edexcel

Mark Scheme (Results)

Summer 2012

International GCSE Mathematics (4MA0) Paper 4H

Level 1 / Level 2 Certificate in Mathematics (KMA0) Paper 4H

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information, please visit our website at www.edexcel.com.

Our website subject pages hold useful resources, support material and live feeds from our subject advisors giving you access to a portal of information. If you have any subject specific questions about this specification that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

www.edexcel.com/contactus

Pearson: helping people progress, everywhere

Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2012
Publications Code UG032640

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
  - awrt – anything which rounds to
  - eeoo – each error or omission
- **No working**
  If no working is shown then correct answers normally score full marks – the mark scheme will make it clear when this does not apply.
  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 the lower mark should be awarded, unless it is clear which method the candidate has chosen.
  If there is no answer on the answer line then check the working for an 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.

Question Number	Working	Answer	Mark	Notes
Apart from questions 5, 7, 13c, 16b, 20, 21 and 22 (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.				
1.	7.92 ÷ 1.65	4.8 oe	2	M1 M1 for 7.92 or 1.65 A1 Accept $\frac{24}{5}$
				Total 2 marks
2.	(12 x 18) + (8 x 16.5) (=348) "348" ÷ 20	17.4	4	M2 M1 for 12 x 18 (=216) or 8 x 16.5 (=132) M1 dep on at least 1 previous M1 A1 17.4 Alt Ratio method M1: 12:8 = 3:2 or 6:4 M1: 18 x3 and 16.5 x 2 or 18 x 6 and 16.5 x 4 M1: (18 x 3 + 16.5 x 2) ÷ 5 or (18 x 6 + 16.5 x 4) ÷ 10 A1: 17.4 Alt Proportion method M1 60 % boys and 40% girls stated or implied M2 (0.6 x 18) + (0.4 x 16.5) (= 10.8 + 6.6) M1 for 0.6 x 18 or 0.4 x 16.5 A1 17.4
				SC B1 for 17.1 (from {(8 x 18) + (12 x 16.5)}÷20)
				Total 4 marks

Question Number	Working	Answer	Mark	Notes
3. (a) (i)		30	1	B1
(ii)		21	1	B1
(b)	Horizontal line from (1400,39) to (1600,39) Line from ("1600", 39) to (1715, 0)		2	B1 B1ft ft if line finishes at (17 15, 0) (± 5 mins) and starts at height 39km
(c)		13 25to 1330 1625 to 1630	2	B1 Accept 1 25 pm to 1 30 pm B1 Accept 4 25 pm to 4 30 pm or ft if line finishes at (17 15, 0) (± 5 mins) and starts at height 39 km
(d)	39 ÷ 1.25 oe (39 ÷ 75 x 60)	31.2	3	M2 M1 for 39 ÷ 1.15 (=33.9..) or 39 ÷ 75 (= 0.52) A1
				Total 9 marks

4. (a)		reflection in line $x = 1$ (rotation (90° {anticlockwise} oe) about (1 , 1)	2	B1 B1 must be a single transformation oe for $x = 1$ B1 B1 must be a single transformation
(b)		flag at (4, – 1) (5, –1) (6, – 1) (5, – 2) or triangle at (5, –1) (6, –1) (5, – 2)	2	B2 B1 for correct orientation of flag, or triangle but in wrong position
				Total 4 marks

Question Number	Working	Answer	Mark	Notes
5. (a)	4/5 x 15/7	12/7 oe	2	M1 or 12a/15a ÷ 7a/15a (denominators the same and a multiple of 15) A1 dep on M1. Improper fraction equivalent to 1 5/7 required produced directly from M1
(b)	21/4 – 5/3 63a/12a – 20a/12a	43/12 oe	3	M1 Correct improper fractions M1 Correct fractions with a common denominator a multiple of 12 A1 dep on M2 Improper fraction required. Alt method M1 (5) 3/12 – (1) 8/12 (i.e. can ignore integer parts) M1 – 5/12 A1 Improper fraction required or 4 – 5/12. Ans dep on M2. Alt method M1 (4) 5/4 – (1) 2/3 (i.e. can ignore integer parts) M1 (4) 15/12 – (1) 8/12 (i.e. can ignore integer parts) A1 (3 +) 7/12 or improper fraction Ans dep on M2
				NB: Follow one strand that gives most marks.
				Total 5 marks

6.	tan 72 or tan 18 selected (*MN*=) 34 x tan 72	105 105	3	M1 M1 or (*MN* =) 34 ÷ tan 18 A1 104.64.... awrt 105 Alt Sine rule method M1 34/sin 18 = "MN"/sin 72 M1 (*MN*=) (34 x sin 72) ÷ sin 18 A1 104.64.... awrt 105
				Total 3 marks

7.	$2a = -4$ or $4b = 14$	$a = -2$ $b = 3.5$	3	M1 Correctly eliminate 1 variable: Accept $3(5 - 2b) + 2b = 1$ oe A1 A1 Ans dep on M1 Ans only or T&E = M0A0A0
				Total 3 marks

