

DEPARTMENT OF BASIC EDUCATION
REPUBLIC OF SOUTH AFRICA

ANNUAL NATIONAL ASSESSMENT 2012
GRADE 9 MATHEMATICS
TEST (BRAILLE)
MEMORANDUM

MARKS: 140

This memorandum consists of 9 pages.

Important Information

- This is a marking guideline. In instances where learners have used different but mathematically sound strategies to solve the problems they should be credited.
- Unless stated otherwise, learners who give a correct answer only, should be awarded full marks.
- Apply consistency accuracy and underline errors committed by learners.

KEY	
M	Method mark
CA	Consistent Accuracy mark
A	Accuracy mark

QUESTION 1

1.	1.1	C	1.2	B	1.3	C	1.4	C	1.5	B	Give 1 mark for each correct answer.
	1.6	B	1.7	C	1.8	C	1.9	C	1.10	B	

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QUESTION 2

2.1 $3,56 \times 10^{-6} \text{ A}$

Answer: 1 mark (1)

2.2.1 $(3x)^3 + 2x^3$
 $= 27x^3 + 2x^3 \checkmark \text{ A}$
 $= 29x^3 \checkmark \text{ CA}$

$27x^3 + 2x^3$: 1 mark

Answer = $29x^3$: 1 mark (2)

2.2.2 $\frac{a^2b^2}{ac^2} \times \frac{4a^2bc}{20b^3}$
 $= \frac{4a^4b^3c}{20ab^2c^2} \checkmark \text{ M}$
 $= \frac{a^3}{5c} \checkmark \checkmark$

Answer: 2 marks

$\frac{4a^4b^3c}{20ab^2c^2}$: 1 mark

$\frac{a^3}{5c}$: 1 mark

(2)

$$2.3.1 \quad 4ab(5a^2b^2 + 2ab - 3) \\ = 20a^3b^3 \checkmark + 8a^2b^2 \checkmark - 12ab \checkmark \mathbf{A}$$

Distributive law: 1 mark each term
 $20a^3b^3$: 1 mark

$$8a^2b^2 : 1 \text{ mark} \\ -12ab : 1 \text{ mark} \quad (3)$$

$$2.3.2 \quad (2x - 1)^2 - (x + 1)(x - 1) \\ = 4x^2 - 4x + 1 \checkmark (-x^2 + 1) \checkmark \mathbf{M} \\ = 3x^2 - 4x + 2 \quad \checkmark \mathbf{CA}$$

Expanding: 1 mark
 Simplifying: 1 mark
 Answer: 1 mark (3)

$$2.4.1 \quad 8p^3 + 4p^2 \\ = 4p^2 \checkmark (2p + 1) \checkmark \mathbf{A}$$

Common factor: 1 mark
 $(2p + 1)$: 1 mark (2)

$$2.4.2 \quad 9p^2 - 36q^2 \\ = 9(p^2 - 4q^2) \checkmark \mathbf{M} \\ = 9(p - 2q)(p + 2q) \checkmark \mathbf{A} \\ \text{OR} \\ = (3p - 6q)(3p + 6q) \checkmark \mathbf{A} \\ = 3(p - 2q)3(p + 2q) \\ = 9(p - 2q)(p + 2q) \checkmark \mathbf{A}$$

Common factor: 1 mark
 Difference of two squares: 1 mark (2)

$$2.4.3 \quad tx - ty - 2x + 2y \\ = t(x - y) \checkmark - 2(x - y) \checkmark \mathbf{M/A} \\ = (x - y) \checkmark (t - 2) \checkmark \mathbf{M/A} \\ \text{OR} \\ = x(t - 2) \checkmark - y(t - 2) \checkmark \\ = (t - 2) \checkmark (x - y) \checkmark$$

Common factor t: 1 mark
 Common factor 2: 1 mark
 Common factor $(x - y)$: 2 marks

(4)

$$2.5.1 \quad 3(x + 6) = 12 \\ x + 6 = 4 \checkmark \mathbf{M} \\ x = -2 \checkmark \mathbf{CA} \\ \text{OR} \\ 3x + 18 = 12 \\ 3x = -6 \checkmark \mathbf{M} \\ x = -2 \checkmark \mathbf{CA}$$

Dividing by 3: 1 mark
 Answer: 1 mark
 OR
 -18 both sides: 1 mark
 Answer: 1 mark (2)

$$2.5.2 \quad x^2 - 2x = 0 \\ x(x - 2) = 0 \checkmark \mathbf{M} \\ x = 0 \checkmark \text{ or } x = 2 \checkmark \mathbf{CA}$$

