Mark Scheme (Results)

Summer 2018

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

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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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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) "172.8" × 1000 (= 172800) "172800" ÷ 3000	58	4	M1 M2 for "172.8" × 1000 ÷ 3000 or "172.8" ÷ 3 If not M2 then M1 for "172.8" × 1000 or "172.8" ÷ 3000 A1 accept 57.6
2	(a)	$\frac{7}{8} \times 120$ (= 105) or $\frac{2}{3} \times 120$ (= 80) $\frac{2}{3} \times$ "105" or $\frac{7}{8} \times$ "80" or "$\frac{7}{12}$" × 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) M1 for a complete method A1
	(b)	$\frac{31500}{42000} \times 100$	75	2	M1 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 A1

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 $\frac{0\times12+1\times3+2\times9+3\times4+4\times14+5\times2+6\times6}{50}$ or $\frac{"135"}{50}$	2.7	3	M1 for Σfx, allow 1 error or omission M1 (dep) for $\Sigma fx/\ \Sigma f$ Allow their Σfx providing first M1 earned Allow division by their Σf provided addition or total under column is shown 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° + 60° (= 96°) or ($\angle CBE$) = 180° –(36° + 60°) (=84°) or 36° + 60° + 60° (=156°) e.g. ($\angle BED$) (or $\angle CBE$) = 180° – "96°" (=84°) **and** ($\angle DEG$) = "84°" – 60° Or 180° – "156°"	24	4	M1 M1 for a complete method A1 B1 (dep M1,M1) Reasons: Angles in an equilateral triangle are 60°, alternate angles are equal, (the sum of co-interior (allied) angles is 180°), (the sum of angles on a straight line is 180°) 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 A1 oe
(b)	$\frac{630}{2+5}\times 5$	450	2	M1 A1
(c)	2 × 13.5(0) (=27) **and** 5 × 18(=90) or e.g.0.18 × 13.50 (=2.43) **and** 0.45 × 18(=8.1(0)) or e.g.0.5 × 13.50(=6.75) **and** 1.25 × 18 (=22.5(0)) or e.g 2 × 13.5(0)÷7 (= 3.85..) **and** 5 × 18÷7 (=12.85..) "27" : "90" or "2.43" :" 8.1(0)" or "6.75" : "22.5(0)" or "3.85":"12.85"	3 : 10	3	M1 oe for any multipliers in the ratio 2:5 M1 Dep and written as a ratio A1 A1 accept 1 : 3.33….. or 0.3 : 1 (SC B1 for 3 : 4)