Question Number	Working	Answer	Mark	Notes
8.	A product of 3 or more factors of 300 of which at least 2 are different primes (i.e. from 2, 3 or 5) All 5 correct prime factors & no extras (ignore 1's)	 2, 2, 3, 5, 5 (with/without 1's) or $2^2 \times 3 \times 5^2 \times 1$ or $2^2 + 3 + 5^2$ 2 x 2 x 3 x 5 x 5	 3	M1 e.g 2 x 3 x 50 (must multiply to 300) could be implied from a factor tree or division ladder M1 could be implied from a factor tree or division ladder $2 \times 2 \equiv 2^2$ $5 \times 5 \equiv 5^2$ A1 any order, do not accept inclusion of 1's accept . in place of x
				Total 3 marks
9.	(19 x1)(=19) + (8x3)(=24) + (3x5)(=15) + (1x 9) (=9)	67	3	M2 for freq x all correct midpoint values correctly evaluated (condone omission of 4th interval) {do not have to see intention to add} if not M2 then M1 for freq x consistent point in each interval or M1 for 1 error in list of 19, 24, 15, (0), 9 A1 isw if 67 calculated correctly. (2.16.. = M2A1)
				Total 3 marks
10. (a) (i)	$10x + 5 - 9x + 3$	$x + 8$	2	B2 B1 for 3 correct terms with correct signs or 4 correct terms ignoring signs
(ii)	$y^2 + 5y - 7y - 35$	$y^2 - 2y - 35$	2	B2 B1 for 3 correct terms with correct signs or 4 correct terms ignoring signs N.B. $-2y$ (with no more y terms) implies $+5y - 7y$
(b)	$V / \pi h = r^2$ (oe)	$\sqrt{\frac{v}{\pi h}}$ oe	2	M1 isolating r^2 (must be correct equation). A1 condone ± Allow $\sqrt{v} \div \sqrt{\pi} \div \sqrt{h}$ etc
				Total 6 marks
11. (a)		78000	1	B1
(b)	$(4.62 \times 10^5) + (7.8 \times 10^4)$	5.4×10^5	2	M1 Intention to add correct values or digits 54 A1 Answer must be in standard form
				Total 3 marks

Question Number	Working	Answer	Mark	Notes
12. (a)	set B separate to A, set C within A		2	B1 B1 Set C has to be a unique set
(b)	outer ring between A and C shaded		1	B1ft Completely outside of C and within all of A. Set C has to be a unique set
				Total 3 marks
13. (a)		–3, (1), –1, –3, 1, 17	2	B2 for all correct, B1 for 3 or 4 correct
(b)	All points plotted correctly from their table Curve		1 1	B1 ft if at least B1 scored in (a) Plotting tolerance ± ½ sq B1 ft if B1 scored from plotting points. Must be attempt at a smooth curve & not line segments
(c)		Line segment at $y = 5$ drawn 2.2 → 2.5 inc	 2	M1 M1 for $x^3 - 3x - 1 = 5$ stated or evidence of reading from $y = 5$ or y=5 stated A1 dep on M1
(d) (i)		$3x^2 - 3$	2	B2 B1 for $3x^2$ or – 3
(ii)		$3 \times 4^2 - 3$ 45	 2	M1 ft for a quadratic in d i) A1 cao
				Total 10 marks
14.	(2) overlapping circles, 6 outside circles 10 in F only, 8 in S only, 7 in overlap	18	4	M1 M2 Venn diagram sets have to labelled if not M2 then M1 for any two values in correct place in union or 7 in overlap A1
	Alt Method 31 – 6 (=25) or (17+15+6) – 31 (=7) oe "25"–17 (=8) {Sp} and "25"– 15 (=10) {Fr} or 17 – "7" (=10) {Fr} and 15 – "7" (=8) {Sp} "10" + "8"	18	4	M1 Identifies union or intersection M1 dep Identifies components to add M1 dep Adds components A1 (Ans only = M3A1) or M2 for "25" – "7"
				Total 4 marks

Question Number	Working	Answer	Mark	Notes
15. (a)	180 – (90 + 58) (oe)	32	2	M1 i.e. 90 – 58 A1
(b) (i)		122	1	B1
(ii)	Opposite angles in a cyclic quad (=180°)		1	B1 Accept abbreviations if meaning is clear. B0 for incorrect statements
				Total 4 marks
16. (a)	("AC^2"=) $6^2 + (7+5)^2 - 2 \times 6 \times (7+5) \cos 28$ ("AC^2"=)52.855...	7.27	3	M1 A1 awrt to 52.8 or 52.9 A1 awrt to 7.27
(b)	6 x "DX" = 12 x 5 "DX" = (12 x 5 ÷ 6) (=10) "DC" = "10" – 6	4	3	M1 M1 for an attempt to use intersecting chord theorem (external or internal case e.g 7 x 5 = 6 x "*x*") M1 must see a correct justification for the value 10 seen A1 Ans dependent on at least M1
				Total 6 marks

