

Mark Scheme Summer 2008

GCE O Level

GCE O Level Mathematics B (7361)

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Mathematics B 7361

Paper 1

General: Penalise not corrected answers where they are demanded by the question.

1. $\frac{x(x+2) - 2 \cdot x}{2(x+2)}$ M1 (no slips)
 $\frac{x^2}{2(x+2)}$ A1 2
Total 2 marks
2. $10.5/24 \times 100$ (o.e. , $\frac{600+30}{1440} \times 100$) M1
A1 2
 43.75 or $43\frac{3}{4}\%$
NB: 10.3 instead of 10.5 scores M0
Total 2 marks
3. $45/1.86$ M1
£ 24.19 A1 2
Total 2 marks
4. 9 or 4 OR $(3+2)(3-2)$ M1
5 A1 2
Total 2 marks
5. $p = -3$, $q = -6$ B1, B1 2
Total 2 marks
6. 7, 16, 25
any two correct (ignore any incorrect values) B1
all three correct (no extra/incorrect values offered) B1 2
Total 2 marks
7. (a) 0 B1
(b) 2 B1 2
Total 2 marks

8. $\frac{9 - -(5)}{2 - 4}$ or $\frac{-5 - 9}{4 - 2}$ M1

-7 A1 2

NB: If using $y = mx + c$, must solve for m completely, allow 1 slip for M1

Total 2 marks

9. $\frac{1}{2} \cdot 3x \cdot 17 = 204$ or $17x + \frac{1}{2} \cdot 17 \cdot x = 204$ M1

8 A1 2

Total 2 marks

10. (a) $A \cap B \cap C$ B1 1

(b) $(A \cap C) \cup B$ or $(A \cup B) \cap (C \cup A)$ B1 1

(c) $(A \cup B) \cap C$ or $(A \cap C) \cup (B \cap C)$ B1 1
or $(A \cap B \cap C) \cup (A \cap C) \cup (B \cap C)$

NB: Brackets are required in (b) and (c)

Total 3 marks

11. $\frac{4(5 - y) - 5}{2} < 7$ M1

$10 - 2y - 5 < 21$ (ie remove denominator) M1 dep

conclusion A1

OR

$x < 13/2$ (o.e.) or $2x < 13$ M1

$y > 5 - 2 \times 13/2$ M1 dep

conclusion A1 3

NB: equality sign is not acceptable in the $y > 5 - 2 \times 13/2$
line - this can score at best M1 M0 A0

Total 3 marks

12. (a)	52°	B1	1
(b)	$\angle DCE = 180^\circ - 2 \times (16^\circ + c's(52^\circ))$	M1	
	44°	A1	2
NB: Accept answers on diagram and apply ISW if the angle on the answer line is different from correct angles shown in the diagram			
Total 3 marks			
13.	Curved surface area = $8 \cdot 17 \pi$	M1	
	Total surface area = $8 \cdot 17 \pi + 8 \times 8 \times \pi$	M1 dep	
	conclusion	A1	3
NB: (1) $\pi \times 8 \times (8 + 17)$ scores M1 M1 then conclusion, A1			
(2) Use of decimal or fractions for π scores M1 M1 but A0 at best			
Total 3 marks			
14. (a)	9	B1	1
(b)	5	B1	1
(c)	7	B1	1
Total 3 marks			
15. (a)	$\frac{1}{4}$	B1	1
(b)	$y(4x - 1) = 1$ or $x(4y - 1) = 1$ or $\frac{1}{y} = 4x - 1$	M1	
	or $\frac{1}{x} = 4y - 1$		
	$(1 + x)/4x$ or $\frac{x^{-1} + 1}{4}$ or $\frac{1}{4} + \frac{1}{4x}$ or	A1	2
	$\frac{1}{4} \left(1 + \frac{1}{x} \right)$		
Total 3 marks			

16. (a) $5^2 \times 12$ M1
 300 cm^2 A1 2
- (b) $6/5^3$ M1
 $0.048 \text{ litres or } \frac{6}{125} \text{ litres}$ A1 2

NB: If any numbers are seen in part (b) which may have come from part (a), send the item to Review

Total 4 marks

17. (a) $(3x + 7)(x + 3)$ M1, A1 2
- (b) 67, 23 or 67×23 B1(one correct), B1 (both correct) 2

