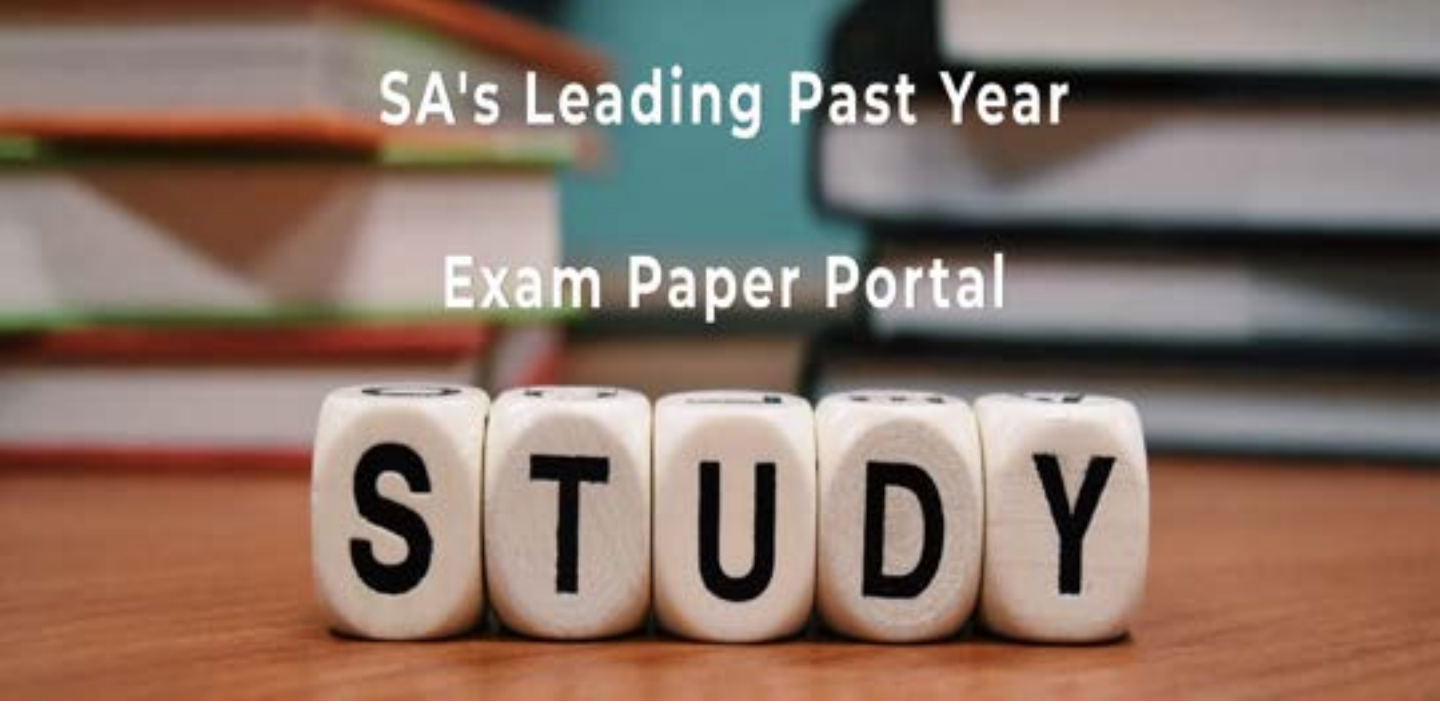

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GAUTENG DEPARTMENT OF EDUCATION

