Province of the
EASTERN CAPE
EDUCATION

EC CURRICULUM: FET MATHEMATICS, MATHEMATICAL LITERACY AND TECHNICAL MATHEMATICS

NATIONAL SENIOR CERTIFICATE

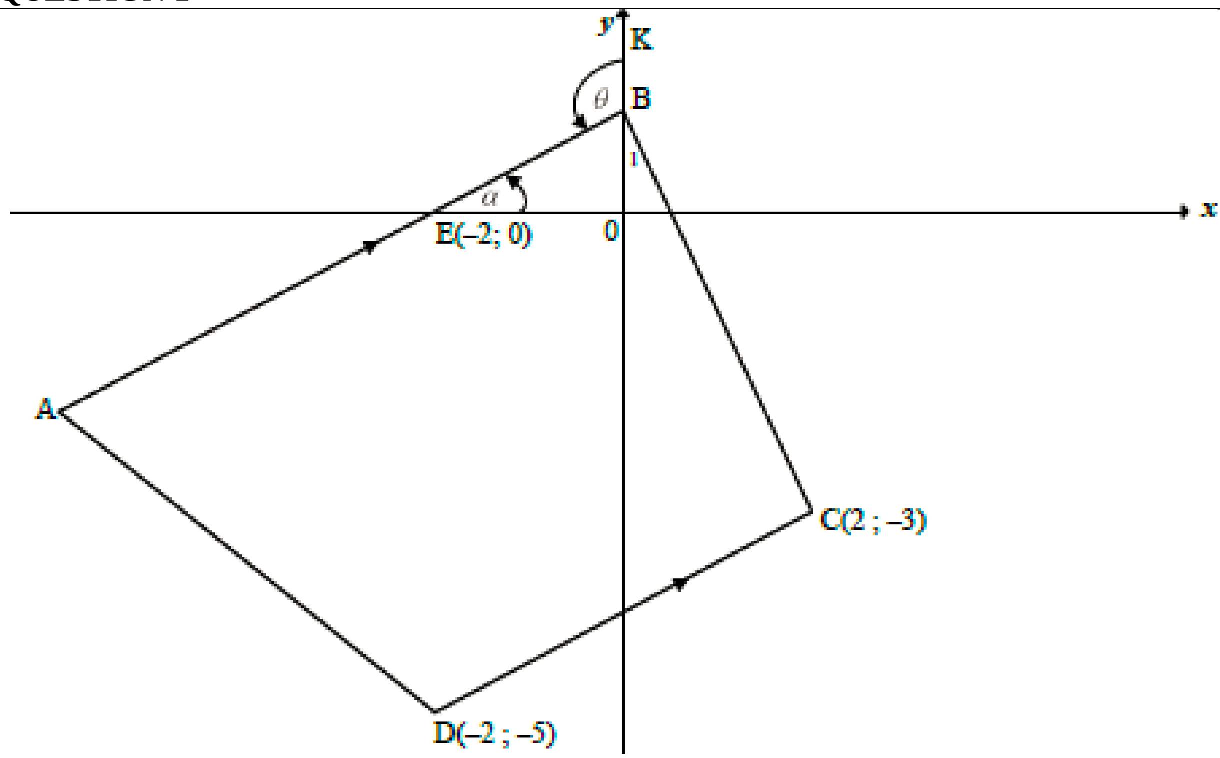
GRADE 12

MATHEMATICS TOPIC TEST 2 OF 2020: ANALYTICAL GEOMETRY MARKING GUIDELINES

MARKS: 40

This Marking Guidelines consists of 3 pages.

