basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

| ANNUAL NATIONAL ASSESSMENTS 2010 |
| GRADE 9 MATHEMATICS - ENGLISH |
| FORM A |
| MEMORANDUM |

Important Information

- This is a marking guideline. In instances where learners have used different but mathematically sound strategies to solve the problems they (learners) should be credited.

- Unless stated otherwise, learners who give a correct answer only, should be awarded full marks.

QUESTION 1

1.	1.1	**B**	1.2	**B**	1.3	**A**	1.4	**B**	1.5	**C**	Give 1 mark for each correct answer.	
	1.6	**D**	1.7	**C**	1.8	**C**	1.9	**C**	1.10	**B**		**[10]**

QUESTION 2

2.1.1	$2x^2 + 3x - 4 - x^2 + 2x + 6$ ✓ $= x^2 + 5x + 2$ ✓✓	Distributive law: 1 mark Answer: 2 marks	(3)

2.1.2	$\dfrac{-4m^3n \times 10mn^2}{5m^4n^3} = \dfrac{-40m^{3+1}n^{2+1}}{5m^4n^3}$ ✓ $= -8m^{4-4}n^{3-3}$ ✓ $= -8$ ✓	Relevant Law of exponents: 1 mark Relevant Law of exponents: 1 mark Answer: 1 mark	(3)

2.1.3	$= \dfrac{\left(16 \times 10^{-4}\right) + \left(4.0 \times 10^{-4}\right)}{\left(4.0 \times 10^{-3}\right) - \left(2 \times 10^{-3}\right)}$ ✓ ✓ $= \dfrac{\left(10^{-4}\right)(16+4)}{\left(10^{-3}\right)(4-2)}$ ✓ $= \dfrac{20 \times 10^{-1}}{2}$ $= \dfrac{2}{2}$ $= 1$ ✓	Changing 1.6 x 10⁻³ to 16 x 10⁻⁴: 1 mark Changing 0.2 x 10⁻² to 2 x 10⁻³: 1 mark Taking out common factors: 1 mark Answer: 1 mark	(4)

2.2.1	✓ ✓ ✓ $\frac{2}{3}\left(12a^2 - 3a - 6\right) = 8a^2 - 2a - 4$	Each correct term: 1 mark	(3)

2.2.2	✓ ✓ ✓ $a^2 - 6ab + 8b^2$	Each correct term: 1 mark	(3)

2.3.1	✓ ✓ $3k(2 + 4k - k^2)$	$3k$: 1 mark $\left(2 - k^2 + 4k\right)$: 1 mark	(2)

2.3.2	✓ ✓ $16y^2 - 49 = (4y - 7)(4y + 7)$	Each correct bracket: 1 mark	(2)

2.3.3	$\checkmark$ $\checkmark$ $\checkmark$ $3x^2 - 12 = 3(x^2 - 4) = 3(x-2)(x+2)$	Common factor: 1 mark Each correct bracket: 1 mark	(3)

2.4			
	<table><tr><td>2</td><td>784</td></tr><tr><td>2</td><td>392</td></tr><tr><td>2</td><td>196</td></tr><tr><td>2</td><td>98</td></tr><tr><td>7</td><td>49</td></tr><tr><td>7</td><td>7</td></tr><tr><td></td><td>1</td></tr></table> $\checkmark\checkmark$ $784 = 2 \times 2 \times 2 \times 2 \times 7 \times 7 = 2^4 \times 7^2$ $\quad\quad\quad 2 \times 2 \times 7$ $\therefore \sqrt{784} = \sqrt{2^4 \times 7^2} = 4 \times 7 = 28$ $\checkmark$ $\checkmark$	factorising correctly: 2 marks Answer: 2 marks	(4)

2.5.1	$2x - 3 = 17 + x$ $2x - x = 17 + 3$ $\checkmark$ $\therefore x = 20$ $\checkmark$	Simplifying x : 1 mark Answer = 20: 1 mark	(2)

2.5.2	$\dfrac{3x+4}{2} = 2$ $\therefore 3x + 4 = 4$ $\checkmark$ $\therefore 3x = 0$ $\checkmark$ $\therefore x = 0$ $\checkmark$	multiply by 2: 1 mark correct equation: 1 mark Answer: 1 mark	(3)

2.5.3	$\dfrac{2(x+5)}{3} = 1 - \dfrac{3(x-5)}{4}$ $\therefore 8(x+5) = 12 - 9(x-5)$ $\checkmark$ $\therefore 8x + 40 = 12 - 9x + 45$ $\checkmark\checkmark$ $\therefore 8x + 9x = 57$ $\checkmark$ $\therefore 17x = 17$ $\therefore x = 1$ $\checkmark$	multiply by 12: 1 mark Simplifying: 2 marks correct equation: 1 mark Answer: 1 mark	(5)