Question	Working	Answer	Mark	Notes
6	20×20 or $\pi \times 9^2$ $20 \times 20 - \pi \times 9^2$	145.5	3	M1 oe M1 for a complete method 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 A1 any correct expression (SC B1 for $x + 4x + 3 \times 4x$ or $17x$)
8 (a)		9, −1, −3, 3	2	B2 All correct (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 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 $AB = 10\cos 30^\circ$ (=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 AC=10 sin30° (=5)			M1	Or $AB=\sqrt{10^2-(10\sin 30)^2}$ and $AC=\sqrt{10^2-(10\cos 30)^2}$
	$\tan AMC = \frac{"5"}{"4.33"}$ (= 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 $AB = 10\cos 30^\circ$ (=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 AC=10sin 30° (=5) OR $AB = 10\cos 30^\circ$ (=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 $AC=\sqrt{10^2-(10\cos 30)^2}$
	$\sin AMC = \frac{"5"}{"6.61."}$ or $\frac{"5"}{\sqrt{"4.33^2"+"5"^2}}$ $\cos AMC = \frac{"4.33"}{"6.61."}$ or $\frac{"4.33"}{\sqrt{"4.33^2"+"5"^2}}$			M1	
	angle $AMC = \sin^{-1}$("0.756…") 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 $\vec{BC}=\vec{BA}+\vec{AD}+\vec{DC}$ 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)	$(L=)\dfrac{10}{\pi\times1.2^2}$	2.21	3	M2 For $(L=)\dfrac{10}{\pi\times1.2^2}$ oe or $\dfrac{10}{4.52...}$ If not M2 then award M1 for $\pi\times1.2^2\times L=10$ A1 2.209 - 2.212
(b)	e.g 0.15mm = 1.5×10^{-4}m $1m^2=10^6mm^2$ Area of 1 sphere = $4\pi\times0.00015^2$ ($=2.82..\times10^{-7}$) $1\div$ "$2.82..\times10^{-7}$" or $1000\,000\div$ "0.282 .."	3.54×10^6	4	B1 for a correct conversion of length units or area units M1 or $4\pi\times0.15^2$ (accept wrong or no unit conversions) M1 (accept wrong or no unit conversions) A1 3.53×10^6 - 3.54×10^6
12	$\dfrac{3(x-3)}{2\times3}-\dfrac{2(x+4)}{2\times3}$ $\dfrac{3x-9-2x-8}{6}$	$\dfrac{x-17}{6}$	3	M1 for correct use of a common denominator, either as separate correct fractions or a single correct fraction M1 (dep) for correct expansion of brackets in a single correct fraction A1
13	$4n^2+2n+2n+1$, $n^2-2n-2n+4$ or $4n^2+4n+1$, n^2-4n+4 $4n^2+2n+2n+1+n^2-2n-2n+1$ or $4n^2+4n+1+n^2-4n+4$ or $5n^2+5$ $5(n^2+1)$	shown	3	M1 for at least one correct expansion M1 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 A1
(b)	$"3x^2 - 12" = 0$ $x = 2$ or -2 $(y =)"2^3" - 12 \times "2" + 4$ or $(y =)"(-2)^3" - 12 \times "(-2)" + 4$	$(-2, 20)$ $(2, -12)$	4	M1 Dep M1in (a) A1 at least one of $x = 2$ or $x = -2$ M1 Dep preceding M1for substituting a correct (ft) solution of $"3x^2 - 12" = 0$ into the original equation A1 Allow if misattributed
(c)	Grad = "3"×1 "−12" (=−9) $-7 =$ "−9" × 1 + c	$y = -9x + 2$	3	M1 (dep M1 earned in (a)) for substituting $x = 1$ in $"3x^2 - 12"$ M1 (dep previous M) 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 B1 Correct binary structure 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 A1 oe ft (0.37…)
(c)	$\frac{6}{9} \times \frac{5+n}{9+n} \left(= \frac{1}{2}\right)$ e.g. $12\,(5 + n) = 9(9 + n)$ e.g $(5 + n) = \frac{3}{4}(9 + n)$	7	3	M1 M1 For a correct equation of the form $a\,(5 + n) = b\,(9 + n)$ where a, b are numerical A1
	Alternative method			
	P(Black from Y) = $\frac{1}{2} \times \frac{9}{6} \left(= \frac{3}{4}\right)$ or $\frac{1}{2} \div \frac{6}{9} \left(= \frac{3}{4}\right)$ So n (white) : n (black) = 1:3 and $1 \times 4 : 3 \times 4$	7		M1 M1 A1

