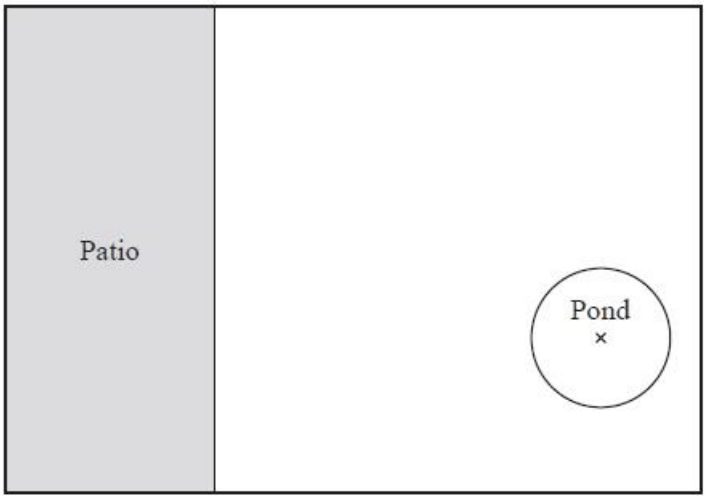
.....

(Total for question = 3 marks)

Q9.

The diagram shows a garden in the shape of a rectangle.

The scale of the diagram is 1 cm represents 2 m.



Scale: 1 cm represents 2 m

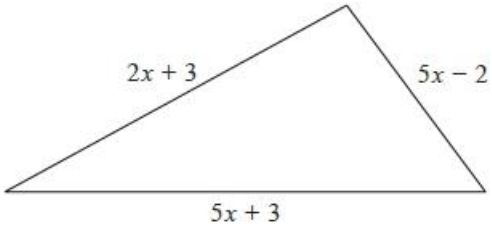
Irfan is going to plant a tree in the garden.
The tree must be

more than 3 metres from the patio
and more than 6 metres from the centre of the pond.

On the diagram, shade the region where Irfan can plant the tree.

(Total for Question is 3 marks)

Q10.
The perimeter of a square has the same length as the perimeter of this triangle.



All measurements are in centimetres.

Find an expression, in terms of *x*, for the length of a side of the square.
Give your answer in its simplest form.

.....

(Total for question = 3 marks)

Q11.

The box plots give information about the wages of a group of 16 year old workers and a group of 18 year old workers.

*(a) Compare the distribution of the wages of the 16 year old workers with the distribution of the wages of the 18 year old workers.

(3)

There are 200 workers who are 16 years old.

(b) Work out an estimate for the number of these workers whose wages are £130 or more.

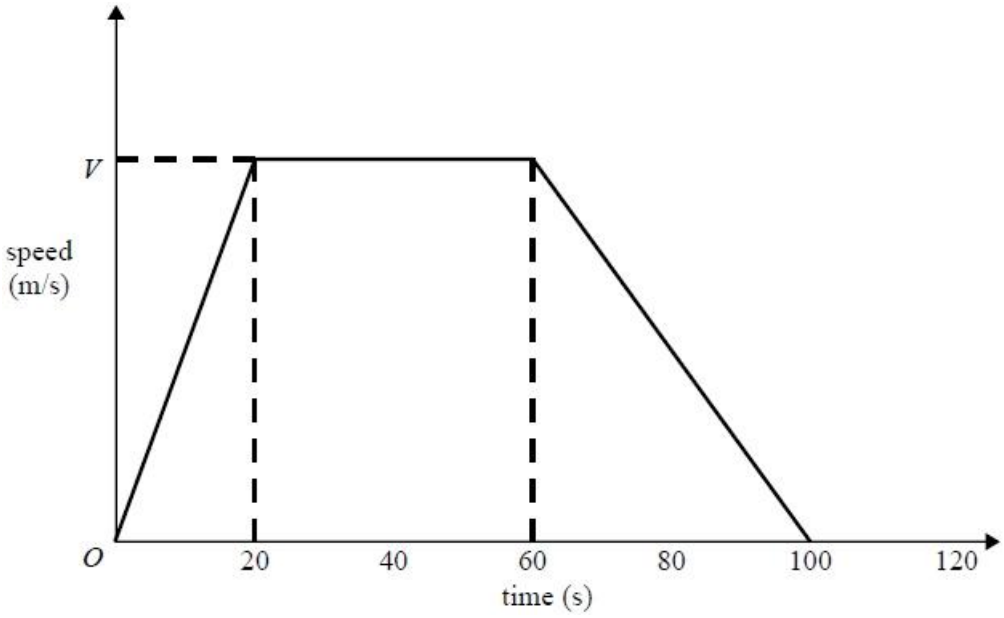
.....

