For **Pearson Edexcel**
**Level 1/Level 2 GCSE (9 – 1)**

# Mathematics

## Paper 2 (Calculator)

## Higher Tier

Churchill Paper 2A – Marking Guide

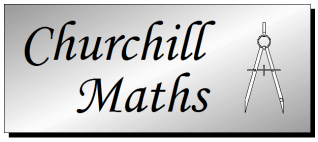
Method marks (M) are awarded for a correct method or partial method

Process marks (P) are awarded for a correct process as part of a problem solving question

Accuracy marks (A) are awarded for a correct answer, having used a correct method or process

(B) marks are unconditional accuracy marks (no method or process needed)

(C) marks are for communication

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**Churchill Paper 2A Marking Guide – Edexcel Higher Tier**

**1** **(a)** $= \frac{3}{2} \times 4 = 6$ eggs — B1

**(b)** $75 \div 30 = 2.5$ — P1
$2.5 \times 250 = 625$ ml of milk — A1

**(c)** $20 \div 4 = 5$ lots of 4 eggs
$2000 \div 250 = 8$ lots of 250 ml milk — P1
$500 \div 30 = 16$ and a bit lots of 30 g butter
Smallest of these is 5 lots of 4 eggs
She can make $5 \times 2 = 10$ portions — A1 — Total 5

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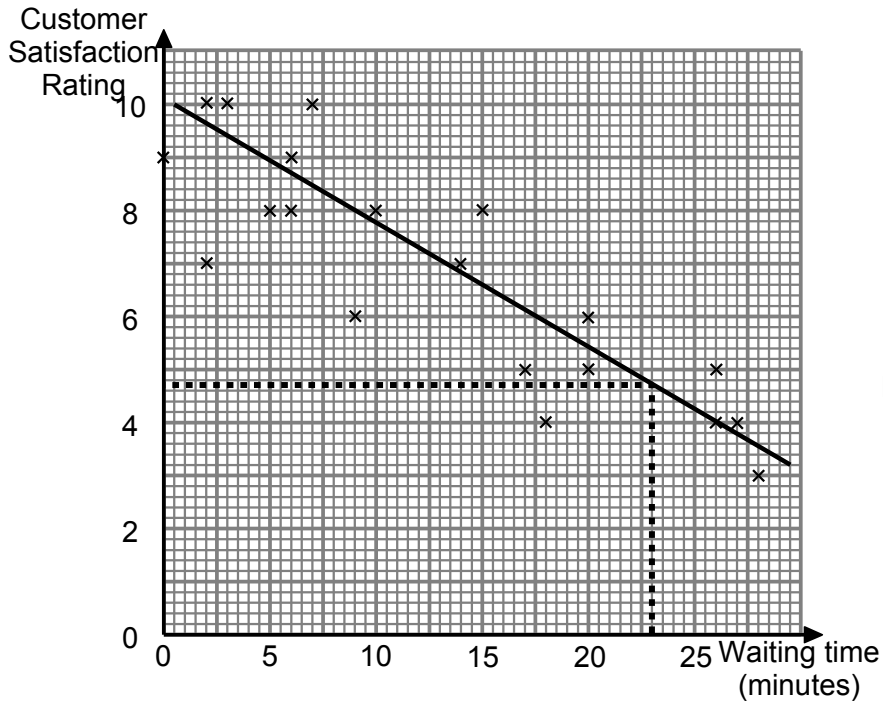
**2** **(a)** 9 callers gave a rating of 8 or more
Percentage $= \frac{9}{20} \times 100\% = 45\%$ — M1 A1

**(b)**




M1

5 (from their line – nearest whole number or raw value) — A1 — Total 4

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**3** **(a)** Median $= \frac{1}{2}(n + 1)$th value $= \frac{1}{2}(31 + 1)$th value $= 16^{th}$ value
There are 6 in first class
There are $6 + 10 = 16$ in 1st & 2nd classes so $16^{th}$ is in second class — M1
The median is in the class $25 < N \leq 30$ — A1

**(b)** e.g. The class intervals have different widths and the 5 large values between 50 and 70 could pull the mean above 35 — C1 — Total 3

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**4** Let the amount Eileen received be £$x$
Layla received £($x$ + 60)
Naira received £1.5$x$ B1
Total = £900 so: $x + x + 60 + 1.5x = 900$ P1
$3.5x = 840$
$x = 840 \div 3.5 = 240$ P1
Naira received 1.5 × 240 = £360 A1 Total 4

