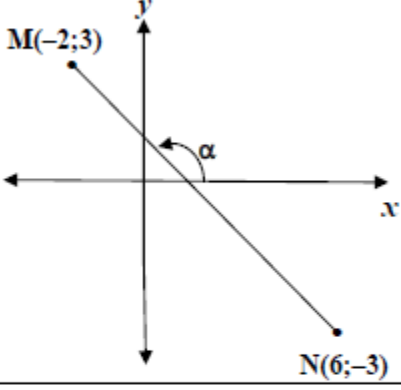


Analytical Geometry Grade 11 Memo

2008 Standard Grade Paper 2 Q 1

QUESTION 1		[21]	
			
1.1	$ \begin{aligned} MN &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \quad \checkmark \text{ M} \\ &= \sqrt{(6 + 2)^2 + (-3 - 3)^2} \quad \checkmark \text{ A} \\ &= \sqrt{64 + 36} \\ &= 10 \quad \checkmark \text{ CA} \end{aligned} $	(3)	1M – distance formula 1A – substitution 1CA – correct simplification.

1.2	$m_{MN} = \frac{y_2 - y_1}{x_2 - x_1} \checkmark M$ $= \frac{3+3}{-2-6} \checkmark A$ $= -\frac{6}{8} = -\frac{3}{4} \checkmark CA \quad (3)$	1M – gradient formula 1A – substitution 1CA – correct simplification.
1.1.3	$\therefore \tan \alpha = m \checkmark M$ $= -\frac{3}{4}$ $\text{ref angle} = 36,9^\circ \checkmark CA$ $\therefore \alpha = 180^\circ - 36,9^\circ$ $= 143,1^\circ \checkmark CA \quad (3)$	1M – Method 1CA – RA 1CA – correct simplification
1.1.4	$y - y_1 = m(x - x_1) \checkmark M$ $\checkmark CA$ $y - 1 = -\frac{3}{4}(x - 4) \checkmark A$ $4y - 4 = -3x + 12$ $\checkmark CA$ $4y + 3x - 16 = 0 \quad \text{OR} \quad y = -\frac{3}{4}x + 4$	1M – formula 1CA – Sub. of gradient 1A – sub. of the point 1CA – correct simplification

1.1.5	$S(-4; 7)$ $\text{Sub. } x = -4 \checkmark M$ $y = -\frac{3}{4}(-4) + 4 = 7 \checkmark CA$ $\therefore S \text{ lies on the straight line} \checkmark CA \quad (3)$	1M – choosing x or y 1CA substitution 1CA – conclusion
-------	---	--

1.2	$x_3 = \frac{x_1 + x_2}{2} ; \quad y_3 = \frac{y_1 + y_2}{2} \checkmark M$ $\checkmark A$ $-3 = \frac{x + (-5)}{2} ; \quad y = \frac{4 + 2}{2} \checkmark A$ $-6 = x - 5 ; \quad y = 3 \checkmark CA$ $x = -1 \checkmark CA \quad (5)$	1M – midpoint formula 2A – substitution 1 CA – xvalue 1 CA – y value
-----	--	---

2015 Mpumalanga Prelim Paper 2 Q 3

3.1	$m_{AD} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{13 - 5}{6 - 0}$ $= \frac{4}{3}$ $y - y_1 = m(x - x_1)$ $y - 5 = \frac{4}{3}(x - 0)$ $y = \frac{4}{3}x + 5$	✓ substitution into correct formula ✓ gradient ✓ equation (3)
3.2	$AB^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$ $(\sqrt{50})^2 = (1 - 0)^2 + (p - 5)^2$ $50 = 1 + p^2 - 10p + 25$ $0 = p^2 - 10p - 24$ $0 = (p - 12)(p + 2)$ $p = 12 \text{ or } p = -2$ $\therefore p = -2 \text{ only}$	✓ subst. into correct formula ✓ expansion ✓ standard form ✓ factors ✓ $p = -2 \text{ only}$ (5)

3.3	$m_{AD} = m_{BC}$ $\frac{4}{3} = \frac{n+2}{n-1}$ $4(n-1) = 3(n+2)$ $4n-4 = 3n+6$ $n = 10$	✓ equating ✓ substitution ✓ simplification ✓ answer (4)
3.4	$m_{BC} = \frac{4}{3}$ $y - y_1 = m(x - x_1)$ $y - 10 = \frac{4}{3}(x - 10)$ $3(y - 10) = 4(x - 10)$ $3y - 30 = 4x - 40$ $3y - 4x + 10 = 0$ OR $y - (-2) = \frac{4}{3}(x - 1)$ $3(y + 2) = 4(x - 1)$ $3y + 6 = 4x - 4$ $3y - 4x + 10 = 0$	✓ gradient ✓ substitution ✓ answer (3)
3.5	$m_{AB} = \frac{5+2}{0-1}$ $m_{AB} = -7$ $\tan \theta = -7$ $\theta = 180^\circ - 81,87^\circ$ $\theta = 98,13^\circ$ $\hat{A}BC = \hat{E}AB + \hat{E}$ ext. $\angle$ of Δ = sum opp. $\angle$'s of Δ $\hat{A}BC - \hat{E} = \hat{E}AB$ $\hat{E}AB = 98,13^\circ - 53,13^\circ = 45^\circ$ $\hat{E}AB = 180^\circ - (81,87 + 53,13^\circ) = 45^\circ$ $\therefore \hat{B}AD = 135^\circ$	$m_{AD} = \frac{4}{3}$ $\tan \alpha = \frac{4}{3}$ $\alpha = 53,13^\circ$ ✓ $\tan \theta = -9$ ✓ $\theta = 98,13^\circ$ ✓ $\tan \alpha = \frac{4}{3}$ ✓ $\alpha = 53,13^\circ$ ✓ answer (5)

2014 November Paper 2 Q 4

4.1	$y = 0: 3x + 8 = 0$ $x = -\frac{8}{3}$ $\therefore E\left(-2\frac{2}{3}; 0\right)$ OR/OR $E\left(-\frac{8}{3}; 0\right)$	✓ y-value/waarde ✓ x-value/waarde (2)
4.2	$\tan \hat{DEO} = m_{DE} = 3$ $\therefore \hat{DEO} = 71,565\dots = 71,57^\circ$ $\hat{DAE} = 71,565\dots^\circ - 45^\circ$ $= 26,57^\circ$	✓ $\tan \hat{DEO} = 3$ ✓ $71,565\dots^\circ$ ✓ $26,57^\circ$ (3)
4.3	$m_{AB} = \tan 26,57^\circ$ $= \frac{1}{2}$ $y = \frac{1}{2}x + c$ OR/OR $y - y_1 = \frac{1}{2}(x - x_1)$ $5 = \frac{1}{2}(1) + c$ $y - 5 = \frac{1}{2}(x - 1)$ $y = \frac{1}{2}x + 4\frac{1}{2}$ $y = \frac{1}{2}x + \frac{9}{2}$	✓ $m_{AB} = \tan 26,57^\circ$ ✓ $m_{AB} = \frac{1}{2}$ ✓ subst of m and $(1; 5)$ into formula/ subst m en $(1; 5)$ in formule ✓ equation/vgl (4)

4.4	Solve $x - 2y + 9 = 0$ and $y = 3x + 8$ simultaneously: $x - 2(3x + 8) + 9 = 0$ $x - 6x - 16 + 9 = 0$ $-5x = 7$ $x = -1\frac{2}{5}$ $\therefore y = 3(-1\frac{2}{5}) + 8 \quad \text{OR/OF} \quad -1\frac{2}{5} - 2y + 9 = 0$ $y = 3\frac{4}{5} \qquad y = 3\frac{4}{5}$ $\therefore D(-1\frac{2}{5} ; 3\frac{4}{5})$ OR/OF $x = 2y - 9$ $y = 3(2y - 9) + 8$ $y = 6y - 27 + 8$ $\therefore y = 3\frac{4}{5}$ $x = 2(3\frac{4}{5}) - 9 \quad \text{OR/OF} \quad 3\frac{4}{5} = 3x + 8$ $x = -1\frac{2}{5} \qquad x = -1\frac{2}{5}$ $\therefore D(-1\frac{2}{5} ; 3\frac{4}{5})$	✓ subst/vervang ✓ x-value/waarde ✓ subst/vervang ✓ y-value/waarde (4)
	OR/OF $3x + 8 = \frac{1}{2}x + 4\frac{1}{2}$ $6x + 16 = x + 9$ $5x = -7$ $\therefore x = -1\frac{2}{5}$ $\therefore y = 3(-1\frac{2}{5}) + 8 \quad \text{OR/OF} \quad y = \frac{1}{2}(-1\frac{2}{5}) + 4\frac{1}{2}$ $y = 3\frac{4}{5} \qquad y = 3\frac{4}{5}$ $\therefore D(-1\frac{2}{5} ; 3\frac{4}{5})$ OR/OF	(4) ✓ equating/gelyk stel ✓ x value/waarde ✓ subst/vervang ✓ y-value/waarde (4)