[37]

QUESTION 3

3.1	*Compound Interest calculation* $A = P\left(1 + \dfrac{r}{100}\right)^n = 8000(1 + 0{,}035)^3$ $= 8869{,}74$ $\therefore CI = R869{,}74$	*Simple Interest Calculation:* $SI = \dfrac{P.n.r}{100}$ $A = P\left(1 + \dfrac{n.r}{100}\right)$ $= \dfrac{(8000)(3)(7{,}5)}{100}$ *or* $= 8000\left(1 + \dfrac{3(7{,}5)}{100}\right)$ $= 80(3)(7{,}5)$ $= 8000(1 + 0{,}225)$ $= 1800$ $= 9800$ $SI = 9800 - 8000 = R1800$ The SI investment is better	Correct Formula (for CI and SI): 2 marks Simplification (for CI and SI): 2 marks Correct choice: 1 mark **Note:** $i = \dfrac{r}{100}$ in all formulae.	(5)

| 3.2 | | | | | | Distance = 315 km: 2 marks
Substitution into formula: 1 mark
Answer: 1 mark | |

	S(km/h)	T(h)	D(h)	
A → B	70	$\frac{9}{2}$	$70 \times \frac{9}{2}$	✓
B → A	90	x	315	✓

Distance from A to B = 315 km   ✓

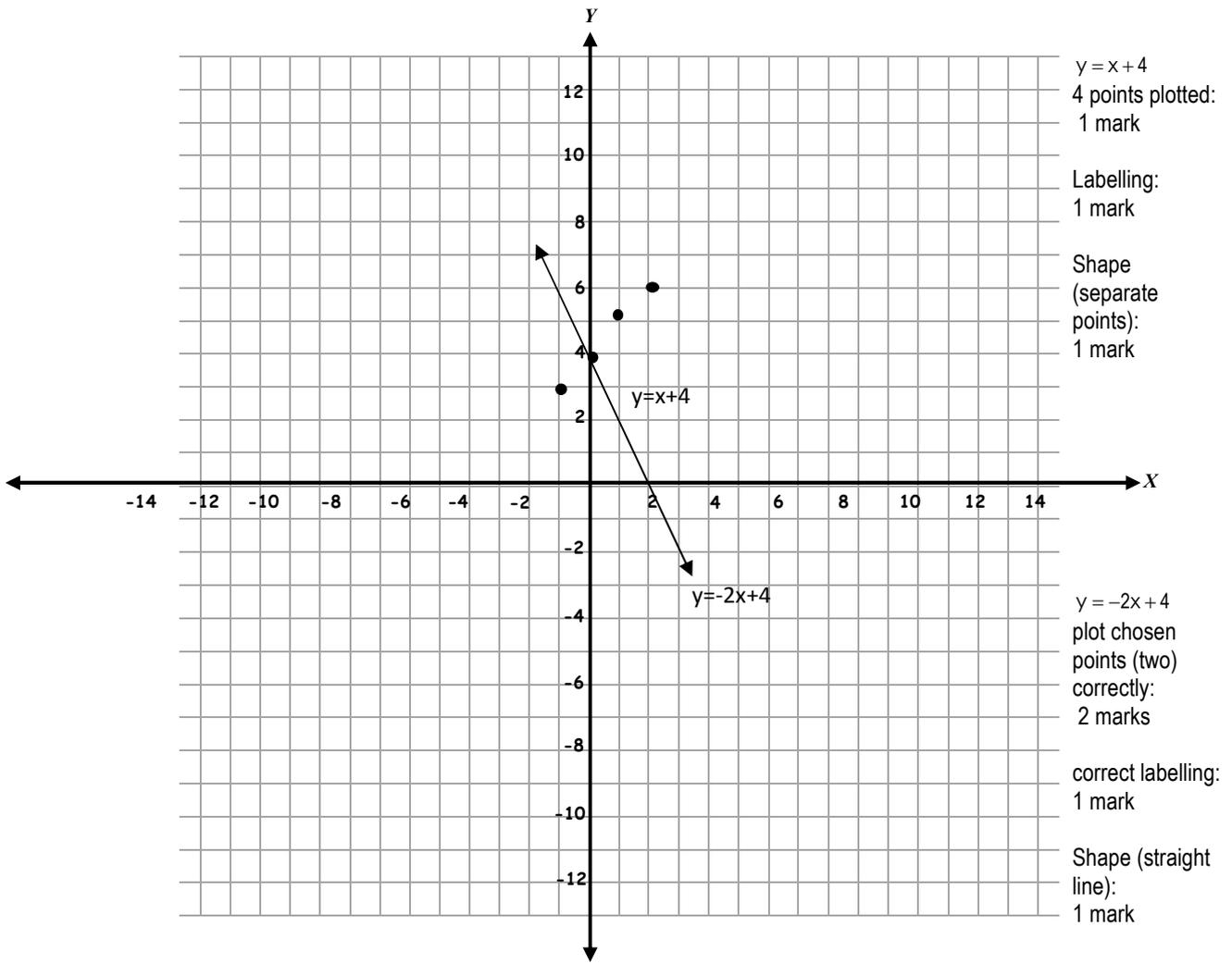Time from B to A = $\frac{315}{90}$h = 3,5h = 3h 30 min.   ✓

