

# Mark Scheme (Results)

January 2012

International GCSE Mathematics  
(4MA0) Paper 3H

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Question	Working	Answer	Mark	Notes
1. (a)	7/32 x 100 oe	21.9	2	M1 A1 (21.875) accept awrt to 21.9
(b)	4/100 x 32 (=1.28) or 4/100 x 32000000 (=1280000) 32 + "1.28" or 32000000 + "1280000")	33	3	M1 M2 for 32 x 1.04 oe or 32000000 x 1.04 oe M1 (dep) A1 (33.28) accept 33.3, 33000000, 33300000, 33280000
<b>Total 5 marks</b>				
2.	2/5 x 30	12	2	M1 A1 12 out of 30 = M1A1 12/30 = M1A0
<b>Total 2 marks</b>				
3.	$\pi \times 7.5^2 \times 26$	4590	3	M2 M1 for $\pi \times 15^2 \times 26$ or 18369 $\rightarrow$ 18386 inc A1 (4594.579....) accept answers 4592 $\rightarrow$ 4597 inc
<b>Total 3 marks</b>				
4.	Arcs of length 6cm from A <b>and</b> B		4	M1
	Arc of length 10 cm from A <b>or</b> B			M1
	Arc of length 6 cm from correct p vertex			M1
	Correct rhombus within overlay tolerance			A1 Dependent on M3 sc B1 for correct rhombus with no construction lines.
<b>Total 4 marks</b>				
5. (a)		$a(5 - 3a)$	2	B2 B1 for factors which when expanded & simplified give 2 terms for which one is correct.
(b) (i)		$8 - 6w$	1	B1
(ii)		$y^3 + 10y^2$	2	B2 B1 for $y^3$ or $10y^2$
(c)	7.168 / 0.64	11.2	2	B2 B1 for 7.168 or 0.64
<b>Total 7 marks</b>				

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6. (a) (i)		Does not study Maths No student studies (both) German <b>and</b> Maths Students who study German do not study Maths etc	1	B1	Accept general answers (e.g. no student belongs in both sets).
(ii)		(Preety) does not study French (Preety) is not a member of (set) F	1	B1	Accept she /he in place of Preety or omission of name. Penalise extra incorrect statements (e.g. Preety studies Maths and German but not French)
(b)		1,2,3,4	2	B2	B1 for any 3 correct with no repetitions or additions.
<b>Total 4 marks</b>					

7. (a)		9 to 11	1	B1	
(b) (i)	(1 x 3) + (4 x 6) + (7 x 10) + (10 x 15) + (13 x 5) + (16 x 1) (=328)  "328" ÷ ("3+6+10+15+5+1")	8.2	4	M2 M1 A1	All products, $t \times f$ using $\frac{1}{2}$ way points correctly, and intention to add. Award M1 if all products, $t \times f$ using their $\frac{1}{2}$ way points consistently, from 6 to 8 interval onwards and intention to add. (dep on one at least M1) Accept 8 with working. 8 without working = M0A0
(ii)		Mid-points used as actual data is unknown	1	B1	Mention of mid-points <u>or</u> exact (actual) data is unknown.
<b>Total 6 marks</b>					

8. (a)		$x/60$ oe	1	B1	Must be a fraction or $0.016 \text{ rec } x$
(b) (i)	$2("x/60") = (x+20)/80$ $16(0) x = 6(0)(x + 20)$ or $80 x = 30(x + 20)$ or $2x/3 = (x + 20)/4$		3	M2 A1 dep	( must be an equation) M1 for either $2("x/60")$ or $(x+20)/80$ Correct removal of denominators. Simplifying denominators.
(ii)	$8x = 3x + 60$ or $5x = 60$ or $60 \div :$	12	2	M1 A1	Dependent on M1. Can be marked if seen in b(i)
<b>Total 6 marks</b>					

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9. (a)	Use of sine or $\frac{\sin x}{3.4} = \frac{\sin 90}{5.8}$  sin "x" = 3.4 / 5.8 (=0.586..)	35.9	3	M1 Sine must be selected for use.  M1 A1 (35.888...)Use isw on awrt 35.9
(b) (i)		5.85	1	B1 accept 5.849 rec
(ii)		5.75	1	B1
				<b>Total 5 marks</b>

10.	6/100 x 7500 (=450) {1st Year} or 1.06 x 7500 (=7950) "450" + "477" + "505.62"	1432.62	3	M1 M2 for $1.06^3 \times 7500$ (=8932.62) M1 Calculating 6% of previous capital for another 2 years. A1 M1A0 for 1350 or 8850
				<b>Total 3 marks</b>

11.	$3y + 6x - 3 = x + 5y$ $5x - 3 = 2y$ oe	$(5x - 3)/2$	3	M1 Multiplying out brackets. M1 dep Correctly collecting like terms, (3 terms needed here). A1 oe
				<b>Total 3 marks</b>

12. (a)	6/9 x 12 oe	8	2	M1 e.g $12 \div 1.5$ A1
(b)	9/6 (or 12/"8") x 5	7.5	2	M1 A1 cao
(c)	$1.5^2 \times 32$ (=72) oe "72" - 32	40	3	M1 M1 for $1.5^2$ or $(2/3)^2$ M1 dep A1
				<b>Total 7 marks</b>

