**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

**CAMBRIDGE INTERNATIONAL MATHEMATICS** **0607/31**

Paper 3 (Core) **October/November 2016**

MARK SCHEME

Maximum Mark: 96

**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

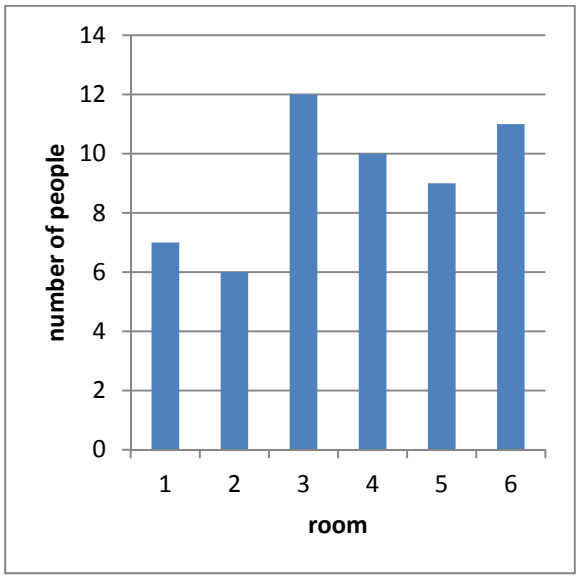
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

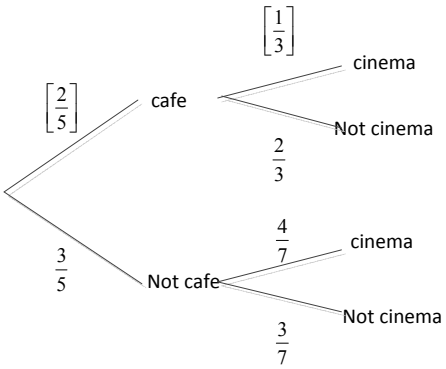
Cambridge is publishing the mark schemes for the October/November 2016 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

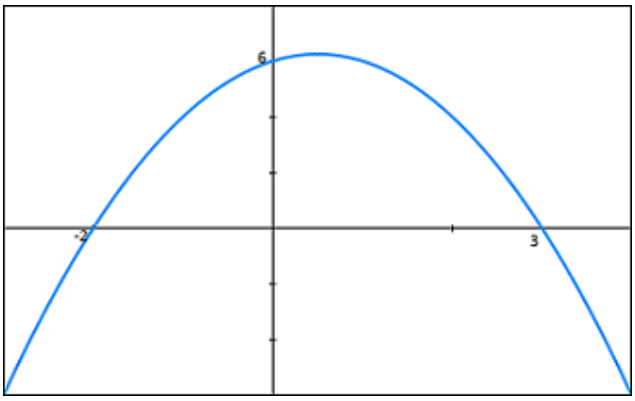
**Abbreviations**

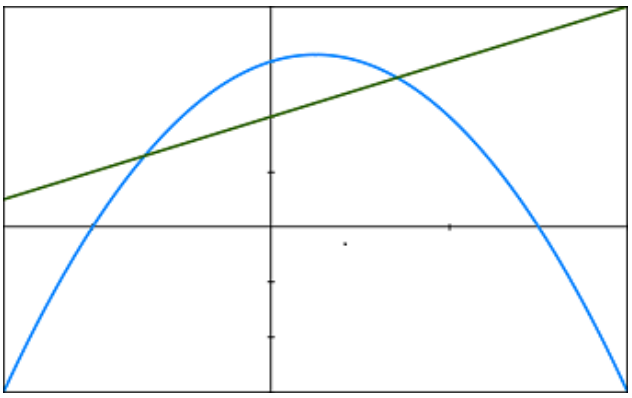
awrt answers which round to
cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| 1 (a) | Square<br>equilateral triangle<br>hexagon | 1<br>2<br>1 | **B1** for each word |
| (b) | [$x$ =] 16<br>[$y$ = ] 8 | 3 | **B2** for 1 correct<br>or **M1** for $12 \times 4$ soi |
| 2 (a) | 55 | 1 | |
| (b) |  | 2 | **B1** for 3 bars with correct height and equal width or 5 bars with correct height |
| (c) (i) | 1800 | 1 | |
| (ii) | 30 | 1 | |
| (iii) | 348 | 2 | **M1** for $6 \times 8$ oe |
| 3 (a) (i) | 21 or 9 | 1 | |
| (ii) | –6 or –18 | 1 | |
| (iii) | 9 | 1 | |
| (iv) | $\frac{5}{8}$ oe | 1 | |

