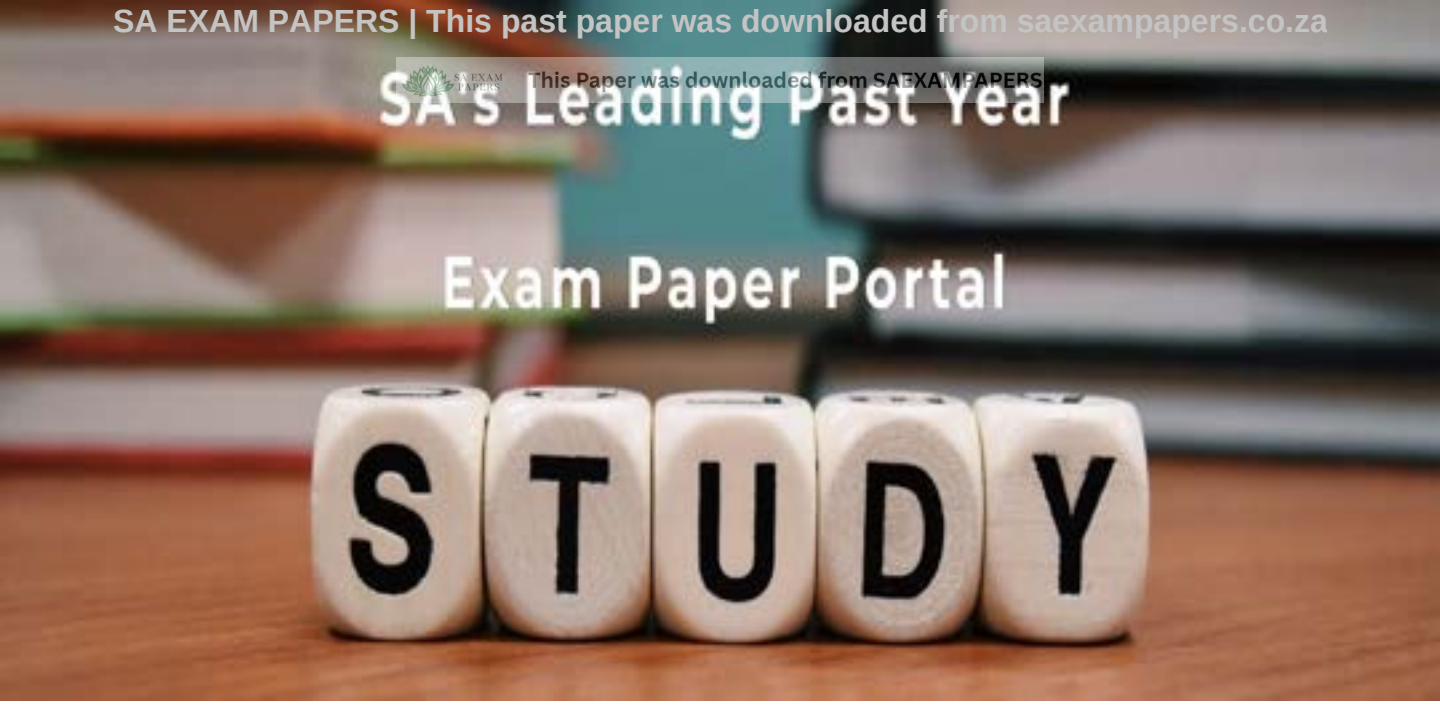


QUESTION 1

1.1	$\tilde{x} = 48.45$ ✓✓	(2)
1.2	$\sigma = 25.97$ ✓	(1)
1.3	$[48.45 - 25.97\,;\, 48.45 + 25.97]$ $[22.48$ ✓ $;\, 74.42$✓ $]$ 8 learners ✓	(3)
1.4	IQR $= 55 - 31$ ✓✓ $= 24$ ✓	(3)
1.5	112 $Q_3 + 1.5IQR = 55 + 1.5(24) = 91$ $112 > 91$ ✓	(1)
		[10]

