education

DEPARTMENT: EDUCATION
MPUMALANGA PROVINCE

NATIONAL SENIOR CERTIFICATE EXAMINATION

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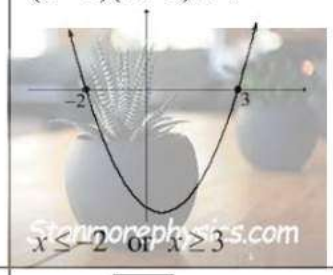
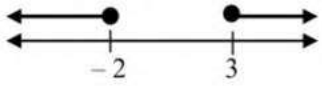
MATHEMATICS

GRADE 11

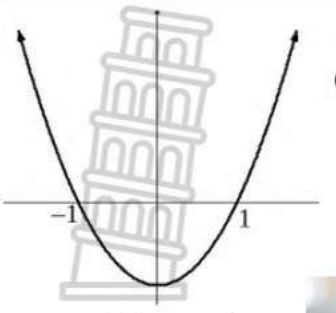


MARKS: 50

QUESTION 1

1.1.1	$x^2 - 2x = 8$ $x^2 - 2x - 8 = 0$ $(x+2)(x-4) = 0$ $x = -2$ or $x = 4$	✓ Standard Form ✓Factors ✓ x values (3)
1.1.2	$4x^2 - x - 2 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-1) \pm \sqrt{(-1)^2 - 4(4)(-2)}}{2(4)}$ $x = 0{,}84$ or $x = -0.59$	✓ Substitution ✓✓ Answers (3)
1.1.3	$x(x-1) \geq 6$ $x^2 - x - 6 \geq 0$ $(x-3)(x+2) \geq 0$  OR  $x \leq -2$ or $x \geq 3$	✓ Standard Form ✓ Critical Values ✓✓ Answers (4)
1.1.4	$2x + \sqrt{x+1} = 1$ $\sqrt{x+1} = 1 - 2x$ $(\sqrt{x+1})^2 = (1-2x)^2$ $x + 1 = 1 - 4x + 4x^2$ $4x^2 - 5x = 0$ $x(4x-5) = 0$ $x = 0$ *or* $x \neq \frac{5}{4}$	✓ Isolating the surd ✓ Squaring on both sides ✓ Standard Form ✓ Common factor ✓Rejecting $x = \frac{5}{4}$ (5)

1.2	$4x+y=7$ and $3x^2+2xy=y^2$ $4x+y=7$ $y=7-4x$ .....*line*1 $3x^2+2xy=y^2$ .....*line*2 *substitute line*1 int*o line*2: $3x^2+2x(7-4x)=(7-4x)^2$ $3x^2+14x-8x^2=49-56x+16x^2$ $-21x^2+70x-49=0$ $3x^2-10x+7=0$ $(3x-7)(x-1)=0$ $y=\frac{7}{3}$ *or* $x=1$ $y=-\frac{7}{3}$ *or* $y=3$ Substitute $x=\frac{7}{3}$ in $y=7-4x$ Substitute $x=1$ in $y=7-4x$ $y=7-4\left(\frac{7}{3}\right)$ $y=7-4(1)$ $y=-\frac{7}{3}$ $y=3$	✓ Making y the subject ✓ Substitution ✓ Standard form ✓ Factors ✓ x values ✓ y values (6)
1.3	*For equal roots*: $13-2k=0$ $2k=13$ $k=\frac{13}{2}$ *or* $k=6\frac{1}{2}$	✓ $13-2k=0$ ✓ $k=\frac{13}{2}$ (2)
1.4	$(x+5)^2=1-p^2$ $x+5=\pm\sqrt{1-p^2}$ $x=5\pm\sqrt{1-p^2}$ *For non−real roots*: $1-p^2<0$ $p^2-1>0$ $p<-1$ 0r $p>1$	✓ Squaring both sides ✓ x subject of the formula ✓ $1-p^2<0$ ✓ ✓ answer (5)



OR



$p < -1$ 0r $p > 1$

OR

$x^2 + 10x + 25 = 1 - p^2$

$x^2 + 10x + 24 + p^2 = 0$

$b^2 - 4ac = 100 - 4(1)(24 + p^2)$

$= 100 - 96 - 4p^2$

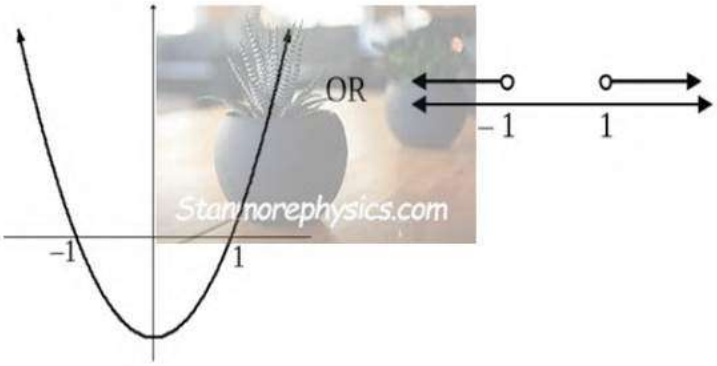
$= 4 - 4p^2$

For non − real roots:

