Mark Scheme
Sample Assessment Material

GCSE

GCSE in Mathematics Specification A
Higher Tier

Paper 1:(Non-Calculator)

Edexcel Limited. Registered in England and Wales No. 4496750
Registered Office: One90 High Holborn, London WC1V 7BH

A PEARSON COMPANY

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

  i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear
  Comprehension and meaning is clear by using correct notation and labelling conventions.

  ii) select and use a form and style of writing appropriate to purpose and to complex subject matter
  Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

  iii) organise information clearly and coherently, using specialist vocabulary when appropriate.
  The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

Guidance on the use of codes within this mark scheme
M1 – method mark
A1 – accuracy mark
B1 – working mark
C1 – communication mark
QWC – quality of written communication
oe – or equivalent
cao – correct answer only
ft – follow through
sc - special case

1MA0/1H					
Question		Working	Answer	Mark	Additional Guidance
1.	(i)		$30x - 10y$	5	B2 cao (If no marks then B1 $30x$, B1 $10y$)
	(ii)	$6 - 12x - 3x - 3 = 0$ $3 - 15x = 0$ $15x = 3$	$\frac{1}{5}$		M1 for correct multiplication of brackets to get $6 - 12x - 3x - 3$ A1 $3 - 15x = 0$ B1 ft for "$\frac{1}{5}$"
					Total for Question: 5 marks
2. **QWC iii FE**		See table at end	Best month and supporting explanation	4	M1 Converts for at least 2 months to a common format (fractions, decimals or %age) A1 all correct C1 for Council target: No (yes) dep on M1 and consistent with the candidates calculations **QWC: Decisions should be stated, following through from working out** C1 March with all calculations correct for the 3 months **QWC: Decisions should be stated, following through from working out**
					Total for Question: 4 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
3. **FE**		No of tiles around room = 2 × lengths of room = 8, 16, 16, 12 Total number of tiles = 8 × 16 + 8 × 12 = 224 Cost = 4 × 224 **OR** Area of the room =4 × 8 + 4 × 6 = 56 Area of a tile = 0.5 × 0.5 = 0.25 Number of tiles = 56 ÷ 0.25 = 224 Cost = 4 × 224	£ 896	6	M1 for doubling each length to show number of tiles for each side B1 for 8, 16, 16 and 12 M1 for a full method of finding the number of tiles (12 × 16 + 8 × 4) A1 for at least one 'section' correct M1 for 4 × '224' A1 cao **OR** M1 for full method for finding the area of the room A1 at least one area correct B1 for area of tile = 0.25m^2 or 2500 cm^2 or 4 tiles = 1 m^2 M1 for area of room ÷ area of a tile M1 for 4 × number of tiles A1 cao
					Total for Question: 6 marks
4.	(a)	$5p = 20$	$p = 4$	2	M1 add 16 to both sides A1 cao
	(b)	$-9 = 3q$	$q = -3$	2	M1 correct method to isolate $\pm 3q$ A1 cao
	(c)	$6x - 3 - 10 - 6x =$	-13	2	M1 at least one expansion correct A1 –13 or a statement that the answer is indep of x depending on correct working
					Total for Question: 6 marks

