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EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

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MATHEMATICS TERM 1 CONTROLLED TEST MARKING GUIDELINE

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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)
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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)

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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)
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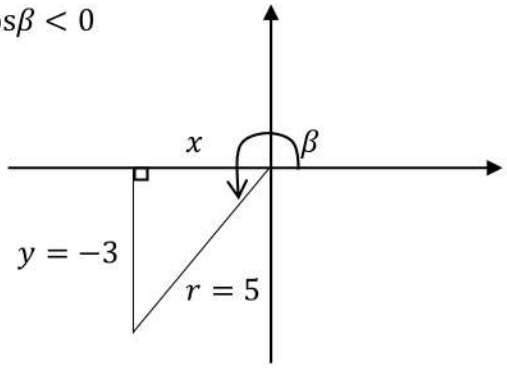
QUESTION 3

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

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

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

$x^2 = 16$

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

$x = \pm 4$

$x = -4$

✓ $x = -4$

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

✓ $\frac{-3}{-4}$

✓ $\frac{-4}{5}$

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

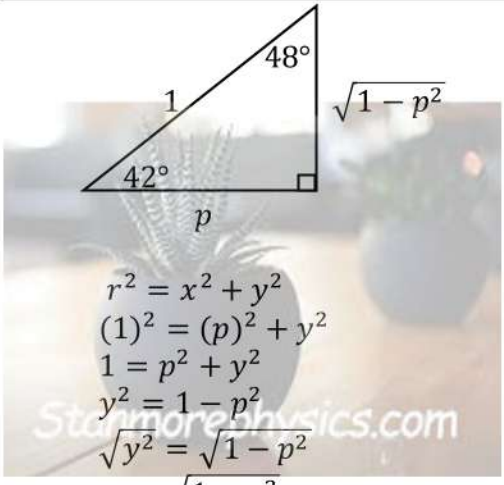
✓ Answer

(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)
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		TOTAL MARKS: 75

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