NB: (1) Deduct 1 mark if more than 2 primes
 eg 1, 67, 23 scores B1 B0

(2) $67 \times a$ (where $a \neq 23$) or $b \times 23$ (where $b \neq 67$) scores B1 B0

Total 4 marks

18. 78 kg or 3×26 B1
 $114 + c's(78)$ M1
 $c's(192) / 24 = x$ M1 dep
- OR
 (here x is the original number of sheep) M1
 $114 + c's(78)$ M1 dep
 $c's(x=5)+3$ M1 dep
- 8 sheep A1 4

NB: $c's(78)$ cannot be 26

Total 4 marks

19. $120 = k \cdot 5^2$ (o.e) M1
 $k = 4.8$ A1
 $s = c's(k) \times 3^2$ M1 dep
- $43.2 \text{ m or } 43\frac{1}{5} \text{ m}$ A1 4

Total 4 marks

20.	(a)	Complete method for finding internal angle of a pentagon	M1	
		108°	A1	2
	(b)	complete (and correct) method for finding either $\angle BAC$ and $\angle EAD$ or $\angle ACD$ and $\angle ADC$ or $\angle ADE$	M1	
		$\angle BAC = 36^\circ$ and $\angle EAD = 36^\circ$	A1	3
		or $\angle ACD = \angle ADC = 72^\circ$ or $\angle ADE = 36^\circ$		
		$\angle DAC = 36^\circ$	A1	
		NB: Accept answers on diagram and apply ISW if the angle on the answer line is different from correct angles shown in the diagram		
				Total 5 marks
21.		$a^2 = (b + c)/(b - c)$	M1	
		$a^2(b - c) = b + c$	M1 dep	
		$a^2b - b = c + a^2c$ (allow sign slip)	M1 dep	
		$a^2b - b = c(1 + a^2)$	M1 dep	
		$c = (a^2b - b)/(1 + a^2)$ (o.e)	A1	5
				Total 5 marks
22.	(a)	Plotting both A and C	B1	
		Either B or D correctly plotted	B1	
		All vertices correct and square drawn.	B1	3
	(b)	Correct use of Pythagoras (or recognising 3, 4, 5 Δ)	M1	
		5	A1	2
				Total 5 marks

23.	(a)	£ 6320	B1	1
	(b)	$c's(a) - (15 \times 280 \times 110/100 + 360 \times 125/100)$	M1	
		£ 1250	A1	2
		NB: No MR for 10% or 25%		
	(c)	$c's(1250)/c's(6320) \times 100$	M1	
		19.8 %	A1	2
			Total 5 marks	
24.		$2 - x(x - 1) = -4$ (no sign slips)	M1	
		$x^2 - x - 6 = 0$	A1	
		$(x - 3)(x + 2) = 0$ (solving a trinomial quadratic - usual rules)	M1 Indep	
		OR		
		$2 - bc = -4$	M1	
		$bc = 6$	A1	
		$x(x-1) = 6$ (solving a trinomial quadratic - usual rules)	M1 indep	
		3, -2	A1, A1	
		NB: If using a T&E method, they must have both correct answers otherwise the candidate collects no marks ie from working he may collect the first M1 A1 but unless he has <i>both</i> 3 <i>and</i> -2 he will not collect the M1 A1 A1		5
			Total 5 marks	
25.	(a)	correctly drawn	B1	1
	(b)	correctly drawn	B1	1
		NB In (a) and (b), allow a tolerance of 2mm for the length of the lines and angles ie the thickness of the lines on the overlays	B1	1
	(c)	73 km (± 2 km)	B1	
	(d)	Attempting to measure a bearing from A which is greater than 180°	B1	2
		accept answer in the range $198 - 201^\circ$ (integer values only)		
			Total 5 marks	

26. (a)	$15/100 \times 360;$	54°	M1, A1	2
(b)	One correct sector, angle clearly marked		B1	
	Two sectors, angles clearly marked		B1	
	All correct, angles clearly marked		B1	3
				Total 5 marks
27. (a)	68°		B1	1
(b)	$\angle PAO = 360 - [c's(68) + 90 + 34]$		M1	
	$= 168^\circ$		A1	
	$\angle BAO = 12^\circ$		A1	
OR				
	$\triangle OBC$ is isosceles \triangle so			
	$\angle OBC = \angle OCB = \angle PCB(=112^\circ) - 90$		M1	
	$= 22^\circ$		A1	
	$\angle BAO = 12^\circ$		A1	3
NB: Accept answers on diagram and apply ISW if the angle on the answer line is different from correct angles shown in the diagram				
(c)	$\angle OBC = 34 - c's(12)$ or		M1	
	$\angle BCO = 180 - (90 + 2 \times 34)$			
	ie complete method needed			
	22°		A1	2
NB: Accept answers on diagram and apply ISW if the angle on the answer line is different from correct angles shown in the diagram				
				Total 6 marks

