

# Mark Scheme (Results)

## Summer 2018

Pearson Edexcel International GCSE
In Mathematics A (4MA0) Paper 4H

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Summer 2018
Publications Code 4MA0_4H_1806_MS
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# 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.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- 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.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- **Types of mark**
  - M marks: method marks
  - A marks: accuracy marks
  - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
  - cao – correct answer only
  - ft – follow through
  - isw – ignore subsequent working
  - SC - special case
  - oe – or equivalent (and appropriate)
  - dep – dependent
  - indep – independent
  - eeoo – each error or omission

- **No working**

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.

- **With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.
If there is no answer on the answer line then check the working for an obvious answer.

- **Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another

# IGCSE Maths - Paper 4H June 2018 Mark scheme

| The correct answer, apart from question 13, unless clearly obtained by an incorrect method, should be taken to imply a correct method | | | | | |
|---|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| **1** | | $12 \times 8 \times 1.8$ (= 172.8)<br><br>"172.8" × 1000 (= 172800)<br><br>"172800" ÷ 3000 | 58 | 4 | M1<br>M2 for "172.8" × 1000 ÷ 3000 or "172.8" ÷ 3<br>If not M2 then M1 for "172.8" × 1000 or "172.8" ÷ 3000<br><br>A1 accept 57.6 |
| **2** | (a) | $\frac{7}{8} \times 120$ (= 105) or $\frac{2}{3} \times 120 (= 80)$<br><br>$\frac{2}{3} \times$ "105" or $\frac{7}{8} \times$ "80"<br>or $"\frac{7}{12}" \times 120$ oe | 70 | 3 | M1 or $\frac{7}{8} \times \frac{2}{3}$ $\left(= \frac{7}{12}\right)$ oe or $\frac{7}{8} \times 100 (= 87.5)\%$ **and** $\frac{87.5}{100} \times 120$ (=105)<br>M1 for a complete method<br><br>A1 |
| | (b) | $\frac{31500}{42000} \times 100$ | 75 | 2 | M1<br><br>A1 |
| | (c) | $\frac{1}{2} \times (120 + 80) \times 110$ **or** 80 × 110 + 2 × ½×½× (120 − 80) ×110 | 11 000 | 2 | M1 or a complete method involving a rectangle and two triangles<br><br>A1 |