QUESTION 2

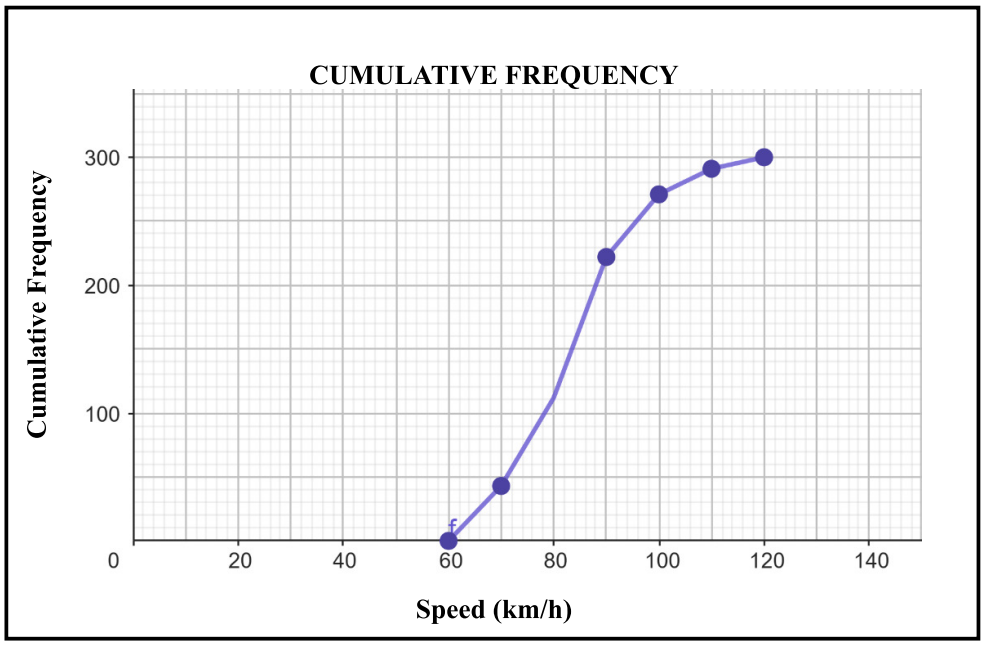
2.1 $43 + 69 + 110 + 49 + 20 + 9 = 300$ cars ✓ (1)

2.2

Speed Km/h	Frequency	F
$60 \leq x < 70$	43	43
$70 \leq x < 80$	69	112
$80 \leq x < 90$	110	222
$90 \leq x < 100$	49	271
$100 \leq x < 110$	20	291
$110 \leq x < 120$	9	300

(2)

2.3



(3)

2.4	$Q_1 = 75$ ✓ $Q_3 = 90$ ✓ accept Q_1 from $72 - 75$, accept Q_3 from $90 - 93$ $\text{Semi} - IQR = \frac{90 - 75}{2} = 7.5$ ✓	(3)
2.5	$300 - 112 = 188$ cars ✓✓ (If read from ogive – accept from 187 - 189)	(2)
		[11]

QUESTION 3

3.1	$m = \frac{6-0}{3-0}$ ✓ $= 2$ ✓ Not allowed to use the value of S in q3.1-3.3	(2)
3.2	$\tan\theta = 2$ ✓ $\theta = \tan^{-1}(2)$ $= 63.43°$ ✓	(2)
3.3.1	$\alpha = 63.43° + 20.23°$ (ext ∠ of Δ) $\alpha = 83.66$ ✓ $m = \tan 83.66°$ ✓ $m = 9$ ✓	(3)
3.3.2	$y = 9x + c$ $3 = 9(-2) + c$ ✓✓ $3 + 18 = c$ $c = 21$ $y = 9x + 21$ ✓	(3)
3.4	$2x = 9x + 21$ ✓ $-7x = 21$ ✓ $x = -3$ $y = 2(-3)$ ✓ $y = -6$ ✓ $S(-3;-6)$ Mistake in question paper. S given in paper differs from S calculated in 3.4	(4)
3.5	$S(-21;-42)$ $M\left(\frac{-21+3}{2};\frac{6+(-42)}{2}\right)$ $M(-9;-18)$ ✓✓ $S(-3;-6)$ $M\left(\frac{-3+3}{2};\frac{6+6}{2}\right)$ $M(0;0)$ ✓✓	(2)