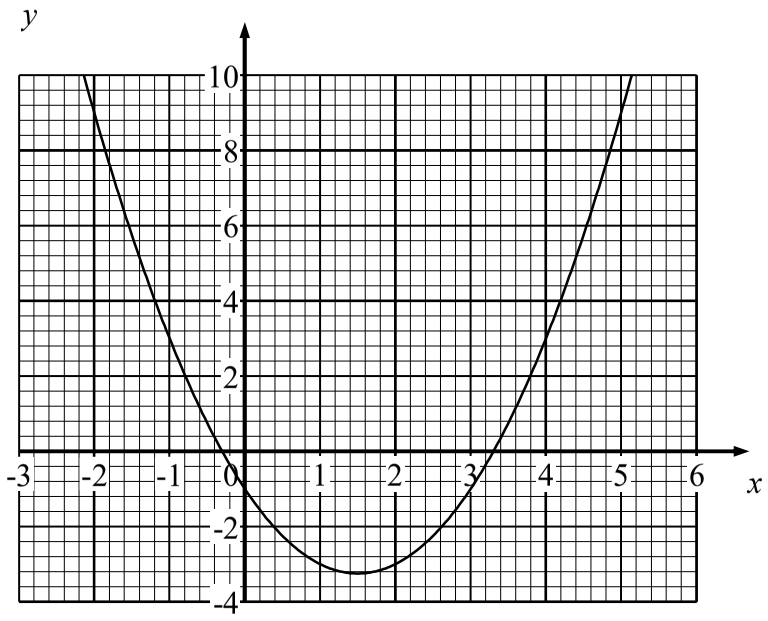
Question	Working	Answer	Mark	Notes
16	$v = k\sqrt{E}$ $30 = k\sqrt{64}$ or $k = 3.75$ oe $v =$ "3.75" × √400	75	4	M1 ($k \neq 1$) M1 Allow this for M2 if $v = k\sqrt{E}$ is not written M1 Using their value of k correctly dep on M1M1 or dep on M2 A1
17 (a)	At end of mark scheme	Correctly completed diagram	2	B1 for '6' in correct place 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 Let $DC = y$ (cm), $7\left(\frac{y}{2}+7\right) = 6(y+6)$ or $7 \times PA = 6 \times PD$	11.2	4	M1
	$12x - 7x = 49 - 36$ or $6y - \frac{7}{2}y = 49 - 36$			M1 for correct expansion of both terms and correct rearrangement
	$(x = \frac{13}{5})$, $6 + 2 \times "\frac{13}{5}"$ $(y = \frac{26}{5})$, $"\frac{26}{5}" + 6$			M1 for a complete method to find *PD* A1 oe

