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SENIOR PHASE

GRADE 9

NOVEMBER 2016

MATHEMATICS
MEMORANDUM

MARKS: **100**

This memorandum consists of 9 pages.

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NOTE:

- This is marking guideline. In instances where learners have used different mathematically sound strategies to solve the problems, they should be credited.
- Underline errors committed by learners and apply Consistent Accuracy (CA) marking.

KEY	
M	Method mark
CA	Consistent Accuracy mark
A	Accuracy mark
S	Statement
R	Reason
S/R	Statement and Reason

QUESTION 1 [10 marks]				
Ques.			**Mark Allocation**	**Total**
1.1	B	✓	1 mark for each correct answer	(1)
1.2	C	✓		(1)
1.3	A	✓		(1)
1.4	B	✓		(1)
1.5	A	✓		(1)
1.6	D	✓		(1)
1.7	C	✓		(1)
1.8	A	✓		(1)
1.9	C	✓		(1)
1.10	C	✓		(1)
				[10]

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QUESTION 2 [26 marks]			
Ques.	**Solution**	**Mark Allocation**	**Total**
2.1	$6{,}74 \times 10^{-7}$ ✓ **A**	Answer: 1 mark	(1)
2.2.1	$\sqrt[3]{x^3} + x^0$ ✓ **A** ✓ **A** $x + 1$	x : 1 mark $+1$: 1 mark	(2)
2.2.2	$\sqrt{0{,}03\,x^8 + 0{,}01x^8}$ $\sqrt{0{,}04\,x^8}$ ✓ **A** $0{,}2\,x^4$ ✓ **A**	$\sqrt{0{,}04\,x^8}$: 1 mark Answer: 1 mark	(2)
2.2.3	$\dfrac{(2d^2e)^2}{(4d^{-3}e^{-2})^{-1}}$ ✓ **M** ✓ **M** $2^2d^4e^2 \times 2^2d^{-3}e^{-2}$ $16d$ ✓ **A**	$2^2d^4e^2$: 1 mark $2^2d^{-3}e^{-2}$: 1 mark Answer: 1 mark	(3)
2.2.4	$2(x+2)^2 - 2(x+1)(x+2)$ ✓ **M** ✓ **M** $2(x^2 + 4x + 4) - 2(x^2 + 3x + 2)$ $2x^2 + 8x + 8 - 2x^2 - 6x - 4$ ✓ **A** $2x + 4$ ✓ **CA**	$x^2 + 4x + 4$: 1 mark $x^2 + 3x + 2$: 1 mark $2x^2 + 8x + 8 - 2x^2 - 6x - 4$: 1 mark Answer: 1 mark	(4)
2.3.1	$x^2 + 5x - 24$ ✓ **A** ✓ **A** $(x+8)(x-3)$	$x + 8$: 1 mark $x - 3$: 1 mark	(2)
2.3.2	$2(a-b) - b + a$ $2(a-b) + 1(a-b)$ ✓ **M** $(2+1)(a-b)$ ✓ **M** $3(a-b)$ ✓ **A**	$+1(a-b$: 1 mark $(2+1)(a-b)$: 1 mark Answer : 1 mark	(3)
2.4.1	$4x - 10 = 6$ $4x = 16$ ✓ **M** $x = 4$ ✓ **A**	$4x = 16$: 1 mark Answer : 1 mark	(2)
2.4.2	$\dfrac{3x-10}{2} = \dfrac{2x-5}{3}$ $6 \times \left(\frac{3x-10}{2}\right) = 6 \times \left(\frac{2x-5}{3}\right)$ ✓ **M** $9x - 30 = 4x - 10$ ✓**A** $5x = 20$ $x = 4$ ✓ CA	$\times$ LCD: 6: 1 mark $9x - 30 = 4x - 10$: 1 mark Answer: 1 mark	(3)