1MA0/1H					
Question		Working	Answer	Mark	Additional Guidance
5.	(i)		32	1	B1 cao
	(ii)	$2n^2 = 400$, $n^2 = 200$, n not a whole number	No + explanation	2	M1 sets $2n^2 = 400$ C1 and concludes correctly **OR** M1 14th term is (392), 15th term is (450) C1 and concludes correctly
					Total for Question: 3 marks
6. **FE**		15400 ÷ 70 × 100 = 22000 22000 × 2÷ 100	440	4	M1 15400 ÷ 70 × 100 oe A1 22000 M1 '22000' × 2 ÷ 100 oe A1 cao
					Total for Question: 4 marks
7.	(a)	66 = 2 ×33 = 2 × 3 × 11	2 × 3 × 11	2	M1 Successive division by 2 and 3 either by a factor tree or by repeated division A1 cao
	(b)	$132^2 = 4 \times 66^2$ $= 2^2 \times (2 \times 3 \times 11)^2$ **OR** $132^2 = 17424 = 2 \times 8712$ $= 2 \times 2 \times 4356 =$ $2^3 \times 2178 = 2^4 \times 1089$ $=2^4 \times 3 \times 363 =...$	$2^4 \times 3^2 \times 11^2$	2	M1 $(2 \times 3 \times 11)^2$ A1 $2^2 \times 3^2 \times 11^2$ oe **OR** M1 $132^2 = 17424$ and at least 3 correct steps in for example the factor tree
					Total for Question: 4 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
8.		$x + 4x + \frac{1}{2} = 1$ $5x = \frac{1}{2}$, $x = \frac{1}{10}$ **OR** Chooses a suitable number of balls (say 10) 5 will be red The other 5 need to be shared out in the ratio 1:4, Hence 1 yellow and 4 blue	$\frac{4}{10}$	3	M1 $x + 4x + \frac{1}{2} = 1$ A1 $x = \frac{1}{10}$ A1 $\frac{4}{10}$ oe
					Total for Question: 3 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
9.	(a) (i) (ii)		a^2 $6x^4y^3$	3	B1 cao B2 $6x^4y^3$ (B1 for 2 out of 3 terms correct in a product)
	(b)	$x^2 + 3x + 7x + 21$	$x^2 + 10x + 21$	2	M1 3 or 4 terms out of 4 correct in a 4 term expansion A1 cao
	(c)		$3p(q - 4p)$	2	B2 cao (B1 $p(3q - 12p)$, $12p(\frac{1}{4}q - p)$, $p(aq + bp)$ where a and b are numbers)
	(d)(i) (ii)	$(3(x+2)-1)(x+2-3)$ **OR** $3x^2 + 12x + 12 - 10x - 20 + 3$ $= 3x^2 + 2x - 5$	$(3y-1)(y-3)$ $(3x+5)(x-1)$	4	B2 cao (B1 $(3y - m)(y - n)$ where $mn = \pm 3$ or $m + n = \pm 10$ M1 use of the factorised form with y replaced twice by $3x + 2$ A1 cao **OR** B1 $3x^2 + 2x - 5$ B1 cao
					Total for Question: 11 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
10.		Reds 6, 12, 18, 24, 30... Greens 9, 18, 27...	$\frac{1}{20}$	3	B1 list of red and green multiples (both to at least 18) or explicitly states 'LCM' B1 works out highest number (90 seen) B1 $\frac{1}{20}$ (accept $\frac{5}{100}$)
					Total for Question: 3 marks
11.		$\frac{x}{5} = \frac{2}{4}$ $\frac{y}{x+5} = \frac{9}{6}$ or $\frac{y}{9} = \frac{x+5}{6}$	$x = 2.5$ $y = 11.25$	4	M1 a correct expression for x involving ratios of sides, e.g. $\frac{x}{5} = \frac{2}{4}$ oe A1 cao M1 $\frac{y}{x+5} = \frac{9}{6}$ or $\frac{y}{9} = \frac{x+5}{6}$ oe A1 cao **OR** $\frac{y}{5} = \frac{9}{4}$ A1 cao
					Total for Question: 4 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