28. (a) $2 \times 15 \times \cos 40^\circ$ (o.e) M1
 $100/360 \times 2 \times \pi \times 15$ M1
 $2 \times 15 \times \cos 40^\circ + 100/360 \times 2 \times \pi \times 15$ M1 dep
49.2 cm A1 4
- (b) $100/360 \times \pi \times 15^2$, $\frac{1}{2} 15^2 \sin 100^\circ$ (one of) M1
 $100/360 \times \pi \times 15^2 - \frac{1}{2} 15^2 \sin 100^\circ$ M1 dep
85.5, 85.6 cm² A1 3

Total 7 marks

TOTAL 100 MARKS

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Paper 2

1.	Balancing equations, no errors	M1	
	Correct decision to add/subtract (one sign error)	M1 dep	
	OR		
	Making x/y the subject (one sign error)	M1	
	Correctly substituting x or y into 2 nd equation	M1 dep	
	OR (by matrices)		
	Inverse matrix (allow one numerical error)	M1	
	Premultiplying $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$ by c's inverse matrix	M1 dep	
	$x = \frac{1}{2}, y = \frac{2}{3}$ (o.e)	A1, A1	4
			Total 4 marks
2.	(a) 205/2.5; 82 km/h	M1, A1	2
	(b) 125/75; 15 00 hrs (allow 3 pm)	M1, A1	2
	(c) 465 x 2/3; 310 km	M1, A1	2
			Total 6 marks
3.	(a) $5(-2)^3 + 6(-2)^2 - 2k - 2 = 0$	M1	
	$k = -9$	A1	2
	(b) $5x^2 - 4x$	M1	
	$5x^2 - 4x - 1$	A1	
	attempt to factorise a trinomial quadratic	M1	
	$(x + 2)(5x + 1)(x - 1)$	A1	4
			Total 6 marks

4.	(a)	$6x^3 - 15x^2 + 14x - 35$	B1	1
	(b)	One term correctly differentiated (and simplified) from c's expression	M1	
		$18x^2 - 30x + 14$	A1	2
	(c)	Correctly rearranging c's equation into a trinomial quadratic (= 0)	M1	
		$18x^2 - 30x - 12 (= 0)$ (o.e.)	A1	
		attempt to factorise a trinomial quadratic	M1	
		$x = 2, x = -1/3$ (o.e.)	A1	4
				Total 7 marks

5.	(a)	(i) $\frac{3}{4}a - c$ (o.e.) (ii) $a + \frac{4}{5}c$ (o.e.)	B1, B1	2
		→		
	(b)	$OX = c + 2\left(\frac{3}{4}a - c\right)$	M1	
		$= \frac{3}{2}a - c$ OR $\frac{1}{2}(3a - 2c)$	A1	2
		→	M1	
	(c)	$XY = \frac{3}{2}a + \frac{6}{5}c - c's\left(\frac{3}{2}a - c\right)$ (o.e.)	A1	
		$= \frac{11}{5}c + \text{conclusion}$		2
				Total 6 marks

6.	(a)	$(x^2 =) 20 \times 1.8$	M1	
		$(x =) 6 \text{ cm}$	A1	2
	(b)	$AF = \sqrt{\{20^2 + (9 + 6)^2\}}$	M1	
		conclusion	A1	2
	(c)	$FE. 25 = 9.(9 + 2 \times c's(6))$ (o.e.) (correct use of intersecting chords)	M1	
		$AE = 17.4 \text{ cm}$ (or better)	A1	2
	(d)	$OX = 21.8/2 - 1.8$	M1	
		$\tan \angle XFO = c's(OX)/(c's(6) + 9)$	M1 dep	
		(o.e. trig statement)		
		$\angle XFO = 31.2^\circ/31.3^\circ$	A1	3
			Total 9 marks	
7.	(a)	12, 2 & 4	B1	
		any one of $14 - x$, $18 - x$ or $4 - x$ (o.e.)	B1	
		all three of $14 - x$, $18 - x$ and $4 - x$ (o.e.)	B1	
		8	B1	4
	(b)	$14 - x + 18 - x + 4 - x + x + 26 = 56$	M1	
		$62 - 2x = 56$		
		$x = 3$	A1	2
	(c)	(i) 47 (ii) 9 (iii) 8	B1 ft, B1 ft, B1	3
			Total 9 marks	