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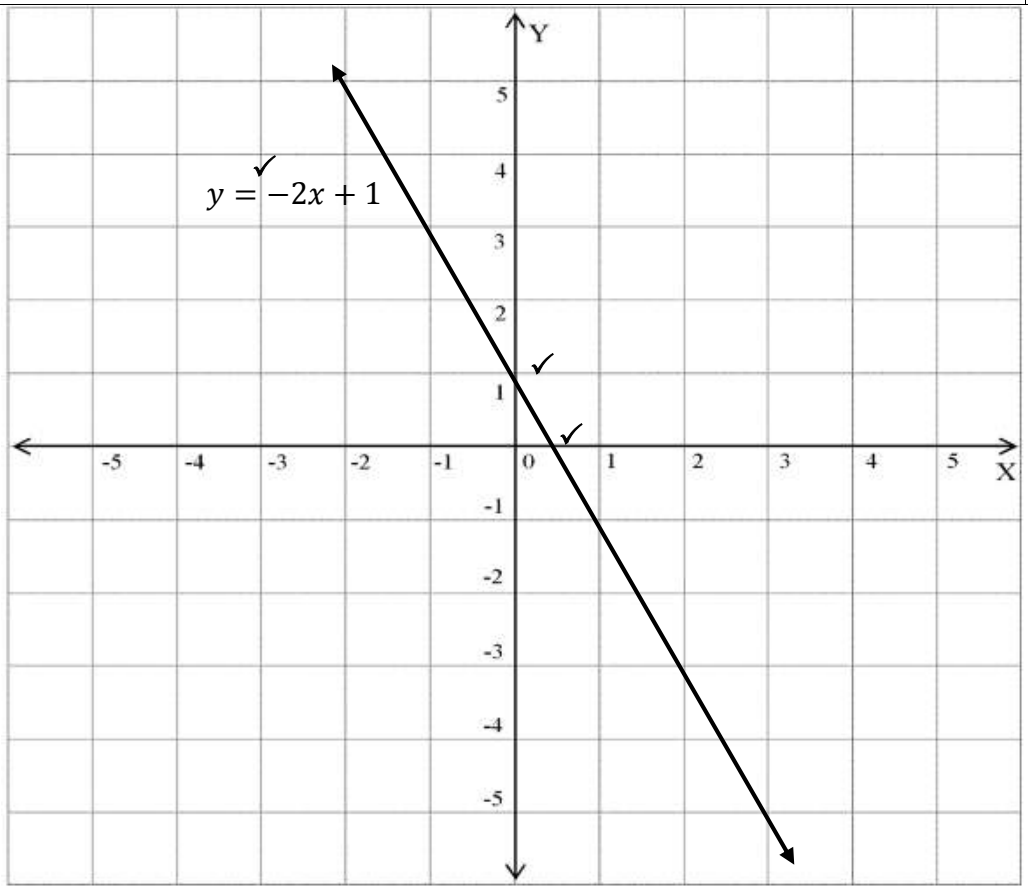
2.4.3	$x^2 = 4$ $(x+2)(x-2) = 0$ ✓ **M** $x = -2$ or $x = 2$ ✓ **A**	$(x+2)(x-2) = 0$: 1 mark Answer: 1 mark	(2)
2.4.4	$3x^5 = 96$ $x^5 = 32$ $x^5 = 2^5$ ✓**M** $x = 2$ ✓ **A**	2^5: 1 mark Answer: 1 mark	(2)
			[26]

QUESTION 3 [8 marks]

Ques.	Solution	Mark Allocation	Total
3.1.1	16 ✓ **A**	Answer: 1 mark	(1)
3.1.2	✓ **A** ✓ **A** $5n + 1$	$5n$: 1 mark $+1$: 1 mark	(2)
3.2.1	$y = x$ ✓**A**	Answer: 1 mark	(1)
3.2.2	$x = -2$ ✓**A**	Answer: 1 mark	(1)



y intercept : $y = +1$ ✓**A**
x intercept : $x = \frac{1}{2}$ ✓ **A**
label ✓ **A** (3)

[8]

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Question 4 [12 marks]			
Ques.	**Solution**	**Mark Allocation**	**Total**
4.1	$p.n.i = SI$ ✓**M** $5\,000 \times n \times 0{,}12 = 1\,800$ ✓**M** $n = 3$ ✓**A** OR $A = P(1 + ni)$ ✓**M** $6\,800 = 5\,000(1 + 0{,}12n)$ ✓**M** $1.36 = 1 + 0{,}12n$ $0{,}36 = 0{,}12n$ $n = 3$ ✓**A**	Formula: 1 mark Substitution: 1 mark Answer: 1 mark	(3)
4.2	Let the numbers be a and b ✓**M** $a + b = 143$ $a - b = 7$ $a = b + 7$ $b + 7 + b = 143$ $2b = 136$ $b = 68$ $a = 68 + 7$ $a = 75$ ✓**A** ✓**A** The numbers are 75 and 68 **OR** $a + b = 143$ $a - b = 7$ $\therefore 2a = 150$ (adding the 2 equations) $a = 75$ $75 + b = 143$ $b = 68$	Any method: 1 mark 75: 1 mark 68: 1 mark	(3)