Common factor: 1 mark
 Answer: 2 marks
 (1 mark per factor) (3)

2.5.3 $\frac{x+1}{3} - \frac{x-1}{6} = 1$

Multiplying by 6: 1 mark
Expanding: 1 mark
Answer: 1 mark (3)

$$\begin{aligned} 2(x+1) - (x-1) &= 6 \checkmark \text{ M} \\ 2x + 2 - x + 1 &= 6 \checkmark \text{ CA} \\ x &= 3 \checkmark \text{ CA} \end{aligned}$$

2.5.4 $2^{x+1} = 32$

2^5 : 1 mark
Applying exponential law: 1 mark
Answer: 1 mark (3)

$$\begin{aligned} 2^{x+1} &= 2^5 \checkmark \text{ M} \\ x + 1 &= 5 \checkmark \text{ M/CA} \\ x &= 4 \checkmark \text{ CA} \end{aligned}$$

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QUESTION 3

3.1 Number of boys = $\frac{3}{4} \checkmark \times 240 = 180 \checkmark \text{ M/CA}$

$\frac{3}{4}$: 1 mark
Answer: 1 mark (2)

3.2 Speed = $\frac{\text{distance}}{\text{time}} \checkmark \text{ M/A}$
 $40 \text{ km/h} = \frac{9 \text{ km}}{\text{time}}$
 $\text{time} = \frac{9}{40} \times 60 \text{ minutes} \checkmark \text{ M}$
 OR $0,225 \times 60 \text{ minutes}$
 $= 13,5 \text{ minutes} \checkmark \text{ CA}$

Formula / Substitution: 1 mark

$\frac{9}{40}$ or 0,225: 1 mark
Answer: 1 mark (3)

3.3 $A = P(1+i)^n \checkmark \text{ M/A}$
 $= R12\,000(1+0,065)^5 \checkmark \text{ M}$
 $= R16\,441,04 \checkmark \text{ CA}$

OR

Formula: 1 mark
Substitution: 1 mark
Answer: 1 mark (3)

OR

$$\begin{aligned} A &= P \left(1 + \frac{r}{100} \right)^n \checkmark \\ &= R12\,000 \left(1 + \frac{6,5}{100} \right)^5 \checkmark \\ &= R16\,441,04 \checkmark \end{aligned}$$

Year 1: $12\,000 \times 6,5\% = 780$
 Year 2: $12\,780 \times 6,5\% = 830,70$
 Year 3: $13\,610,7 \times 6,5\% = 884,70$
 Year 4: $14\,495,4 \times 6,5\% = 942,20$
 Year 5: $15\,437,6 \times 6,5\% = 1\,003,44$
 There will be R16 441,04 in his account

3.4.1 $15\% \text{ cash} = \frac{15}{100} \times R15\,000$
 $= R2\,250 \checkmark \text{ A}$

Answer: 1 mark (1)

3.4.2 $A = P(1+ni) \checkmark \text{ CA from 3.4.1}$
 $= R12\,750 \checkmark [1 + 2(0,1)] \checkmark$
 $= R15\,300 \checkmark$
 OR

Formula: 1 mark
Substitution: 2 marks
Answer: 1 mark

$$SI = \frac{Pnr}{100} \checkmark$$

OR

Formula: 1 mark

$$= \frac{R12\,750 \checkmark (2)(10) \checkmark}{100}$$

$$= R2\,250$$

Total amount = $R12\,750 + R2\,250$

$$= R15\,300 \checkmark$$

Substitution: 1 mark

Answer: 1 mark

Answer: 1 mark

(4)

3.4.3 Monthly payments = $R15\,300 \div 24 \checkmark$ **CA from 3.4.1**

$$= R637,50 \checkmark$$

$$R15\,300 \div 24: 1 \text{ mark}$$

Answer: 1 mark

(2)

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QUESTION 4

4.1 $18 \checkmark$ and $23 \checkmark$ **A**

Answer: 2 marks

1 mark per term

(2)

4.2 Add 5 to the last term to get the next. \checkmark **A**

Correct answer: 1 mark

(1)

4.3 $T_n = 5n - 2 \checkmark \checkmark$ **A**

Answer: 2 marks

(2)

