For **AQA**

Mathematics

Paper 1 (Non-Calculator)

Higher Tier

Churchill Paper 1A – Marking Guide

Method marks (M) are awarded for a correct method which could lead to a correct answer

Accuracy marks (A) are awarded for a correct answer, having used a correct method, although this can be implied

(B) marks are awarded independent of method

Churchill
Maths

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Churchill Paper 1A Marking Guide – AQA Higher Tier

1 ~~2~~ ~~4~~ ~~4~~ ~~4~~ [✓ 6] ~~7~~ ~~8~~ ~~8~~ ~~9~~

4 5 [✓ 6] 6.5 B1 Total 1

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2 $3\frac{1}{2} \times £10 = £35$

$3\frac{1}{2} \times 60p = £1.80 + £0.30 = £2.10$

$3\frac{1}{2} \times £10.60 = £35 + £2.10 = £37.10$

£31.80 £35.30 £36.80 [✓ £37.10] B1 Total 1

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3 2 6 18 54

×3 ×3 ×3 Next term = 3 × 54 = 162

72 [✓ 162] 166 2916 B1 Total 1

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4 $\frac{3}{10} \div \frac{1}{2} = \frac{3}{10} \times \frac{2}{1} = \frac{6}{10} = \frac{3}{5}$

$\frac{3}{20}$ [✓ $\frac{3}{5}$] $\frac{5}{6}$ $1\frac{1}{5}$ B1 Total 1

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5 **(a)** 1 chain costs 180 ÷ 20 = £9
1 bead costs 750 ÷ 500 = £1.50 M1
1 spacer costs 90 ÷ 100 = £0.90
1 heart charm costs 120 ÷ 30 = £4

Total = 9 + (8 × 1.50) + (4 × 0.90) + 4 M1
= 9 + 12 + 3.60 + 4
= £28.60 A1

(b) Profit on 1 bracelet = 39.90 – 28.60 = £11.30
Profit on 15 bracelets = 15 × 11.30 M1
= 10 × 11.30 + 5 × 11.30
= 113 + 56.50
= £169.50 A1 Total 5

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6 The angles in a triangle add up to 180º so

$4x + 3x + 20 + 5x - 8 = 180$ M1
$12x + 12 = 180$
$12x = 168$
$x = 14$ A1

$4x = 56$, $3x + 20 = 62$ and $5x - 8 = 62$ M1

As angle *ABC* = angle *ACB* the triangle is isosceles
The two sides opposite the equal angles are the same length
Hence, *AB* = *AC* A1 Total 4

7	**(a)**	= 7 × 6 = 42 ways	B1	
	(b)	Smallest 2 frame sizes:		
		no. of combinations = 2 × 7 × 3 = 42	M1	
		Largest 3 frame sizes:		
		no. of combinations = 3 × 7 × 6 = 126		
		Total no. of combinations = 42 + 126 = 168	A1	Total 3
8	**(a)**	e.g. She can not be sure of this because 10 is a very small number of trials	B1	
	(b)	No. of times red bead picked = 7 + 6 + 8 + 6 = 27	M1	
		No. of trials = 40		
		P(Faria picks a red bead) = $\frac{27}{40}$	A1	
	(c)	No, she is wrong. We know the probability that one bead will be green is $\frac{6}{10}$. However, we don't know the probability that the second will be green, given that the first was green, because we don't know how many beads are in the bag. Her answer assumes that the bag contains 10 beads so that after removing one green bead there are 9 beads left, 5 of which are green.	B2	Total 5
9		$p = 4q - 7$ $p + 7 = 4q$ $q = \frac{p+7}{4}$		
		[✓ $\frac{p+7}{4}$] $7p - 4$ $\frac{p}{4} + 7$ $p + \frac{7}{4}$	B1	Total 1
10	**(a)**	Jeremy marks 1 homework in 60 ÷ 12 = 5 minutes	M1	
		Kira marks 1 homework in 120 ÷ 30 = 4 minutes		
		Liz marks 1 homework in 6 minutes		
		Therefore Kira is the quickest	A1	
	(b)	In 20 minutes Jeremy marks 4 homeworks and Kira marks 5 homeworks		
		Together they mark 9 homeworks in 20 minutes	M1	
		36 ÷ 9 = 4 so they take 4 × 20 = 80 minutes	M1	
		4.30 pm + 80 minutes = 5.30 pm + 20 minutes = 5.50 pm	A1	
		They finish marking at 5.50 pm		Total 5
11		Last week = 100%		
		This week = 120% = 240		
		So, 10% = 240 ÷ 12 = 20	M1	
		100% = 10 × 20 = 200	A1	
		Leanne sent 200 emails last week		Total 2