$4 - 4p^2 < 0$

$p^2 - 1 > 0$

$(p-1)(p+1) > 0$



$p < -1$ *or* $p > 1$

- ✓ $b^2 - 4ac = 4 - 4p^2$
- ✓ $4 - 4p^2 < 0$
- ✓ Factors

✓ ✓ answer

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QUESTION 2

2.1.1	$=\frac{3^{2n+2}-9^{n-1}}{2.3^{2n+1}}$ $=\frac{3^{2n+2}-3^{3(n-1)}}{2.3.3^{n}}$ $=\frac{3^{2n+2}-3^{3n-3}}{6.3^{2n}}$ $=\frac{3^{2n}(3^{2}-3^{-3})}{6.3^{2n}}$ $=\frac{3^{2n}(9-\frac{1}{27})}{6.3^{2n}}$ $=\frac{80}{9}\times\frac{1}{6}$ $=\frac{40}{27}$	✓ Exponential Laws(Numerator) ✓ Common Factor ✓ Simplification ✓✓ Answer (5)
2.1.2	$\frac{(3-\sqrt{3})^{2}}{\sqrt{3}.\sqrt{6}}$ $=\frac{9-6\sqrt{3}+3}{\sqrt{3}.\sqrt{6}}$ $=\frac{12-6\sqrt{3}}{\sqrt{3}.\sqrt{6}}$ $=\frac{6(2-\sqrt{3})}{\sqrt{3}.\sqrt{6}}\times\frac{\sqrt{6}}{6}$ $=\frac{\sqrt{6}(3-\sqrt{3})}{\sqrt{3}}$ $=\sqrt{2}(2-\sqrt{3})$ *OR* $2\sqrt{2}-\sqrt{6}$	✓ Multiplying out the numerator ✓ Common Factor ✓✓ Answer (4)
2.2.1	$\sqrt[x]{32}=128$ $32^{\frac{1}{x}}=128$ $(2^{5})^{\frac{1}{x}}=2^{7}$ $\frac{5}{x}=7$ $x=\frac{7}{5}$	✓✓ $32^{\frac{1}{x}}$ ✓ Equating the exponents ✓ Answer (4)

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2.2.2	$x^{\frac{1}{2}} - 3x^{\frac{1}{4}} - 10 = 0$ $(x^{\frac{1}{4}} - 5)(x^{\frac{1}{4}} + 2) = 0$ $x^{\frac{1}{4}} = 5 \quad or \quad x^{\frac{1}{4}} = -2$ $x = 5^4 \quad or \quad x^{\frac{1}{4}} \neq -2$ $x = 625$ OR $x^{\frac{1}{2}} - 3x^{\frac{1}{4}} - 10 = 0$ $let \ k = x^{\frac{1}{4}}$ $k^2 - 3k - 10 = 0$ $(k-5)(k+2) = 0$ $k = 5 \ \ or \ \ k \neq -2$ $x^{\frac{1}{4}} = 5 \ \ or \ \ x^{\frac{1}{4}} \neq -2$ $x = 5^4$ $x = 625$	✓✓ Factors ✓ Restriction ($x^{\frac{1}{4}} \neq -2$) ✓ Answer (4) ✓ Standard Form ✓ Factors ✓ Restriction ($x^{\frac{1}{4}} \neq -2$) ✓ Answer (4)

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QUESTION 3

3.1.1	$x^2 + y^2 = r^2$ Phythagorsus $(-6)^2 + (8)^2 = r^2$ $r^2 = 100$ $r = 10$	✓ Substitution inti the Phythagorus ✓ Answer (2)
3.1.2	$\tan\theta = \frac{8}{-6} = -\frac{4}{3}$	✓ Answer (1)
3.1.3	$\sin\theta + \cos\theta$ $= \frac{8}{10} + \left(-\frac{6}{10}\right)$ $= \frac{8}{10} - \frac{6}{10} = \frac{1}{5}$	✓✓ Substitution ✓ Answer (3)
		[6]