Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

AMATHOLE EAST DISTRICT

GRADE 11

MARCH CONTROLLED TEST
TERM 1 2026

MATHEMATICS

MARKS : **60**

TIME : **1 HOUR 10 MIN**

This question paper consists of 4 pages, including formulae that might be needed

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of **TWO** questions. Answer ALL the questions.

2. Clearly show ALL calculations that you have used in determining your answer.

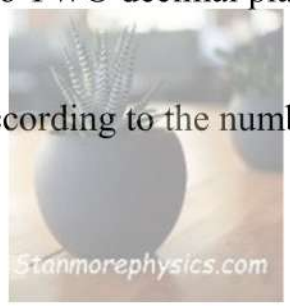
3. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

4. Answers only will not necessarily be awarded full marks.

5. If necessary, round off answers to TWO decimal places, unless stated otherwise.

6. Number the answers correctly according to the numbering system used in this question paper.

7 Write neatly and legibly.



QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 - 2x = 8$ (3)

1.1.2 $4x^2 - x - 2 = 0$ $(round\ off\ to\ decimal\ places)$ (3)

1.1.3 $x(x-1) \geq 6$ (4)

1.1.4 $2x + \sqrt{x+1} = 1$ (5)

1.1.5 $4.3^x + 3^x = 15$ (3)

1.2 Solve for x and y simultaneously (6)
$4x + y = 7$ and $3x^2 + 2xy = y^2$

1.3 The roots of the equation are $x = \frac{-3 \pm \sqrt{13-2k}}{4}$
Calculate the value(s) of k for which the roots are real (3)

1.4 Simplify: $\frac{8^k.6^{k-3}.9^{1-k}}{16^{k-1}.3^{-k}}$ (4)

[31]

QUESTION 2

2.1 Given $\tan\alpha = -\frac{9}{40}$ and $180^o < \alpha < 360^o$, determine without using a calculator and by the use of a diagram the value(s) of:

2.1.1 $\sin\alpha$ (2)

2.1.2 $\cos\alpha$ (1)

2.1.3 $sin^2\alpha + cos^2\alpha$ (2)

2.2 Simplify fully:

$$\frac{sin(90^o - x).tan(360^o - x).sin(x - 180^o)}{1 - cos^2 x}$$ (6)

2.3 Simplify without using a calculator

$$\frac{1 - cos^2 17^o + sin^2 17^o}{tan17°.cos73°.cos17°}$$ (5)

2.4 Prove that:

2.4.1 $(1-cos^2x)\left(tanx+\frac{cosx}{sinx}\right)=tanx$ (5)

2.4.2 For which value(s) of x in the interval $[0;360]$ is the identity in QUESTION 3.4.1 undefined? (3)

2.5 Determine the general solution of

$2sinAcosA-cosA=0$ (5)

[29]

TOTAL MARKS 60

FORMULAE

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$cos^2\theta+sin^2\theta=1$$

$$tan\theta=\frac{sin\theta}{cos\theta}$$

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MATHEMATICS TERM 1 CONTROLLED TEST MARKING GUIDELINE

MARKS: 75

This marking guideline consists of 7 pages.

QUESTION 1

1.1	Solve for x:	
1.1.1	$2x(3-x)=0$ $x=0$ or $x=3$	✓ $x=0$ ✓ $x=3$ (2)
1.1.2	$(x+1)(x-3)=2x$ $x^2-3x+x-3=2x$ $x^2-4x-3=0$ $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $x=\frac{-(-4)\pm\sqrt{(-4)^2-4(1)(-3)}}{2(1)}$ $x=4{,}65$ or $x=-0{,}65$	✓ Standard form ✓ Substitution ✓ $x=4{,}65$ ✓ $x=-0{,}65$ (4)
1.1.3	$-x^2+24\leq -2x$ $x^2-2x-24\geq 0$ $(x-6)(x+4)\geq 0$ c.v $x=6$ or $x=-4$ $x\leq -4$ or $x\geq 6$ **OR** $-x^2+24\leq -2x$ $-x^2+2x+24\leq 0$ $(-x+6)(x+4)\leq 0$ $(x-6)(x+4)\geq 0$ c.v $x=6$ or $x=-4$ $x\leq -4$ or $x\geq 6$	✓ Standard form ✓ Critical values ✓ $x\leq -4$ ✓ $x\geq 6$ (4) **OR** ✓ Standard form ✓ Critical values ✓ $x\leq -4$ ✓ $x\geq 6$ (4)
1.1.4	$\sqrt{7+3x}+2x=0$ $\sqrt{7+3x}=-2x$ $(\sqrt{7+3x})^2=(-2x)^2$ $7+3x=4x^2$ $4x^2-3x-7=0$ $(4x-7)(x+1)=0$ $x=\frac{7}{4}$ or $x=-1$ $\therefore x=-1$	✓ Isolation ✓ Squaring both sides ✓ Standard form ✓ Both x values ✓ Conclusion (5)