12 Angle in semi-circle = 90º
$a = 180 - (90 + 38)$
$a = 52$

38 [✓ 52] 58 62 B1 Total 1

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13 2 + 3 = 5
600 ÷ 5 = 120
2 × 120 = 240

120 200 [✓ 240] 250 B1 Total 1

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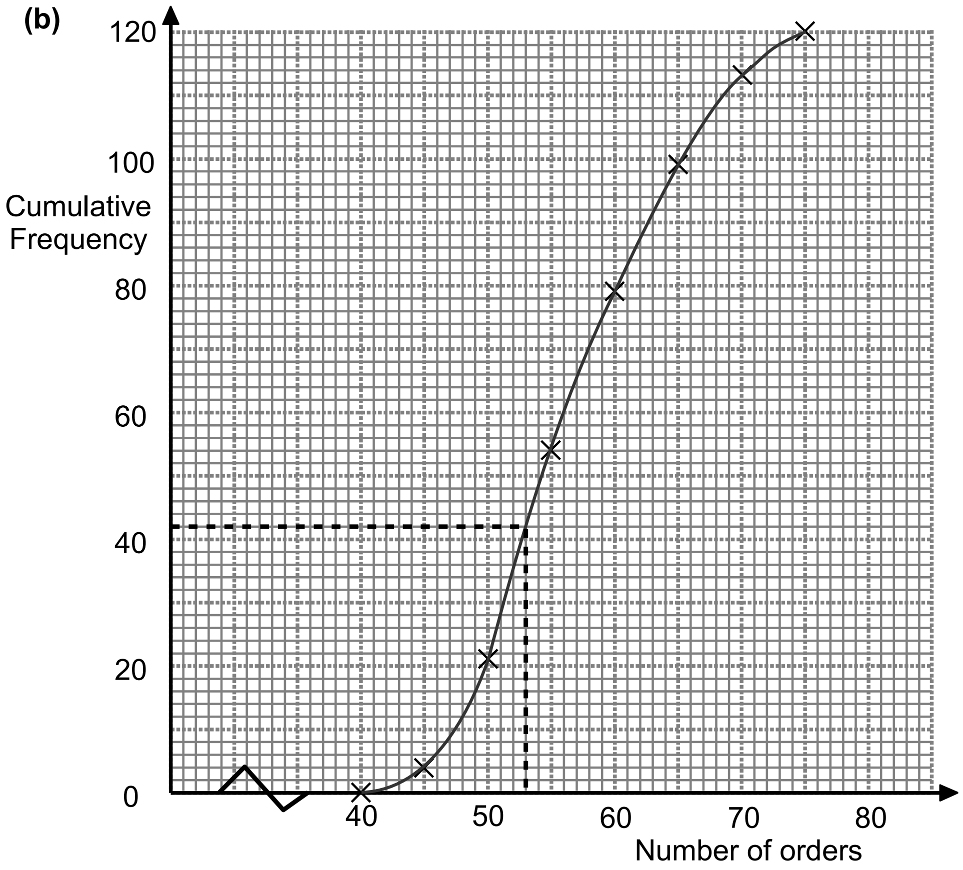
14 **(a)** M1 A1