(2)

(Total for question = 5 marks)

Q12.

Here is a speed-time graph for a car journey.
The journey took 100 seconds.



The car travelled 1.75km in the 100 seconds.

(a) Work out the value of *V*.

.....

(3)

(b) Describe the acceleration of the car for each part of this journey.

.....

.....

.....

.....

(2)

(Total for question = 5 marks)

Q13.

(a) Write $\frac{3^5 \times 3^4}{3^2}$ as a power of 3

.....

(2)

(b) Write down the value of 12^0

.....

(1)

(c) Write down the value of 3^{-2}

.....

(1)

(Total for question = 4 marks)

Q14.

The diagram shows a prism.

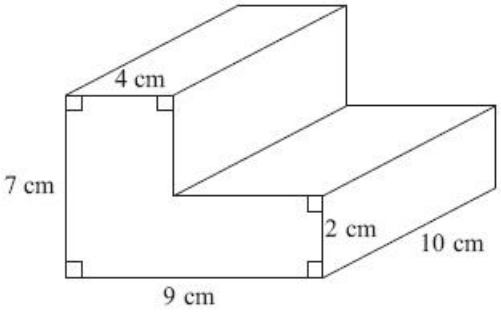


Diagram **NOT** accurately drawn

Work out the volume of the prism.

.....cm^3

(Total for Question is 3 marks)

Q15.

Here is an equilateral triangle.

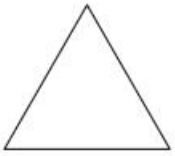
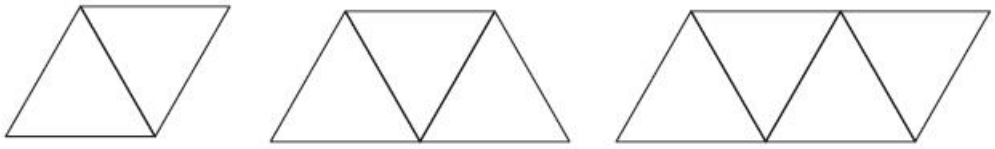


Diagram **NOT** accurately drawn

The equilateral triangle has a perimeter of 24 cm.

Some of these equilateral triangles are used to make this sequence of quadrilaterals.



quadrilateral 1 quadrilateral 2 quadrilateral 3

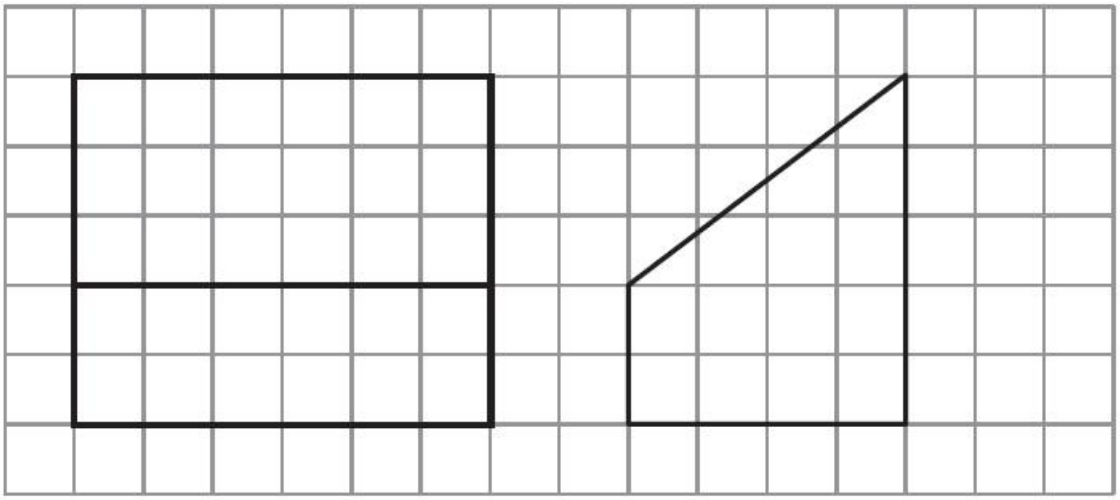
Find an expression for the perimeter, in centimetres, of quadrilateral *n*.