(4)

[9]

QUESTION 4

4.1	✓ ✓ 5; 7	Each term: 1 mark	(2)

4.2	✓ Two is added every time to obtain the next term **OR** there is a constant difference of 2 between two consecutive terms.	Answer: 1 mark	(1)

4.3	✓ $T_n = 2n - 3$	Correct answer: 1 mark	(1)

4.4	$2n - 3 = 37$ ✓ $2n = 40$ $n = 20$ ✓ $\therefore T_{20} = 37$	Equation: 1 mark Answer: 1 mark	(2)

[7]

QUESTION 5

5.1	5.1.1	**b**	5.1.2	**a**	5.1.3	**c**	1 mark each	(3)

5.2 $y = x + 4$

x	-1	0	1	2
y	3	4	5	6

$y = -2x + 4$ Note: learners can choose other x–values in the table below.

x	-1	0	1	2
y	6	4	2	0

$y = x + 4$

4 points plotted:
1 mark

Labelling:
1 mark

Shape
(separate
points):
1 mark

y=x+4

y=-2x+4

$y = -2x + 4$
plot chosen
points (two)
correctly:
2 marks

correct labelling:
1 mark

Shape (straight
line):
1 mark

(7)

[10]

QUESTION 6

	6.1.1	Rhombus	1 mark	(1)

	6.1.2	In $\triangle$ KCL: KL^2 = CK^2 + LC^2 ...Pythagoras ✓✓ = (5 cm)^2 +(12 cm)^2 = 25 cm^2 + 144 cm^2 ✓ = 169 cm^2 KL = $\sqrt{169}$ cm ✓ KL = 13 cm ✓	KL^2 = CK^2 + LC^2 and reason : 2 marks Simplification: 1 mark Finding square root $\sqrt{169}$: 1 mark Answer: 1 mark	(5)

	6.1.3	✓ Perimeter = 13 cm x 4 = 52 cm	Answer: 1 mark	(1)

4

	6.1.4	In $\triangle$ JBK and $\triangle$ LDM		Correct statement and reason: 2 marks	
		1. BK = MD $\left(\frac{1}{2}BC = \frac{1}{2}AD\right)$ ✓✓		Correct statement and reason: 2 marks	
		2. JK = ML (sides of a rhombus) ✓✓		Correct statement and reason: 2 marks	
		3. $\hat{B} = \hat{D} = 90^\circ$ **or** BJ = DL $\left(\frac{1}{2}AB = \frac{1}{2}CD\right)$✓✓		Correct case: 1 mark	(7)
		$\triangle$ JBK ≡ $\triangle$ LDM $(90^\circ, H, S)$ ✓			
		or			
		1. BK = MD			
		2. BJ = DL			
		3. $\hat{B} = \hat{D} = 90^\circ$			
		$\triangle$ JBK ≡ $\triangle$ LDM (S, <, S)			

	6.1.5	Draw diagonal KM	Correct statement: 2 marks	
		Area $\triangle$ AMJ + Area $\triangle$ BKJ = Area $\triangle$ MJK		
		$= \frac{1}{2}$ Area rectangle ABKM ✓✓		
		and Area $\triangle$ DML + $\triangle$ Area $\triangle$ KCL = Area $\triangle$ MLK	Correct statement: 2 marks	
		$= \frac{1}{2}$ Area rectangle DCKM ✓✓		
		$\Rightarrow$ Area JKLM $= \frac{1}{2}$ Area ABCD $\Rightarrow$ t $= \frac{1}{2}$ ✓	$t = \frac{1}{2}$: 1 mark	(5)

6.2.1	$3a + 2a + 20^\circ = 180^\circ$ [sum of angles on a straight line $= 180^\circ$] ✓✓	Statement with reason: 2 marks	
	$5a + 20^\circ = 180^\circ$		
	$5a = 180^\circ - 20^\circ$ ✓ ✓	Simplification: 1 marks	
	$5a = 160^\circ$		
	$a = 32^\circ$ ✓	Answer: 1 mark	(4)
	Note: It is incorrect to equate $3a = 4a - 32$ although this calculation leads to an answer of 32°		