4.4 $T_n = 5n - 2$ **CA from 4.3**

$$38 = 5n - 2 \checkmark$$

CA

$$40 = 5n \checkmark$$

M

$$\therefore 8 = n \checkmark$$

A

Substitution into the formula: 1 mark

Solving equation: 1 mark

Answer: 1 mark

(3)

[8]

QUESTION 5

5.1.1 Parallel ✓ **A**

Answer: 1 mark (1)

5.1.2 $y = -2$ ✓ **A**

Answer: 1 mark (1)

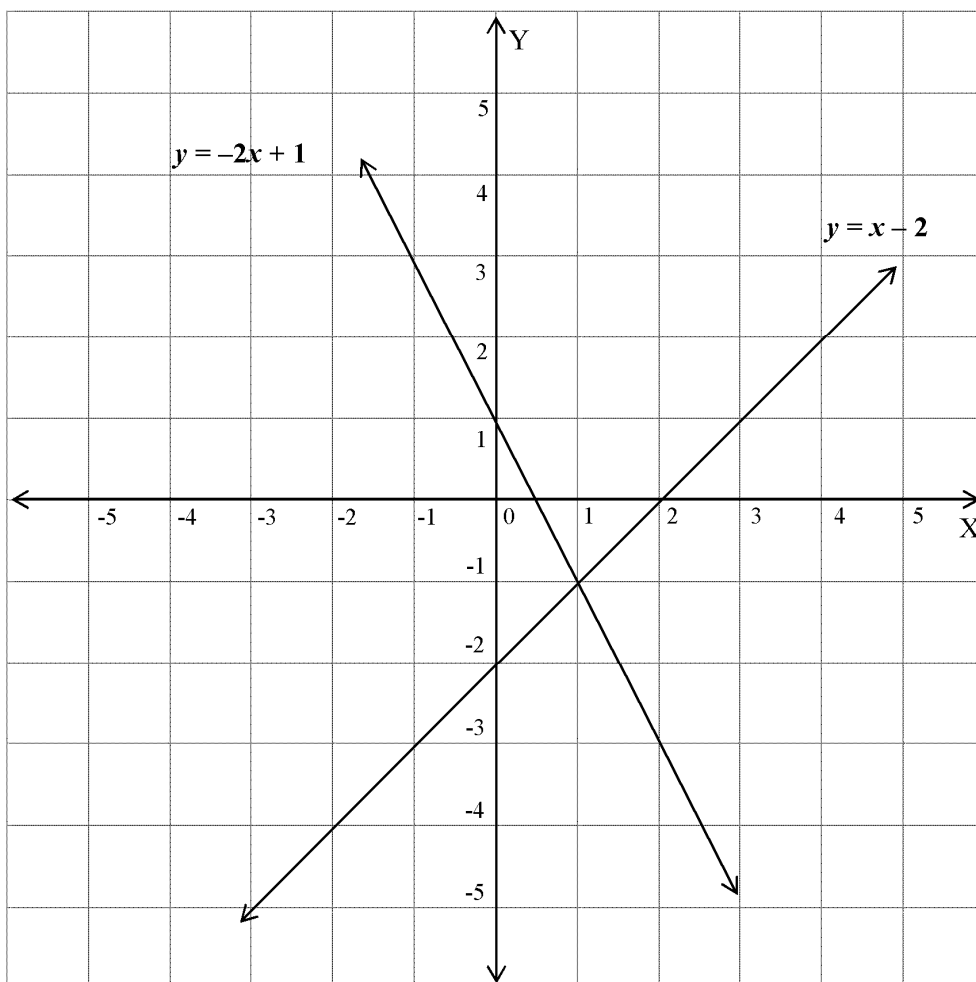
5.1.3 4 ✓ **A**

Answer: 1 mark (1)

5.1.4 Non-linear ✓ **A**

Answer: 1 mark (1)

5.2.1



X-intercept and Y-intercept: 2 marks per graph ✓✓ + ✓✓✓

Gradient: 1 mark per graph ✓ + ✓

Correct Labelling of graph: 1 mark per graph ✓ + ✓ (8)

5.2.2 At point of intersection: $-2x + 1 = x - 2$ ✓
 $-3x = -3$
 $x = 1$
 and $y = (1) - 2 = -1$
 $\therefore T(1; -1)$ ✓

Equation: 1 mark
 Answer: 1 mark (2)

OR

$y = -2x + 1$ If $x = 1; y = (-2(1) + 1) = -1$
 $y = x - 2$ If $x = 1; y = 1 - 2 = -1$