.....

(Total for question = 3 marks)

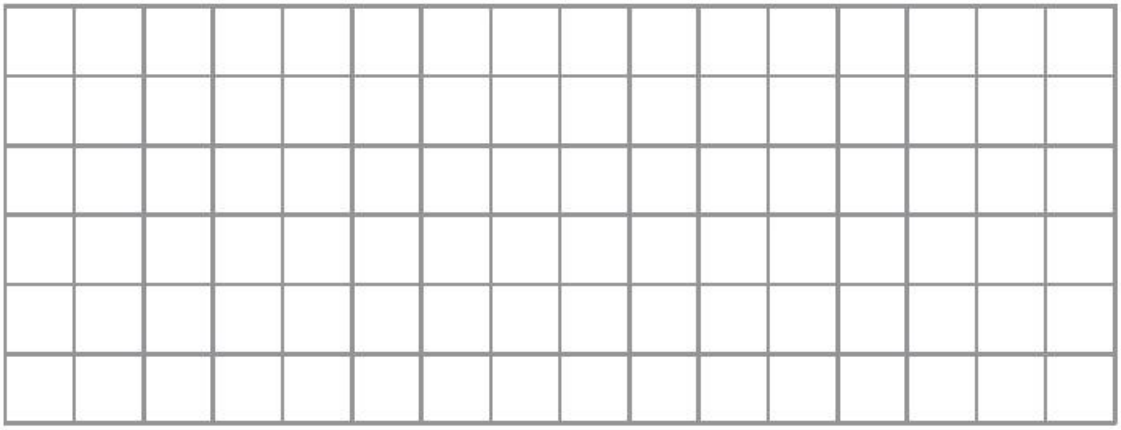
Q16.

The diagram shows the front elevation and the side elevation of a prism.



Front elevation Side elevation

(a) On the grid, draw a plan of this prism.



(2)

(b) In the space below, draw a sketch of this prism.

(2)

(Total for Question is 4 marks)

Q17.

Make *a* the subject of $a + 3 = \frac{2a + 7}{r}$

.....

(Total for question = 3 marks)

Q18.

There are three different types of sandwiches on a shelf.

There are

4 egg sandwiches,
5 cheese sandwiches
and 2 ham sandwiches.

Erin takes at random 2 of these sandwiches.

Work out the probability that she takes 2 different types of sandwiches.

.....

(Total for Question is 5 marks)

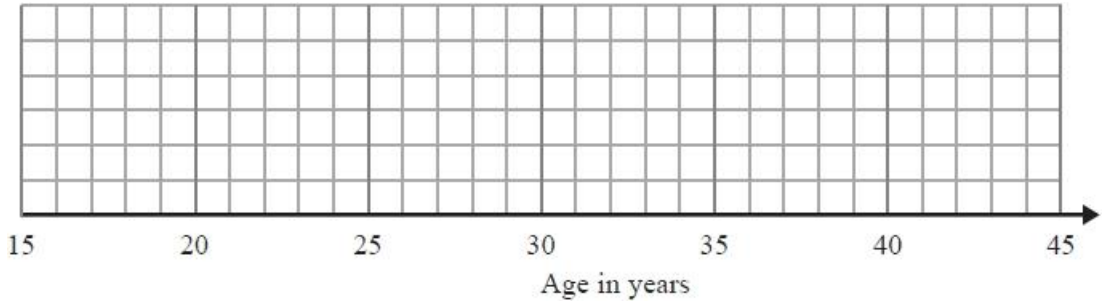
Q19.