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**5** £500 = €1.38 × 500 = €690 M1
€690 – €465 = €225
€225 = £225 ÷ 1.31 = £171.76 [ or £172 to nearest pound ] M1 A1 Total 3

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**6** Radius = 49 244 ÷ 2 = 24 622
Mean dist. From Sun = 30.069 × 149 597 871 = 4 498 258 383 M1
Mean dist. ÷ radius = 4 498 258 383 ÷ 24 622 M1
= 182692.6...
= $1.83 \times 10^5$ times (3sf) A1 Total 3

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**7** $P \propto Q$
$P = kQ$
When $Q$ = 6, $P$ = 15 so $15 = k \times 6$ P1
$k = 15 \div 6 = 2.5$
$P = 2.5Q$
When $Q$ = 3.5 $P = 2.5 \times 3.5 = 8.75$ P1 A1 Total 3

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**8** $y$-intercept = –1 B1
Gradient [using (–4, 1) to (4, –3)] = $\frac{-3-1}{4-(-4)} = \frac{-4}{8} = -\frac{1}{2}$ M1
Equation is $y = -\frac{1}{2}x - 1$ A1 Total 3

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**9** **(a)** This approximation will have lowered her estimate as the actual value of $\pi$ is larger than 3, i.e. 3.14... C1

**(b)** She has assumed the lichen covers a circular area. B1
The shape of the lichen will not be a perfect circle. It will have indents and bits sticking out which means that her estimate could be too big or too small. C1 Total 3

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**10** **(a)** As $a$ is even, let $a = 2n$ where $n$ is a whole number
Now $a^2 = (2n)^2 = 4n^2 = 2 \times 2n^2$ M1
As $2n^2$ is a whole number, $a^2$ is divisible by 2 and is therefore even A1

**(b)** **(i)** e.g. When $p$ = 3 and $q$ = 1: B1
$(pq + 1)^2 = (3 + 1)^2 = 16$ which is even B1

**(ii)** If $(pq + 1)^2$ is even then $pq + 1$ must be even
Hence $pq$ must be odd M1
Therefore both the numbers $p$ and $q$ must be odd A1 Total 6

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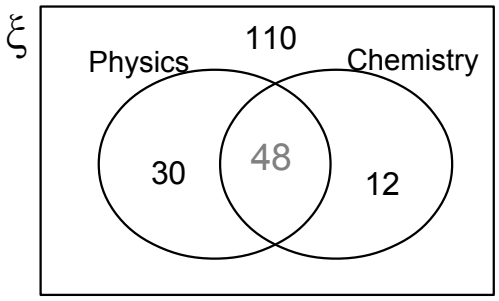
**11** **(a)** 78 – 48 = 30, 60 – 48 = 12
30 + 48 + 12 = 90 M1
200 – 90 = 110




A1

**(b)** **(i)** $= \frac{110}{200}$ $\left[ = \frac{11}{20} \right]$ B1

**(ii)** $= \frac{12}{60}$ $\left[ = \frac{1}{5} \right]$ M1 A1 Total 5

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**12** **(a)** Angle *ACB* = angle *DCE* as they are opposite C1
Angle *ABE* = angle *ADE* as they are angles in the same segment C1
Hence, angle *ABC* = angle *CDE*
Angle *BAD* = angle *BED* as they are angles in the same segment
Hence, angle *BAC* = angle *CED*
As the three angles in triangles *ABC* and *CDE* are equal the triangles must be similar C1

**(b)** $\frac{CD}{BC} = \frac{DE}{AB}$

$\frac{CD}{4.6} = \frac{7.8}{5.2}$ P1

$CD = 4.6 \times \frac{7.8}{5.2} = 6.9$ cm A1 Total 5

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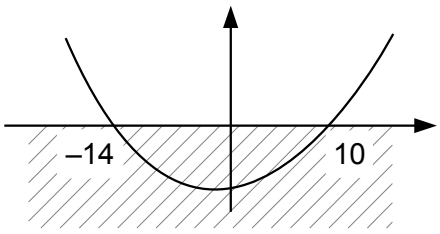
**13** Width of vent = $(x + 4)$ cm
Area of XS = $x(x + 4)$ cm$^2$