$x - 2y = -9 \dots\dots(1)$ $-6x + 2y = 16 \dots\dots(2)$ $(1) + (2):$ $-5x = 7$ $\therefore x = -1\frac{2}{5}$ $\therefore -1\frac{2}{5} - 2y = -9 \quad \text{OR/OR} \quad y = 3(-1\frac{2}{5}) + 8$ $y = 3\frac{4}{5} \qquad y = 3\frac{4}{5}$ $\therefore D(-1\frac{2}{5} ; 3\frac{4}{5})$ OR/OR $y = 3x + 8 \dots\dots\dots(1)$ $6y = 3x + 27 \dots\dots\dots(2)$ $(1) - (2):$ $-5y = -19$ $\therefore y = 3\frac{4}{5}$ $3\frac{4}{5} = 3x + 8 \quad \text{OR/OR} \quad x = 2(3\frac{4}{5}) - 9$ $x = -1\frac{2}{5} \qquad x = -1\frac{2}{5}$ $\therefore D(-1\frac{2}{5} ; 3\frac{4}{5})$	✓ adding/optelling ✓ x-value/waarde ✓ subst/vervang ✓ y-value/waarde (4) ✓ subtracting/afrekking ✓ y-value/waarde ✓ subst/vervang ✓ x-value/waarde (4)
--	---

4.5	area DMOE = area $\triangle AMO$ – area $\triangle ADE$ $x_A = 2(0) - 9 \quad \therefore A(-9 ; 0)$ area $\triangle AMO$ $= \frac{1}{2} \cdot AO \cdot OM$ $= \frac{1}{2} (9)(4 \frac{1}{2})$ $= 20,25$ area $\triangle ADE$ $= \frac{1}{2} \cdot AE \cdot y_D$ $= \frac{1}{2} \cdot (AO - EO) \cdot y_D$ $= \frac{1}{2} \left(9 - 2 \frac{2}{3} \right) \left(3 \frac{4}{5} \right)$ $= 12,03$ OR/OF area $\triangle ADE$ $= \frac{1}{2} AD \cdot AE \cdot \sin \hat{DAE}$ $= \frac{1}{2} \left(\frac{19\sqrt{5}}{5} \right) \cdot 6 \frac{1}{3} \cdot \sin 26,57^\circ$ $= 12,03$ $\therefore$ area DMOE = 8,22 square units/vk eenh OR/OF	✓ correct method/ <i>korrekte metode</i> ✓ $x_A = -9$ ✓ $\frac{1}{2} (9)(4 \frac{1}{2})$ ✓ $AE = 9 - 2 \frac{2}{3} = 6 \frac{1}{3}$ ✓ $y_D = 3 \frac{4}{5}$ OR/OF ✓ $AD = \frac{19\sqrt{5}}{5}$ ✓ $AE = 6 \frac{1}{3}$ ✓ answer/<i>antw</i> (6)
-----	--	---

area DMOE = area rectangle DCOG + area $\triangle DMG$ + area $\triangle DEC$ $= \left(1\frac{2}{5} \times 3\frac{4}{5}\right) + \frac{1}{2}\left(1\frac{2}{5}\right)\left(\frac{7}{10}\right) + \frac{1}{2}\left(3\frac{4}{5}\right)\left(\frac{19}{15}\right)$ $= 8,22 \text{ square units/vk eenh}$ OR/OF area DMOE = area $\triangle EDO$ + area $\triangle ODM$ $= \frac{1}{2}(EO \times y_D) + \frac{1}{2}(OM \times -x_D)$ $= \frac{1}{2}\left[\left(\frac{8}{3} \times \frac{19}{5}\right) + \left(\frac{9}{2} \times \frac{7}{5}\right)\right]$ $= \frac{1}{2}\left(\frac{304+189}{30}\right)$ $= \frac{493}{60} \text{ or/of } 8\frac{13}{60} \text{ or/of } 8,22 \text{ square units/vk eenh}$ OR/OF area DMOE = area $\triangle EOF$ – area $\triangle DMF$ $= \frac{1}{2}(EO \times OF) - \frac{1}{2}(OF - OM)(-x_D)$ $= \frac{1}{2}\left[\left(\frac{8}{3} \times 8\right) + \left(\frac{7}{2} \times \frac{7}{5}\right)\right]$ $= \frac{1}{2}\left(\frac{640-147}{30}\right)$ $= \frac{493}{60} \text{ or } 8\frac{13}{60} \text{ or } 8,22 \text{ square units/vk eenh}$	✓ correct method/ korrekte metode ✓ $3\frac{4}{5}$ ✓ $1\frac{2}{5}$ ✓ 0,7 ✓ $\frac{19}{15}$ ✓ answer (6) ✓ correct method/ korrekte metode ✓ $y_D = \frac{19}{5}$ or $3\frac{4}{5}$ ✓ $EO = \frac{8}{3}$ ✓ $-x_D = \frac{7}{5}$ ✓ $OM = \frac{9}{2}$ or $4\frac{1}{2}$ ✓ answer/antw (6) ✓ correct method/ korrekte metode ✓ $y_F = 8$ ✓ $EO = \frac{8}{3}$ ✓ $-x_D = \frac{7}{5}$ ✓ $FM = 3\frac{1}{2}$ ✓ answer/antw (6)
--	--

2024 KwaZulu Natal November Paper 1 Q 3

3.1.1	$P(-1; 1) \quad Q(2; 5) \quad R(5; y)$ $m_{PQ} = \frac{5-1}{2-(-1)}$ $= \frac{4}{3}$ $m_{PQ} = m_{QR}$ $\frac{4}{3} = \frac{y-5}{5-2}$ $3y-15=12$ $y=9$	 $\checkmark m_{PQ}$ $\checkmark$ condition $\checkmark$ substitution $\checkmark$ answer (4)
3.1.2	$m_{PQ} \times m_{QR} = -1$ $\frac{4}{3} \times \frac{y-5}{3} = -1$ $4y-20 = -9$ $4y = 11$ $y = \frac{11}{4}$	 $m_{PQ} = \frac{-1}{m_{QR}}$ $\frac{y-5}{3} = -\frac{3}{4}$ $4y-20 = -9$ $4y = 11$ $y = \frac{11}{4}$ $\checkmark$ condition $\checkmark$ substitution $\checkmark$ answer (3)

3.2		
3.2.1	$RT = \sqrt{(-5-1)^2 + (-1+3)^2}$ $= \sqrt{40}$ $= 2\sqrt{10} \text{ or } 6,32 \text{ units}$	✓ substitution of R and T into correct formula ✓ answer (2)
3.2.2	$m_{ST} = \frac{2-(-3)}{4-1}$ $= \frac{5}{3}$	✓ substitution of S and T into correct formula ✓ answer (2)
3.2.3	$M\left(\frac{4-5}{2}; \frac{2-1}{2}\right)$ $M\left(-\frac{1}{2}; \frac{1}{2}\right)$	✓ x-value ✓ y-value (2)
3.2.4	$m = \frac{5}{3} \quad \text{point: } M\left(-\frac{1}{2}; \frac{1}{2}\right)$ $y - y_1 = m(x - x_1)$ $y - \frac{1}{2} = \frac{5}{3}\left(x + \frac{1}{2}\right)$ $y - \frac{1}{2} = \frac{5}{3}x + \frac{5}{6}$ $y = \frac{5}{3}x + \frac{4}{3}$ OR $y = mx + c$ $\frac{1}{2} = \frac{5}{3}\left(-\frac{1}{2}\right) + c$ $c = \frac{4}{3}$ $y = \frac{5}{3}x + \frac{4}{3}$	✓ $m = \frac{5}{3}$ ✓ subst $M\left(-\frac{1}{2}; \frac{1}{2}\right)$ into equation of line ✓ answer (3)

3.2.5	By using transformation: $T \rightarrow S: (1; -3) \rightarrow (4; 2)$ $(x; y) \rightarrow (x+3; y+5)$ $\therefore R \rightarrow G: G(-5+3; -1+5)$ $\therefore G(-2; 4)$ OR $T \rightarrow R: (1; -3) \rightarrow (-5; -1)$ $(x; y) \rightarrow (x-6; y+2)$ $\therefore S \rightarrow G: G(4-6; 2+2)$ $\therefore G(-2; 4)$ OR Midpoint RS: $M\left(-\frac{1}{2}; \frac{1}{2}\right)$ $x_M = \frac{x_G + x_T}{2}$ and $y_M = \frac{y_G + y_T}{2}$ $-\frac{1}{2} = \frac{x_G + 1}{2}$ and $\frac{1}{2} = \frac{y_G - 3}{2}$ $2x_G + 2 = -2$ and $2y_G - 6 = 2$ $x_G = -2$ and $y_G = 4$ $\therefore G(-2; 4)$ Answer only: Full marks	✓ x value ✓ y value (2) ✓ x value ✓ y value (2) ✓ x value ✓ y value (2)
3.2.6	$m_{ST} = \frac{5}{3}$ $\tan \theta = \frac{5}{3}$ $\theta = 59,04^\circ$ $m_{RS} = \frac{1}{3}$ $\tan \alpha = \frac{1}{3}$ $\alpha = 18,43^\circ$ $\beta = \theta - \alpha$ $\beta = 59,04^\circ - 18,43^\circ$ $\beta = 40,61^\circ$	✓ $\tan \theta = m_{ST}$ ✓ size of θ ✓ $m_{RS} = \frac{1}{3}$ ✓ size of α ✓ answer (5)