Therefore, this point lies on both graphs and it must be the point of intersection [14]

QUESTION 6

6.1 6.1.1 $2x + 3x + 4x = 180^\circ$ ✓ (TQ̂S is a straight angle) ✓ M/A
 $9x = 180^\circ$
 $x = 20^\circ$ ✓ A

Statement: 1 mark
 Reason: 1 mark
 Answer: 1 mark (3)

6.1.2 $y = 3x$ ✓ (alternate Ls ; PQ || RS) ✓ M
 $y = 60^\circ$ ✓ CA for 6.1.1

Statement: 1 mark
 Reason: 1 mark
 Answer: 1 mark (3)

6.1.3 $\hat{S} = T\hat{Q}P$ ✓ (corresponding Ls; PQ || RS) ✓
 $z = 2x^\circ$
 $z = 40^\circ$ ✓ M

OR

$\hat{Q} + \hat{R} + \hat{S} = 180^\circ$ ✓ (sum of Ls of $\Delta = 180^\circ$) ✓ M
 $4x + y + z = 180^\circ$
 $80^\circ + 60^\circ + z = 180^\circ$
 $z = 180^\circ - 140$
 $z = 40^\circ$ ✓ A

OR

$T\hat{Q}P + P\hat{Q}R = \hat{R} + \hat{S}$ ✓ (ext L of $\Delta =$ sum of intopp Ls) ✓ M
 $2x + 3x = y + z$
 $5x = 60^\circ + z$
 $100^\circ = 60^\circ + z$
 $z = 40^\circ$ ✓ A

Statement: 1 mark
 Reason: 1 mark
 Answer: 1 mark (3)

6.2 $\Delta STV \equiv \Delta ABC$ ✓ ($S, <, S$) ✓ A

Statement with vertices in the correct order: 1 mark
 Reason : 1 mark (2)

6.3.1 In ΔABD and ΔACD
 $AB = AC$ (given) ✓ A
 $BD = CD$ (given) ✓ A
 $AD = AD$ (common side) ✓ A
 $\therefore \Delta ABD \equiv \Delta ACD$ (s,s,s) ✓ A

Correct statement with reason: 1 mark
 Correct statement with reason: 1 mark
 Correct statement with reason: 1 mark
 Correct deduction and reason : 1 mark (4)

OR

In $\triangle ABD$ and $\triangle ACD$

$\angle ABD = \angle ACD$ (opposite angles of a kite)

$AB = AC$ (given) ✓

$BD = CD$ (given) ✓

$\therefore \triangle ABD \equiv \triangle ACD$ (s, \angle , s) ✓

6.3.2 In $\triangle ABE$ and $\triangle ACE$

$AB = AC$ (given) ✓ A

$AE = AE$ (common side) ✓ A

$\angle BAE = \angle CAE$ corr. \angle s of congr. \triangle s/ bisecting diagonals) ✓ A

$\therefore \triangle ABE \equiv \triangle ACE$ (s, L, s) ✓ A

OR

In $\triangle ABE$ and $\triangle ACE$

$AB = AC$ (given) ✓

$\angle ABE = \angle ACE$ (Ls opp = sides of \triangle) ✓

$\angle BAE = \angle CAE$ corr. \angle s of congr. \triangle s) or $BE = EC$ (AD bisects BC) ✓

$\therefore \triangle ABE \equiv \triangle ACE$ (L, L, s)

Correct statement with reason: 1 mark

Correct statement with reason: 1 mark

Correct statement with reason: 1 mark

Correct deduction and reason: 1 mark (4)

6.3.3 $\angle AEC + \angle AEB = 180^\circ$ ($\angle BEC$ is str L) ✓ A

But $\angle AEC = \angle AEB$ (corr. \angle s of congr. \triangle s) ✓ A

$\therefore \angle AEC = \angle AEB = 90^\circ$ ✓ A

Correct statement with reason: 1 mark

Correct statement with reason: 1 mark

Conclusion: 1 mark (3)

OR

$BC \perp AD$ ✓✓ (diagonals of a kite) ✓

6.3.4 AE is perpendicular to BC ✓ A

Answer: 1 mark (1)