8.	(a)	2 correct probabilities	B1	
		4 correct probabilities	B1	
		8 correct probabilities	B1	3
	(b)	(i) $c's(3/10) \times c's(2/9) = 1/15$ (o.e.)	M1, A1	
		(ii) attempt to gather at least two consistent pairs of probabilities together	M1	
		complete method	M1 dep	
		$31/45$ (o.e.)	A1	
		(iii) $1 - 2/10 \times 1/9 = 44/45$ (o.e.)	M1, A1	7
				Total 10 marks
9.	(a)	$63 \rightarrow 65$ m	B1	1
	(b)	Accept a reading in the range $51 \text{ km/h} \rightarrow 54 \text{ km/h}$	M1	
		$32 \rightarrow 34$ m	A1	2
	(c)	6.7, 36.7, 90.7	B1, B1, B1	3
	(d)	usual graph penalties straight line segment each point missed (\pm one small square) each missed segment each point plotted incorrectly (\pm one small square) tramlines	B3	3
	(e)	identification of a distance of 134 m used (\pm one small square)	M1	
		$97 \rightarrow 99 \text{ km/h}$	A1	2
	(f)	an answer given in the range $90 \rightarrow 100 \text{ km/h}$	M1	
		$93 \rightarrow 97 \text{ km/h}$	A1	2
				Total 13 marks

10. (a)	90° clockwise (-90)	B1	1
(b)	scale factor 2; centre P OR (3, 6)	M1, M1	2
(c)	centre of enlargement plus at least one enlarged vertex identified correctly	M1	
	plotted figure (C) and labelled	A2 (-1 ee)	3
(d)	plotted figure (D) and labelled	B2 ft (-1 ee)	2
(e)	reflection; $y = x$	M1, A1	2
(f)	reflection, x-axis OR $y = 0$	M1, A1	2
(g)	$\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$	B2	2

Total 14 marks

11. (a)	$\sqrt{8^2 + 8^2}$ (o.e.)	M1	
	11.3 cm	A1	2
(b)	$\angle EBD = 76^\circ$ OR $\angle BDE = 28^\circ$	B1	
	$\frac{\frac{1}{2} BE}{c's(11.3)} = \cos c's(76^\circ)$	M1	
	$BE = 2 \times c's(11.3) \times \cos c's(76^\circ)$	M1 dep	
	5.47 cm	A1	4
(c)	$\angle EDB = 180 - 2 \times c's(76^\circ)$	M1	
	$\angle CDF = 17^\circ$	A1	2
(d)	$CF/8 = \tan c's(17^\circ)$	M1	
	$CF = 2.45$ cm	A1	2
(e)	$BF = 8 - c's(CF)$	M1	
	$\frac{1}{2} \times c's(5.47) \times c's(5.55) \times \sin(31^\circ)$	M1 dep	
	$7.75 \text{ cm}^2 \rightarrow 7.83 \text{ cm}^2$	A1	3
(f)	area $\triangle BEC = \frac{1}{2} \cdot 8 \cdot c's(5.47) \times \sin(31^\circ)$	M1	
	area $\triangle EFC = \frac{1}{2} \cdot 8 \cdot c's(5.47) \times \sin(31^\circ) - c's(7.82)$	M1 dep	
	$3.42 \rightarrow 3.52 \text{ cm}^2$	A1	3
	OR (ratio of areas)		
	$\frac{c's(2.45)}{\text{area}\triangle EFC} = \frac{8 - c's(2.45)}{c's(7.82)}$	M1	
	area $\triangle EFC = \frac{c's(7.82) \times c's(2.45)}{c's(5.55)}$	M1 dep	
	$3.42 \rightarrow 3.52 \text{ cm}^2$	A1	

Total 16 marks

PAPER TOTAL 100 MARKS

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