

Mark Scheme (Results)

Summer 2010

GCE O Level

GCE O Level Mathematics B (7361/01)

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Mathematics B 7361

Paper 1

1.	$\frac{37.5}{100}$ OR $\frac{75}{200}$ OR $\frac{15}{40}$ OR 0.375	M1	
	3/8 cao	A1	2
	NB: Ignore units		
			Total 2 marks
2.	-1458	B1	
	4374	B1 ft	2
			Total 2 marks
3.	$7/12 \times 180$	M1	
	105°	A1	2
			Total 2 marks
4.	$3(x^2 - 4y^2)$ OR $(3x - 6y)(x + 2y)$ OR $(x - 2y)(3x + 6y)$ (no slips)	M1	
	$3(x - 2y)(x + 2y)$	A1	2
	SC: $k(x - 2y)(x + 2y)$ M1 A0		
			Total 2 marks
5.	$0.6 \times 0.4 \times 0.6$ OR $\frac{6}{10} \times \frac{4}{10} \times \frac{6}{10}$ OR $\frac{3}{5} \times \frac{2}{5} \times \frac{3}{5}$	M1	
	0.144 OR $\frac{18}{125}$ OR 14.4%	A1	2
			Total 2 marks
6.	$50/40$ OR 1.25 OR 1hr 15mins OR 75mins	M1	
	14 35 OR 2.35pm	A1	2
			Total 2 marks
7.	$360/7\frac{1}{2}$	M1	
	48	A1	2
			Total 2 marks
8.	$84/AB = 0.8$ (o.e.)	M1	
	105 cm or answer rounding to 105.0 cm	A1	2
	(NB: $AC=63.0$ and $\angle ABC = 36.87^\circ$)		
			Total 2 marks

9.	-1	B1	
	7	B1	2
		Total 2 marks	
10.	(a) 1, 2, 3, 4, 6, 12	B1	1
	(b) 1, 3, 5, 7, 9, 11	B1	1
	(c) 1, 3	B1 ft	1
		Total 3 marks	
11.	$150 \times \frac{17.5}{100}$ OR 150×117.5	M1	
	$150 + c's(26.25)$ OR $\frac{150 \times 117.5}{100}$	M1 dep	
	£ 176.25	A1	3
		Total 3 marks	
12.	60 x 60 (correctly using number of seconds in one hour) OR 60 x 24 x 365 (=525 600mins) OR 24 x 365 (=8760 hrs) OR 315 360 000secs OR 60 x 60 x 24 (=86400secs)	M1	
	Complete method	M1 dep	
	946 000 000 km OR 9.46×10^8	A1	3
		Total 3 marks	
13.	$\frac{2(x+2)-3(x-3)}{(x-3)(x+2)}$	M1 Indep	
	$2x + 4 - 3x + 9$ OR $13 - x$	M1 Indep	
	$\frac{13-x}{(x-3)(x+2)}$ OR $\frac{13-x}{x^2-x-6}$	A1	3
		Total 3 marks	

14.	$\pi r^2 \times 4r$	M1	
	$r^3 = 729$ OR $r^3 = 2916/4$ OR $r = \sqrt[3]{729}$ OR $r = \sqrt[3]{\frac{2916}{4}}$ OR		
	$r^3 = \frac{2916\pi}{4\pi}$ (or decimal equivalent, eg, $\frac{9162}{12.568}$)	A1	
	$r = 9$ cm	A1	3
	NB: If decimals used, accept answer rounding to 9.00 for A1		
		Total 3 marks	
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15.	(a) $25^{3/2}$ or $1/(1/5)^3$ OR $\frac{1}{8 \times 10^{-3}}$	M1	
	125	A1	2
	(b) 1.25×10^2	B1 ft	1
		Total 3 marks	
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16.	(a) $(2x + 16) + (2x - 17) + (2x + 8) + (3x + 2) = 360$	M1	
	$x = 39$	A1	2
	NB: 4 angles must be added together = 360 for M1		
	(b) (a pair) of opposite angles add up to 180°	B1	1
		Total 3 marks	
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17.	$xy + xz - y^2 - yz$	M1	
	$-xy + xz - y^2 + yz$ (allow 1 sign slip)	M1	
	$2xz - 2y^2$	A1	3
		Total 3 marks	
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18.	$uv = fv - fu$	M1	
	$uv + fu = fv$	M1 dep	
	$u(v + f) = fv$	M1 dep	
	$u = fv / (v + f)$	A1	4
		Total 4 marks	

Alternative method

	$\frac{1}{u} = \frac{1}{f} + \frac{1}{v}$	M1	
	$\frac{1}{u} = (v + f) / fv$	M1 dep	
	$u = (fv) / (v + f)$	M1 dep A1	4

NB: Allow only 1 sign slip in all 3 M marks

SC:	$\frac{1}{\left(\frac{1}{f} + \frac{1}{v}\right)}$ scores M1 M1 M0 A0		4
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19.	(a) $\angle ABD = 180 - 2x$ OR $\angle BDA = x$ (accept if seen on diagram)	M1	
	$2x$	A1	2
	(b) $\angle BDC = (180 - 2x) / 2$	M1	
	$\angle ADC = x + 90 - x$ + conclusion	A1	2
		Total 4 marks	

Alternative method for part (b)

	B is the centre of a circle passing through A, C and D.	M1	
	$\angle ADC = 90^\circ$ (\angle in a semi circle)	A1	2

20.	$30t - 120$	M1 (1 term correct), A1	
	$c's(30t - 120) = 0$	M1	
	$t = 4$	A1	4
		Total 4 marks	