The stem and leaf diagram shows the ages, in years, of 25 people.

1	7 7 8 9
2	1 2 4 4 5 5 6 7 8 9 9
3	0 1 2 2 3 4 5 6
4	0 1

Key: 1 | 7 represents 17 years

(a) (i) On the grid, draw a box plot for this information.



(3)

One of these people is chosen at random.

(ii) What is the probability that this person is 30 years of age or older?

.....

(2)

The grouped frequency table gives information about the ages of a different group of people.

Age (a years)	Frequency
$0 < a \leqslant 20$	7
$20 < a \leqslant 30$	12
$30 < a \leqslant 40$	5
$40 < a \leqslant 50$	1

Anne drew this cumulative frequency table for this information.

Age (a years)	Cumulative frequency
$0 < a \leqslant 20$	7
$20 < a \leqslant 30$	19
$30 < a \leqslant 40$	24
$40 < a \leqslant 50$	25

The cumulative frequency table is **not** correct.

(b) Write down one thing that is wrong with the table.

.....

(1) (Total for question = 6 marks)

Q20.

***** One sheet of paper is 9×10^{-3} cm thick.

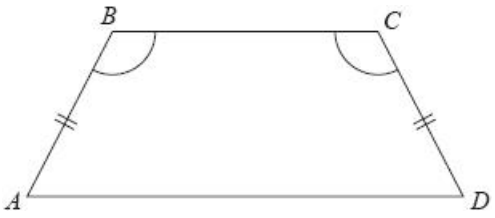
Mark wants to put 500 sheets of paper into the paper tray of his printer.
The paper tray is 4 cm deep.

Is the paper tray deep enough for 500 sheets of paper?
You must explain your answer.

(Total for Question is 3 marks)

Q21.

ABCD is a quadrilateral.



AB = *CD*.
Angle *ABC* = angle *BCD*.

Prove that *AC* = *BD*.

(Total for question = 4 marks)

Q22.

***** The diagram shows a pentagon.

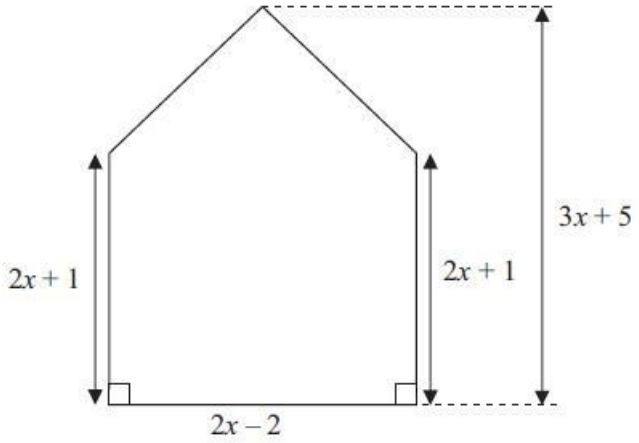


Diagram **NOT** accurately drawn

All measurements are in centimetres.

Show that the area of this pentagon can be written as $5x^2 + x - 6$

(Total for Question is 4 marks)

Mark Scheme

Q1.

PAPER: 5MB2H_01					
Question		Working	Answer	Mark	Notes
			(–3,–12,–1)	2	B2 cao B1 for two out of three coordinates correct

Q2.

Question		Working	Answer	Mark	Notes
			$4n + 2$	2	B2 for $4n + 2$ oe (eg $4\times n + 2$ or $n4 + 2$, …) or nth = $4n + 2$ (B1 for a linear expression in $4n$ e.g. $4n + a$ ($a \neq 2$) or $n = 4n + 2$) (B0 for $n = 4n$ and $n + 4$)

Q3.