6.2.2	$F\hat{E}A = 3a$ ✓	Substitution: 1 mark	
	$= 3(32^\circ)$ ✓	Answer: 1 mark	
	$= 96^\circ$ ✓		
	$H\hat{C}D = G\hat{C}E = 4a - 32^\circ$ $H\hat{C}D = G\hat{C}E$ ✓✓	Statement with reason: 2 marks	
	$= 128 - 32^\circ$		
	$= 96^\circ$ ✓	Answer: 1 mark	(5)

6.2.3	FK//GH [$F\hat{E}C + G\hat{C}E = 180^\circ$] ✓✓	FK//GH: 1 mark	
	OR	Reason: 1 mark	
	FK//GH [sum of co-interior angles $= 180^\circ$]		
	OR		
	$F\hat{E}A = G\hat{C}E$ [corresponding angles are equal]		(2)

5

6.3.1	AC = AE $\Rightarrow \hat{C}_1 = \hat{E}_1$ ✓ ✓ (angles opp. equal sides of $\triangle$ ACE) $\Rightarrow \hat{C}_2 = \hat{E}_2$ ✓ ✓ (supplements of equal angles)	$\hat{C}_1 = \hat{E}_1$: 1 mark Reason: 1 mark $\hat{C}_2 = \hat{E}_2$: 1 mark Reason: 1 mark	(4)

6.3.2	In $\triangle$ ABC and $\triangle$ AGE 1. $\hat{C}_2 = \hat{E}_2$ (proved) ✓ 2. $\hat{B} = \hat{G}$ (< s opp. equal sides of $\triangle$ ABC) ✓✓ 3. $\hat{A}_1 = \hat{A}_3$ (sum of < s = 180˚) ✓ $\triangle$ ABC ||| $\triangle$ AGE (< , < , <) ✓	Showing 3 angles equal: 4 marks Conclusion on similarity: 1 marks	(5)

6.4.1	$\dfrac{2500000}{1000}$ m³ = 2 500 m³ ✓✓ **Note: Answer only full marks** **OR** 2 500 000 litres = 2 500 kl = 2 500 m³	Conversion: 1 mark Answer: 1 mark	(2)

6.4.2	$V = l \times b \times h$ $2500m = 50m \times 25m \times h$ $h = \dfrac{2500m^3}{1250m^2}$ ✓ $h = 2$ m ✓	Formula: 1 mark Substitution: 1 mark Making h the subject of the formula: 1 mark Answer: 1 mark	(4)

6.4.3	$speed = \dfrac{d}{t}$ ✓ $speed = \dfrac{100m}{67.02s}$ ✓ $speed = 1{,}49209...$ m/s ✓ $speed = 1{,}49$ m/s ✓	Formula: 1 mark Substitution: 1 mark Correct answer (not rounded off): 1 mark Answer correct to two decimal places: 1 mark	(4)

6.4.4	Area of paving = (55 m x 30 m) – (50 m x 25m) = 1650m² – 1250m² = 400 m²	Correct formula with substitution: 2 marks Simplification: 1 mark Answer: 1 mark	(4)

[53]

QUESTION 7

7.1.1	$P(R\,50) = \dfrac{2}{6} = \dfrac{1}{3}$ ✓	answer: 1 mark Note: learners can stop at $\dfrac{2}{6}$	(1)

7.1.2		first branch: 1 mark second branch: 1 mark third branch: 1 mark	(3)

7.2.1	P(Yellow and Black) = $\dfrac{1}{4}$✓$\times\dfrac{1}{2} = \dfrac{1}{8}$ ✓	correct fractions in product: 1 mark answer: 1 mark	(2)
7.2.2	Relative freq. of purple = $\dfrac{15}{50}$ ✓ $= \dfrac{3}{10}$ ✓	correct fraction: 2 marks	(2)

[8]

QUESTION 8

8.1	Number of terms = 8 $\Rightarrow$ median lies between 4th and 5th scores $\therefore \dfrac{y+5}{2} = \dfrac{11}{2}$ ✓ $\Rightarrow y = 6$ ✓	1 mark: correct equation 1 mark: answer	(2)
8.2	Mean = 5 = $\dfrac{1+3+5+5+6+6+6+z}{8}$ $\therefore 5 \times 8 = 32 + z$ ✓✓ $\Rightarrow z = 8$	1 mark: correct equation 1 mark: answer	(3)
8.3	Mode = most recurring score = 6	1 mark: answer	(1)

[6]

Total   [140]