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| (v) | $\sqrt{3}$ or $\pi$ | 1 | |
| (b) (i) | 1.7321 | 1 | |
| (ii) | 1.732 | 1 | |
| (c) | $\frac{33}{100}$ | 1 | |
| (d) | 3.4 | 1 | |
| (e) | 62.5 | 1 | |
| 4 (a) (i) | M O E Y cao | 2 | **B1** for 2 correct and none incorrect or 3 correct and 1 extra |
| (ii) | O N | 2 | **B1** for 1 correct and none incorrect or 2 correct and 1 extra |
| (b) (i) | [*AB* = ] 12<br>[*DF* = ] 5 | 3 | **B2** for 1 correct<br>or **M1** for a correct ratio, equation or correct Pythagoras statement. |
| (ii) | 54 : 6 oe | 2 FT | **FT** *their AB*<br>**B1** for 54 or 6 seen or $3^2$ seen<br>or **M1** for $0.5 \times 4 \times 3$ or $0.5 \times 9 \times$ *their AB* |
| 5 (a) | 19 | 1 | |
| (b) | 18 | 1 | |
| (c) | 2 | 2 | **M1** for 17 or 19 seen |
| (d) | 18.34 | 2 | **M1** for multiplying number of petals by frequencies |
| 6 (a) | 298<br>291 | 1<br>1 FT | <br>**FT** *their*298 – 7 |
| (b) | $333 - 7n$ oe | 2 | **B1** for $333 - kn$ or $k - 7n$ |
| (c) | Yes, with correct justification soi | 1 | |

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| 7 (a) | [a =] 31 | 1 | |
| | [b =] 42 | 1 | |
| | [c =] 107 | 1 | |
| | [d =] 107 | 1 | |
| (b) | [p =] 28 | 1 | |
| | [q =] 90 | 1 | |
| | [r =] 62 | 1 | |
| 8 (a) |  | 3 | **B1** for $\frac{3}{5}$<br>**B1** for $\frac{2}{3}$<br>**B1** for $\frac{4}{7}$ or $\frac{3}{7}$ |
| (b) | $\frac{2}{15}$ oe | 2 | **M1** for $\frac{2}{5} \times \frac{1}{3}$ |
| (c) | $\frac{10}{21}$ oe | 3 | **M2** for $their(\text{b}) + their\frac{3}{5} \times their\frac{4}{7}$<br>or **M1** for $their\ \frac{3}{5} \times their\ \frac{4}{7}$ |
| 9 (a) | 1.2 | 3 | **M2** for $\frac{\frac{100}{1000}}{\frac{5}{60}}$ oe seen<br>or **M1** for $\frac{100}{1000}$ or $\frac{5}{60}$ or $\frac{100}{5}$ oe seen |
| (b) (i) | 9 | 3 | **M2** for $\frac{6}{40} \times 60$ oe<br>or **M1** for $\frac{6}{40}$ |
| (ii) | [0]8 04 | 1 FT | **FT** 07 55 + *their*(b)(i) |
| (iii) | [0]7 55 + *their* (b)(i) + 5 minutes oe | 1 FT | **FT** providing before 08 15 |

| | | | |
|---|---|---|---|
| **10 (a) (i)** | 2 | **2** | **M1** for correct first step |
| **(ii)** | $x < 5$ | **2** | **M1** for correct first step.<br>Allow $=, \leqslant, >, \geqslant$ for M1 |
| **(b)** |  | **1** | |
| **(c) (i)** | $12x^8$ | **2** | **B1** for $12x^k$ or $kx^8$ |
| **(ii)** | $3y^6$ | **2** | **B1** for $3y^k$ or $ky^6$ |
| **(d)** | 2 drink + 4 chocolate = 6.10 oe<br>[1] chocolate = 0.85<br>[1] drink + 2(0.85) = 3.05 oe<br>[1] drink = 1.35 | **M1**<br>**A1**<br>**M1**<br>**A1** | **SC2** for correct answer with no working. |
| **11 (a)** | 4.24 or 4.241 to 4.242 | **2** | **M1** for $\pi \times 1.5^2 [\times 0.6]$ or better |
| **(b)** | 5.5[0] or 5.497 to 5.498 | **2 FT** | **M1** for $\pi \times 2^2$ seen |
| **(c)** | 59.4 or 59.43 to 59.44 | **2** | **M1** for $6 \times 12 -$ an area seen |
| **12 (a) (i)** | Fully correct sketch<br>  | **2** | **B1** for axes intercepts approximately correct<br>**B1** for correct shape |
| **(ii)** | (0, 6) | **1** | |
| **(iii)** | (–2, 0)<br>(3, 0) | **1**<br>**1** | |
| **(iv)** | (0.5, 6.25) | **1** | |

| | | | |
|---|---|---|---|
| **(b) (i)** | Correct line<br>  | **2** | **B1** for approximately correct slope<br>**B1** for approximately correct $y$ intercept |
| **(ii)** | (1.41, 5.41 )<br>(−1.41, 2.59) | **1**<br>**1** | |