3.6	$-9 = \frac{-2+x}{2}$ ✓ $-18 + 2 = x$ $x = -16$ ✓ $-18 = \frac{3+y}{2}$ $-36 - 3 = y$ $y = -39$ ✓ $R(-16; -39)$	$0 = \frac{-2+x}{2}$ ✓ $x = 2$ ✓ $0 = \frac{3+y}{2}$ $y = -3$ ✓ $R(2; -3)$	
			[19]

QUESTION 4

4.1.1	$0 = \frac{-5}{2}x - 4$ ✓ $4 = \frac{-5}{2}x$ $8 = -5x$ $x = -\frac{8}{5}$ ✓ $E\left(\frac{-8}{5}; 0\right)$	(2)
4.1.2	$x^2 + y^2 = r^2$ $(0)^2 + \left(-\frac{8}{5}\right)^2 = r^2$ ✓ $r^2 = \frac{64}{25}$ ✓ $x^2 + y^2 = \frac{64}{25}$ ✓ NB: It was not given that AMB is a diameter. BUT the sketch is misleading. The option is therefore added to the memo, that AMB is a diameter.	(3)
4.2	CORRECT $M_{AE} = -\frac{5}{2}$ $M_{AM} = \frac{2}{5}$ $(\tan \perp radii)$ ✓ $y = \frac{2}{5}x + c$ ✓ $c = -4$ $y = \frac{2}{5}x - 4$ ✓ xx ASSUMED $M_{AM} = \frac{-2-(-4)}{5-0}$ $= \frac{2}{5}$ ✓ $c = -4$ ✓ $y = \frac{2}{5}x - 4$ ✓	(3)
4.3	CORRECT $-3 = \frac{2}{5}a - 4$ ✓ $1 = \frac{2}{5}a$ ✓ $a = \frac{5}{2}$ ✓ xx ASSUMED $a = \frac{5+0}{2}$ ✓✓ $a = \frac{5}{2}$ ✓	(3)

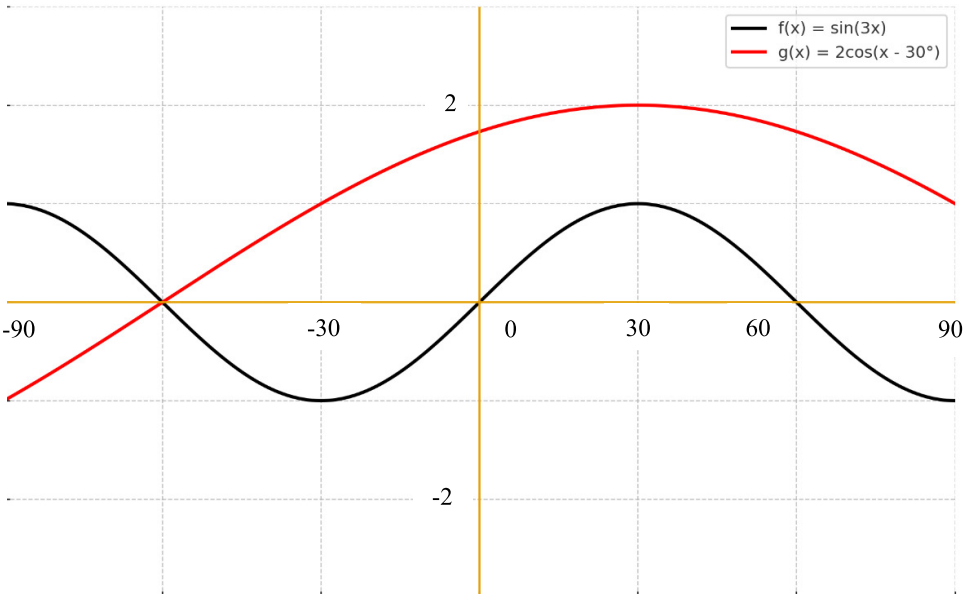
4.4	$\left(x-\frac{5}{2}\right)^2+\left(y-(-3)\right)^2=r^2$ $\left(x-\frac{5}{2}\right)^2+(y+3)^2=r^2$ ✓ $\left(0-\frac{5}{2}\right)^2+(-4+3)^2=r^2$ ✓ $r^2=\frac{29}{4}$ ✓ $\left(x-\frac{5}{2}\right)^2+(y+3)^2=\frac{29}{4}$ ✓	(4)
4.5	$\hat{G}=90°\quad(\angle\ in\ semi-circle)$ ✓ $G\left(0;\frac{8}{5}\right)$ $F\left(\frac{8}{5};0\right)$ $EG=\sqrt{\left(\frac{-8}{5}-0\right)^2+\left(\frac{8}{5}-0\right)^2}=\frac{8\sqrt{2}}{5}$ ✓ $GF=\frac{8\sqrt{2}}{5}$ ✓ Area of $\Delta EFG=\frac{1}{2}\left(\frac{8\sqrt{2}}{5}\right)\left(\frac{8\sqrt{2}}{5}\right)$ ✓ $=\frac{64}{25}=2.56\ units^2$ ✓ OR Area of $\Delta EFG=\frac{1}{2}.EF.OG$ ✓✓ Area of $\Delta EFG=\frac{1}{2}\left(2.\frac{8}{5}\right)\left(\frac{8}{5}\right)$ ✓✓ $=\frac{64}{25}=2.56\ units^2$ ✓	(5)
		[20]