13. (a) (i)		$41^\circ$		B1
(ii)		Angles in same segment (are equal)	2	B1 Accept "from same chord", "on same arc".
(b) (i)		$75^\circ$		B1
(ii)		Angle at centre/middle is not 2 x angle at circumference / edge / perimeter / arc or Angle PQR $\neq$ QPT or PRS $\neq$ RSQ (oe) or $34 \neq 41$	2	B1 Accept $75 \neq 2 \times 41$ or $75 \neq 2 \times 34$  or using idea of isosceles triangles but must mention angles.
				<b>Total 4 marks</b>

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14. (a)	$y = 36 - x$	(Area =) $x(36 - x)$	3	M2 M1 for $x + y = 36$ oe or $2y = 72 - 2x$ A1 Must see x times $(36 - x)$ dep on M2
(b)		$(dA/dx) = 36 - 2x$	2	B1 B1 B1 for 36 B1 for $-2x$
(c)	“ $36 - 2x$ ” = 0 $x = 18$	(Area =) 324	3	M1 allow ft only on $a + bx$ ( $a, b \neq 0$ ) A1ft A1ft
<b>Total 8 marks</b>				

15. (a)	$F = “k”/d^2$ $12 = k/2^2$ $k = 48$	$F = 48/d^2$	3	M1 $k =$ letter not number. M1 A1 Award 3 marks for $F = “k”/d^2$ and $k = 48$ stated anywhere, unless contradicted by later work.
(b)	$(F =) “48”/5^2$	1.92 oe	1	B1 ft $k \neq 1$ accept 48/25 as an answer.
(c)	$3 = “48”/d^2$ $d^2 = “48”/3$	4	2	$k \neq 1$ M1 Rearrangement to make $d^2$ or $d$ the subject A1 ignore $\pm$
<b>Total 6 marks</b>				

16. (a)	$10 \times 3$ or $15 \times 2$ or $12 \times 7.5/3$	30	2	M1 or any correct fd in correct position and no errors, or 1 sq = 2 (runners) indicated. A1
(b)	Missing blocks = 6cm, 10cm, 2cm		2	B2 3 correct blocks B1 1 or 2 correct blocks
(c)	$0.6 \times 20 + 0.8 \times “30”$ or $3 \times “4” + 8 \times “3”$ or $450 \times 0.08$	36	2	M1 (partitioning blocks) (time x fd’s) {must see clear evidence that fd values used}. 450 small squares. A1 cao
<b>Total 6 marks</b>				

17.	$x = 0.1777\dots$ and $10x = 1.777\dots$ $9x = 1.6$	$16/90$ oe		See at least 3 sevens or recurring symbol. Condone omission of x. M1 Accept $10x = 1.777\dots$ and $100x = 17.77\dots$ A1 Must be integers in numerator and denominator but not 8 & 45 N.B for $0.1777 = 1/10 + 0.0777\dots$ (0.777 needs to be shown to be 7/90 to gain first M1)
<b>Total 2 marks</b>				

18.	$AOC = 70^\circ$ $"70"/360 \times \pi \times 9^2 (=49.48..)$ $0.5 \times 9^2 \times \sin "70" = (38.057..)$ 49.48.. or 38.057.. "49.48.." – "38.057.."	11.4	6	B1 Could be marked on diagram. M1ft Area of sector. M1ft Area of triangle. Follow through angles must be the same. A1 Either area correct to 3 sf M1 dep on both previous M1's A1 ( 11.42253...) awrt 11.4
<b>Total 6 marks</b>				
19.	$(\sqrt{3} + 3\sqrt{3})/\sqrt{2}$ $4\sqrt{3}/\sqrt{2}$ $2\sqrt{6}$ or $(\sqrt{48}/\sqrt{2})$	24	3	M1 Must see $\sqrt{27}$ reduce to $3\sqrt{3}$ alternative $\frac{\sqrt{6} + \sqrt{54}}{2}$ (or better) M1 dep on 1st M1 A1cao dep on M2 Accept $\sqrt{24}$ if M2 awarded.
<b>Total 3 marks</b>				
20.	$\frac{4(2-x)+3x}{x(2-x)}$ oe $\frac{8-4x+3x}{x(2-x)}$	$\frac{8-x}{x(2-x)}$	3	M1 M1 A1 Accept $\frac{8-x}{2x-x^2}$ Single fraction needed as final answer.
<b>Total 3 marks</b>				

21. (a)	$0.5x[(x+5)+(x+8)] = 42$ (trapezium formula) or $x(x+5) + 0.5x \times 3 = 42$ (partitioning) $x(2x+13) = 84$ or $x^2 + 5x + 1.5x = 42$		2	M1 M1 dep on 1 <sup>st</sup> M1 then needs to develop on to quadratic given.
(b)	$(2x+21)(x-4) = 0$ oe  $x = 4$  (P=) “4” +”9” +”12” + $\sqrt{3^2 + “4”^2}$	30	5	B2 B1 for either factor correct or $(2x \pm 21)(x \pm 4)$ or M1 for $x = \frac{-13 \pm \sqrt{13^2 - 4 \times 21 \times -84}}{4}$ (condone 1 sign error) then M1 for $x = \frac{-13 \pm \sqrt{169 + 672}}{4}$ A1 dep on M1 or B2 M1 i.e $x + (x+5) + (x+8) + \sqrt{3^2 + x^2}$ in numeric form. A1cao (Last two marks independent) N.B. Working for solving quadratic could be seen in (a) if not contradicted in (b).
				<b>Total 7 marks</b>

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