1.2	$3x^2 - 12x = -9$ $x^2 - 4x = -3$ $x^2 - 4x + (-2)^2 = -3 + (-2)^2$ $(x-2)^2 = 1$ $\sqrt{(x-2)^2} = \pm\sqrt{1}$ $x - 2 = \pm 1$ $x = 2 + 1$ or $x = 2 - 1$ $x = 3$ or $x = 1$	✓ Dividing by 3 ✓ Adding the half square on both sides ✓ Introducing root on both sides ✓ $x = 3$ or $x = 1$ (4)
1.3 (a)	$x + y = 50$ $x - 5 = 7(y - 5)$	✓ $x + y = 50$ ✓ $x - 5 = 7(y - 5)$ (2)
(b)	$x + y = 50$ .....(1) $x - 5 = 7(y - 5)$ .....(2) From (1) $y = 50 - x$ .....(3) Sub (3) into (2) $x - 5 = 7((50 - x) - 5)$ $x - 5 = 7(50 - x - 5)$ $x - 5 = 7(45 - x)$ $x - 5 = 315 - 7x$ $7x + x = 315 + 5$ $8x = 320$ $x = 40$ $y = 50 - 40$ $y = 10$	✓ Equation…3 ✓ Substitution ✓ Simplification ✓ Value of x ✓ Value of y (5)
1.4.1	$x = \frac{m \pm \sqrt{m^2 - 9}}{2}$ $\Delta = (5)^2 - 9$ $\Delta = 16$ ∴ The roots are **real, rational and unequal.**	✓ $\Delta = 16$ ✓ **Real** (2)
1.4.2	$\Delta < 0$ $m^2 - 9 < 0$ $(m-3)(m+3) < 0$ c.v $m = 3$ or $m = -3$ $-3 < x < 3$	✓ $m^2 - 9 < 0$ or $\Delta < 0$ ✓ Factors ✓ ✓ $-3 < x < 3$ (4)
		[32]

QUESTION 2		
2.1	Simplify:	
2.1.1	$\frac{10^{n+3}.5^{n-1}}{50^{n+2}}$ $= \frac{(2\times5)^{n+3}.5^{n-1}}{(2\times5^2)^{n+2}}$ $= \frac{2^{n+3}\times5^{n+3}.5^{n-3}}{2^{n+2}.5^{2n+4}}$ $= 2^{n+3-n-2}\times5^{n+3+n-1-2n-4}$ $= 2^1\times5^{-2}$ $= \frac{2^1}{5^2}$ $= \frac{2}{25}$	✓ Prime bases ✓ Addition and subtractions of exponents for same bases ✓ Answer (3)
2.1.2	$\frac{3^{x+3}-5.3^{x+1}}{3^{x+1}}$ $= \frac{3^x.3^3-5.3^x.3^1}{3^x.3^1}$ $= \frac{3^x(3^3-5.3^1)}{3^x.3^1}$ $= \frac{3^3-5.3^1}{3^1}$ $= \frac{27-15}{3}$ $= \frac{12}{3}$ $= 4$	✓ Rewriting with prime bases ✓ Factorising ✓ Simplification ✓ Answer (4)
2.1.3	$\frac{\sqrt{45}-\sqrt{20}}{3\sqrt{5}}$ $= \frac{\sqrt{9\times5}-\sqrt{4\times5}}{3\sqrt{5}}$ $= \frac{3\sqrt{5}-2\sqrt{5}}{3\sqrt{5}}$ $= \frac{\sqrt{5}}{3\sqrt{5}}$ $= \frac{1}{3}$	✓ Breaking surds ✓ Simplification ✓ Answer (3)