Question		Working	Answer	Mark	Notes
	(a)		6.08×10^7	1	B1 cao
	(b)		0.00017	1	B1 cao

Q4.

Question	Working	Answer	Mark	Notes
(a)		40 100	3	M1 for method to find unit weight eg 60 ÷ 3 (= 20) M1 for complete method to find weight of one of the other ingredients eg "20" × 2 (= 40) or "20" × 5 (= 100) A1 cao
(b)		1.44	3	M1 for a complete method to work out the weight of nuts needed eg 300 ÷ (3 + 2 + 5) × 3 (= 90) or 300 ÷ (60 + "40" + "100") × 60 (= 90) M1 for a complete method to work out the cost eg (800 ÷ 500) × "90" (= 144) A1 cao

Q5.

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
		3.75 oe	3	M1 for a correct scale factor or ratio using two corresponding sides from similar triangles or two sides from the same triangle (may be seen in an equation) e.g $\frac{6}{1.5}$ oe or $\frac{1.5}{6}$ oe or $\frac{5}{6}$ or $\frac{6}{5}$ etc. (accept these written as ratios) M1 for a complete method to find ED A1

Q6.

Paper 1MA1: 1H			
Question	**Working**	**Answer**	**Notes**
		$4\ m^2$	B1 substitution into formula eg $1.5 = \frac{12}{A}$ A1 4 (oe) stated C1 (indep) units stated

Q7.

PAPER: 1MA0_1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
		Region identified	4	M1 for the graph of $x + y = 7$ or $y = 2x$ drawn M1 for the graphs of $x + y = 7$, $y = 2x$ and $y = 3$ drawn M1 for any correct shading (in or out), satisfying at least two correct inequalities where the shading must extend from the appropriate lines. A1 for correct region identified by either shading in, or shading out; the letter R is not required. Accept without shading only with the correct region indicated by R. NB accept lines that are solid or dotted/dashed etc or lines defined by unambiguous shading

Q8.

Paper 1MA1: 1H			
Question	Working	Answer	Notes
		400	P1 Start to process eg. 1200 ÷ 60 A1 400 oe (accept number of whole pizzas eg. 400 ÷ 4 = 100 with 4 people per pizza) C1 Eg. Assumption that sample is representative of population – it may not be all 1200 people are going to the party – need less pizza if they don't, assume 4 people per pizza – if different may need more/fewer pizzas

Q9.

PAPER: 1MA0_1H					
Question		Working	Answer	Mark	Notes
			Correct region	3	B1 for full line drawn 1.5 cm from edge of patio and parallel to it B1 for full arc of circle radius 3 cm centre the centre of the pond B1 ft for shading region to the right of their vertical line **and** outside the arc of their circle with correct centre

Q10.

Question	Working	Answer	Mark	Notes
		$3x + 1$	P1	process to start to problem e.g. states perimeter algebraically, e.g. $2x + 3 + 5x - 2 + 5x + 3$
			P1	(dep P1) continues process e.g. simplifies to $12x + 4$ or divides their linear expression (linked to perimeter) by 4
			A1	cao

Q11.

Question	Working				Answer	Mark	Notes
* (a)		Age 16		Age 18	Compares: medians and spread	3	C1 for any correct comparison of the medians C1 for any correct comparison of the IQRs or the ranges C1 (dep on one C1) for either statement written in context
	HV	310	<	380			
	LV	80	<	130			
	Median	180	<	240			
	Range	230	<	250			
	IQR	80	>	70			
(b)					150	2	M1 for $\frac{3}{4} \times 200$ oe A1 cao

Q12.

Paper 1MA1: 1H			
Question	Working	Answer	Notes
(a)		25	C1 For interpretation eg.. area equated to 1750m P1 Process to solve equation A1
(b)		Description	C1 Start to interpret graph eg. describe or give acceleration for one stage of the journey or state that acceleration is constant in all 3 parts C1 Describe acceleration for all stages of the journey or give acceleration for all 3 stages ($1.25\ m/s^2$; $0\ m/s^2$; $-0.625\ m/s^2$)

Q13.