3.2.7	$RS_{\text{equation}} : y - 2 = \frac{1}{3}(x - 4)$ $y = \frac{1}{3}x + \frac{2}{3}$ $\therefore E\left(0; \frac{2}{3}\right)$ $ST_{\text{equation}} : y - 2 = \frac{5}{3}(x - 4)$ $y = \frac{5}{3}x - \frac{14}{3}$ $\therefore D\left(\frac{14}{5}; 0\right)$ $\text{Area SEOD} = \text{Area } \Delta FSD - \text{Area } \Delta FEO$ $= \frac{1}{2}(\text{FD} \times \text{SH}) - \frac{1}{2}(\text{FO} \times \text{EO})$ $= \frac{1}{2}\left(\frac{24}{5} \times 2\right) - \frac{1}{2}\left(2 \times \frac{2}{3}\right)$ $= \frac{24}{5} - \frac{2}{3}$ $= \frac{62}{15} \text{ or } 4\frac{2}{15} \text{ or } 4,13 \text{ square units}$ OR $RS_{\text{equation}} : y = \frac{1}{3}x + \frac{2}{3}$ $\therefore E\left(0; \frac{2}{3}\right)$ $ST_{\text{equation}} : y = \frac{5}{3}x - \frac{14}{3}$ $\therefore D\left(\frac{14}{5}; 0\right)$ $\text{Area SEOD} = \text{Area SEOH} - \text{Area } \Delta SDH$ $= \frac{1}{2}(\text{EO} + \text{SH}) \times \text{OH} - \left(\frac{1}{2} \times \text{DH} \times \text{SH}\right)$ $= \frac{1}{2}\left(\frac{2}{3} + 2\right) \times 4 - \left(\frac{1}{2} \times \frac{6}{5} \times 2\right)$ $= \frac{16}{3} - \frac{6}{5}$ $= \frac{62}{15} \text{ or } 4\frac{2}{15} \text{ or } 4,13 \text{ square units}$	✓ coordinates of E ✓ equation of ST ✓ coordinates of D ✓ substitution into area ΔFSD ✓ substitution into area ΔFEO ✓ answer (6) ✓ coordinates of E ✓ equation of ST ✓ coordinates of D ✓ substitution into area SEOH ✓ substitution into area ΔSDH ✓ answer (6)
-------	---	--

GRADE 11
Marking Guidelines

	OR RS_{equation} : $y = \frac{1}{3}x + \frac{2}{3}$ $\therefore E\left(0; \frac{2}{3}\right)$ ST_{equation} : $y - 2 = \frac{5}{3}(x - 4)$ $y = \frac{5}{3}x - \frac{14}{3}$ $\therefore D\left(\frac{14}{5}; 0\right)$ Area SEOD = Area ΔSFH – (Area ΔEFO + Area ΔSDH) $= \frac{1}{2}(FH \times SH) - \left(\frac{1}{2} \times FO \times EO + \frac{1}{2} \times DH \times SH\right)$ $= \frac{1}{2}(6 \times 2) - \left(\frac{1}{2} \times 2 \times \frac{2}{3} + \frac{1}{2} \times \frac{6}{5} \times 2\right)$ $= 6 - \frac{23}{15}$ $= \frac{62}{15} \text{ or } 4\frac{2}{15} \text{ or } 4,13 \text{ square units}$ OR RS_{equation} : $y - 2 = \frac{1}{3}(x - 4)$ $y = \frac{1}{3}x + \frac{2}{3}$ $\therefore E\left(0; \frac{2}{3}\right)$ ST_{equation} : $y - 2 = \frac{5}{3}(x - 4)$ $y = \frac{5}{3}x - \frac{14}{3}$ $\therefore D\left(\frac{14}{5}; 0\right)$ Area SEOD = Area SKOD – Area ΔSKE $= \frac{1}{2}(SK + OD) \times KO - \frac{1}{2}(KE \times KS)$ $= \frac{1}{2}\left(4 + \frac{14}{5}\right) \times 2 - \frac{1}{2}\left(2 - \frac{2}{3}\right) \times 4$ $= \frac{34}{5} - \frac{8}{3}$ $= \frac{62}{15} \text{ or } 4\frac{2}{15} \text{ or } 4,13 \text{ square units}$	✓ coordinates of E ✓ equation of ST ✓ coordinates of D ✓ subst into area of ΔSFH ✓ subst into area of ΔEFO & ΔSDH ✓ answer (6) ✓ coordinates of E ✓ equation of ST ✓ coordinates of D ✓ subst into area SKOD ✓ subst into area ΔSKE ✓ answer (6)
		[29]

2020 Eastern Cape November Paper 2 Q 1

1.1	$m_{PS} = \frac{0 - (-2)}{3 - 6} = -\frac{2}{3}$ OR/OF $3y + 2x = 6$ $3y = -2x + 6$ $y = -\frac{2}{3}x + 2$ $m_{PS} = -\frac{2}{3}$	✓ substitution / <i>vervang</i> ✓ answer / <i>antwoord</i> OR/OF $y = -\frac{2}{3}x + 2$ ✓ answer / <i>antwoord</i>	(2)
1.2	$m_{MR} = \frac{4 - 0}{10 - 3} = \frac{4}{7}$ $\tan \hat{RQX} = \frac{4}{7}$ $\hat{RQX} = 29,74^\circ$	✓ $\frac{4-0}{10-3}$ ✓ gradient / <i>gradiënt</i> ✓ $\tan \hat{RQX} = m_{RM}$ ✓ answer / <i>antwoord</i>	(4)
1.3	$\tan \hat{PQX} = -\frac{2}{3}$ $\hat{PQX} = 146,31^\circ$ $\theta = 146,31^\circ - 29,74^\circ$ $\theta = 116,57^\circ$	✓ $\tan \hat{PQX} = -\frac{2}{3}$ ✓ $\hat{PQX} = 146,31^\circ$ ✓ answer / <i>antwoord</i>	(3)
1.4	$m_{RN} = \frac{3}{2}$ $m_{RN} \times m_{PS} = \frac{3}{2} \times -\frac{2}{3} = -1$ $RN \perp PS$	✓ m_{RN} ✓ product / <i>produk</i> ✓ -1	(3)
1.5	$NR = \sqrt{(10 - 6)^2 + (4 + 2)^2}$ $NR = \sqrt{52}$ $QN = \sqrt{13}$ $\text{Area} = \frac{1}{2} \times QN \times NR$ $\text{Area} = \frac{1}{2} \times \sqrt{13} \times \sqrt{52}$ $\text{Area} = 13 \text{ units}^2 / \text{eenhede}^2$	✓ substitution / <i>vervang</i> ✓ answer / <i>antwoord</i> ✓ length QN / <i>lengte QN</i> ✓ choosing correct sides / <i>kies korrekte sye</i> ✓ substitution / <i>vervang</i> ✓ answer / <i>antwoord</i>	(6)

1.6	$\frac{y-0}{x-3} = \frac{4}{7}$ $7y = -12$ $y = -\frac{12}{7}$ OR/OF $y = \frac{4}{7}x + c$ Subst./<i>vervang</i> (3; 0) $0 = \frac{4}{7}(3) + c$ $c = -\frac{12}{7}$ $y = -\frac{12}{7}$	$\checkmark x = 0$ $\checkmark$ substitution / <i>vervanging</i> $\checkmark$ equation / <i>vergelyking</i> $\checkmark$ y-coordinate / <i>y-koördinaat</i> OR/OF $\checkmark$ equation / <i>vergelyking</i> $\checkmark$ substitution / <i>vervanging</i> $\checkmark$ value of <i>c</i> / <i>waarde van c</i> $\checkmark$ y-coordinate / <i>y-koördinaat</i>	(4)
			[22]