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| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **3** (a) | $0\times12+1\times3+2\times9+3\times4+4\times14+5\times2+6\times6$ or (0) + 3 + 18 + 12 + 56 +10+ 36 or 135<br>$\frac{0\times12+1\times3+2\times9+3\times4+4\times14+5\times2+6\times6}{50}$<br>or $\frac{"135"}{50}$ | 2.7 | 3 | M1 for $\Sigma fx$, allow 1 error or omission<br>M1 (dep) for $\Sigma fx/\ \Sigma f$<br>Allow their $\Sigma fx$ providing first M1 earned Allow division by their $\Sigma f$ provided addition or total under column is shown<br>A1 accept 3 if 2.7 or 135÷ 50 seen in working |
| (b) | | $\frac{9}{50}$ | 1 | B1 oe |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **4** | ($\angle ABE$) = $36^o + 60^o$ (= $96^o$)<br>or ($\angle CBE$) = $180^o - (36^o + 60^o)$ (=$84^o$)<br>or $36^o + 60^o + 60^o$ (=$156^o$)<br><br>e.g. ($\angle BED$) (or $\angle CBE$) = $180^o$ − "$96^o$" (=$84^o$) **and**<br>($\angle DEG$) = "$84^o$" − $60^o$<br>Or $180^o$ − "$156^o$" | 24 | 4 | M1<br><br><br><br>M1 for a complete method<br><br><br><br>A1<br><br>B1 (dep M1,M1) Reasons: Angles in an equilateral triangle are $60^o$, alternate angles are equal, (the sum of co-interior (allied) angles is $180^o$), (the sum of angles on a straight line is $180^o$)<br>At least 2 relevant reasons, one of which must refer to alternate or co-interior (allied) angles |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **5** (a) | $\frac{0.5}{2}\times 5$ | 1.25 | 2 | M1<br>A1 oe |
| (b) | $\frac{630}{2+5}\times 5$ | 450 | 2 | M1<br>A1 |
| (c) | 2 × 13.5(0) (=27) **and** 5 × 18(=90)<br>or<br>e.g.0.18 × 13.50 (=2.43) **and** 0.45 × 18(=8.1(0) )<br>or<br>e.g.0.5 × 13.50(=6.75) **and** 1.25 × 18 (=22.5(0))<br>or<br>e.g 2 × 13.5(0)÷7 (= 3.85..) **and** 5 × 18÷7 (=12.85..)<br><br>"27" : "90" or "2.43" :" 8.1(0)"<br>or "6.75" : "22.5(0)" or "3.85":"12.85" | 3 : 10 | 3 | M1 oe for any multipliers in the ratio 2:5<br>M1 Dep and written as a ratio<br>A1 A1 accept 1 : 3.33….. or 0.3 : 1<br>(SC B1 for 3 : 4) |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **6** | $20 \times 20$ or $\pi \times 9^2$<br>$20 \times 20 - \pi \times 9^2$ | 145.5 | 3 | M1 oe<br>M1 for a complete method<br>A1 145.4 - 145.7 |
| **7** (a) | | $2x^2 + 5x$ | 1 | B1 |
| (b)(i) | | $y^8$ | 1 | B1 |
| (b)(ii) | | $k^7$ | 1 | B1 |
| (b)(iii) | | $t^{12}$ | 1 | B1 |
| (c) | $x + x + 4 + 3(x + 4)$ | $5x + 16$ | 2 | M1 for two of $x$, $x + 4$, $3(x + 4)$ oe<br>A1 any correct expression<br>(SC B1 for $x + 4x + 3 \times 4x$ or $17x$) |
| **8** (a) | | 9, −1, −3, 3 | 2 | B2 All correct<br>(B1 for two or three correct) |
| (b) | At end of mark scheme | Correct curve | 2 | M1 dep on at least B1 in (a); at least 6 of their points correctly plotted<br>A1 Correct smooth curve |
| (c) | | −3.25 | 1 | B1 −3.(0) to −3.4 ft on M1 in (b) |

| Question | Working | Answer | Mark | Notes | |
|---|---|---|---|---|---|
| **9** | $\frac{AB}{10} = \cos 30^\circ$ or $\frac{AC}{10} = \sin 30^\circ$ or<br>$AB = 10\cos 30^\circ$ (=8.66…) or $AC$=10 sin30° (=5) | 49.1 | 5 | M1 | Or substitutes correctly into the Sine Rule |
| | $AB = 10\cos 30^\circ$ (=8.66…) and<br>$AC$=10 sin30° (=5) | | | M1 | Or $AB=\sqrt{10^2-(10\sin 30)^2}$ and<br>$AC=\sqrt{10^2-(10\cos 30)^2}$ |
| | $\tan AMC = \frac{"5"}{"4.33"}$ (= 1.15…) | | | M1 | |
| | angle $AMC = \tan^{-1}$("1.15…") | | | M1 | |
| | | | | A1 | 49.1 - 49.11 |
| | **Alternative Method** | | | | |
| | $\frac{AB}{10} = \cos 30^\circ$ or $\frac{AC}{10} = \sin 30^\circ$ or<br>$AB = 10\cos 30^\circ$ (=8.66…) or $AC$=10 sin30° (=5) | 49.1 | 5 | M1 | Or substitutes correctly into the Sine Rule |
| | $AB = 10\cos 30^\circ$ (=8.66…) and<br>$AC$=10sin 30° (=5) OR<br>$AB = 10\cos 30^\circ$ (=8.66…) and $CM = \sqrt{4.33..^2+10^2-2\times 4.33..\times 10\times\cos 30^0}$ (=6.61…) | | | M1 | Or $AB=\sqrt{10^2-(10\sin 30)^2}$ and<br>$AC=\sqrt{10^2-(10\cos 30)^2}$ |
| | $\sin AMC = \frac{"5"}{"6.61."}$ or $\frac{"5"}{\sqrt{"4.33^2"+"5"^2}}$<br>$\cos AMC = \frac{"4.33"}{"6.61."}$ or $\frac{"4.33"}{\sqrt{"4.33^2"+"5"^2}}$ | | | M1 | |
| | angle $AMC = \sin^{-1}$("0.756…")<br>angle $AMC = \cos^{-1}$("0.655..") | | | M1 | |
| | | | | A1 | 49.1 - 49.11 |