6.4 $\frac{AB}{ED} = \frac{BC}{DF}$ ✓ (proportional sides of similar \triangle s) ✓ A

$$\frac{AB}{6cm} = \frac{15cm}{10cm} \quad \checkmark \quad A$$

$$AB = \frac{(15)(6)}{10} cm$$

$$AB = 9 cm \quad \checkmark \quad A$$

Proportional sides and reason: 2 marks

substitution: 1 mark

Answer: 1 mark

(4)

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QUESTION 7

7.1 $D'(-1; 1)$ ✓ $E'(1; 1)$ ✓ A

Answer: 2 marks

1 mark per pair of co-ordinates (2)

7.2 $A'(1; 7)$ ✓ $B'(1; 1)$ ✓ A

Answer: 2 marks

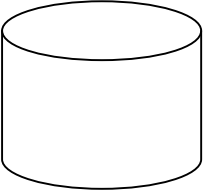
1 mark per pair of co-ordinates (2)

- 7.3 The perimeter = $(3 + 1,5 + 1 + 1 + 2 + 0,5) \text{ units} = 9 \text{ units}$ ✓✓
M/A
 OR
 $(6+3+2+2+4+1) \div 2 = 9 \text{ units}$
- Length of reduced sides: 1 mark
 Answer: 1 mark (2)

- 7.4 Area of fig. P: Area of reduced fig = 4: 1 ✓✓ **M/A**
 OR
 Area of fig P to Area of reduced Fig = 1:0,25 or $1:\frac{1}{4}$
 OR
 Area of fig P to Area of reduced Fig = 10:2,5
- Answer: 2marks
 (Dimensions halved: Area $\frac{1}{4}$ of original) (2)

[8]

QUESTION 8

8.1	3-D figure	Name of figure	No. of faces	No. of vertices	No. of edges	1 mark for each answer
		Cylinder ✓	3 faces ✓	No vertices ✓	2 edges ✓	
	Shape of the faces: Circles ✓ and a rectangle ✓					(6)

- 8.2 The surface area of a rectangular prism is:
 $= 2(l \times b) + 2(l \times h) + 2(b \times h)$ ✓
 $= 2(7,2 \times 5) + 2(7,2 \times 3,32) + 2(5 \times 3,32) \text{ m}^2$ ✓✓ **M/A**
 $= (72 + 47,808 + 33,2) \text{ m}^2$ ✓ **CA**
 $= 153,01 \text{ m}^2$ ✓ **CA**
- Formula/ substitution into the correct formula: 3 marks
 Calculation: 1 mark
 Answer: 1 mark
 Wrong formula: 0 marks (5)

OR

$$\begin{aligned}
 &2lb + 2(l + b)h \text{ ✓} \\
 &= 2(7,2 \times 5) + 2(7,2 + 5)3,32 \text{ ✓✓} \\
 &= 72 \text{ m}^2 + 81,01 \text{ m}^2 \text{ ✓} \\
 &= 153,01 \text{ m}^2 \text{ ✓}
 \end{aligned}$$

- 8.3 Volume of a cylinder = $1\,000 \text{ cm}^3$
 $\pi r^2 h = 1\,000 \text{ cm}^3$ ✓✓ **M**
 $\pi (2,82)^2 h = 1\,000 \text{ cm}^3$ ✓ **M**
 $h = 40 \text{ cm}$ ✓
 $h = 40,0268 \text{ cm} \approx 40 \text{ cm}$ ✓ **CA**
- Formula & substitution: 2 marks
 Calculation: 1 mark
 Answer: 1 mark (4)

[15]

QUESTION 9

9.1.1	Class Interval	Tally marks	Frequency	1 mark per interval A
	1 – 10	—	0	
	11 – 20	II	2	
	21 – 30		12	
	31 – 40	IIII	9	
	41 – 50	II	7	

(4)

9.1.2 (a) Modal class is 11 – 20 ✓ answer (1)

9.1.2 (b) A = 9 ✓ answer (1)

9.1.2 (c) B = 20 ✓ answer (1)

9.1.2 (d) 16 ✓ answer (1)

9.2.1 Range = $10 - 5 = 5$ ✓ **A**
 5 5 6 7 8 **8** 9 9 9 9 10
 Median = 8 ✓ **A** Range: 1 mark
 Median: 1 mark (2)

9.2.2 Mode = 5 ✓ Answer: 1 mark (1)

9.2.3 Mean = $\frac{5+7+7+5+5+7+5+5+8+6}{10}$ ✓ **M**
 = 6 ✓ **A** Formula: 1 mark
 Answer: 1 mark (2)

[13]

TOTAL: 140