2014 March Paper 2 Q 4

4.1	$y = -3x + k$ $-3 = (-3)(-1) + k$ $k = -6$	OR By inspection, using the gradient: $k = -6$	✓ substitution of $(-1; -3)$ ✓ $k = -6$ (2)
4.2	$\frac{x_A + x_B}{2} = x_P$ $\frac{-1 + x_B}{2} = \frac{5}{2}$ $x_B = 6$ $\therefore B(6; 5)$	$\frac{y_A + y_B}{2} = y_P$ $\frac{-3 + y_B}{2} = 1$ $y_B = 5$	OR By using translation: B(6; 5) ✓ 6 ✓ 5 (2)
4.3	$m_{AB} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{5 - (-3)}{6 - (-1)}$ $= \frac{8}{7}$	OR $m_{AB} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{1 - (-3)}{2,5 - (-1)}$ $= \frac{8}{7}$	✓ substitution ✓ gradient (2)
4.4	$\tan \beta = m_{AD} = -3$ $\beta = 108,43^\circ$ $\tan \alpha = m_{AB} = \frac{8}{7}$ $\alpha = 48,81^\circ$ $\theta = 108,43^\circ - 48,81^\circ$ $\theta = 59,62^\circ$ OR $\tan \beta = m_{AD} = -3$ $\beta = 108,43^\circ$ $\hat{CDO} = 18,43^\circ$ $\tan \alpha = m_{AB} = \frac{8}{7}$ $\alpha = 48,81^\circ$ $\theta = 18,43^\circ + (90^\circ - 48,81^\circ)$ $\theta = 59,62^\circ$		✓ $\tan \beta = -3$ ✓ $\beta = 108,43^\circ$ ✓ $\tan \alpha = \frac{8}{7}$ ✓ $\alpha = 48,81^\circ$ ✓ $\theta = 59,62^\circ$ (5) ✓ $\tan \beta = -3$ ✓ $\beta = 108,43^\circ$ ✓ $\tan \alpha = \frac{8}{7}$ ✓ $\alpha = 48,81^\circ$ ✓ $\theta = 59,62^\circ$ (5)
4.5	$AD = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(0 + 1)^2 + (-6 + 3)^2}$ $= \sqrt{10}$		✓ substitution into distance formula ✓ $\sqrt{10}$ (2)

4.6

$$AC = 2 AD$$

$$= 2\sqrt{10}$$

$$CB^2 = AC^2 + AB^2 - 2AC \cdot AB \cdot \cos \theta$$

$$= (2\sqrt{10})^2 + (\sqrt{113})^2 - 2(2\sqrt{10})(\sqrt{113}) \cos 59,62^\circ$$

$$= 84,998...$$

$$CB = 9,22 \text{ units.}$$

OR

$$D(0; -6), A(-1; -3), AC = 2AD$$

$$\text{So } x_C - x_A = 2(x_A - x_D) \quad x_C + 1 = 2(-1 - 0), x_C = -3$$

$$y_C - y_A = 2(y_A - y_D) \quad y_C + 3 = 2(-3 + 6), y_C = 3$$

The coordinates of C are $(-3; 3)$.

$$CB = \sqrt{(6 - (-3))^2 + (5 - 3)^2}$$

$$= 9,22 \text{ units}$$

$$\checkmark AC = 2\sqrt{10}$$

$$\checkmark \text{ using cosine rule}$$

$$\checkmark \text{ substitution}$$

$$\checkmark 84,998...$$

$$\checkmark 9,22$$

(5)

$$\checkmark \checkmark \checkmark C(-3; 3)$$

$$\checkmark \text{ substitution into distance formula}$$

$$\checkmark 9,22$$

(5)

[18]

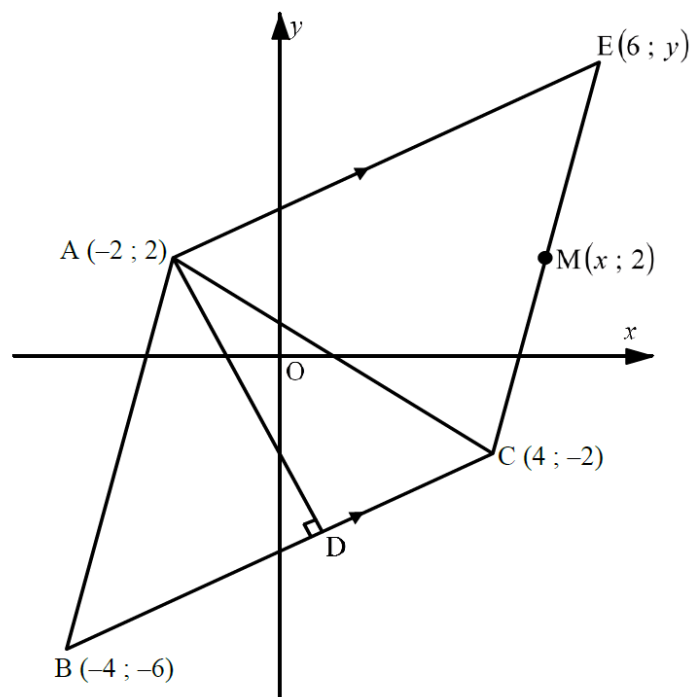
2022 Gauteng November Paper 2 Q 3

QUESTION 3

3.1	$AB = \sqrt{(0-10)^2 + (7-2)^2}$ $AB = \sqrt{125}$ $AB = 5\sqrt{5}$	✓ Substitute into correct formula ✓ AB ✓ Simplified surd	(3)
3.2	$m_{AC} = \frac{7-(-4)}{0-7}$ $m_{AC} = -\frac{11}{7}$	✓ Gradient substitute ✓ m_{AC}	(2)
3.3	$\tan \theta = -\frac{11}{7}$ $RA = 57,528 \dots^\circ$ $\theta = 180^\circ - 57,528 \dots^\circ$ $\theta = 122,47^\circ$	✓ Angle of inclination substitute (CA 4.2) ✓ RA ✓ θ (subtract RA from 180°)	(3)

3.4	$\tan \alpha = 2$ $\alpha = 63,434 \dots^\circ$ $\hat{A}CB = 122,47^\circ - 63,434 \dots^\circ$ $\hat{A}CB = 59,04^\circ$ $m_{AB} = \frac{1}{2}$ $\hat{C}AB = 180^\circ - \tan^{-1} \left(\frac{1}{2} \right) - 122,74^\circ$ $\hat{C}AB = 30,69^\circ$ $\hat{A}CD = 30,69^\circ$ [alt $\angle$'s, $AB \parallel CD$] $\hat{B}CD = 30,69^\circ + 59\ 04^\circ$ $\hat{B}CD = 89,73^\circ$ OR IF θ is not rounded $\tan \alpha = 2$ $\alpha = 63,434 \dots^\circ$ $\hat{A}CB = 122,4711 \dots^\circ - 63,434 \dots^\circ$ $\hat{A}CB = 59,036 \dots^\circ$ $m_{AB} = \frac{1}{2}$ $\hat{C}AB = 180^\circ - \tan^{-1} \left(\frac{1}{2} \right) - 122,74 \dots^\circ$ $\hat{C}AB = 30,963^\circ$ $\hat{A}CD = 30,963^\circ$ [alt $\angle$'s, $AB \parallel CD$] $\hat{B}CD = 30,963^\circ + 59\ 036 \dots^\circ$ $\hat{B}CD = 90^\circ$	α $\hat{A}CB$ $\hat{C}AB$ $\hat{B}CD$ OR $\checkmark \alpha$ $\checkmark \hat{A}CB$ $\checkmark \hat{C}AB$ $\checkmark \hat{B}CD$	 <
-----	---	---	---

2019 November Paper 2 Q 3



3.1	$B(-4;-6) \quad C(4;-2)$ $m_{BC} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-2 - (-6)}{4 - (-4)}$ $= \frac{4}{8}$ $= \frac{1}{2}$	$m_{BC} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-6 - (-2)}{-4 - 4}$ $= \frac{-4}{-8}$ $= \frac{1}{2}$	✓ gradient formula/ gradiëntformule ✓ subst into/ vervang in gradient form./ gradiëntform. ✓ answer/antwoord (3)
3.2	$x = \frac{6+4}{2}$ $x = 5$ $\frac{y+(-2)}{2} = 2$ $y=6$		✓ $x = 5$ ✓ $\frac{y+(-2)}{2} = 2$ ✓ $y=6$ (3)

3.3	$BC = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{((-4) - 4)^2 + ((-6) - (-2))^2}$ $= \sqrt{80}$	✓ subst. in distance formula/verv. in afstandformule ✓ answer/antwoord (2)
3.4	Parallelogram	✓ answer/antwoord (1)
3.5	$m_{AD} = -2 \text{ (AD} \perp \text{BC)}$ $y = \frac{4}{3}x + c$ $2 = -2(-2) + c$ $-2 = c$ $\therefore y = -2x - 2$ OR/OF $m_{AD} = -2 \text{ (AD} \perp \text{BC)}$ $y - 2 = -2(x - (-2))$ $y - 2 = -2x - 4$ $\therefore y = -2x - 2$	✓ $m_{AD} = -2$ ✓ subst. of/verv. m and point/en punt $(-2; 2)$ / ✓ answer/antwoord ✓ $m_{AD} = -2$ ✓ subst. of/verv. m and point/en punt $(-2; 2)$ ✓ answer/antwoord (3)