2.2	Solve for x:	
2.2.1	$\sqrt[x]{3} = 27$ $(3)^{\frac{1}{x}} = 3^3$ $3^{\frac{1}{x}} = 3^3$ $\frac{1}{x} = 3$ $x = \frac{1}{3}$	✓ Applying laws of exponents ✓ Equating the exponents ✓ Answer (3)
2.2.2	$x^{\frac{2}{3}} - 5x^{\frac{1}{3}} + 6 = 0$ $\left(x^{\frac{1}{3}} - 2\right)\left(x^{\frac{1}{3}} - 3\right) = 0$ $x^{\frac{1}{3}} = 2$ or $x^{\frac{1}{3}} = 3$ $x^{\frac{1}{3}\times\frac{3}{2}} = 2^{1\times\frac{3}{1}}$ or $x^{\frac{1}{3}\times\frac{3}{2}} = 3^{1\times\frac{3}{1}}$ $x = 2^3$ or $x = 3^3$ $x = 8$ or $x = 27$ **OR** $x^{\frac{2}{3}} - 5x^{\frac{1}{3}} + 6 = 0$ $(x^{\frac{1}{3}})^2 - 5x^{\frac{1}{3}} + 6 = 0$ Let $x^{\frac{1}{3}} = k$ $k^2 - 5k + 6 = 0$ $(k-2)(k-3) = 0$ $k = 2$ or $k = 3$ $x^{\frac{1}{3}} = 2$ or $x^{\frac{1}{3}} = 3$ $x^{\frac{1}{3}\times\frac{3}{2}} = 2^{1\times\frac{3}{1}}$ or $x^{\frac{1}{3}\times\frac{3}{2}} = 3^{1\times\frac{3}{1}}$ $x = 2^3$ or $x = 3^3$ $x = 8$ or $x = 27$	✓ Factors ✓ $x^{\frac{1}{3}} = 2$ and $x^{\frac{1}{3}} = 3$ ✓ $x = 8$ ✓ $x = 27$ (4) **OR** ✓ Factors ✓ $k = 2$ or $k = 3$ ✓ $x = 8$ ✓ $x = 27$ (4)
		[17]

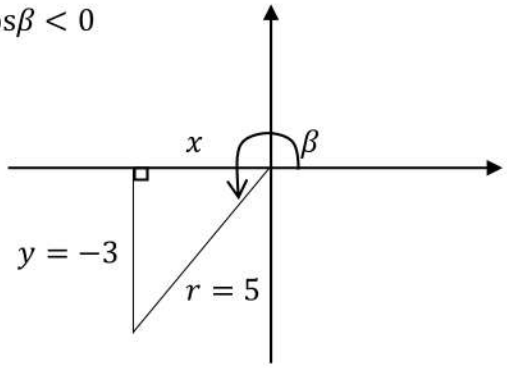
QUESTION 3

3.1

$5\sin\beta + 3 = 0$

$5\sin\beta = -3$

$\sin\beta = -\frac{3}{5}$, $\cos\beta < 0$



✓ $\sin\beta = -\frac{3}{5}$

✓ Diagram

$r^2 = x^2 + y^2$

$(5)^2 = x^2 + (-3)^2$

$x^2 = 16$

$\sqrt{x^2} = \sqrt{16}$

$x = \pm 4$

$x = -4$

✓ $x = -4$

$\frac{\tan\beta.\cos\beta}{2} = \frac{\left(\frac{-3}{-4}\right).\left(\frac{-4}{5}\right)}{2}$