| Question | | Working | Answer | Mark | Notes | |
|---|---|---|---|---|---|---|
| **10** | (a) | $\begin{pmatrix}5\\8\end{pmatrix}-\begin{pmatrix}3\\4\end{pmatrix}$ | $\begin{pmatrix}2\\4\end{pmatrix}$ | 2 | M1 | or $\vec{AO}+\vec{OB}$ oe |
| | | | | | A1 | |
| | (b) | $\overrightarrow{(DC}=)2\times"\begin{pmatrix}2\\4\end{pmatrix}"=\begin{pmatrix}4\\8\end{pmatrix}$ or<br>$\vec{BC}=\vec{BA}+\vec{AD}+\vec{DC}$<br>e.g. $-"\begin{pmatrix}2\\4\end{pmatrix}"+\begin{pmatrix}1\\-3\end{pmatrix}+"\begin{pmatrix}4\\8\end{pmatrix}"$ | $\begin{pmatrix}3\\1\end{pmatrix}$ | 3 | M1 | Or coordinates (3 +1, 4 –3) assigned to D or coordinates (3 + 1 +4, 4 – 3 + 8) assigned to C (may be in vector form) |
| | | | | | M1 | for a complete method |
| | | | | | A1 | ft (a) |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **11** (a) | $(L=)\frac{10}{\pi\times1.2^2}$ | 2.21 | 3 | M2 For $(L=)\frac{10}{\pi\times1.2^2}$ oe or $\frac{10}{4.52...}$<br>If not M2 then award M1 for $\pi\times1.2^2\times L=10$<br>A1 2.209 - 2.212 |
| (b) | e.g 0.15mm = $1.5\times10^{-4}$m $1m^2 = 10^6mm^2$<br>Area of 1 sphere = $4\pi \times 0.00015^2$ ( $=2.82..\times10^{-7}$)<br>$1 \div$ "$2.82..\times10^{-7}$" or $1000\,000 \div$ "0.282 .." | $3.54 \times 10^6$ | 4 | B1 for a correct conversion of length units or area units<br>M1 or $4\pi \times 0.15^2$ (accept wrong or no unit conversions)<br>M1 (accept wrong or no unit conversions)<br>A1 $3.53 \times 10^6$ - $3.54 \times 10^6$ |
| **12** | $\frac{3(x-3)}{2\times3}-\frac{2(x+4)}{2\times3}$<br>$\frac{3x-9-2x-8}{6}$ | $\frac{x-17}{6}$ | 3 | M1 for correct use of a common denominator, either as separate correct fractions or a single correct fraction<br>M1 (dep) for correct expansion of brackets in a single correct fraction<br>A1 |
| **13** | $4n^2 + 2n + 2n + 1$, $n^2 - 2n - 2n + 4$ or $4n^2 + 4n + 1$, $n^2 - 4n + 4$<br>$4n^2 + 2n + 2n + 1 + n^2 - 2n - 2n + 1$ or $4n^2 + 4n + 1 + n^2 - 4n + 4$ or $5n^2 + 5$<br>$5(n^2 + 1)$ | shown | 3 | M1 for at least one correct expansion<br>M1<br>A1 with conclusion stated or factorisation oe |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **14** (a) | $\frac{dy}{dx} = 3x^2 - 12$ or $3\times x^{3-1} - 12x^0$ | $3x^2 - 12$ | 2 | M1 for at least one term correct<br>A1 |
| (b) | "$3x^2 - 12$" = 0<br>$x$ = 2 or −2<br>($y$ = )"$2^3$" −12 × "2" + 4<br>or ($y$ = )"$(-2)^3$" −12 × "(−2)" + 4 | ( −2, 20)<br>(2, −12) | 4 | M1 Dep M1in (a)<br>A1 at least one of $x$ = 2 or $x$ = −2<br>M1 Dep preceding M1for substituting a correct (ft) solution of "$3x^2 - 12$" = 0 into the original equation<br>A1 Allow if misattributed |
| (c) | Grad = "3"×1 "−12" (=−9)<br>−7 = "−9" × 1 + c | $y = -9x + 2$ | 3 | M1 (dep M1 earned in (a)) for substituting $x$ = 1 in "$3x^2 - 12$"<br>M1 (dep previous M)<br>A1 oe |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **15** (a) | At end of mark scheme | Complete tree diagram | 3 | B1 $\frac{3}{9}$ oe (0.33…) on first black branch<br>B1 Correct binary structure<br>B1 5 correct labels and correct probabilities on all second branches |
| (b) | $\frac{6}{9} \times$ "$\frac{5}{9}$" | $\frac{30}{81}$ | 2 | M1 ft diagram<br>A1 oe ft (0.37…) |
| (c) | $\frac{6}{9} \times \frac{5+n}{9+n} \left(= \frac{1}{2}\right)$<br>e.g. $12\,(5 + n) = 9(9 + n)$<br>e.g $(5 + n) = \frac{3}{4}(9 + n)$ | 7 | 3 | M1<br>M1 For a correct equation of the form $a\,(5 + n) = b\,(9 + n)$ where $a$, $b$ are numerical<br>A1 |
| | **Alternative method** | | | |
| | P(Black from Y) = $\frac{1}{2} \times \frac{9}{6} \left(= \frac{3}{4}\right)$ or $\frac{1}{2} \div \frac{6}{9} \left(= \frac{3}{4}\right)$<br>So n (white) : n (black) = 1:3 and $1 \times 4 : 3 \times 4$ | 7 | | M1<br>M1<br>A1 |