3.6	$m_{BC} = \frac{1}{2}$ Equation of/Verg. van BC : $y = \frac{1}{2}x + c$ $-2 = \frac{1}{2}(4) + c$ $-4 = c$ $\therefore y = \frac{1}{2}x - 4$ $-2x - 2 = \frac{1}{2}x - 4$ $-4x - 4 = x - 8$ $4 = 5x$ $x = \frac{4}{5}$ $y = (-2)\frac{4}{5} - 2$ $= \frac{-18}{5}$ $D\left(\frac{4}{5}; \frac{-18}{5}\right)$ $y - (-2) = \frac{1}{2}(x - 4)$ $y + 2 = \frac{1}{2}x - 2$ $\therefore y = \frac{1}{2}x - 4$ $y = \frac{1}{2}\left(\frac{4}{5}\right) - 4$ $= \frac{-18}{5}$ OR/OF OR/OF	✓subst. of/verv. m and point/en punt (4;-2)/ ✓ $y = \frac{1}{2}x - 4$ ✓equating both equations/vergelyking van beide vergelykings ✓x-value/-waarde ✓y-value/-waarde (5)
3.7	$AD = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{\left(\left(\frac{4}{5}\right) - (-2)\right)^2 + \left(\left(\frac{-18}{5}\right) - 2\right)^2}$ $= \frac{14\sqrt{5}}{5}$ Area of/Oppervlakte van $\triangle AEC = \frac{1}{2}AE \times AD$ $= \frac{1}{2} \times \sqrt{80} \times \frac{14\sqrt{5}}{5}$ $= 28 \text{ units}^2 / \text{eenhede}^2$	✓length of AD/ lengte van AD ✓subst into area formula ✓answer/antwoord (3)
		[20]

2016 KwaZulu Natal Preliminary Paper 2 Q 3

3.1 $AC = \sqrt{(-5-7)^2 + (1-(2))^2}$ $= \sqrt{(12)^2 + (3)^2}$ $= \sqrt{144 + 9}$ $= \sqrt{153}$ $= 12,37$	A✓ correct Subst CA ✓ answer (2)
3.2 $M_{BC} = \frac{6-(2)}{1-7}$ $= \frac{8}{-6}$ $= \frac{-4}{3}$ $y - y_1 = m(x - x_1)$ $y - 6 = \frac{-4}{3}(x - 1)$ $3y - 18 = -4x + 4$ $3y = -4x + 22$	A✓ $\frac{-4}{3}$ CA✓ correct subst. of (1;6) And (7;-2) CA✓ equation in any form (3)
3.3 $\hat{B} = \theta = \alpha - \beta \text{ Ext } \angle$ $\tan \alpha = m_{BC} = -\frac{4}{3}$ $\therefore \alpha = 126,9^\circ$ $\tan \beta = m_{AB} = \frac{5}{6}$ $\therefore \beta = 39,8^\circ$ $\theta = \alpha - \beta$ $\theta = \alpha - \beta$ $= 126,9^\circ - 39,8^\circ$ $= 87,1^\circ$ $\therefore \hat{ABC} = 87,1^\circ$ OR	CA✓ $\tan \alpha = -\frac{4}{3}$ CA✓ $\alpha = 126,9^\circ$ A ✓ $\tan \beta = \frac{5}{6}$ CA✓ $\beta = 39,8^\circ$ CA ✓ $\hat{ABC} = 87,1^\circ$ (5)

$\text{Distance AB} = \sqrt{(1+5)^2 + (6-1)^2}$ $= \sqrt{61}$ $\text{Distance BC} = \sqrt{(1-7)^2 + (6+2)^2}$ $= \sqrt{100}$ $= 10$ $\text{Distance AC} = \sqrt{(-5-7)^2 + (1+2)^2}$ $= \sqrt{153}$ $\cos \hat{B} = \frac{a^2 + c^2 - b^2}{2ac}$ $= \frac{10^2 + (\sqrt{61})^2 - (\sqrt{153})^2}{2(10)(\sqrt{61})}$ $= 0,051$ $\hat{B} = 87,1^\circ$	A ✓ Distance AB A ✓ Distance BC A ✓ Distance AC CA ✓ substitution in cosine rule CA ✓ answer (5)
3.4 $P\left(\frac{-5+1}{2}; \frac{1+6}{2}\right)$ $P\left(-2; \frac{7}{2}\right)$	AA ✓ ✓ both co-ordinates (2)
3.5 $m_{AC} = \frac{-2-1}{7+5}$ $= \frac{-3}{12}$ $= \frac{-1}{4}$ through $(-1; 3)$ equation: $y - 3 = -\frac{1}{4}(x + 1)$ $y - 3 = -\frac{1}{4}x - \frac{1}{4}$ $\therefore y = \frac{-1}{4}x + 2\frac{3}{4}$ or $y = -\frac{1}{4}x + \frac{11}{4}$ or $4y + x - 11 = 0$	A ✓ $\frac{-1}{4}$ CA ✓ subst. $(-1;3)$ CA ✓ equation in any form (3)

$$3.6 \quad m_{AB} = \frac{5}{6}; \quad 6x + 5y = 18$$

$$5y = -6x + 18$$

$$y = \frac{-6}{5}x + \frac{18}{5}$$

$$\therefore m_1 = \frac{-6}{5}$$

$$m_{AB} \cdot m_1 = -1$$

$$\therefore m_{AB} \perp 6x + 5y = 18$$

$$A \checkmark m_1 = -\frac{6}{5}$$

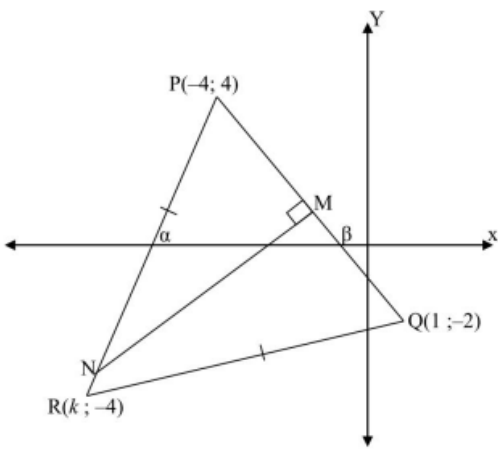
$$A \checkmark m_{AB} \cdot m_1$$

$$A \checkmark = -1$$

(3)

2016 Gauteng June Paper 2 Q 4

4.1.1	$PQ = \sqrt{(-4-1)^2 + (4+2)^2}$ $= \sqrt{61}$	$\checkmark \sqrt{(-4-1)^2 + (4+2)^2}$ $\checkmark \sqrt{61}$ (2)
4.1.2	$M\left(\frac{-4+1}{2}; \frac{4-2}{2}\right)$ $= M\left(-\frac{3}{2}; 1\right)$	$\checkmark -\frac{3}{2}$ $\checkmark 1$ (2)
4.1.3	$y - y_1 = m(x - x_1)$ $y - 1 = \frac{5}{6}\left(x + \frac{3}{2}\right)$ $y - 1 = \frac{5}{6}x + \frac{5}{4}$ $y = \frac{5}{6}x + \frac{9}{4}$ OR $12y - 10x + 27 = 0$	$m_{PQ} = \frac{4+2}{-4-1} = -\frac{6}{5}$ $m_{PQ} = \frac{4+2}{-4-1} = -\frac{6}{5}$ $m_{MN} = \frac{5}{6}$ $m_{MN} = \frac{5}{6}$ $x_1 = -\frac{3}{2}$ $y_1 = 1$ $y = \frac{5}{6}x + c$ $1 = \frac{5}{6}\left(-\frac{3}{2}\right) + c$ $c = \frac{9}{4}$ $y = \frac{5}{6}x + \frac{9}{4}$ $\checkmark m_{PQ} = -\frac{6}{5}$ $\checkmark m_{MN} = \frac{5}{6}$ $\checkmark$ Substitute $\left(-\frac{3}{2}; 1\right)$ $\checkmark y = \frac{5}{6}x + \frac{9}{4}$ (4)
4.1.4	$\sqrt{(k+4)^2 + (-4-4)^2} = \sqrt{(k+4)^2 + (-4+2)^2}$ $k^2 + 8k + 16 + 64 = k^2 - 2k + 1 + 4$ $10k = -75$ $k = -\frac{15}{2}$	$\checkmark$ substitute correct both sides $\checkmark 10k = -75$ $\checkmark k = -\frac{15}{2}$ (3)

4.1.5	$m_{PR} = \frac{4+4}{-4+\frac{15}{2}}$ $= \frac{16}{7}$ $\tan \alpha = \frac{16}{7}$ $\alpha = 66,4^\circ$ $\tan \beta = -\frac{6}{5}$ $\beta = 129,8^\circ$ $\widehat{RPQ} = \beta - \alpha$ $= 63,4^\circ$		$\checkmark m_{PR} = \frac{16}{7}$ $\checkmark \tan \alpha = \frac{16}{7}$ $\checkmark \alpha = 66,4^\circ$ $\checkmark \beta = 129,8^\circ$ $\checkmark \widehat{RPQ} = 63,4^\circ$
-------	--	--	--