JOHANNESBURG NORTH DISTRICT

2021
GRADE 12
CONTROL TEST

MATHEMATICS
TERM 1

MARKING GUIDELINES

MARKS : 100
TIME : 2 hours

QUESTION 1		
1.1.1	$(x-5)(x+1)=0$ $x=5$ or $x=-1$	✓ $x=5$ ✓ $x=-1$ (2)
1.1.2	$2x^2-11x+7=0$ $x=\dfrac{-(-11)\pm\sqrt{(-11)^2-4(2)(7)}}{2(2)}$ $x=4{,}77$ or $x=0{,}73$	✓ Sub ✓ $x=4{,}77$ ✓ $x=0{,}73$ (3)
1.1.3	$x-5x^{\frac{1}{2}}=-6$ $x-5x^{\frac{1}{2}}+6=0$ Let $k^2=x$ and $k=x^{\frac{1}{2}}$ $\therefore k^2-5k+6=0$ $(k-3)(k-2)=0$ $k=3$ or $k=2$ But: $x^{\frac{1}{2}}=3$ or. $x^{\frac{1}{2}}=2$ $(x^{\frac{1}{2}})^2=(3)^2$ or. $(x^{\frac{1}{2}})^2=(2)^2$ $x=9$ or $x=4$	✓ Standard form ✓ factors ✓ squaring ✓ x values (4)
1.2	$\sqrt{\dfrac{5^{2014}-5^{2012}}{6}}$ $=\sqrt{\dfrac{5^{2012}.5^2-5^{2012}}{6}}$ $=\sqrt{\dfrac{5^{2012}(25-1)}{6}}$ $=\sqrt{4.5^{2012}}$ $=2(5^{1006})$ $\therefore a=2.$ and. $b=1006$	✓ $\sqrt{\dfrac{5^{2012}.5^2-5^{2012}}{6}}$ ✓ $\sqrt{4.5^{2012}}$ ✓ $a=2.$ ✓ . $b=1006$ (4)

1.3	$1 = 3y - x$ ……(1) $y^2 + 2xy = 3x^2 - 7$ ……..(2) $x = 3y - 1$ ……(3) Sub (3) into (2) $y^2 + 2y(3y - 1) = 3(3y - 1)^2 - 7$ $y^2 + 6y^2 - 2y = 27y^2 - 18y + 3 - 7$ $0 = 20y^2 - 16y - 4$ $0 = 5y^2 - 4y - 1$ $0 = (y - 1)(5y + 1)$ $y = 1$ or $y = \frac{-1}{5}$ Sub y-values into (3) $x = 3(1) - 1$ or $x = 3(\frac{-1}{5}) - 1$ $x = 2$ or $x = \frac{-8}{5}$	✓ Equation 3 ✓ Sub ✓ Simplification ✓ Standard form ✓ Factors ✓ y-values ✓ x-values (7)
20 MARKS		

QUESTION 2		
2.1	$T_n = 24$	✓ Ans (1)
2.2	$T_n = 3 + (n - 1)(7)$ $T_n = 7n - 4$	✓ Sub ✓ Ans (2)
2.3	$\sum_{k=1}^{22} (7k - 4)$	✓ Ans (1)
4 MAKRS		

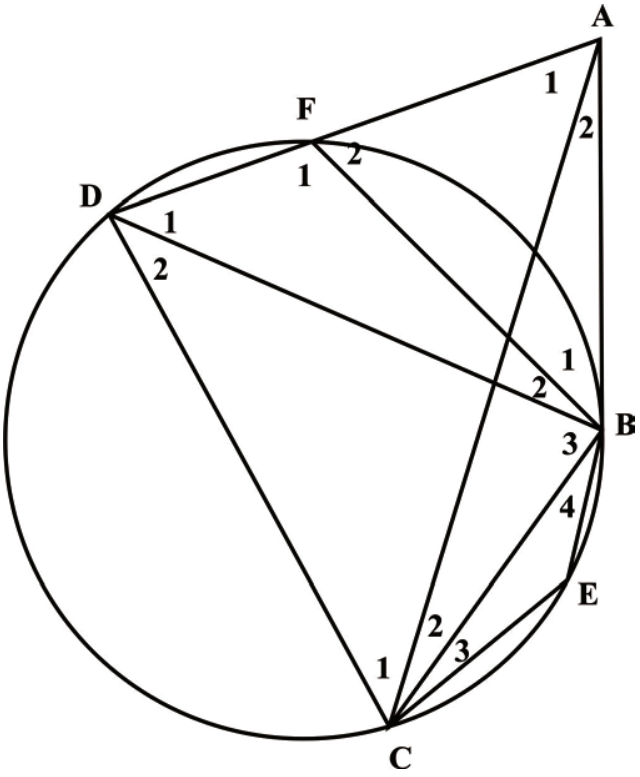
QUESTION 3		
3.1.1	3; $\frac{64}{250}$	✓ Ans (1)
3.1.2	$3 \times 18 = 54$ $S_{17} = \frac{\frac{1}{2}[(\frac{4}{5})^{17} - 1]}{(\frac{4}{5}) - 1}$ $= 2{,}44$ $\therefore S_{35} = 56{,}44$	✓ Odd terms ✓ Sub ✓ 2,44 ✓ ✓ $S_{35} = 56{,}44$ (5)
3.2	$T_1 = \frac{5}{9}$ $T_2 = \frac{5}{27}$ $\therefore r = \frac{1}{3}$ $S_\infty = \frac{\frac{5}{9}}{1 - \frac{1}{3}}$ $= \frac{5}{6}$ or 0,83	✓ a ✓ r ✓ Sub ✓ Ans (4)
10 MARKS		