QUESTION 5

5.1.1	$\left(\sqrt{34}\right)^2 = (3)^2 + p^2$ ✓ $34 - 9 = p^2$ $p = -5$ ✓	(2)
5.1.2	$\cos(450° - 2\theta)$ $= \sin 2\theta$ $= 2\sin\theta\,.\cos\theta$ ✓ $= 2\left(\frac{-5}{\sqrt{34}}\right)\left(\frac{3}{\sqrt{34}}\right)$ ✓ $= \frac{-30}{34}$ $= \frac{-15}{17}$ ✓	(3)
5.1.3	$\cos(30° - \theta)$ $= \cos 30°\,.\cos\theta + \sin 30°\,.\sin\theta$ ✓ $= \left(\frac{\sqrt{3}}{2}\right)\left(\frac{3}{\sqrt{34}}\right) + \left(\frac{1}{2}\right)\left(\frac{-5}{\sqrt{34}}\right)$ ✓ $= \frac{3\sqrt{3} - 5}{\sqrt{34}}$ ✓ $= \frac{3\sqrt{102} - 5\sqrt{34}}{34}$	(3)
5.2	$\frac{-2\sin x\,.-\cos x}{\sin(x + 60° + x)}$ ✓✓✓ $= \frac{2\sin x\,.\cos x}{\sin(2x + 60°)}$ $= \frac{\sin 2x}{\sin 2x.\cos 60° + \cos 2x\,.\sin 60°}$ ✓ $= \frac{\sin 2x}{\frac{1}{2}\sin 2x + \frac{\sqrt{3}}{2}\cos 2x}$ $= \frac{2\sin 2x}{\sin 2x + \sqrt{3}\cos 2x}$	

	$= \dfrac{2\tan 2x}{\tan 2x + \sqrt{3}}$ ✓	(6)
5.3.1	$f(x) = \cos(x + 45°).\cos(45° - x)$ $= [\cos x \,.\cos 45° - \sin x \,.\sin 45°][\cos x \,.\cos 45° + \sin x \,.\sin 45°]$ ✓✓ $= \left[\dfrac{1}{\sqrt{2}}\cos x - \dfrac{1}{\sqrt{2}}\sin x\right]\left[\dfrac{1}{\sqrt{2}}\cos x + \dfrac{1}{\sqrt{2}}\sin x\right]$ $= \dfrac{1}{2}\cos^2 x - \dfrac{1}{2}\sin^2 x$ ✓ $= \dfrac{1}{2}(\cos^2 x - \sin^2 x)$ ✓ $= \dfrac{1}{2}\cos 2x$	(4)
5.3.2	$\dfrac{1}{2}\cos 2x = 1 - 2\sin x$ ✓ $1 - 2\sin^2 x = 2 - 4\sin x$ $2\sin^2 x - 4\sin x + 1 = 0$ ✓ $\sin x = \dfrac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(1)}}{2(2)}$ $\sin x = \dfrac{2 - \sqrt{2}}{2} = 0.29$ *or* $\sin x = \dfrac{2 + \sqrt{2}}{2} = 1.71$ ✓ $x = 17.03° + k.360°$; ✓ $k\epsilon Z$ *no solution* $x = 162.97° + k.360°$; ✓ $k\epsilon Z$ ✓	(6)
5.4	$\cos\theta = 2m$ *and* $\cos 2\theta = 7m$ $2\cos^2\theta - 1 = 7m$ ✓ $2(2m)^2 - 1 = 7m$ ✓ $8m^2 - 7m - 1 = 0$ ✓ $(8m + 1)(m - 1) = 0$ ✓ $m = \dfrac{-1}{8}$ *or* $m = 1$ ✓ $\therefore m = \dfrac{-1}{8}$ ✓	(5)
		[29]