(5)

2018 Eastern Cape Preliminary Paper 2 Q 3

3.1	$(\sqrt{89})^2 = (-3-t)^2 + (-3-5)^2$ $89 = 9 + 6t + t^2 + 64$ $t^2 + 6t - 16 = 0$ $(t-2)(t+8) = 0$ $\therefore t = 2 \text{ or / of } t \neq -8$	$\checkmark$ substitution / vervanging $\checkmark$ simplification / vereenvoudiging $\checkmark$ standard form / standaardvorm $\checkmark$ factors / faktore $\checkmark$ value of t / waarde van t	(5)
3.2	$m_{AB} = -3$ $\frac{3+3}{p+3} = -3$ $-3p - 9 = 6$ $p = -5$	$\checkmark m_{AB}$ $\checkmark m_{AB}$ in terms of p / in terme van p $\checkmark$ equating / gelykstelling $\checkmark$ value of p / waarde van p	(4)
3.3	$-3x - 12 = 0$ $x = -4$ $E(-4; 0)$	$\checkmark y = 0$ $\checkmark x = 4$	(2)
3.4	$M = \left(\frac{-5+2}{2}; \frac{3+5}{2} \right)$ $= \left(-\frac{3}{2}; 4 \right)$	$\checkmark$ x - coordinate / koördinaat $\checkmark$ y - coordinate / koördinaat	(2)

3.5	$m_{EM} = \frac{0 - 4}{-4 + \frac{3}{2}}$ $= \frac{8}{5}$ $m_{BC} = \frac{5 + 3}{2 + 3}$ $= \frac{8}{5}$ $\therefore EM \parallel BC \text{ [= gradients/gradiente]}$	✓ correct substitution / <i>korrekte vervanging</i> ✓ m_{EM} ✓ m_{BC} ✓ = gradients / = <i>gradiente</i>	(4)
3.6	$\tan \theta = -3$ $\theta = 108,4349488^\circ$ $\tan \beta = \frac{8}{5}$ $\beta = 57,99461679^\circ$ $\therefore \hat{A}\hat{B}\hat{C} = 50,44^\circ$	✓ size of θ / <i>grootte van θ</i> ✓ size of α / <i>grootte van β</i> ✓ size of $\hat{A}\hat{B}\hat{C}$ / <i>grootte van $\hat{A}\hat{B}\hat{C}$</i>	(4)

2016 Western Cape Prelim Paper 2 Q 3

3.1	$AB = \sqrt{(4+2)^2 + (9-1)^2}$ $= \sqrt{6^2 + 8^2}$ $= \sqrt{100}$ $= 10$	✓ Subst in correct formula/ <i>Instel in korrekte formule</i> ✓ Ans/ <i>Antw</i>	(2)
3.2	$AB = BC = 10$ <i>y value</i> = 9 + 10 $BC \parallel y - \text{axis}$ $C(4; 19)$	✓ <i>x value/waarde</i> ✓ <i>y - value/waarde</i>	(2)
3.3	$K\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$ $K\left(\frac{4+2}{2}; \frac{19+1}{2}\right)$ $K(1; 10)$	✓ Subst in correct formula/ <i>Instel in korrekte formule</i> ✓ Ans/ <i>Antw</i>	(2)
3.4	$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{19-1}{4+2} = \frac{18}{6} = 3$ $y - y_1 = m(x - x_1)$ $y - 1 = 3(x + 2)$ $y = 3x + 6 + 1$ $y = 3x + 7$	✓ <i>m</i> ✓ Subst A or C point into correct formula/ <i>Stel A of C in korrekte formule</i> ✓ Ans/ <i>Antw</i>	(3)
3.5	$m_{AC} = 3$ <i>Angle of inclination</i> = $\tan^{-1}(3)$ $= 71,57^\circ$ $\therefore \theta = 90^\circ - 71,57^\circ$ $= 18,43^\circ$ OR In the right-angled triangle: $\tan \theta = \frac{6}{18}$ $\theta = 18,43^\circ$	✓ $\tan \angle = m$ ✓ $\angle$ of inclination/ <i>Inklinasie</i> $\angle$ ✓ Comple $\angle$'s/ <i>Kompl $\angle$</i> ✓ Ans/ <i>Antw</i> OR ✓ correct trig ratio/ <i>korrekte trig verhouding</i> ✓✓ correct values / <i>korrekte waardes</i> ✓ Ans/ <i>Antw</i>	(4)
3.6	$\text{Area } \triangle ABC = \frac{1}{2} \cdot BC \cdot \perp h$ $= \frac{1}{2} (10)(6)$ $= 30 \text{ sq units}$	✓ correct formula/ <i>korrekte formule</i> ✓ base/ <i>basis</i> = 10 ✓ height/ <i>hoogte</i> = 6 ✓ ans/ <i>antw</i>	(4)

2018 Kwazulu Natal Preliminary Paper 2 Q 3

3.1.1	$m_{AB} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{1 - 5}{4 - (-4)}$ $= \frac{-4}{8}$ $= \frac{-1}{2}$	✓ A substitution into gradient formula ✓ CA answer (provided – answer)	(2)
3.1.2	$y = mx + c$ $5 = -\frac{1}{2}(-4) + c$ $c = 3$ $y = -\frac{1}{2}x + 3$	✓ CA substituting point and gradient of line AB ✓ CA answer	(2)
3.1.3	$m_{CD} = 2 \quad CD \perp AB$ $y = mx + c$ $-4 = 2(-1) + c$ $c = -2$ $y = 2x - 2$	✓ CA $CD \perp AB$ ✓ A substituting point (-1;-4) ✓ CA answer	(3)

3.1.4	$\therefore 2x - 2 = -\frac{1}{2}x + 3$ $\frac{5}{2}x = 5$ $\therefore x = 2$ $\therefore y = 2(2) - 2$ $= 2$ $\therefore E(2; 2)$	✓ CA Equating ✓ CA $x = 2$ ✓ CA $y = 2$ (CA if both co-ordinates are positive)	(3)
-------	--	---	-----

3.1.5	$m_{CB} = \frac{1 - (-4)}{4 - (-1)}$ $= 1$ Equation of line passing through A parallel to BC = 1 $y = mx + c$ $5 = 1(-4) + c$ $c = 9$ $y = x + 9$	✓ A substitution into gradient formula ✓ CA gradient value ✓ CA gradient of Line parallel ✓ A substitution of point (-4 ; 5) ✓ CA answer	(5)
3.2	$\tan \theta = 1$ $\theta = 45^\circ$	✓ CA $\tan \theta = 1$ ✓ CA answer	(2)
3.3	$CE = \sqrt{(2 - (-1))^2 + (2 - (-4))^2}$ $= \sqrt{9 + 36}$ $= \sqrt{45}$ $= 3\sqrt{5}$ $AE = \sqrt{(2 - (-4))^2 + (2 - 5)^2}$ $= \sqrt{36 + 9}$ $= \sqrt{45}$ $= 3\sqrt{5}$ $\text{Area of } \triangle AEC = \frac{1}{2} \text{ base x height}$ $= \frac{1}{2} \cdot 3\sqrt{5} \times 3\sqrt{5}$ $= \frac{1}{2} \cdot 9 \times 5$ $= \frac{45}{2}$ $= 22,5 \text{ units}^2$	✓ CA answer ✓ CA answer ✓ CA Correct substitution into Area formula ✓ CA Answer	(4) [21]

2010 November Paper 2 Q 5

5.1.1	$m_{AD} = m_{AC} = \frac{7-4}{3-(-3)} = \frac{3}{6} = \frac{1}{2}$ OR $m_{AD} = m_{AC} = \frac{4-7}{-3-(3)} = \frac{-3}{-6} = \frac{1}{2}$ Note: If candidate gives $m_{AD} = \frac{7}{3-x}$ then 1/2 marks	✓ substitution of A and C into correct formula ✓ answer (2)
5.1.2	$m_{BC} = \frac{-6-4}{1-(-3)} = \frac{-10}{4} = \frac{-5}{2}$ OR $m_{BC} = \frac{4-(-6)}{-3-(1)} = \frac{10}{-4} = \frac{-5}{2}$	✓ answer (1)
5.2	$m_{AD} = \frac{1}{2} = \tan \hat{CDO}$ $\hat{CDO} = 26,56505....^\circ$ $m_{BC} = \frac{-5}{2} = \tan \alpha$ $\alpha = 111,814\,095^\circ$ $\hat{DCB} = 111,8014095....^\circ - 26,56505....^\circ$ $= 85,236359^\circ$ $= 85,24^\circ$ $\approx 85,2^\circ$ OR	✓ 26,57° ✓ 111,80° ✓ answer (3)
	$\tan \hat{CDO} = \frac{1}{2}$ $\hat{CDO} = 26,56505....^\circ$ $\tan(180^\circ - \alpha) = \frac{5}{2}$ $180^\circ - \alpha = 68,19859051....^\circ$ $\hat{DCB} = 180^\circ - (26,56505....^\circ + 68,19859051....^\circ)$ $= 85,236359^\circ$ $= 85,24^\circ$ OR	✓ 26,57° ✓ 68,2° ✓ answer (3)