12.	(a)	4 6 8 10 6 8 10 12 8 10 12 14 10 12 14 16 **OR** $\frac{1}{4} \times \frac{1}{4}$ $\frac{1}{4} \times \frac{1}{4} \times 4$	$\frac{4}{16}$	3	M1 Attempts to list all outcome pairs A1 all 16 found A1 cao **OR** M2 $\frac{1}{4} \times \frac{1}{4} \times 4$ (M1 $\frac{1}{4} \times \frac{1}{4} \times 1, 2$ or 3) A1 $\frac{4}{16}$ oe
	(b)	Prob Ali wins = $\frac{6}{16}$ Number of wins = $\frac{6}{16} \times 80$	30	3	B1 Prob Ali wins = $\frac{6}{16}$ oe M1 $'\frac{6}{16}' \times 80$ A1 ft
					Total for Question: 6 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
13.	(a)		3.4×10^{7}	1	B1 cao
	(b)	$2.4\times10^{12}\times\frac{5}{100}(\div10^{6})$	1.2×10^{5}	2	M1 $2.4\times10^{12}\times\frac{5}{100}$ oe $(\div10^{6})$ A1 cao
					Total for Question: 3 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
14.		Let $AB = x, AD = y$ Area of rectangle $= xy$ Area $AXD = \frac{xy}{4}$ Area $CYZ = \frac{xy}{8}$ Shaded area $= \frac{5xy}{8}$	$\frac{5}{8}$	4	M1 a full method to find the unshaded area and subtracting from 1 B1 area of AXD = area of $ABCD \div 4$ B1 area of CYZ = area of $ABCD \div 8$ A1 cao **OR** **Diagram** M1 for dividing left into 2 congruent triangles for dividing right into 4 congruent triangles B1 left = $2A$ and $2A$ or shaded = $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4} = \frac{2}{8}$ B1 right = $2A$ and A and A or shaded = $\frac{3}{4}$ of $\frac{1}{2} = \frac{3}{8}$ A1 cao **Substitution** M1 for deciding upon suitable side lengths for AD and AB and calculating dimensions of internal shapes B1 for area of DZX B1 for area of $ZXBY$ A1 cao **OR** M1 for deciding upon suitable side lengths for AD and AB and calculating dimensions of internal shapes B1 for area ADX B1 for area ZCY A1 cao
					Total for Question: 4 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
15.	(a) (i)	$\vec{BC} = \vec{CO} + \vec{OB}$	12**a** – 4**b**	4	M1 $\vec{BC} = \vec{CO} + \vec{OB}$ A1 cao
	(ii)	$\vec{AQ} = \vec{AO} + \vec{OB} + \vec{BQ}$ = –4**a** + 4**b** + $\frac{1}{4}$(12**a** – 4**b**)	3**b** – **a**		M1 –4**a** + 4**b** + $\frac{1}{4}$ '(12**a** – 4**b**)' A1 cao
	(b)	$\vec{OX}$ = 12**b** , $\vec{AX}$ = –4**a** + 12**b** = 4(–**a** + 3**b**)	Correct reason, with correct working	3	B1 $\vec{OX}$ = 12**b** B1 $\vec{AX}$ = –4**a** + 12**b** C1 convincing explanation
					Total for Question: 7 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
16.		$\frac{4}{10}\times\frac{6}{9}\times\frac{5}{8} = \frac{120}{720}$ $\frac{120}{720} + \frac{6}{10}\times\frac{5}{9}\times\frac{4}{8} + \frac{6}{10}\times\frac{4}{9}\times\frac{5}{8}$	$\frac{360}{720}$	4	M1 for $\frac{4}{10}\times\frac{6}{9}\times\frac{5}{8}$ A1 for $\frac{120}{720}$ oe M1 $\frac{'120'}{720}$ + 2 correct cases (M1 any 2 correct cases) **or** $\frac{'120'}{720}$ X 3 A1 cao SC with replacement M1 $\frac{4}{10}\times\frac{6}{10}\times\frac{6}{10}$ M1 $\frac{4}{10}\times\frac{6}{10}\times\frac{6}{10}$ ×3
					Total for Question: 4 marks
17.		$\frac{(3x+5)(x-7)}{(3x-5)(3x+5)}$	$\frac{x-7}{3x-5}$	3	B1 $(3x+5)(x-7)$ B1 $(3x-5)(3x+5)$ B1 $\frac{x-7}{3x-5}$
					Total for Question: 3 marks