QUESTION 4		
4.1	3cm	✓ ✓ Ans (2)
4.2	24; 12; 6; 3 $r = \frac{1}{2}$ $T_n = 24(\frac{1}{2})^{n-1}$	✓ Sequence ✓ ratio ✓ Ans (3)
5 MAKRS		

QUESTION 5		
5.1.1	$y^2 = (2)^2 - (-\sqrt{2})^2$ $y = \sqrt{2}$	✓ method ✓ Answer (2)
5.1.2	$\frac{2\left(\frac{\sqrt{2}}{2}\right)\left(-\frac{\sqrt{2}}{2}\right)}{\left(-\frac{\sqrt{2}}{2}\right)^2 - 1} = \frac{2\left(-\frac{1}{2}\right)}{\frac{1}{2} - 1} = 2$	✓✓✓substitution ✓sign ✓answer (5)
5.2	$\frac{\cos(180^\circ + \theta) \cdot \tan(720^\circ - \theta) \cdot \sin^2(90^\circ - \theta)}{\sin(180^\circ - \theta)} + \sin^2\theta$ $= \frac{-\cos\theta \times -\tan\theta \times \cos^2\theta}{\sin\theta} + \sin^2\theta$ $= \frac{\cos\theta \times \frac{\sin\theta}{\cos\theta} \times \cos^2\theta}{\sin\theta} + \sin^2\theta$ $= \cos^2\theta + \sin^2\theta = 1$	✓ $-\cos\theta$ ✓ $-\tan\theta$ ✓ $\cos^2\theta$ ✓ $\sin\theta$ ✓Identity: $\tan\theta$ ✓ $\cos^2\theta + \sin^2\theta$ ✓=1 (7)
5.3	$6\sin^2\theta - 5\sin\theta\cos\theta - 4\cos^2\theta = 0$ $(2\sin\theta - \cos\theta)(3\sin\theta + 4\cos\theta) = 0$ $\therefore 2\sin\theta = \cos\theta$ $\therefore \tan\theta = \frac{1}{2}$ Ref $\angle = 26,57^\circ$ $\therefore \theta = 26,57^\circ + n180^\circ$ OR: $\theta = 180^\circ + 26,57^\circ + n180^\circ$ $\therefore \theta = 206,57^\circ + n180^\circ$ AND: $3\sin\theta = -4\cos\theta$ $\therefore \tan\theta = -\frac{4}{3}$ Ref $\angle = 53,13^\circ$ $\therefore \theta = 180^\circ - 53,13^\circ + n180^\circ$ $\theta = 126,87^\circ + n180$ OR: $\theta = 360^\circ - 53,13^\circ + n180^\circ$ $\therefore \theta = 306,87^\circ + n180^\circ$	✓=0 ✓factors ✓ $\tan\theta$ ✓solution ✓solution ✓ $\tan\theta$ ✓solution ✓solution (8)
22 MARKS		