$\hat{DCB} = \alpha - \hat{CDO}$ $\tan \hat{DCB} = \frac{m_{CB} - m_{CD}}{1 + m_{CB} \cdot m_{CD}}$ $= \frac{-\frac{5}{2} - \frac{1}{2}}{1 + (-\frac{5}{2})(\frac{1}{2})}$ $= 12$ $\hat{DCB} = 85,24^\circ$	✓ $\tan \hat{DCB} = \frac{m_{CB} - m_{CD}}{1 + m_{CB} \cdot m_{CD}}$ ✓ substitution ✓ answer (3)
OR $AC = \sqrt{45} \quad BC = \sqrt{116} \quad AB = \sqrt{173}$ $\cos \hat{ACB} = \frac{AC^2 + BC^2 - AB^2}{2AC \cdot BC}$ $= \frac{45 + 116 - 173}{2(\sqrt{45})(\sqrt{116})}$ $= -0,083045...$ $\hat{ACB} = 94,76...^\circ$ $\hat{DCB} = 180^\circ - 94,76...^\circ$ $= 85,24^\circ$ OR $D(-11; 0)$ $DC = \sqrt{80} \quad BC = \sqrt{116} \quad DB = \sqrt{180}$ $\cos \hat{DCB} = \frac{DC^2 + BC^2 - DB^2}{2DC \cdot BC}$ $= \frac{80 + 116 - 180}{2(\sqrt{80})(\sqrt{116})}$ $= 0,08304547985...$ $\hat{DCB} = 85,24^\circ$ OR	✓ cosine rule ✓ substitution into cosine rule ✓ answer (3) ✓ cosine formula ✓ substitution into cosine rule ✓ answer (3)
Equation AC: $2y = x + 11$ D(-11; 0) C(-3; 4) $DC^2 = (x_C - x_D)^2 + (y_C - y_D)^2$ $= (-3 + 11)^2 + (4 - 0)^2$ $= 80$ Equation BC: $2y = -5x - 7$ P(-$\frac{7}{5}$; 0) $PC^2 = (-3 + \frac{7}{5})^2 + (4 - 0)^2$ $= \frac{464}{25}$	

	$DP^2 = \left(-\frac{7}{5} + 11\right)^2$ $= \frac{2304}{25}$ In $\triangle DCP$: $DP^2 = DC^2 + CP^2 - 2DC \cdot CP \cdot \cos \hat{DCP}$ $\frac{2304}{25} = \frac{2000}{25} + \frac{464}{25} - 2\left(\frac{\sqrt{2000}}{5}\right)\left(\frac{\sqrt{464}}{5}\right) \cdot \cos \hat{DCP}$ $\hat{DCP} = 85,23635\dots$ $\hat{DCP} = 85,24^\circ$	✓ cosine formula ✓ substitution into cosine rule ✓ answer
5.3	$y - 7 = \frac{1}{2}(x - 3)$ $y = \frac{1}{2}x + \frac{11}{2}$ $x - 2y + 11 = 0$ OR $y - 4 = \frac{1}{2}(x + 3)$ $y = \frac{1}{2}x + \frac{11}{2}$ $x - 2y + 11 = 0$ OR $y = \frac{1}{2}x + c$ $(7) = \frac{1}{2}(3) + c$ $c = \frac{11}{2}$ $y = \frac{1}{2}x + \frac{11}{2}$ $x - 2y + 11 = 0$ Note: If candidate leaves answer as $y - 7 = \frac{1}{2}(x - 3)$ or $y - 4 = \frac{1}{2}(x + 3)$: max 1 / 3 marks	✓ substitution of (3 ; 7) into $y - y_1 = m(x - x_1)$ ✓ answer in any form (2) ✓ substitution of (-3 ; 4) into $y - y_1 = m(x - x_1)$ ✓ answer in any form (2) ✓ substitution of (3 ; 7) into $y = mx + c$ ✓ answer in any form (2)
5.4	$M(x, y) = \left(\frac{-3+1}{2}; \frac{4-6}{2}\right)$ $M(x, y) = (-1; -1)$	✓ substitution ✓ answer (2)
5.5	$m_{AM} = \frac{7 - (-1)}{3 - (-1)} = 2$ $y = 2x + c$ $-1 = 2(-1) + c$ $\therefore c = 1$ $y = 2x + 1$ $G(a; b)$ lies on the line $\therefore b = 2a + 1$ Note: If the candidate does not conclude $b = 2a + 1$ from $y = 2x + 1$: max 3 / 4 marks	✓ gradient = 2 ✓ substitution (-1 ; -1) ✓ $c = 1$ ✓ conclusion (4)

OR

$$\frac{7-b}{3-a} = \frac{b+1}{a+1}$$

$$(7-b)(a+1) = (b+1)(3-a)$$

$$7a + 7 - ab - b = 3b - ab + 3 - a$$

$$8a - 4b = -4$$

$$2a - b = -1$$

$$b = 2a + 1$$

OR

Using the point $(-1; -1)$

$$\frac{b+1}{a+1} = \frac{8}{4}$$

$$\frac{b+1}{a+1} = 2$$

$$b+1 = 2a+2$$

$$b = 2a + 1$$

OR

Using the point $(3; 7)$

$$\frac{7-b}{3-a} = \frac{8}{4}$$

$$\frac{7-b}{3-a} = 2$$

$$7-b = 6-2a$$

$$b = 2a + 1$$

$$\checkmark \frac{7-b}{3-a}$$

$$\checkmark \frac{b+1}{a+1}$$

✓ equating

✓ simplification
leading to
 $2a - b = -1$

(4)

✓ substitution of
 $(-1; -1)$ into
gradient

✓ gradient = 2

✓ equating

✓ simplification
leading to
 $b+1 = 2a+2$

(4)

✓ substitution of
 $(3; 7)$ into
gradient

✓ gradient = 2

✓ equating

✓ simplification
leading to
 $7-b = 6-2a$

(4)

5.6

$$GC = \sqrt{17}$$

$$GC^2 = 17$$

$$(a+3)^2 + (b-4)^2 = 17$$

$$(a+3)^2 + (2a+1-4)^2 = 17$$

$$a^2 + 6a + 9 + 4a^2 - 12a + 9 - 17 = 0$$

$$5a^2 - 6a + 1 = 0$$

$$(5a-1)(a-1) = 0$$

$$a = \frac{1}{5} \text{ or } a = 1$$

$$\therefore b = \frac{7}{5} \text{ or } b = 3$$

OR

Note:

If candidate swops a
and b around:

max 2 / 6 marks

✓ distance
formula in terms
of a and b

✓ substitution of
 $b = 2a + 1$

✓ standard form

✓ factors or
correct

substitution into
formula

✓ values of a

✓ values of b

(6)

$a = \frac{b-1}{2}$ $17 = (a+3)^2 + (b-4)^2$ $17 = \left(\left(\frac{b-1}{2} \right) + 3 \right)^2 + (b-4)^2$ $17 = \left(\frac{b+5}{2} \right)^2 + (b-4)^2$ $17 = \frac{b^2 + 10b + 25 + 4b^2 - 32b + 64}{4}$ $68 = 5b^2 - 22b + 89$ $0 = 5b^2 - 22b + 21$ $0 = (5b-7)(b-3)$ $\therefore b = \frac{7}{5} \text{ or } b = 3$	$\checkmark a = \frac{b-1}{2}$ $\checkmark \text{ distance}$ formula in terms $\text{of } a \text{ and } b$ $\checkmark \text{ substitution}$ $\text{of } a = \frac{b-1}{2}$ $\checkmark \text{ standard form}$ $\checkmark \text{ factors or}$ correct substitution into formula $\checkmark \text{ values of } b$ (6) $[20]$
---	--

2013 November Paper 2 Q 5

5.1.1	$m_{PT} = \tan 63,43^\circ$ $= 2$	$\checkmark \tan 63,43^\circ$ $\checkmark 2$ (2) Answer only: full marks
5.1.2	Coordinates of P(-5 ; 0) $y - y_1 = m(x - x_1)$ $y - 0 = 2(x + 5)$ $y = 2x + 10$ $y = mx + c$ $0 = (2)(-5) + c$ $c = 10$ $y = 2x + 10$ $m_{PT} = 2 = \tan 63,43^\circ$ $\tan 63,43^\circ = \frac{OS}{OP} = \frac{OS}{5} = 2$ $\therefore OS = 10$ $y = 2x + 10$	$\checkmark \text{ substitution of}$ $P(-5 ; 0) \text{ and}$ $m = 2 \text{ into equation}$ $\checkmark \text{ equation}$ (2) $\checkmark \text{ substitution of}$ $P(-5 ; 0) \text{ and}$ $m = 2 \text{ into equation}$ $\checkmark \text{ equation}$ (2) $\checkmark \frac{OS}{5} = 2$ $\checkmark \text{ equation}$ (2)

