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PROVINCIAL COMMON TEST

GRADE 12

MATHEMATICS
CONTROL TEST 1
MARCH 2025
MEMORANDUM

MARKS: 100

TIME : 2 HOURS

This memorandum consist of 12 pages



SA EXAM PAPERS

Proudly South African

QUESTION 1

1.1.1	$(3x-6)(x+5)=0$ $x=2 \quad \text{or} \quad x=-5$	$\checkmark x=2$ $\checkmark x=-5$ (2)
1.1.2	$7x^2 + 4x - 9 = 0$ $x = \frac{-(4) \pm \sqrt{(4)^2 - 4(7)(-9)}}{2(7)}$ $x = 0.88 \quad \text{or} \quad x = -1.46$	$\checkmark$ substitution $\checkmark x = 0.88$ $\checkmark x = -1.46$ (3)
1.1.3	$(3-x)(x+7) < 0$ $cv: x=3 \quad \text{or} \quad x=-7$ $x < -7 \quad \text{or} \quad x > 3$ or $-(x-3)(x+7) < 0$ $(x-3)(x+7) > 0$ $x=3 \quad \text{or} \quad x=-7$ $x < -7 \quad \text{or} \quad x > 3$	$\checkmark$ critical values $\checkmark \checkmark x < -7 \quad \text{or} \quad x > 3$ (3)
1.1.4	$3\sqrt{x+3} - 5 = x$ $3\sqrt{x+3} = x+5$ $(3\sqrt{x+3})^2 = (x+5)^2$ $9(x+3) = x^2 + 10x + 25$ $9x + 27 = x^2 + 10x + 25$ $x^2 + x - 2 = 0$ $(x+2)(x-1) = 0$ $x = -2 \quad \text{or} \quad x = 1$ Both valid answers	$\checkmark$ squaring both sides $\checkmark$ standard for $\checkmark$ factors $\checkmark$ Answers (4)



1.2	$y = 3x + 2 \dots\dots(1)$ $\frac{1}{y} + \frac{3}{x} = -4$ $\frac{1}{3x+2} + \frac{3}{x} = -4$ $x + 3(3x+2) = -4(x)(3x+2)$ $x + 9x + 6 = -12x^2 - 8x$ $12x^2 + 18x + 6 = 0$ $2x^2 + 3x + 1 = 0$ $(2x+1)(x+1) = 0$ $x = -\frac{1}{2} \text{ or } x = -1$ $y = 3\left(-\frac{1}{2}\right) + 2 \quad \text{or } y = 3(-1) + 2$ $y = \frac{1}{2} \quad \text{or } y = -1$	✓ Substitution ✓ standard form ✓ factors ✓ x-value(s) ✓ y-value(s) (5)
1.3	$\frac{2^x}{8} = \frac{3^y}{3}$ $\frac{2^x}{2^3} = \frac{3^y}{3}$ $2^{x-3} = 3^{y-1}$ $x - 3 = 0 \quad y - 1 = 0$ $x = 3 \quad y = 1$ $x + y = 3 + 1 = 4$	✓ $2^{x-3} = 3^{y-1}$ ✓ $x = 3$ ✓ $y = 1$ ✓ Answers (4)
		[22]



QUESTION 2

2.1.1	$81; x; y; 3$ $a = 81$ $a + 3d = 3$ $81 + 3d = 3$ $3d = -78$ $d = -26$ $x = 81 - 26$ $x = 55$ $y = 55 - 26$ $y = 29$	$\checkmark 81 + 3d = 3$ $\checkmark d = -36$ $\checkmark x = 55$ $\checkmark y = 29$	(4)
2.1.2	$81; x; y; 3$ $a = 81$ $ar^3 = 3$ $81r^3 = 3$ $r^3 = \frac{1}{27}$ $r = \frac{1}{3}$ $x = 81\left(\frac{1}{3}\right)$ $x = 27$ $y = 27\left(\frac{1}{3}\right) \text{ OR } 81\left(\frac{1}{3}\right)^2$ $y = 9$	$\checkmark 81r^3 = 3$ $\checkmark r = \frac{1}{3}$ $\checkmark x = 27$ $\checkmark y = 9$	(4)





2.2.1	$661 \quad ; \quad 591 \quad ; \quad 525 \quad ; \quad 463$ $\begin{array}{ccc} -70 & -66 & -62 \\ 4 & 4 & \end{array}$ $2a = 4$ $a = 2$ $3(2) + b = -70$ $b = -76$ $2 + (-76) + c = 661$ $c = 735$ $T_n = 2n^2 - 76n + 735$	$\checkmark a = 2$ $\checkmark b = -76$ $\checkmark c = 735$ $\checkmark$ Answer (4)
2.2.2	$n = \frac{-(-76)}{2(2)}$ $n = 19$ $T_{19} = 2(19)^2 - 76(19) + 735$ $= 13$	$\checkmark$ substitution $\checkmark n = 19$ $\checkmark$ Answer (3)
2.3	$S_{2014} = \frac{2014}{2}[2a + (2014-1)d]$ $3029 + 6050 = 1007(2a + 2013d)$ $\frac{9079}{1007} = 2a + 2013d \dots\dots(1)$ $3029 = \frac{1007}{2}(2a + (1007-1)2d)$ $\frac{6058}{1007} = 2a + 2012d \dots\dots(2)$ $(1) - (2)$ $3 = d$	$\checkmark$ equation 1 $\checkmark$ equation 2 $\checkmark$ Answer (3)
		[18]