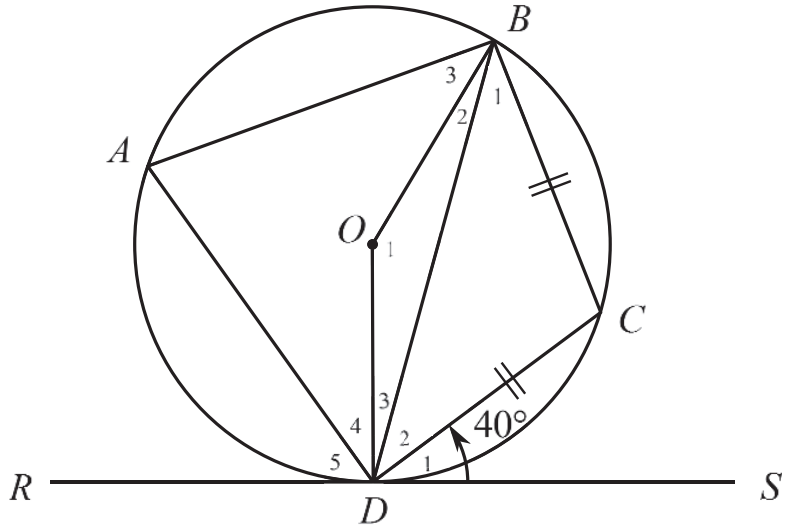
QUESTION 6		
6.1	$\frac{PS}{\sin a} = \frac{x}{\sin b}$ $\therefore PS = \frac{x \sin a}{\sin b}$	✓✓method sine rule (2)
6.2	$S_2 = a + b$	✓accuracy (1)
6.3	$Area = \frac{1}{2} PS \times SR \sin S_2$ $= \frac{1}{2}\left(\frac{x \sin a}{\sin b}\right)\left(x\right)\left(\sin(a+b)\right)$ $= \frac{x^2 \sin a \cdot \sin(a+b)}{2 \sin b}$	✓method: Area rule ✓✓sub in (3)
6.4	$Area = \frac{(14,2)^2 \times \sin(34^\circ) \times \sin(34^\circ + 41^\circ)}{2 \sin(41^\circ)}$ $= 83,01 cm^2$	✓✓sub into formula ✓answer (3)
9 MARKS		

QUESTION 7



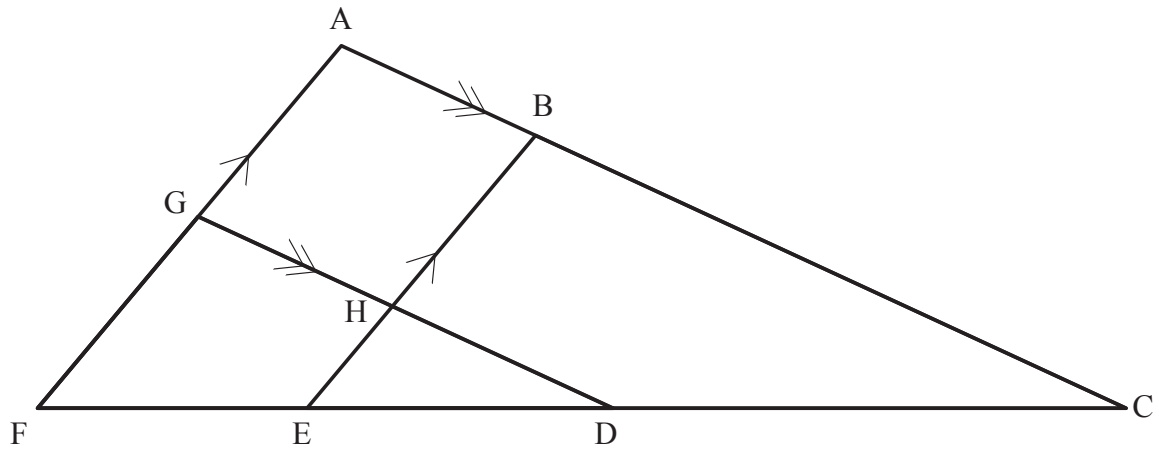
7.1	**STATEMENT**	**REASONS**
	$\hat{C}_1 + \hat{C}_2 = \hat{F}_2$	✓ [ext $\angle'$ of cyclic quad]
	$\hat{D}_2 + \hat{E} = 180^0$	✓ [opp $\angle'$ of cyclic quad]
	$\hat{B}_1 = \hat{D}_1$	✓ [tan chord]
	$\hat{B}_2 + \hat{B}_3 + \hat{D}_1 + \hat{D}_2 = 180^0$	✓ [opp $\angle'$ of cyclic quad]
	$\hat{B}_2 + \hat{B}_1 = \hat{C}_1 + \hat{C}_2$	✓ [tan chord] (5)
7.2.1	$A\hat{M}B = 90°$ ($\angle's$ in semi circle) $\hat{T} = 45°$ ($\angle'$ at center $= 2 \times \angle$ at circum) $\hat{C} = 135°$ (opp $\angle's$ of cyclic quad $= 180$)	✓ S ✓ R ✓ S ✓ R ✓ S ✓ R (6)
7.2.2	$\hat{M} + \hat{C} \neq 180°$; opp $\angle$'s do not add up to $180°$	✓ S & R (1)
	12 MARKS	