5.1.3	OS = 10 units $PS^2 = (5)^2 + (10)^2$ $= 125$ $PS = \sqrt{125} = 5\sqrt{5}$ Accept PS = 11,18	✓ OS = 10 ✓ substitution of correct distances into Pythagoras ✓ $\sqrt{125}$ (3)
5.1.4	Let T be (x ; y). Then $\frac{-5+x}{2} = 0 \quad \text{and} \quad \frac{0+y}{2} = 10$ $x = 5 \quad y = 20$ T(5 ; 20) OR by inspection: T(5 ; 20)	✓ 5 ✓ 20 (2) ✓ 5 ✓ 20 (2)
5.2	$OR = \left(\frac{3}{2}\right)(5) = \frac{15}{2} = 7,5$ $R\left(\frac{15}{2}; 0\right)$ If only x-coordinate : 2 marks	✓ $x = 7,5 / \frac{15}{2}$ ✓ $y = 0$ (2)
5.3	Area $\Delta PTR = \frac{1}{2}(\text{base PR}) \times (\text{height})$ $= \frac{1}{2}\left(5 + \frac{15}{2}\right) \times 20$ $= 125 \text{ square units}$ OR Area $\Delta PTR = \frac{1}{2} PT.PR. \sin \hat{TPR}$ $= \frac{1}{2} \left(10\sqrt{5}\right) \left(\frac{25}{2}\right) \sin 63,43^\circ$ $= 124,99 \text{ square units}$	✓ area formula ✓ $5 + \frac{15}{2} = 12,5$ ✓ 20 ✓ 125 (4) ✓ area formula ✓ $10\sqrt{5}$ ✓ $\frac{25}{2}$ ✓ 124,99 (4)

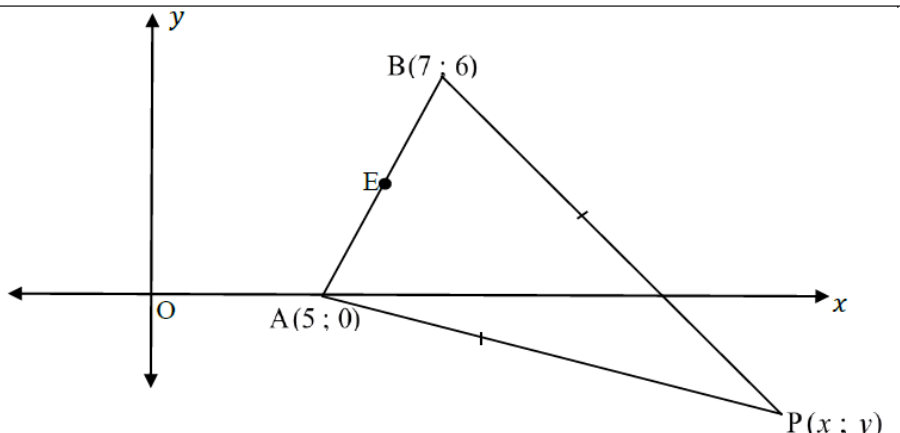
[15]

2018 Free State Prelim Paper 2 Q 3

3.1.1	$M_{EF} = M_{FG}$ $\frac{-1-3}{0-4} = \frac{1-(-1)}{t}$ $\frac{-4}{-4} = \frac{1+1}{t}$ $1 = \frac{2}{t}$ $t = 2$	✓ $M_{EF} = M_{FG}$ ✓ Substitution into the correct formula ✓ $1 = \frac{2}{t}$ ✓ Answer (4)
3.1.2	$M_{EF} \times M_{FG} = -1$ $1 \times \frac{2}{t} = -1$ $t = -2$	✓ $1 \times \frac{2}{t} = -1$ ✓ Answer (2)

3.2.1	$y = \frac{1}{2}x + 8$ $M_{QR} = M_{PS} = \frac{1}{2}$ QR//PS $y - 5 = \frac{1}{2}(x - 4)$ $y = \frac{1}{2}x - 2 + 5$ $\therefore y = \frac{1}{2}x + 3$	✓ rewrite equation of PR ✓ $M_{PS} = \frac{1}{2}$ ✓ Substitute (4; 5) correctly ✓ Equation (4)
3.2.2	$0 = \frac{1}{2}x + 3$ $x = -6$ $\therefore S(-6; 0)$	✓ $y = 0$ ✓ $S(-6; 0)$ (2)
3.2.3	$M\left(\frac{2 + (-6)}{2}; \frac{6 + 0}{2}\right)$ $= M(-2; 3)$	✓ $\frac{2 + (-6)}{2}$ ✓ $\frac{6 + 0}{2}$ (2)
3.2.4	Midpoint of QS = midpoint of PR (diagonals bisect) $-2 = \frac{x + 4}{2}$ $x = -8$ $3 = \frac{y + 5}{2}$ $y = 1$ $\therefore R(-8; 1)$ OR $P \rightarrow Q : (x - 2; y + 1)$ $S \rightarrow R : (x - 2; y + 1)$ $\therefore R(-6 - 2; 0 + 1)$ $\therefore R(-8; 1)$	✓ $-2 = \frac{x + 4}{2}$ ✓ $3 = \frac{y + 5}{2}$ ✓ $R(-8; 1)$ (3) ✓ $\rightarrow R : (x - 2; y + 1)$ ✓✓ $\therefore R(-8; 1)$ (3)
3.2.5	$m_{PS} = \frac{1}{2}$ PS // QR $\tan \hat{O} \hat{S} P = m_{PS} = \frac{1}{2}$ $\therefore \hat{O} \hat{S} P = 26,57^\circ$ $m_{RS} = -\frac{1}{2}$ $R \hat{S} O = 180^\circ - 26,57^\circ$ $= 153,43^\circ$ $\therefore R \hat{S} P = 153,43^\circ - 26,57^\circ$ $= 126,86^\circ$	✓ $\tan \hat{O} \hat{S} P = m_{PS} = \frac{1}{2}$ ✓ $\hat{O} \hat{S} P = 26,57^\circ$ ✓ $m_{RS} = -\frac{1}{2}$ ✓ $R \hat{S} O = 153,43^\circ$ ✓ $126,86^\circ$ (5)

2020 Gauteng Preliminary Paper 2 Q 3

		
3.1	$E\left(\frac{12}{2}; \frac{6}{2}\right)$ $E(6; 3)$	$\checkmark 6$ $\checkmark 3$ (2)
3.2	$m_{BA} = \frac{6-0}{7-5}$ $= 3$ $y = mx + c$ $y = 3x + c$ $6 = 3(7) + c$ OR / OF $y - y_1 = m(x - x_1)$ $c = -15$ $y - 6 = 3(x - 7)$ $y = 3x - 15$ $y = 3x - 21 + 6$ $y = 3x - 15$ OR / OF	$\checkmark m_{BA} = 3$ $\checkmark$ substitution of m and $(7; 6) / (5; 0)$ <i>Vervanging van m en</i> $(7; 6) / (5; 0)$ $\checkmark y = 3x - 15$

	$y = mx + c$ $y = 3x + c$ $0 = 3(5) + c$ $c = -15$ $y = 3x - 15$	OR / OF $y - y_1 = m(x - x_1)$ $y - 0 = 3(x - 5)$ $y = 3x - 15$	(3)
3.3	$rx - 3y + 5 = 0$ $-3y = -rx - 5$ $y = \frac{r}{3}x + \frac{5}{3}$ $3 = \frac{r}{3}$ $r = 9$	✓ standard form / <i>standaardvorm</i> ✓ $3 = \frac{r}{3}$ ✓ $r = 9$	(3)
3.4	Area $\triangle AOP = 10$ $\frac{1}{2} \times AO \times \perp h = 10$ $\frac{1}{2} \times 5 \times \perp h = 10$ $\perp h = 4$ but / <i>maar</i> $y < 0$ $\therefore y = -4$ $AP = BP$ $AP^2 = BP^2$ $(x-5)^2 + (-4-0)^2 = (x-7)^2 + (-4-6)^2$ $x^2 - 10x + 25 + 16 = x^2 - 14x + 49 + 100$ $4x = 108$ $x = 27$ P (27 ; -4)	✓ $\frac{1}{2} \times 5 \times \perp h = 10$ ✓ $\perp h = 4$ ✓ $y = -4$ ✓ $(x-5)^2 + (-4-0)^2$ and / <i>en</i> $(x-7)^2 + (-4-6)^2$ ✓ equate the two lengths / <i>gelykstel van die twee</i> <i>lengtes</i> ✓ $4x = 108$ ✓ $x = 27$	(7)
			[15]