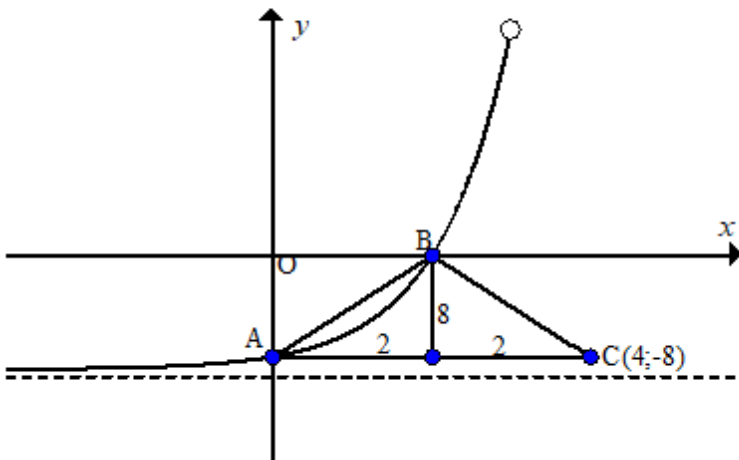


QUESTION 3

3.1	$63 + 21 + 7 + \dots$ $r = \frac{21}{63} = \frac{7}{21}$ $r = \frac{1}{3}$ $-1 < \frac{1}{3} < 1$	✓ expansion ✓ $r = \frac{1}{3}$ ✓ $-1 < \frac{1}{3} < 1$ (3)
3.2	$\sum_{k=m}^{\infty} 7 \cdot 3^{2-k}$ $a = 7 \cdot 3^{2-m}$ $s_{\infty} = \frac{a}{1-r}$ $\frac{21}{2} = \frac{7 \cdot 3^{2-m}}{1 - \frac{1}{3}}$ $14 = 14 \cdot 3^{2-m}$ $1 = 3^{2-m}$ $3^0 = 3^{2-m}$ $m = 2$	✓ $a = 7 \cdot 3^{2-m}$ ✓ substitution ✓ simplification ✓ $1 = 3^{2-m}$ ✓ Answer (5)
		[8]

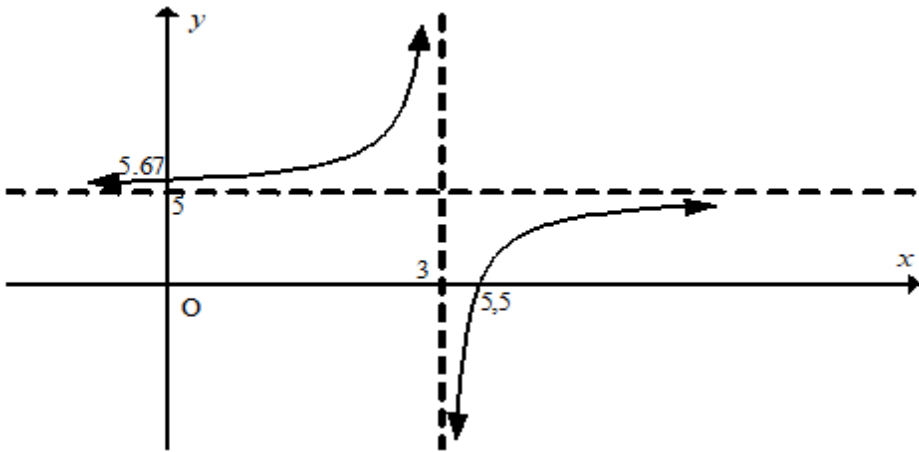


QUESTION 4

4.1	$y = -9$	✓ Answer (1)
4.2	$y = 3^0 - 9$ $y = -8$ $A(0; -8)$	✓ substitution ✓ $y = -8$ (2)
4.3	$0 = 3^x - 9$ $3^x = 3^2$ $x = 2$ $B(2; 0)$ $m = \frac{0 - 2}{-8 - 0}$ $y = \frac{1}{4}x - 8$	✓✓ coordinates of B ✓ substitution ✓ Answer (4)
4.4	$m(x) = 3^x$	✓ Answer (1)
4.5	$y = \log_3 x$	✓✓ Answer (2)
4.6	$y \in [-3; 2)$	✓✓ Answer (2)
4.7	 Area of $\triangle ABC = \frac{1}{2}(4)(8)$ $= 16 - \text{units}^2$	✓✓ coordinates of C. ✓ substitution ✓ Answer (4)
		[16]