Number of orders (N)	Cum. Freq.
$40 < N \le 45$	4
$40 < N \le 50$	21
$40 < N \le 55$	54
$40 < N \le 60$	79
$40 < N \le 65$	99
$40 < N \le 70$	113
$40 < N \le 75$	120

(b) B3



(c) 42 (approx, from graph) B1 Total 6

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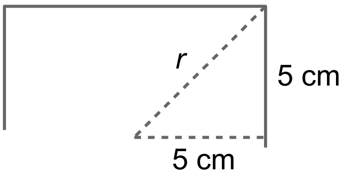
15 Radius of inner circle = 10 ÷ 2 = 5

Area of inner circle = $\pi \times 5^2 = 25\pi$ B1

Radius of outer circle = distance from centre to corner of square:



Pythagoras': $r^2 = 5^2 + 5^2 = 25 + 25 = 50$ M1

Area of outer circle = $\pi \times 50 = 50\pi$

Shaded area = $50\pi - 25\pi = 25\pi$ M1

Therefore shaded area = area of inner circle A1 Total 4

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16 In a normal week, let Henrik earn h and Rob earn r

$h : r = 3 : 2$ so $h = \frac{3}{2}r$ (1) B1

$h + 20 : r + 20 = 4 : 3$ so $h + 20 = \frac{4}{3}(r + 20)$ M1

$3(h + 20) = 4(r + 20)$

$3h + 60 = 4r + 80$ (2)

Sub (1) into (2) $3 \times \frac{3}{2}r + 60 = 4r + 80$ M1

$\frac{9}{2}r + 60 = 4r + 80$

$\frac{1}{2}r = 20$

$r = 40$ so, $h = \frac{3}{2} \times 40 = 60$

In the week before Christmas, Henrik earns $h + 20 = £80$ A1 Total 4

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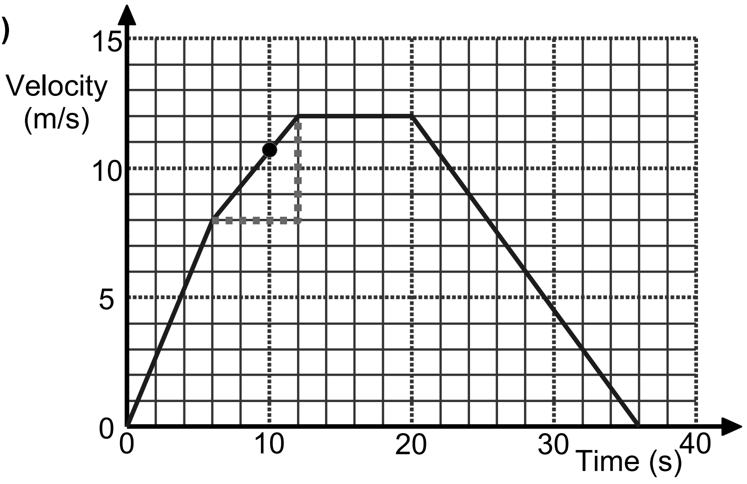
17 **(a)** 8 seconds B1

(b)



Acceleration = gradient of line = $\frac{12-8}{12-6} = \frac{4}{6} = \frac{2}{3}$ m/s^2 M1 A1

(c) Distance = area under graph

$= (\frac{1}{2} \times 6 \times 8) + [\frac{1}{2} \times (8 + 12) \times 6] + (8 \times 12) + (\frac{1}{2} \times 16 \times 12)$ M2

$= 24 + 60 + 96 + 96$

$= 276$ m A1 Total 6

18 $= \frac{8^3}{4^2} = \frac{8\times8\times8}{4\times4} = 2 \times 2 \times 8 = 32$

$\frac{1}{2}$ [✓ 32] 64 128 B1 Total 1

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19 $5y = (4 \times 10^7) + (2 \times 10^6)$
$5y = (4 \times 10^7) + (0.2 \times 10^7)$
$5y = 4.2 \times 10^7$ M1
$10y = 8.4 \times 10^7$
$y = 8.4 \times 10^6$ M1 A1 Total 3