Therefore $x(x + 4) \geq 140$ P1
$x^2 + 4x - 140 \geq 0$
For c.v. $(x + 14)(x - 10) = 0$ P1
$x = -14$ or $10$ A1




$x \leq -14$ or $x \geq 10$ P1
$x$ is a length so can't be negative
The smallest value of $x$ is 10 A1 Total 5

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**14** $700 = \dfrac{7}{\text{area}}$

$700 \times \text{area} = 7$

Area $= 7 \div 700 = 0.01$ m$^2$ P1

Side length of cube $= \sqrt{0.01} = 0.1$ m P1

Volume of cube $= (0.1)^3 = 0.001$ m$^3$ P1

$\text{Density} = \dfrac{\text{mass}}{\text{volume}}$

$720 = \dfrac{\text{mass}}{0.001}$

Mass $= 720 \times 0.001 = 0.72$ kg A1 Total 4

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**15** **(a)** On 1st Jan 2016, $t = 1$

When $t = 1$, $V = 2500 \times 1.3 = £3250$ B1

**(b)** 30% B1

**(c)** When $t = 2$, $V = 3660$

Sub in: $3660 = 2500 \times k^2$ P1

$k^2 = \dfrac{3660}{2500} = 1.464$

$k = \sqrt{1.464} = 1.2099... = 1.21$ (3sf) P1 A1 Total 5

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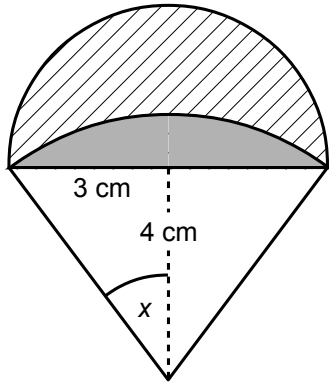
**16**




Small circle: area $= \pi r^2 = \pi \times 3^2 = 28.274...$ M1

Semi-circle: area $= \frac{1}{2} \times 28.27 = 14.137...$

Triangle: area $= \frac{1}{2} \times 6 \times 4 = 12$ B1

Angle: $\tan x = \dfrac{\text{opposite}}{\text{adjacent}} = \frac{3}{4}$ P1

$x = \tan^{-1} \frac{3}{4} = 36.869...$

Sector: angle $= 2x = 73.739...$

$\text{area} = \dfrac{\text{angle}}{360} \times \pi r^2$

$= \dfrac{73.74}{360} \times \pi \times 5^2$ P1

$= 16.087...$

Segment: area = sector – triangle

$= 16.09 - 12 = 4.087...$ P1

Crescent = semi-circle – segment

$= 14.14 - 4.09 = 10.049... = 10.0$ cm$^2$ (3sf) A1 Total 6

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**17** Width of shelf < 1.25 m B1

Thickness of game ≥ 13.5 mm

1.25 m = 125 cm and 13.5 mm = 1.35 cm

Max. no. on shelf $= 125 \div 1.35 = 92.59...$ P1

The maximum is 92 A1 Total 3

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**18** Volume scale factor = 625 ÷ 40 = 15.625 P1

Length scale factor = $\sqrt[3]{15.625}$ = 2.5 P1

Let Don's model be $d$ cm tall $2.5 \times d = d + 21$ M1

$1.5d = 21$

$d = 21 \div 1.5 = 14$

14 + 21 = 35

Paul's model is 35 cm tall A1 Total 4

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**19** Perimeter = 8 m so width + length = 4 m

$x - 1 + \dfrac{4x}{2x - 1} = 4$ P1

$(2x - 1)(x - 1) + 4x = 4(2x - 1)$ P1

$2x^2 - 3x + 1 + 4x = 8x - 4$

$2x^2 - 7x + 5 = 0$

$(2x - 5)(x - 1) = 0$ M1

$x = \frac{5}{2}$ or $x = 1$

$x$ can't be 1 as the width, $x - 1$, would be 0 so $x = \frac{5}{2}$ A1

Width = $\frac{5}{2} - 1 = \frac{3}{2}$

Length = $\dfrac{4 \times \frac{5}{2}}{2 \times \frac{5}{2} - 1} = \dfrac{10}{5 - 1} = \frac{5}{2}$ M1

Area = $\frac{3}{2} \times \frac{5}{2} = \frac{15}{4} = 3\frac{3}{4} = 3.75$ m$^2$ A1 Total 6

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**TOTAL FOR PAPER: 80 MARKS**