QUESTION 5

5.1	$f(x) = \frac{-2}{x+p} + q$ $-x+8 = x+2$ $-2x = -6$ $x = 3$ $y = -3+8 \quad \text{or} \quad y = 3+2$ $y = 5$ $\therefore p = -3 \quad q = 5$	✓ equating ✓ $x = 3$ ✓ $p = -3$ ✓ $q = 5$ (4)
5.2	$f(x) = \frac{-2}{x-3} + 5$ $0 = \frac{-2}{x-3} + 5$ $-5(x-3) = -2$ $x-3 = \frac{2}{5}$ $x = \frac{2}{5} + 3$ $x = \frac{11}{2} \quad \left(\frac{11}{2}; 0\right) \text{ x-intercept}$ $y = \frac{-2}{0-3} + 5$ $y = \frac{17}{3} \quad \left(0; \frac{17}{3}\right) \text{ y-intercept}$	✓ $0 = \frac{-2}{x-3} + 5$ ✓ $x = \frac{11}{2}$ ✓ $y = \frac{17}{3}$ (3)
5.3		✓ shape ✓ asymptotes ✓ x and y intercepts. (3)

[10]

QUESTION 6

6.1.1	$\sin 212^\circ = \sin(180^\circ + 32^\circ)$ $= -\sin 32^\circ$ $= -p$	$\checkmark -\sin 32^\circ$ $\checkmark -p$ (2)
6.1.2	$\tan(-32^\circ)$ $-\tan 32^\circ$ $-\frac{p}{\sqrt{1-p^2}}$	$\checkmark -\tan 32^\circ$ $\checkmark$ Answer (2)
6.1.3	$\cos(-482^\circ) = \cos(-482^\circ + 360^\circ + 360^\circ)$ $= \cos 238^\circ$ $= \cos(180^\circ + 58^\circ)$ $= -\cos 58^\circ$ $= -p$	$\checkmark$ formulae $\checkmark$ substitution $\checkmark$ Answer (3)
6.2	$\frac{\cos^2(90^\circ + y) \cdot \sin(180^\circ - y) - \sin(360^\circ - y) \cdot \cos^2 y}{\cos(360^\circ - y)} = \tan y$ $\frac{\sin^2 y \cdot \sin y - (-\sin y) \cos^2 y}{\cos y}$ $\frac{\sin^3 y + \sin y \cdot \cos^2 y}{\cos y}$ $\frac{\sin y(\sin^2 y + \cos^2 y)}{\cos y}$ $\frac{\sin y(1)}{\cos y}$ $\tan y$	$\checkmark \sin^2 y$ $\checkmark \sin y$ $\checkmark -\sin y$ $\checkmark \cos y$ $\checkmark$ common factor $\checkmark \sin^2 y + \cos^2 y = 1$ (6)
6.3.1	$\cos x ; \sin x ; \sqrt{3} \sin x$ $\frac{\sin x}{\cos x} = \frac{\sqrt{3} \sin x}{\sin x}$ $\tan x = \sqrt{3}$ $x = 60^\circ$	$\checkmark \frac{\sin x}{\cos x} = \frac{\sqrt{3} \sin x}{\sin x}$ $\checkmark \tan x = \sqrt{3}$ $\checkmark x = 60^\circ$ (3)





6.3.2	$\cos 60^\circ ; \sin 60^\circ \sqrt{3} \sin 60^\circ$ $\frac{1}{2} ; \frac{\sqrt{3}}{2} ; \frac{3}{2} \dots$ $r = \frac{\sqrt{3}}{2} \div \frac{1}{2}$ $r = \sqrt{3}$ $S_{10} = \frac{\frac{1}{2}((\sqrt{3})^{10} - 1)}{\sqrt{3} - 1}$ $S_{10} = 165,29$	✓ first three terms ✓ $r = \sqrt{3}$ ✓ substitution ✓ Answer (4)
6.4	$6 \sin^2 x - 7 \cos x - 5 = 0$ $6(1 - \cos^2 x) - 7 \cos x - 5 = 0$ $6 - 6 \cos^2 x - 7 \cos x - 5 = 0$ $-6 \cos^2 x - 7 \cos x + 1 = 0$ $6 \cos x + 7 \cos x - 1 = 0$ $\cos x = \frac{-7 + \sqrt{(7)^2 - 4(6)(-1)}}{2(6)}$ $\cos x = \frac{-7 + \sqrt{73}}{12} \quad \text{or} \quad \cos x = \frac{-7 - \sqrt{73}}{12}$ $x = 82,61^\circ + k.360^\circ \quad N / A$ $x = 277.39^\circ + k.360^\circ, \quad k \in Z$	✓ $1 - \cos^2 x$ ✓ standard form ✓ substitution into formula. ✓ value(s) of $\cos x$ ✓ N/A ✓ $x = 82,61^\circ + k.360^\circ$ ✓ $x = 277.39^\circ + k.360^\circ,$ (7)
		[27]

TOTAL: 100