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20 David is not correct
e.g. When $x = \frac{1}{16}$: $\sqrt{x} = \sqrt{\frac{1}{16}} = \frac{1}{4}$ M1
$\sqrt[4]{x} = \sqrt[4]{\frac{1}{16}} = \frac{1}{2}$
$\frac{1}{4} < \frac{1}{2}$ making his statement incorrect A1 Total 2

[Any value in the interval $0 < x < 1$ can be used]

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21 **(a)** $g(5) = \frac{5+3}{2} = 4$ M1
$fg(5) = f(4) = 3 \times 4 - 1 = 11$ A1

(b) Let $g(x) = -2$
$\frac{x+3}{2} = -2$ M1
$x + 3 = -4$
$x = -7$
Therefore $g^{-1}(-2) = -7$ A1 Total 4

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22 **(a)** B1

sin 0°	sin 30°	sin 45°	sin 60°	sin 90°
0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1

(b) Area *ABC* $= \frac{1}{2} \times 6 \times 8 \times \sin 30°$ M1
$= 24 \times \frac{1}{2}$
$= 12 \text{ cm}^2$
Area *PQR* $= \frac{1}{2} \times 3 \times 8 \times \sin 45°$
$= 12 \times \frac{\sqrt{2}}{2}$
$= 6\sqrt{2} \text{ cm}^2$ M1
Triangle *ABC* has the larger area A1 Total 4

23 Sub P $(2a, a)$ into equation: $(2a)^2 + a^2 = 80$ M1

$5a^2 = 80$

$a^2 = 16$

$a = 4$ [can't be -4 as positive constant]

P is $(8, 4)$

Gradient of $OP = \frac{4-0}{8-0} = \frac{1}{2}$ M1

Gradient of tangent $= \frac{-1}{\left(\frac{1}{2}\right)} = -2$ M1

Equation of tangent: $y = -2x + c$

$4 = (-2 \times 8) + c$ M1

$c = 4 + 16 = 20$

Hence, $y = -2x + 20$

y-intercept $= 20$ so R is $(0, 20)$

Crosses x-axis when $y = 0$: $0 = -2x + 20$

$2x = 20$

$x = 10$ so Q is $(10, 0)$

Area of $OQR = \frac{1}{2} \times 10 \times 20 = 100$ A1 Total 5

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24 **(a)** $\overrightarrow{XY} = \overrightarrow{XO} + \overrightarrow{OY}$

$= -\frac{1}{2}\overrightarrow{OA} + \frac{1}{3}\overrightarrow{OC}$ M1

$= -2\mathbf{p} + 2\mathbf{q}$ A1

(b) $\overrightarrow{BC} = \overrightarrow{BO} + \overrightarrow{OC}$

$= -\overrightarrow{OB} + \overrightarrow{OC}$

$= -(3\mathbf{p} + 3\mathbf{q}) + 6\mathbf{q}$ M1

$= -3\mathbf{p} + 3\mathbf{q}$

$= \frac{3}{2}\overrightarrow{XY}$

As $\overrightarrow{BC}$ is a multiple of $\overrightarrow{XY}$ they have the same direction

so BC is parallel to XY A1 Total 4

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25 **(a)** $x^2 + 4x - 3 = (x + 2)^2 - 2^2 - 3$ M1

$= (x + 2)^2 - 7$ A1

(b) $(x + 2)^2 - 7 = 0$

$(x + 2)^2 = 7$

$x + 2 = \pm\sqrt{7}$

$x = -2 \pm \sqrt{7}$ B1

(c) $y = 1 \pm \sqrt{2}$

$y - 1 = \pm\sqrt{2}$

$(y - 1)^2 = 2$ M1

$y^2 - 2y + 1 = 2$ M1

$y^2 - 2y - 1 = 0$

$a = -2$ and $b = -1$ A1 Total 6

TOTAL FOR PAPER: 80 MARKS