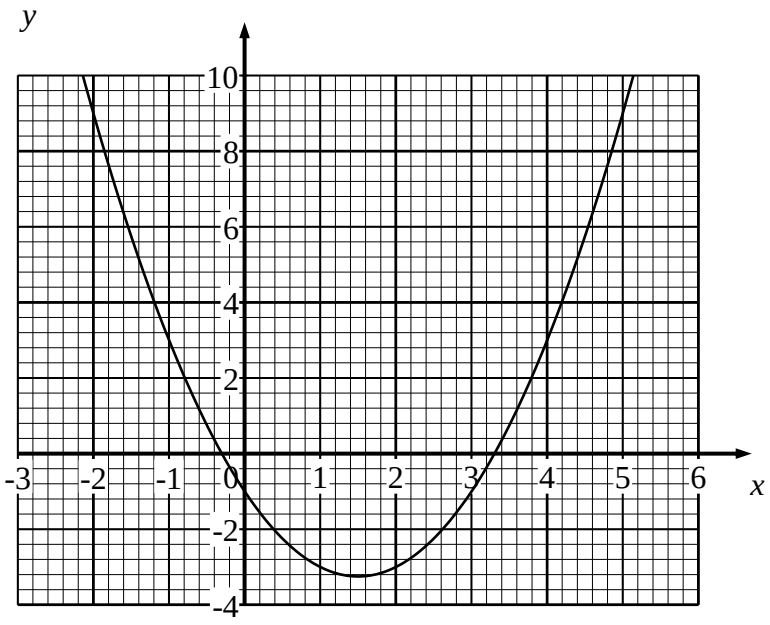
| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **16** | $v = k\sqrt{E}$<br><br>$30 = k\sqrt{64}$ or $k = 3.75$ oe<br><br>$v$ = "3.75" × √400 | 75 | 4 | M1 ($k \neq 1$)<br><br>M1 Allow this for M2 if $v = k\sqrt{E}$ is not written<br><br>M1 Using their value of $k$ correctly dep on M1M1 or dep on M2<br>A1 |
| **17** (a) | At end of mark scheme | Correctly completed diagram | 2 | B1 for '6' in correct place<br>B1 for '7' in correct place |
| (b)(i) | | 24 | 1 | B1 ft "7" |
| (ii) | | 26 | 1 | B1 ft "7" and "6" |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **18** | Let $AB = x$ (cm), $7(x+7) = 6(2x+6)$ or<br>Let $DC = y$ (cm), $7\left(\frac{y}{2}+7\right) = 6(y+6)$ or<br>$7 \times PA = 6 \times PD$ | 11.2 | 4 | M1 |
| | $12x - 7x = 49 - 36$ or<br>$6y - \frac{7}{2}y = 49 - 36$ | | | M1 for correct expansion of both terms and correct rearrangement |
| | $(x = \frac{13}{5})$, $6 + 2 \times "\frac{13}{5}"$<br>$(y = \frac{26}{5})$, $"\frac{26}{5}" + 6$ | | | M1 for a complete method to find *PD*<br>A1 oe |