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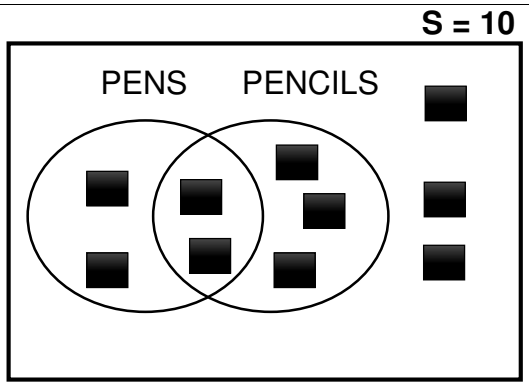
4.3	 $10 - 7 = 3$ boxes ✓✓**A**	Answer: 2 marks	(2)
4.4	$d = s \times t$ ✓**M** $d = 100\ km/h \times 3h$ ✓**A** $d = 300\ km$ $S = \frac{d}{t}$ Av. Speed $= \frac{300km}{2hrs}$ ✓**M** $= 150\ km/h$ ✓**CA** **OR** Speed: 100 *km*, x *km* Time: 3 *hrs*, 2 *hrs* $2x = 300$ $x = 150$ *km/h*	Formula/method: 1 mark $300\ km$: 1 mark $\frac{300\ km}{2\ hrs}$: 1 mark Answer: 1 mark	(4)
			[12]

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QUESTION 5 [16 marks]			
Ques.	**Solution**	**Mark Allocation**	**Total**
5.1.1	$\angle ACB = \angle DCF = 32°$ (Vert. opp. $\angle's$) $\angle EBC = \angle ACB = 32°$ (Alt. $\angle's$, EB ∥ DA)	Statement and reason: 1 mark each	(2)
5.1.2	$\angle CAB + \angle ABE = 180°$ (Co int. $\angle's : EB \| \| DA$) ✓**S/R** $\angle CAB = 180° - 65°$ ✓**M** $\angle CAB = 115°$ ✓**A** **OR** $\angle CAB + \angle ACB + \angle ABC = 180°$ ($\angle's$ of a Δ) ✓**S/R** $\angle CAB = 180° - (32° + 33°)$ [$\angle ABC = 65° - 32°$] ✓**M** $\angle CAB = 180° - 65°$ $\angle CAB = 115°$ ✓**A**	Statement and reason: 1 mark Substitution: 1 mark Answer: 1 mark	(3)
5.2.1	$\angle A + \angle ABC = \angle BCE$ (Ext ∠ of a Δ) ✓**S/R** $(2x - 48°) + (x + 14°) = 116°$ ✓**M** $3x - 34° = 116°$ $3x = 150°$ ✓**A** $x = 50°$ **OR** ✓**S/R** $\angle A + \angle ABC + + \angle ACB = 180°$ ($\angle's$ of a Δ) $(2x - 48°) + (x + 14°) + 64° = 180°$ ✓**M** $3x + 30° = 180°$ $3x = 150°$ $x = 50°$ ✓**A**	Statement and reason: 1 mark Substitution: 1 mark Answer: 1 mark	(3)
5.2.2	$\angle A = 2x - 48°$ $= 2(50°) - 48°$ ✓**M** $= 100° - 48°$ $= 52°$ ✓**A**	Substitution: 1 mark Answer: 1 mark	(2)
5.2.3	$\angle ABC = 50° + 14° = 64°$ $\angle ACB = 180° - 116° = 64°$ ✓**S** ✓**R** ΔABC is an isosceles triangle ($\angle ABC = \angle ACB$)	Correct statement: 1 mark Correct Reason: 1 mark	(2)
5.3.1	✓**S** ✓**R** $\angle ABC = 40°$ (Complementary $\angle's$)	Correct statement: 1 mark Correct Reason: 1 mark	(2)
5.3.2	✓**S** ✓**R** $\angle ADO = 32°$ (AO =OD / radii)	Correct statement: 1 mark Correct Reason: 1 mark	(2)
			[16]

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QUESTION 6 [11 marks]

Ques.	Solution	Mark Allocation		Total
6.1	STATEMENT	REASON	Correct statement with reason: 1 mark each	(4)
	$KL = KN$	Given ✓A		
	$LM = NM$	Given ✓A		
	$KM = KM$	Common ✓A		
	∴ ΔKLM ≡ ΔKNM.	SSS✓A		
6.2.1	STATEMENT	REASON	Correct statement with reason: 1 mark each	(4)
	$\hat{A} = \hat{P}$	Alt .∠'s, AB ∥ PQ ✓A		
	$\hat{B} = \hat{Q}$	Alt .∠'s, AB ∥ PQ ✓A		
	$A\hat{O}B = P\hat{O}Q$	Vert. opp. ∠'s ✓ A		
	∴ Δ ABO ||| ΔPQO.	AAA ✓ A		
6.2.2	$\frac{OQ}{OB} = \frac{OP}{AO}$ (Corr. sides are proportional) ✓S/R $\frac{x}{5\ cm} = \frac{12\ cm}{6\ cm}$ ✓A $x = OQ = 10\ cm$ ✓CA	Statement and reason: 1 mark $\frac{x}{5\ cm} = \frac{12\ cm}{6\ cm}$: 1 mark Answer: 1 mark		(3)
				[11]