17. (a)	3.6 ÷ 20 x 100 oe (large squares or heights of bars) or (6+6+6) ÷ (10+10+8+35+19+6+6+6) x 100 or 90 ÷ 500 x 100 (small squares)	18	3	M2 a full and correct calculation leading to correct ans heights = 2+2+1.6+7+3.8+1.2+1.2+1.2 (=20) or 10+10+8+35+19+6+6+6 (=100) if not M2 then M1 for 3.6 and 20 (large sq or heights) or 6+6+6 and 10+10+8+35+19+6+6+6 (heights) or 12+12+12 and 20+20+16+70+38+12+12+12 (frequencies) or 90 and 500 (small sq) A1 Ans only = M2A1
(b)	20 x 10	200	2	M1 or 1 (large) square = 10 (people) or 1 (small) square = 0.4 (people) or correct fd seen with no errors or 16 ÷ 5 (= 3.2) {fd on 3rd bar} or 20+20+16+70+38+12+12+12 (people in blocks) A1 Ans only = M1A1
				Total 5 marks

Question Number	Working	Answer	Mark	Notes
18. (a)		0.3 on bottom LH branch 0.8, 0.2, 0.5, 0.5 0.5, 0.5, 0.8, 0.2	3	B1 B1 Second game branches correct B1 Third game branches correct
(b)	(0.7 x "0.8")+(0.7 x "0.2"x"0.5")+("0.3"x"0.5"x "0.8")	0.75 oe	3	M2 ft M1 for 1 correct (ft) branch A1
				Alt method (1 – Jo winning) M2 1 – {(0.7x"0.2"x"0.5)+("0.3"x"0.5"x"0.2)+("0.3"x"0.5") A1
				Total 6 marks
19. (a)	$y = 3x - 2$ $y + 2 = 3x$	$(x + 2)/3$	2	or $x = 3y - 2$ M1 or $x + 2 = 3y$ must reach 2nd stage A1 Ans only = M1A1 must be a function of x
(b)	$\frac{10}{3x - 2 + 2}$	$\frac{10}{3x}$	2	M1 A1 cao Do not isw if correct answer is seen in body and extra incorrect operations take place. Ans only = M1A1
				Total 4 marks
20.	36 – 6√8 – 6√8 + 8 or 36 – 12√8 + 8 44 – 12√(4 x 2) 44 – 12 √4 x √2	44 – 24√2*	3	M2 M1 for $6^2 + (\sqrt{8})^2$ or 36 + 8 or $6^2 + \sqrt{64}$ or –12√8 or –6√8 –6√8 M1 for (–)12√8 = (–)12 x 2√2 or √8 = 2√2 or 6√8 = 6 x2√2 Must see √8 stated as 2√2 for final M1
	LHS = $(6 - 2\sqrt{2})^2$ or √8 = 2√2 $6^2 - 12\sqrt{2} - 12\sqrt{2} + 4$ x 2 or 36 – 24√2 + 8			Alt: M1 M2 M1 for $6^2 + 4$ x 2 or 36 + 8
				Total 3 marks

Question Number	Working	Answer	Mark	Notes
21.	$\frac{5(x-2)+9(x+2)}{(x+2)(x-2)}$ (=2) $14x + 8 = 2(x + 2)(x – 2)$ or $\frac{14x+8}{(x-2)(x+2)}$ (=2) $2x^2 – 14x – 16$ (= 0) oe $x^2 – 7x – 8$ (= 0) oe $(x + 1)(x – 8)$ (= 0) oe	$x = – 1,\ x = 8$	5	M1 correct expression with correct common denominator or $5(x – 2) + 9(x + 2) = 2(x + 2)(x – 2)$ M1 gather terms correctly. Accept $x^2 – 4$ for $(x + 2)(x – 2)$ A1 correct 3 part quadratic M1 or $\frac{7\pm\sqrt{7^2-4x1x-8}}{2}$ oe condone 1 sign error A1 dep on previous M1
				Total 5 marks

22.	πr^2 x $4r – 2$ x $4\pi\ r^3/3 = 125\pi/6$ oe $24\ r^3 – 16\ r^3 = 125$ oe $r^3 = 125/8$ oe $r = \sqrt[3]{(125/8)}$	2.5	5	M2 Any equation based on cylinder – 2 spheres = space oe h = 4r must be implicit for award of M2 {decimal form: $12.6r^3 – 8.4r^3 = 65.4$ (1 dp or better)} If not M2 then M1 for πr^2 x $4r$ or better M1 One occurrence of r^3 in correct equation. M1 A1 awrt to 2.5 Ans dep on M3
				Total 5 marks

				TOTAL FOR PAPER : 100 MARKS

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467
Fax 01623 450481
Email publication.orders@edexcel.com

Order Code UG032640 Summer 2012

For more information on Edexcel qualifications, please visit our website www.edexcel.com

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Rewarding Learning