Question	Working	Answer	Mark	Notes
(a)		3^7	M1 A1	for a first step using a rule of indices, e.g. $3^5 \times 3^4 = 3^{5+4}\ (= 3^9)$ or $3^5 \div 3^2 = 3^{5-2}\ (= 3^3)$ or $3^4 \div 3^2 = 3^{4-2}\ (= 3^2)$ cao
(b)		1	B1	cao
(c)		$\frac{1}{9}$	B1	for $\frac{1}{9}$ (or 0.11…)

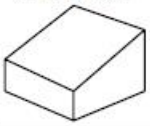
Q14.

Question		Working	Answer	Mark	Notes
			380	3	M1 for 4×7 + 5×2 (=38) or 9×2 + 5×4 (=38) or 4×7×10 or (7×9 − 5×5) or 5×2×10 (=100) or 9×2×10 (=180) or 5×4×10 (=200) or 9×7×10 (=630) or 5×5×10 (=250) M1 (dep) for '38'×10 or 380 or 4×7×10 + 5×2×10 or 9×2×10 + 5×4×10 or ×10 A1 cao

Q15.

5MB2H_01 November 2015					
Question		Working	Answer	Mark	Notes
			$8n + 24$	3	M1 for generating at least 3 terms of sequence 32, 40, 48 or sequence 4, 5, 6 M1 for $8n \pm k$ or $8(n \pm m)$ where $k \neq 24$, $m \neq 3$ A1 for $8n + 24$ or $8(n + 3)$ oe

Q16.

Question		Working	Answer	Mark	Notes
	(a)		6 by 4 rectangle drawn	2	B2 for a 6 by 4 rectangle drawn (B1 for a rectangle drawn with one correct dimension)
	(b)		3-D sketch 	2	M1 for an attempt at a 3-D sketch with a trapezoidal face A1 for a correct 3-D sketch

Q17.

Paper 1MA1: 1H			
Question	Working	Answer	Notes
		$a = \frac{7-3r}{r-2}$	M1 Remove fraction and expand brackets M1 Isolate terms in a A1

Q18.

		Working	Answer	Mark	Notes
		EE + CC + HH **Or** EC+EH+CE+CH+HE+HC **Or** E,not E+ C,not C + H,not H	$^{76}/_{110}$	5	M1 for use of 10 as denominator for 2nd probability M1 for $^{4}/_{11} \times {}^{3}/_{10}$ *or* $^{5}/_{11} \times {}^{4}/_{10}$ *or* $^{2}/_{11} \times {}^{1}/_{10}$ M1 for $^{4}/_{11} \times {}^{3}/_{10} + {}^{5}/_{11} \times {}^{4}/_{10} + {}^{2}/_{11} \times {}^{1}/_{10}$ $\left(=\frac{34}{110}\right)$ M1 (dep on previous M1 for $1 - {}^{'34'}/_{110}$ A1 for $^{76}/_{110}$ oe **Or** M1 for use of 10 as denominator for 2nd probability M1 for $^{4}/_{11} \times {}^{5}/_{10}$ or $^{4}/_{11} \times {}^{2}/_{10}$ or $^{5}/_{11} \times {}^{4}/_{10}$ or $^{5}/_{11} \times {}^{2}/_{10}$ or $^{2}/_{11} \times {}^{4}/_{10}$ or $^{2}/_{11} \times {}^{5}/_{10}$ M2 for $^{4}/_{11} \times {}^{5}/_{10} + {}^{4}/_{11} \times {}^{2}/_{10} + {}^{5}/_{11} \times {}^{4}/_{10} + {}^{5}/_{11} \times {}^{2}/_{10} + {}^{2}/_{11} \times {}^{4}/_{10} + {}^{2}/_{11} \times {}^{5}/_{10}$ (M1 for at least 3 of these) A1 for $^{76}/_{110}$ oe **Or** M1 for use of 10 as denominator for 2nd probability M1 for $^{4}/_{11} \times {}^{7}/_{10}$ *or* $^{5}/_{11} \times {}^{6}/_{10}$ *or* $^{2}/_{11} \times {}^{9}/_{10}$ M2 for $^{4}/_{11} \times {}^{7}/_{10} + {}^{5}/_{11} \times {}^{6}/_{10} + {}^{2}/_{11} \times {}^{9}/_{10}$ (M1 for two of these added) A1 for $^{76}/_{110}$ oe **PTO for SC's** **SC:** B2 for $^{76}/_{121}$ **SC:** B1 for $^{4}/_{11} \times {}^{4}/_{11} + {}^{5}/_{11} \times {}^{5}/_{11} + {}^{2}/_{11} \times {}^{2}/_{11}$ $(= {}^{45}/_{121})$ **Or** $^{4}/_{11} \times {}^{5}/_{11} + {}^{4}/_{11} \times {}^{2}/_{11} + {}^{5}/_{11} \times {}^{4}/_{11} + {}^{5}/_{11} \times {}^{2}/_{11} + {}^{2}/_{11} \times {}^{4}/_{11} + {}^{2}/_{11} \times {}^{5}/_{11}$ **Or** $^{4}/_{11} \times {}^{7}/_{11} + {}^{5}/_{11} \times {}^{6}/_{11} + {}^{2}/_{11} \times {}^{9}/_{11}$