QUESTION 7 [8 marks]

Ques.	Solution	Mark Allocation	Total
7.1	$d = 7 \times 2 = 14cm$ ✓M Area of the shaded part $= s^2 - \frac{\pi r^2}{2}$ ✓M $= 14 \times 14 - \frac{\frac{22}{7} \times 49}{2}$ $= 196\ cm^2 - 77\ cm^2$ ✓A $= 119\ cm^2$ ✓CA	$14\ cm$: 1 mark $s^2 - \frac{\pi r^2}{2}$: 1 mark $196\ cm^2 - 77cm^2$: 1 mark Answer: 1 mark	(4)
7.2	$2l + 2\,b = 16$ ✓M $l + b = 8$ $b = 8 - l$ $l \times b = 15$ ✓ M $l(8 - l) = 15$ $8l - l^2 = 15$ $l^2 - 8l - 15 = 0$ $(l - 5)(l - 3) = 0$ $l = 5$ or $l = 3$ ✓A $b = 3$ or $b = 5$ ✓A	$2l + 2\,b = 16$: 1 mark $l \times b = 15$: 1 mark 5 :1 mark 3 : 1 mark	(4)
			[8]

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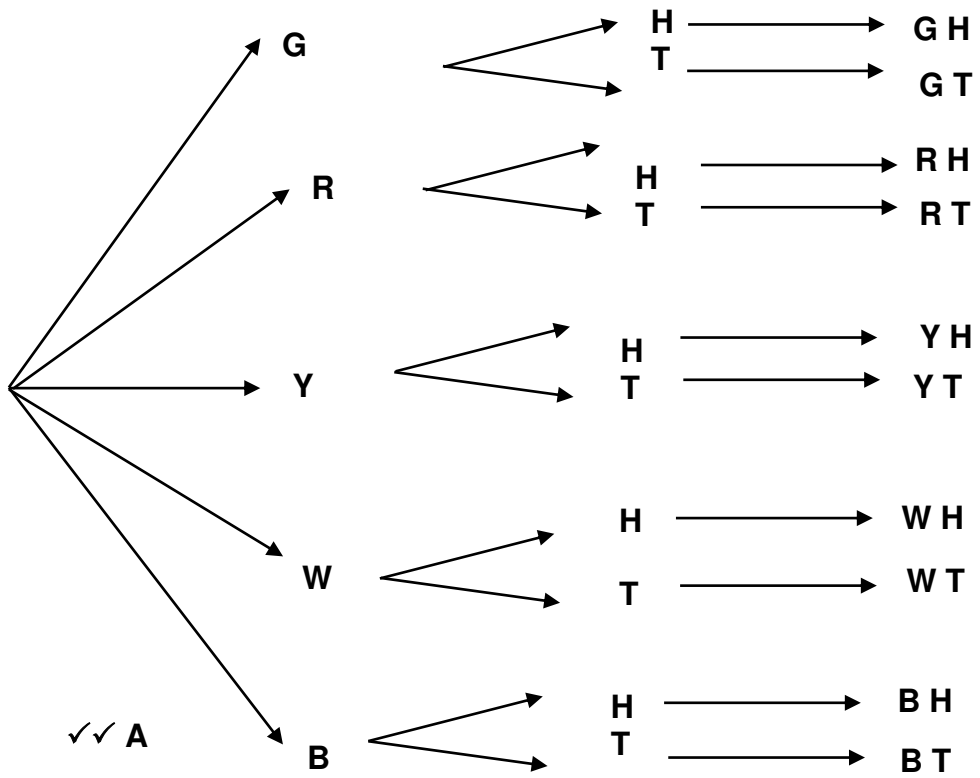
Question 8 [9 marks]

Ques.	Solution	Mark Allocation	Total
8.1.1	 ✓✓ A		(2)
	Key: **G− Green, R − Red, Y − Yellow, B − Black, W − White, H − head, T − tail** 2 marks for correct tree diagram.		
8.1.2	$\frac{5}{10} = \frac{1}{2}$ ✓**A**	Answer: 1 mark	(1)
8.1.3	$\frac{2}{10} = \frac{1}{5}$ ✓**A**	Answer: 1 mark	(1)
8.2.1	$\frac{5}{8}$ ✓**A**	Answer: 1 mark	(1)
8.2.2	✓**A** ✓**A** $\frac{1}{4} = 25\%$	$\frac{1}{4}$: 1 mark 25% : 1 mark	(2)
8.2.3	✓**A** ✓**A** 5:1	5 : 1 mark 1 : 1 mark	(2)
			[9]
		TOTAL:	**100**

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