QUESTION 6

6.1	$120°$ ✓	(1)
6.2		
6.3.1	$x\epsilon[-90°; -60°]$ *or* $-90° \leq x \leq -60°$ ✓✓	(2)
6.3.2	$x\epsilon(-90°; -0°)$ ✓ *or* $(60°; 90°)$ ✓ , $x \neq -60°$ ✓	(3)
6.3.3	No solution. ✓	(1)
6.5	$h(x) = 2\cos(x - 30° - 60°)$ $= 2\cos(x - 90°)$ ✓ $= 2\sin x$ ✓	(2)
		[12]

QUESTION 7

7.1	in ΔPQS $\cos 30° = \frac{x}{PS}$ ✓ $\frac{\sqrt{3}}{2} = \frac{x}{PS}$ $PS = \frac{2x}{\sqrt{3}}$ ✓ in ΔPQR $sin\ 30° = \frac{x}{PR}$ ✓ $\frac{1}{2} = \frac{x}{PR}$ $PR = 2x$ ✓ in ΔPSR $PR^2 = RS^2 + PS^2 - 2RS.PS\ cos\ \theta$ $(2x)^2 = \left(\frac{2x}{\sqrt{3}}\right)^2 + \left(\sqrt{3}\right)^2 - 2\left(\frac{2x}{\sqrt{3}}\right)(\sqrt{3})cos\ \theta$ ✓ $4x^2 = \frac{4}{3}x^2 + 3 - 4x\ cos\ \theta \quad \times 3$ ✓ $12x^2 = 4x^2 + 9 - 12x\ cos\ \theta$ $12x\ cos\ \theta = 9 - 8x^2$ $cos\ \theta = \frac{9-8x^2}{12x}$	(6)
7.2	Area of $\Delta PSR = \frac{1}{2}\left(\sqrt{3}\right)\left(\frac{2(1)}{\sqrt{3}}\right)\sin\theta$ $= \sin\theta$ units^2	(2)
		[8]

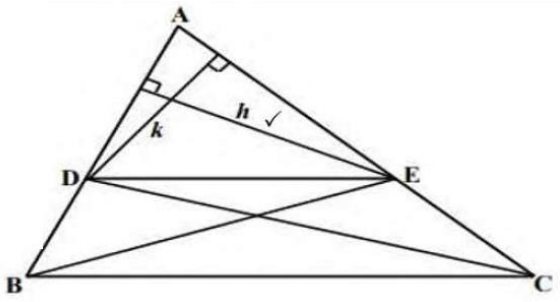
QUESTION 8

8.1	$Q\hat{O}R = 228°$ (∠ around a point) ✓ $Q\hat{T}R = 114°$ (∠ at center = 2∠ at circumference) ✓ ✓ OR $R\hat{P}Q = 66°$ (∠ at center = 2∠ at circumference) ✓ ✓ $Q\hat{P}R = 114°$ ($opp\ \angle s$ of cyclic quad) ✓	(3)
8.2	$O\hat{Q}S = 90°$ (tan ⊥ $radii$) ✓ $Q\hat{R}S = 90°$ (tan ⊥ $radii$) ✓ (∴ QORS is a cyclic quadrilateral ($opp\ \angle s$ are supplementary) ✓ OR (converse of opp ∠s of cyclic quad)	(3)
8.3	$O\hat{S}R = 48°$ (opp $\angle s\ of\ cyclic\ quad$) OR (sum of ∠$s$ of quad) ✓ ✓	(2)
		[8]