Q19.

Question	Working	Answer	Mark	Notes
(a)(i)		Box plot drawn	B1	for a box drawn with at least two correct values from: LQ = 23, Median = 28, UQ = 32.5
			B1	for lowest value = 17 and highest value = 41 clearly shown on the grid
			B1	for a fully correct diagram
(a)(ii)		$\frac{10}{25}$	M1	for $\frac{a}{25}$ where $a < 25$ or $\frac{10}{b}$ where $10 < b \leq 25$
			A1	for $\frac{10}{25}$ oe
(b)		Incorrect classes	C1	for identifying that the class intervals are incorrect, e.g. should be $0 < a \leq 30$, 40, 50

Q20.

		Working	Answer	Mark	Notes
* QWC			No + explanation	3	M1 for $500 \times 9 \times 10^{-3}$oe A1 for 4.5 C1 (dep M1) for correct decision based on comparison of their paper height with 4 **OR** M1 for $4 \div 500$ oe A1 for 0.008 C1 (dep M1) for correct decision based on comparison of their paper thickness with 0.009 **OR** M1 for $4 \div (9 \times 10^{-3})$ oe A1 for 444(.4...) C1 (dep M1) for correct decision based on comparison of their number of sheets of paper with 500

Q21.

Question	Working	Answer	Mark	Notes
			C1	states (angle) ABC = (angle) BCD
			C1	states 2nd link $AB = CD$
			C1	states 3rd link with reason: $BC = BC$ (common)
			C1	concludes proof by stating (triangle) $ABC \equiv$ (triangle) DCB with reason SAS and $AC = BD$

Q22.

Question	Working	Answer	Mark	Notes
*	$(2x - 2)(2x + 1)$ $+ \frac{1}{2}(2x - 2)((3x + 5) - (2x + 1))$ $4x^2 - 2x - 2$ $+ x^2 + 4x - x - 4$ $= 5x^2 + x - 6$ Or $(2x - 2)(3x + 5)$ $- \frac{1}{2}(2x - 2)((3x + 5) - (2x + 1))$ $= 6x^2 - 6x + 10x - 10$ $- x^2 - 4x + x + 4$ $= 5x^2 + x - 6$	Show	4	M1 for correct expression for a single rectangle area $(2x - 2)(2x + 1)$ or $(2x - 2)(3x + 5)$ M1 for correct expression for triangle area $\frac{1}{2}(2x - 2)((3x + 5) - (2x + 1))$ M1 for all 4 terms correct with or without signs or 3 out of no more than four terms correct with signs in expansion of any two linear expressions. C1 for $5x^2 + x - 6$ and all steps clearly shown in a logical progression **QWC: All steps need to be clearly laid out showing a logical progression**