1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
18.	(a)		$\frac{1}{2}$	1	B1
	(b)	$(2+\sqrt{3})\times(1+\sqrt{3})$ $= 2+2\sqrt{3}+\sqrt{3}+\sqrt{9}$	$5+3\sqrt{3}$	2	M1 4 term expansion with 3, 4 terms correct and sight of 3 or $\sqrt{9}$ A1 cao
					Total for Question: 3 marks
19.	(a)		Smooth curve	2	B1 correct plot of their values B1 smooth curve through their points
	(b)		$x = 3$ $y = 0$	3	M1 attempts to draw circle at origin M1 uses radius 3 cm (using graph scale correctly) A1 cao **OR** B1 for substituting a value of x into $y = x(x-3)$ and $x^2 + y = r^2$ B1 for substituting y into $x = 3$ into $x(x-3)$ and $x^2 + y = r^2$ B1 cao
					Total for Question: 5 marks

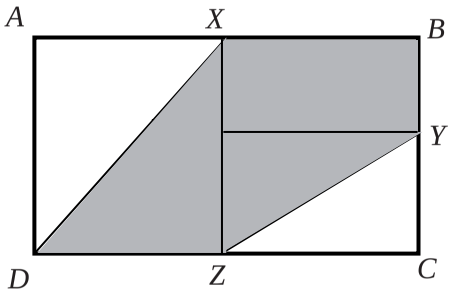
1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
20. **QWC ii, iii**		$(2n+1)^2-(2n-1)^2$ **=** $4n^2+4n+1-(4n^2-4n+1)$ **=** $8n$ **OR** $(2n+1)^2-(2n-1)^2$ **=** $((2n+1)-(2n-1))(2n+1+2n-1))$ $= 2 \times 4n = 8n$	Fully algebraic argument, set out in a logical and coherent manner	6	B2 the nth term for consecutive odd numbers is $2n-1$ oe (B1 $2n+k$, $k \neq -1$ or $n = 2n-1$ or $2x-1$ B1 use of $2n+1$ and $2n-1$ oe M1 $(2n+1)^2-(2n-1)^2$ M1 $4n^2+4n+1-(4n^2-4n+1)$ C1 conclusion based on correct algebra **QWC: Conclusion should be stated, with correct supporting algebra.** **OR** B1 use of $2n+1$ and $2n-1$ oe M1 $(2n+1)^2-(2n-1)^2$ M1 $((2n+1)-(2n-1))(2n+1+2n-1))$ C1 conclusion based on correct algebra **QWC: Conclusion should be stated, with correct supporting algebra.**
					Total for Question: 6 marks

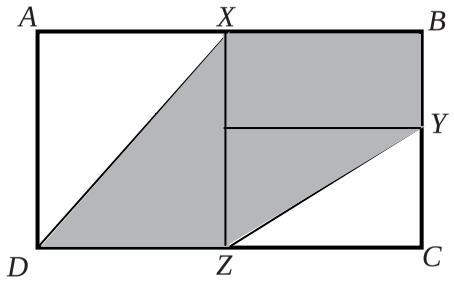
1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Additional Guidance**
21.		<table><tr><th>L</th><th>F</th><th>FD</th><th>CF</th></tr><tr><td>0–10</td><td>40</td><td>4</td><td>40</td></tr><tr><td>10–20</td><td>60</td><td>6</td><td>100</td></tr><tr><td>20–40</td><td>90</td><td>4.5</td><td>190</td></tr><tr><td>40–80</td><td>60</td><td>1.5</td><td>250</td></tr><tr><td>>80</td><td>0</td><td>0</td><td>250</td></tr></table>	Histogram **OR** Cumulative Frequency polygon 82%	6	B1 Scales labelled and also marked on the vertical axis with frequency density or with cumulative frequency M1 frequency densities calculated, at least one non-trivial one correct. A1 all correctly plotted (M1 cumulative frequencies correct) M1 Use 50 on the horizontal scale of CF diagram read off vertical axis (200-210) **or** Use 50 on the horizontal scale of a histogram and covert area to the left to a frequency M1 convert to a percentage A1 80 – 85
					Total for Question: 6 marks

2.