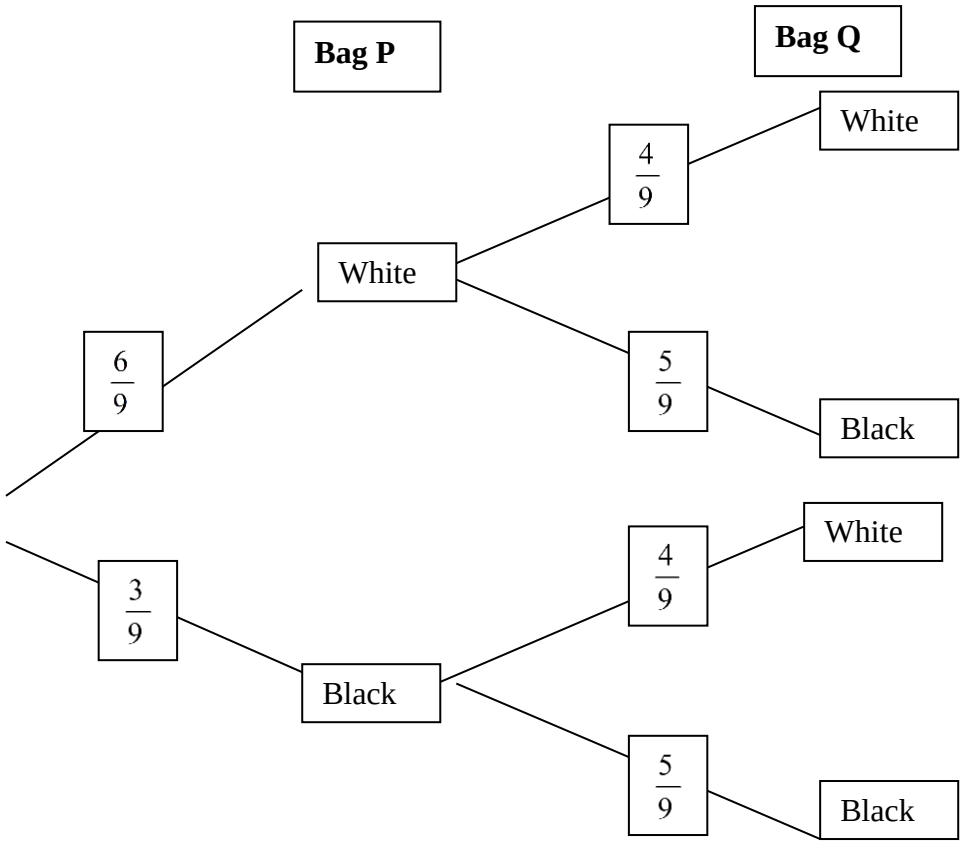
| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **19** | 100 □ represent 80 farms | 99 | 5 | M1 oe e.g. 1 large □ represents 20 farms or '4' written in the first column or correct scale 1 - 4 on FD axis |
| | Frequencies are (80), 90, 100, 30 and 30<br>Areas are e.g. 4, 4.5, 5. 1.5 and 1.5 | | | M1 for any correct calculation for at least one new frequency for a bar of width ≠ 20 e.g. $\frac{40}{100} \times 7.5 \times 30$ (=90) or e.g $3 \times 30$ (=90)<br>Or one correct 'area' for a bar of width ≠ 20<br>e.g 4.5 for 20-50<br>This mark also implies the previous M mark |
| | $\frac{20}{100} \times (80 + "90" + "100")$(=54) or<br>$\frac{3}{4} \times ("30" + "30")$ (=45) | | | M1 Or $\frac{20}{100} \times (4 + "4.5" + "5") \times 20$ oe or<br>$\frac{3}{4} \times ("1.5" + "1.5") \times 20$ oe |
| | 45 or 54 | | | A1 For at least 1 correct<br>A1 |