QUESTION 8

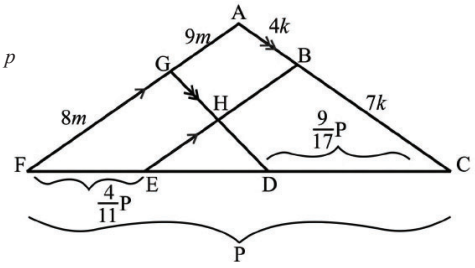


8.1	$B_1 = 40^\circ$ (tan-chord theorem) $\therefore BDC = 40^\circ$ ($\angle's$ opp = sides)	✓ S & R ✓ S & R (2)
8.2	$C = 100^\circ$ ($\angle's$ in $\triangle$)	✓ S ✓ R (2)
8.3	$\therefore A = 80^\circ$ (opp $\angle's$ in a cyclic quad)	✓ S ✓ R (2)
8.4	$O_1 = 160^\circ$ ($\angle$ at centre = $2\angle$ at circum)	✓ S & R (1)
7 MARKS		

QUESTION 9



9.1.1	Let $AB = 4k$ and $BC = 7k$ $\therefore \frac{FE}{FC} = \frac{AB}{AC} = \frac{4}{11}$; (Proportionality theorem OR using theorem on diagram)	✓ S ✓ S ✓ R (3)
9.1.2	Let $AG = 9m$ and $AF = 17m$ $\frac{CD}{DF} = \frac{AG}{GF} = \frac{9}{8}$	✓ Reason ✓ $\frac{CD}{DF} = \frac{AG}{GF} = \frac{9}{8}$ (2)

9.2	If FC = p then ED = $p-\frac{9}{17}p-\frac{4}{11}p$ ED = $\frac{20}{187}p$  The length of ED in kilometres is $\frac{20}{187}\times 374 \text{ km} = 40$ kilometres. It will take 2 000 hours to build the track from E to D. **OR** **Alternate:** Let FE = $4p$ and EC = $7p$ FD = $8m$ and DC = $9m$ $\therefore 11p = 374 \ \therefore p = 34$ $17m = 374 \ \therefore m = 22$ $\therefore$ DC = $374 - 4p - 9m$ = 40 km $\therefore$ 2 000 hours **OR** **Alternate:** FE = $\frac{4}{11}(374) = 136$ CD = $\frac{9}{17}(374) = 198$ $\therefore$ ED = $374 - 136 - 198$ = 40 km $\therefore$ 4 hours $\rightarrow 40 \times 50$ = 2 000 hours	✓ ✓ If FC = p then ED = $p-\frac{9}{17}p-\frac{4}{11}p$ ✓ ✓ ED = $\frac{20}{187}p$ ✓ The length of ED in kilometres is $\frac{20}{187}\times 374$ km = 40 kilometres. ✓ It will take 2 000 hours to build the track from E to D. **or** ✓ Let FE = $4p$ and EC = $7p$ ✓ FD = $8m$ and DC = $9m$ ✓ $\therefore 11p = 374 \ \therefore p = 34$ ✓ $17m = 374 \ \therefore m = 22$ ✓ $\therefore$ DC = $374 - 4p - 9m$ = 40 km ✓ $\therefore$ 2 000 hours **or** FE = $\frac{4}{11}(374) = 136$ ✓ ✓ CD = $\frac{9}{17}(374) = 198$ ✓ ✓ $\therefore$ ED = $374 - 136 - 198$ = 40 km ✓ ✓ $\therefore$ 4 hours $\rightarrow 40 \times 50$ = 2 000 hours (6)
	11 MARKS	

TOTAL MARKS 100