QUESTION 9

9.1	c = x (tan – chord theorem) S R ✓ $E^1 = 180° - (x + y)(sum\ of\ \angle s\ in\ \Delta)$ S/R ✓ $E_3 = y\ (\angle s\ in\ str\ line)\ /\ ext\ \angle\ of\ \Delta DEC$ S/R ✓ $\hat{A}BE = y\ (\angle s\ opp = sides)$ S/R ✓ $\hat{D}_1 = \hat{A}BE = y$ R ✓ ∴ $ABED$ is a cyclic quad (converse of ext ∠ of cyclic quad) ✓	(6)
9.2	$\hat{B}_1 = x\ (\angle s\ in\ same\ seg)$ S R ✓✓ $\hat{B}_1 = \hat{C} = x$ AB is a tangent to a circle B, C and D (converse of tanchord theorem) or (∠ between a line and chord) R ✓	(3)
		[9]

QUESTION 10

10.1	 Construct height h and k perpendicular to AD and AE respectively. Join DC and BE. $\frac{\text{Area of } \Delta ADE}{\text{Area of } \Delta BDE} = \frac{\frac{1}{2}AD.h}{\frac{1}{2}.BD.h} (Same\ height\ h)$ $= \frac{AD}{BD}$ $\frac{\text{Area of } \Delta ADE}{\text{Area of } \Delta CED} = \frac{\frac{1}{2}AE.k}{\frac{1}{2}.EC.K} (Same\ height\ h)$ $= \frac{AE}{EC}$ But Area of ΔBDE = Area of ΔCED (same base DE, same height between ‖ lines.) $\frac{\text{Area of } \Delta ADE}{\text{Area of } \Delta BDE} = \frac{\text{Area of } \Delta ADE}{\text{Area of } \Delta CED}$ $\therefore \frac{AD}{BD} = \frac{AE}{EC}$	(6)
S10.2	$\frac{AD}{DB} = \frac{AF}{FC}$ (Prop theorem DF ‖ BC) ✓ ✓ $AF = \frac{AD.FC}{DB}$ ✓ From $\frac{AF}{FE} = \frac{FC}{EB}$ $AF = \frac{FE.FC}{EB}$ ✓	

	$\frac{FE.FC}{EB} = \frac{AD.FC}{DB}$ $\frac{FE}{EB} = \frac{AD}{DB}$ ✓ $\therefore\ DE \parallel AF$ (Converse of prop theorem) ✓	(6)
		[12]

QUESTION 11

11.1	$F\hat{G}E = \theta$ (Tan – chord theorem) ✓ $\hat{E}_2 = \theta$ (∠s opp = sides) ✓ $F_2 = \theta$ (Alt ∠s, DE ∥ FH) ✓	(3)
11.2	In ΔDEF and ΔDGE ✓ $D = D$ common ✓ $\hat{E}_1 = \hat{G}$ tan chord theorem or (proved in 11.1) ✓ $F_3 = \hat{E}_1 + \hat{E}_2$ (Sum of ∠s in Δ) $\Delta DEF \ /\!/\!/ \ \Delta DGE$ (AAA) ✓ $\frac{DE}{DG} = \frac{EF}{GE} = \frac{DF}{DE}$ (from /// Δs) ✓ $DE^2 = DF.DG$	(5)
11.3	$\frac{DF^2}{DE^2} + \frac{DF}{DE} = \frac{DF^2 + DF.DE}{DE^2}$ $= \frac{DF(DF + DE)}{DE^2}$ $= \frac{DF(DF + FG)}{DF.DG}$ (DE = FG) $= \frac{DF+FG}{DG}$ (DE^2 = DF.DG) $= \frac{DG}{DG}$ (DG = DF.FG) = 1	(4)
		[11]