| Question | Working | Answer | Mark | Notes |
|---|---|---|---|---|
| **20** | e,g. $\frac{2\times(2^{\frac{3}{2}})^{2y+2}}{(2^2)^{2y+1}}$ or $\frac{12\times(\sqrt{2^3})^{2y+2}}{6\times(2^2)^{2y+1}}$ or $2\times\left(2^{\frac{3}{2}}\right)^{2y+2}=(2^2)^{2y+1}\times 2^p$ | $2-y$ | 3 | M1 for writing 8 and 4 correctly in terms of 2 in a correct fraction or equation |
| | $\frac{2^{3y+4}}{2^{4y+2}}$ or $\frac{2\times2^{3y+3}}{2^{4y+2}}$ or $\frac{12\times2^{3y+3}}{6\times2^{4y+2}}$ $2^{3y+4}=2^{4y+2}\times2^p$ or $2\times2^{3y+3}=2^{4y+2}\times2^p$ | | | M1 (dep) for use of $\left(2^q\right)^r=2^{qr}$ twice or $(2\sqrt{2})^{2n}=2^{3n}$ in a correct expression or equation |
| | | | | A1 |

**11**



**15a**


Bag P
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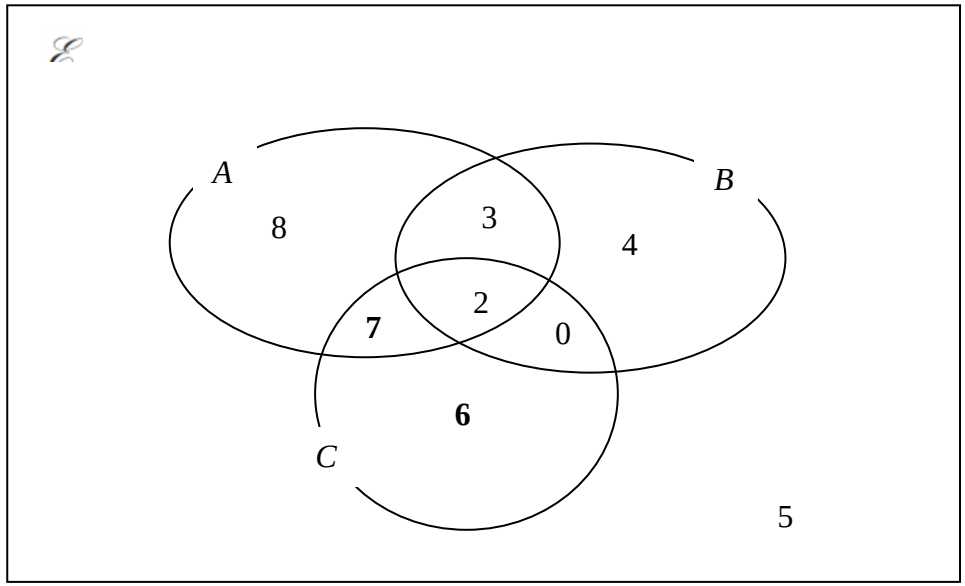
**17**



**19**

| Area (hectares) | Frequency |
|---|---|
| 0 - 20 | 80 |
| 20- 50 | 90 |
| 50 - 100 | 100 |
| 100 - 120 | 30 |
| 120 - 150 | 30 |

**or**

| **Interval** | 0-20 | 20-40 | 40-50 | 50-60 | 60-80 | 80-100 | 100-120 | 120-140 | 140-150 |
|---|---|---|---|---|---|---|---|---|---|
| **Freq** | 80 | 60 | 30 | 20 | 40 | 40 | 30 | 20 | 10 |