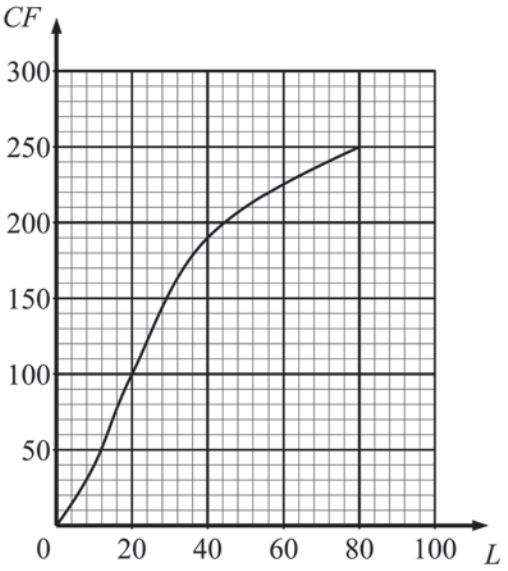
	Fraction	Decimal	%	kg
Jan	$\frac{1}{10}$	0.1	10%	Not known
Feb	$\frac{1}{8}$	0.125	12.5%	15 kg
Mar	$\frac{13}{100}$	0.13	13%	14.56 kg

14.

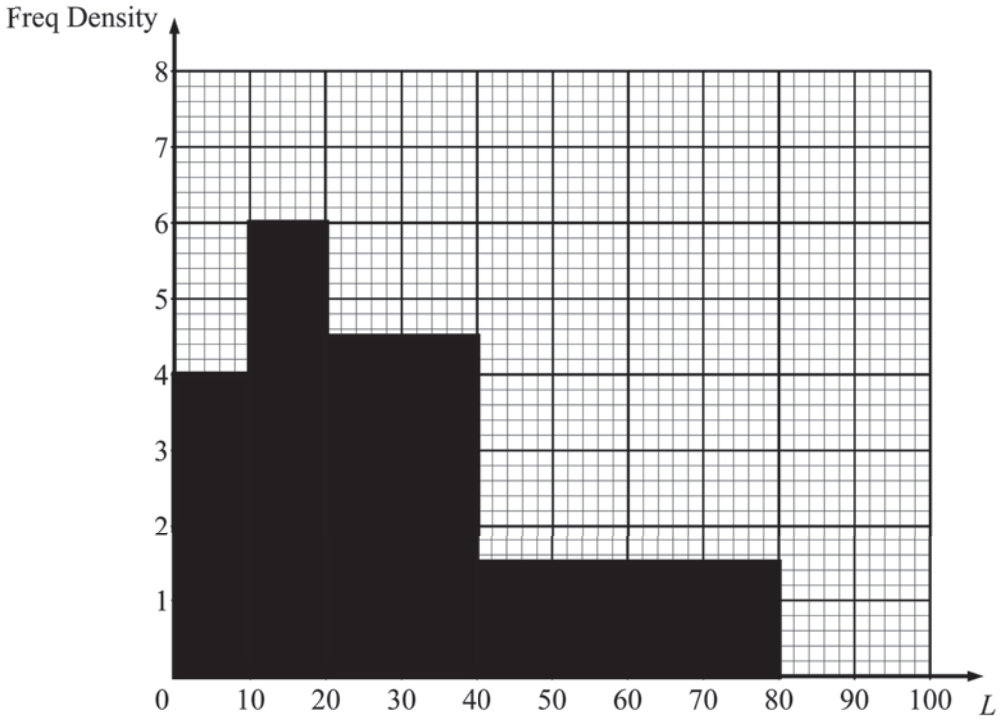




21.



OR



November 2009

For more information on Edexcel and BTEC qualifications
please visit our website: www.edexcel.org.uk

Edexcel Limited. Registered in England and Wales No. 4496750
Registered Office: One90 High Holborn, London WC1V 7BH. VAT Reg No 780 0898 07