✓ $\frac{-3}{-4}$

✓ $\frac{-4}{5}$

$= -\frac{3}{10}$

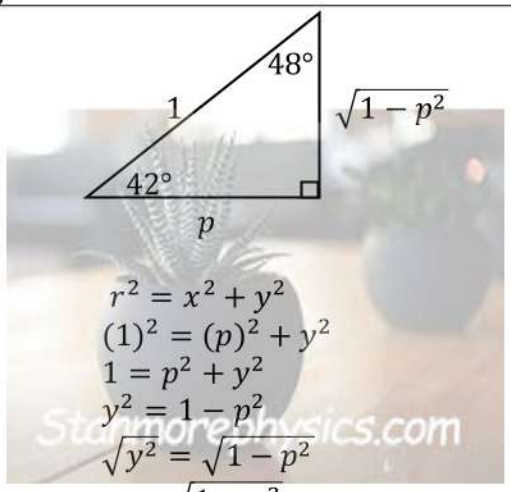
✓ Answer

(6)

3.2

3.2.1

$\cos 42° = p$



$r^2 = x^2 + y^2$

$(1)^2 = (p)^2 + y^2$

$1 = p^2 + y^2$

$y^2 = 1 - p^2$

$\sqrt{y^2} = \sqrt{1 - p^2}$

$y = \sqrt{1 - p^2}$

✓ $y = \sqrt{1 - p^2}$

✓ $\frac{\sqrt{1-p^2}}{1}$

$3\sin 42° = 3\left(\frac{\sqrt{1-p^2}}{1}\right)$

$= 3\sqrt{1 - p^2}$

✓ Answer

(3)

3.2.2

$\cos 132° = \cos(180° - 48°)$

$= -\cos 48°$

$= -\left(\frac{\sqrt{1-p^2}}{1}\right)$

$= -\sqrt{1 - p^2}$

✓ $-\cos 48°$

✓ $-\sqrt{1 - p^2}$

(2)

3.2.3	$\tan 318° = \tan(360° - 42°)$ $= -\tan 42°$ $= -\left(\frac{\sqrt{1-p^2}}{p}\right)$ $= -\frac{\sqrt{1-p^2}}{p}$	✓ $-\tan 42°$ ✓ $-\frac{\sqrt{1-p^2}}{p}$ (2)
3.3 3.3.1	$2\cos^2 x + 2\sin x.\cos x.\tan x$ $= 2\cos^2 x + 2\sin x.\cos x.\ \frac{\sin x}{\cos x}$ $= 2\cos^2 x + 2\sin^2 x$ $= 2(\cos^2 x + \sin^2 x)$ $= 2(1)$ $= 2$	✓ $\frac{\sin x}{\cos x}$ ✓ Factorising ✓ Answer (3)
3.3.2	$\frac{\cos(360°-x).\tan(-x)}{\sin^2(x-180°)}$ $= \frac{\cos x.-tanx}{(-\sin x)^2}$ $= -\frac{\cos x.\tan x}{\sin^2 x}$ $= -\frac{\cos x.\frac{\sin x}{\cos x}}{\sin^2 x}$ $= -\frac{1}{\sin x}$	✓ $\cos x$ ✓ $-\tan x$ ✓ $-\sin x$ ✓ $\frac{\sin x}{\cos x}$ ✓ Answer (5)
3.4	$\frac{\cos225°.\sin(-135°) - \sin330°}{\tan225°} = 1$ $LHS = \frac{\cos225°.\sin(-135°) - \sin330°}{\tan225°}$ $= \frac{\cos225°.-\sin 135° - \sin330°}{\tan225°}$ $= \frac{\cos(180°+45°).-\sin(180°-45°)-\sin(360°-30°)}{\tan(180°+45°)}$ $= \frac{-\cos 45°.-\sin 45°-(-\sin 30°)}{\tan 45°}$ $= \frac{\cos 45°.\sin 45°+\sin 30°}{\tan 45°}$ $= \frac{\left(\frac{\sqrt{2}}{2}\right).\left(\frac{\sqrt{2}}{2}\right)+\left(\frac{1}{2}\right)}{(1)}$ $= 1$ $\therefore LHS = RHS$	✓ $-\cos 45°$ ✓ $-\sin 135°$ or $-\sin 45°$ ✓ $-\sin 30°$ ✓ $\tan 45°$ ✓ Special angles (5)
		[26]
		TOTAL MARKS: 75