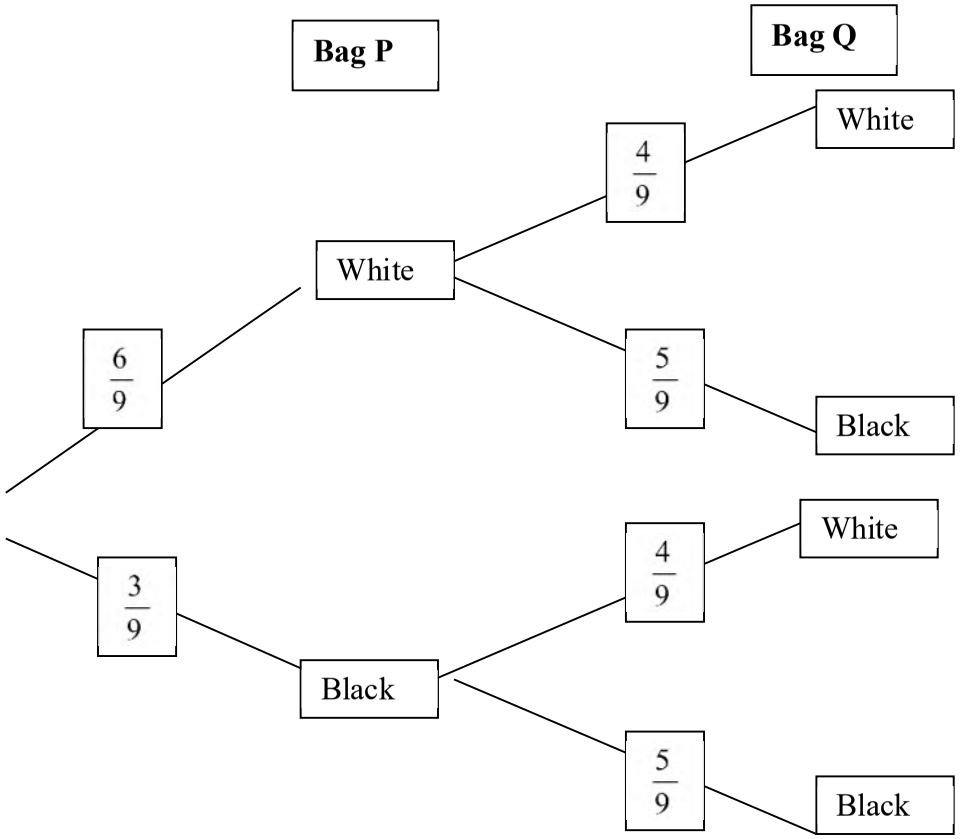
Question	Working	Answer	Mark	Notes
19	100 □ represent 80 farms	99	5	M1 oe e.g. 1 large □ represents 20 farms or '4' written in the first column or correct scale 1 - 4 on FD axis
	Frequencies are (80), 90, 100, 30 and 30 Areas are e.g. 4, 4.5, 5. 1.5 and 1.5			M1 for any correct calculation for at least one new frequency for a bar of width ≠ 20 e.g. $\frac{40}{100} \times 7.5 \times 30$ (=90) or e.g 3 × 30 (=90) Or one correct 'area' for a bar of width ≠ 20 e.g 4.5 for 20-50 This mark also implies the previous M mark
	$\frac{20}{100} \times (80 + "90" + "100")$(=54) or $\frac{3}{4} \times ("30" + "30")$ (=45)			M1 Or $\frac{20}{100} \times (4 + "4.5" + "5") \times 20$ oe or $\frac{3}{4} \times ("1.5" + "1.5") \times 20$ oe
	45 or 54			A1 For at least 1 correct 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 $\frac{12\times2^{3y+3}}{6\times2^{4y+2}}$ $2^{3y+4}=2^{4y+2}\times 2^p$ or $2\times 2^{3y+3}=2^{4y+2}\times 2^p$			M1 (dep) for use of $(2^q)^r=2^{qr}$ twice or $(2\sqrt{2})^{2n}=2^{3n}$ in a correct expression or equation
				A1

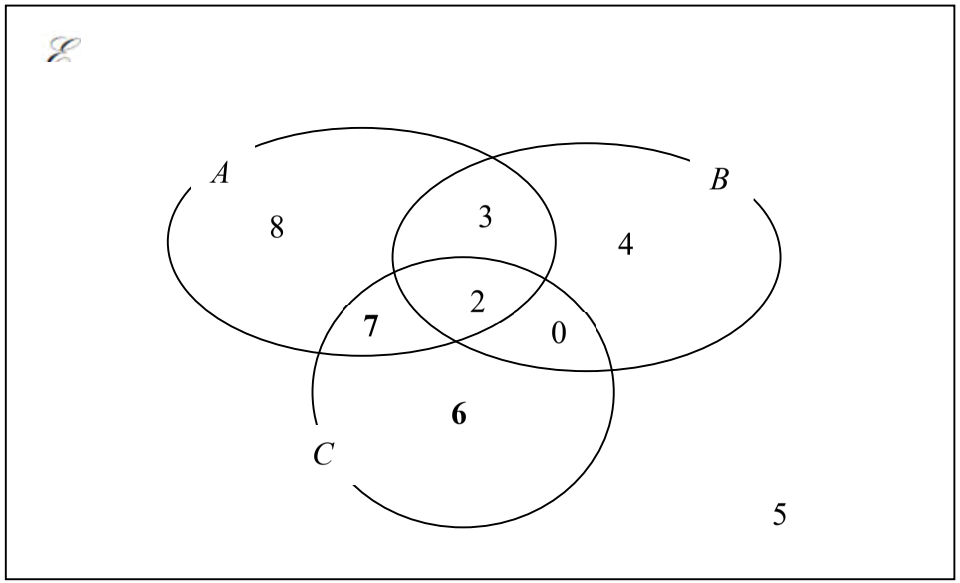
11



15a



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