21.	$(3x-2)^2 - 4$ OR $(3x-2)^2 = 4$	M1	
	$9x^2 - 12x + 4 - 4 = 0$ (o.e.) OR $3x - 2 = \pm 2$	A1	
	$x = 0$ CS0	A1	
	$x = 4/3$ OR $x = 12/9$ OR $x = 1.33$ CS0	A1	4
		Total 4 marks	
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22. (a)	$(6 + 7 + 8 + 9 + 9 + 9 + x + y)/8 = 11.7$	M1	
	$48 + x + y = 93.6$ (o.e.) + conclusión*	M1 dep	2
NB: *	<i>must</i> be proved correctly for M1 dep		
(b)	correct method to eliminate x (or y) (allow 1 sign slip)	M1	
	$x = 14.2$	A1	
	$y = 31.4$	A1	3
		Total 5 marks	
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23.	$2x^2 = 6x + 7$ (oe, ie denominators removed)	M1	
	$2x^2 - 6x - 7 (= 0)$ (o.e)	A1	
	correct substitution into a correct formula	M1	
	$\sqrt{92}$ OR $2\sqrt{23}$ OR 9.6 OR 2×4.8	B1	
	3.90	A1	6
	-0.90	A1	
	(penalise n.c. or missing '0' once only in this order A0 A1)		
	Alternative method (completing the square)		
	$x - \frac{3}{2} = \pm \sqrt{\frac{23}{4}}$ (allow 1 slip)	M1	
	$\sqrt{\frac{23}{4}}$ OR $\sqrt{5.75}$	B1	
		Total 6 marks	
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24. (a)	each correct bar (hts 10, 44, 60, 6 with correct widths ± 1 square, ignore gaps), B1	B4	4
(b)	$61/100$ OR 0.61 OR 61%	B1	1
		Total 5 marks	
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25.	$DB = \sqrt{41^2 - 40^2},$ 9.00	M1 A1	
	$AD = \sqrt{(15^2 - c's(9^2))},$ 12.0	M1 dep A1	
	$\frac{1}{2}(40 + c's(12)) \times "9",$ 234 cm ²	M1 dep A1	6

Alternative methods:

(a)

$$DB = 9.00$$

$$\sin \angle CBD = 40/41 \quad \text{AND} \quad \cos \angle ABD = "9"/15$$

$$\angle ABC = 130$$

$$\Delta ABC = \frac{1}{2} \times 15 \times 41 \times \sin "130.45"$$

$$234 \text{ cm}^2$$

(b)

$$DB = 9.00$$

$$AD = 12.0$$

$$(\angle DAB = 36.87)$$

$$\Delta ABC = \frac{1}{2} \times 15 \times (40 + "12") \times \sin "36.87",$$

$$234 \text{ cm}^2$$

(c)

$$DB = 9.00$$

$$AD = 12.0$$

$$(\angle BCD = 12.68)$$

$$\Delta ABC = \frac{1}{2} \times 41 \times (40 + "12") \times \sin "12.68"$$

$$234 \text{ cm}^2$$

NB: (1) \forall methods, final answer must round to 234 cm²
 (2) When using trig., accept answers that round to 9.00 for DB , 12.0 for AD , 130 for $\angle ABC$ to 3 sig. figs.

Total 6 marks

26. (a)	(\angle at centre) (o.e.), $\angle BOA = 100^\circ$	B1 B1	
	$\angle FOE = 100^\circ$	B1	3
(b)	(\angle sum of triangle or \angle s of a quadrilateral add up to 360) $\angle BFD = 95^\circ$ OR $\angle BEO = 65^\circ$ OR $\angle EAD = 15^\circ$	B1 B1	
	$\angle AED = 115^\circ$	B1	3

NB: These reasons require the use of words.

			Total 6 marks
27. (a)	$3b - 3a$	B1	1
(b)	$3a + \lambda(c's(a))$	B1 ft	1
(c)	$\vec{OD} = 2b$ OR $\vec{OD} = \frac{2}{3}(3b)$	B1	
	$2b + \mu a$	B1	2
NB:	$\frac{2}{3}(3b) + \mu a$ collects	B1 B1	
(d)	equating their coefficients of either a or b	M1	
	$\lambda = 2/3$	A1	
	$\mu = 1$	A1	3
			Total 7 marks

28. NB: Penalise n.c.c ONCE

(a)	$\sin(\frac{1}{2}\angle AOB) = 8/15$	M1	
	32.2° (or better)	A1	
	64.5° cao	A1	3

Alternative method: Cosine rule

$$16^2 = 15^2 + 15^2 - 2 \times 15 \times 15 \times \cos \angle AOB \quad \text{M1}$$

$$\angle AOB = \cos^{-1} \left(\frac{15^2 + 15^2 - 16^2}{2 \times 15 \times 15} \right) (= \cos^{-1} \left(\frac{194}{450} \right) = \cos^{-1} \left(\frac{97}{225} \right)) \quad \text{A1}$$

OR $16^2 = 15^2 + 15^2 - 2 \times 15 \times 15 \times \cos \angle AOB$ M1
then just 64.5° A2

(b) area of sector = $c's(64.5)/360 \times \pi \times 15 \times 15$ M1
 (= 127 or better)
 area of Δ = $\frac{1}{2} \times 15 \times 15 \times \sin c's(64.5)$ M1
 (= [101, 102])

OR

$$\text{area of } \Delta = \frac{1}{2} \times 16 \times 12.7 \text{ (or better, accept 12.6 and } \sqrt{161})$$

$$\text{area of sector} - \text{area of } \Delta$$

M1 dep on
previous 2 Ms

$$25.1 \text{ cm}^2 \text{ cao} \quad \text{A1} \quad 4$$

Total 7 marks

TOTAL 100 MARKS

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