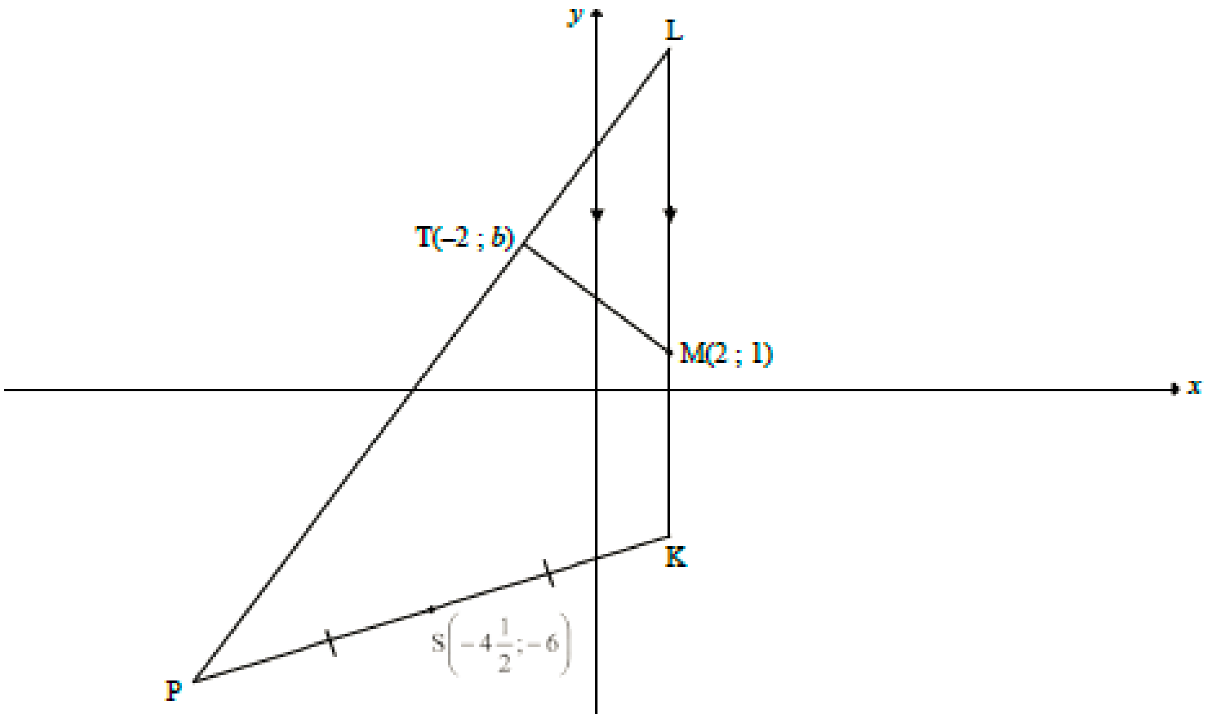
QUESTION 1



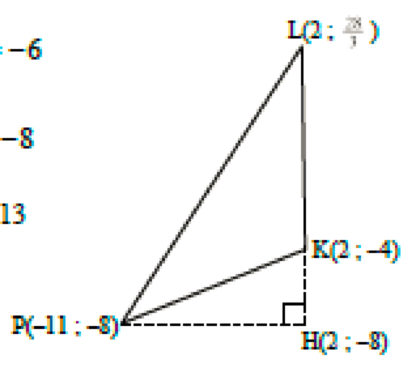
1.1.1	Midpoint of EC: $=\left(\frac{-2+2}{2}\ ;\ \frac{0+(-3)}{2}\right)=\left(0\ ;\ \frac{-3}{2}\right)$	✓ x value ✓ y value (2)
1.1.2	$m_{DC}=\frac{-3-(-5)}{2-(-2)}$ OR $\frac{-5-(-3)}{-2-2}$ $=\frac{2}{4}=\frac{1}{2}$ Answer only: full marks	✓ substitution ✓ answer (2)
1.1.3	$m_{AB}=\frac{1}{2}$ [AB ∥ DC] $y=\frac{1}{2}x+c$ $0=\frac{1}{2}(-2)+c$ $c=1$ $\therefore y=\frac{1}{2}x+1$ OR $y-y_1=\frac{1}{2}(x-x_1)$ $y-0=\frac{1}{2}(x-(-2))$	✓ $m_{AB}=\frac{1}{2}$ ✓ substitution of $(-2\,;0)$ ✓equation (3)
1.1.4	$\tan\alpha=m_{AB}=\frac{1}{2}$ $\alpha=26{,}57°$ $\theta=90°+26{,}57°$ [ext ∠of Δ] $=116{,}57°$	✓ $\tan\alpha=\frac{1}{2}$ ✓ value of α ✓ value of θ (3)

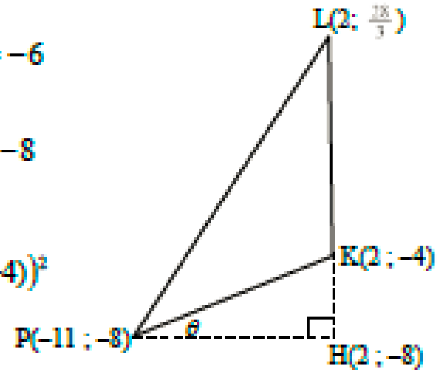
1.2	B(0 ; 1) $m_{BC}=\frac{1-(-3)}{0-2}$ OR $m_{BC}=\frac{(-3)-1}{2-0}$ $=-2$ $\quad$ $=-2$ $m_{AB}\times m_{BC}=\frac{1}{2}\times -2$ $=-1$ $\therefore AB\perp BC$	✓ coordinates of B ✓ $m_{BC}=-2$ ✓ product of gradients $=-1$ (3)
1.3.1	$A\hat{B}C=90^\circ$ $\therefore$ EC is diameter [converse: ∠ in semi circle] $\therefore$ centre of circle $=\left(0\ ;\ -\frac{3}{2}\right)$	✓ answer (1)
1.3.2	$(x-0)^2+\left(y+\frac{3}{2}\right)^2=r^2$ $(-2-0)^2+\left(0+\frac{3}{2}\right)^2=r^2$ OR $(2-0)^2+\left(-3-\left(\frac{-3}{2}\right)\right)^2=r^2$ OR $(0-0)^2+\left(1-\left(\frac{-3}{2}\right)\right)^2=r^2$ OR $r=\frac{EC}{2}=\frac{\sqrt{(-2-2)^2+(0-(-3))^2}}{2}$ OR $r=1-(-\frac{3}{2})$ $\therefore\ r^2=\frac{25}{4}$ or $r=\frac{5}{2}$ $x^2+\left(y+\frac{3}{2}\right)^2=\frac{25}{4}$	✓ substitution of centre ✓ correct substitution of E(–1 ; 0), B(0 ; 1) or C(2 ; –3) to calculate r^2 or r ✓ value of r^2 or r ✓ equation (4)
		[18]

QUESTION 2



2.1	$(x-2)^2+(y-1)^2=25$ $(-2-2)^2+(b-1)^2=25$ $(b-1)^2=9$ $b-1=\pm 3$ $\therefore b=4$ or $b\neq -2$ OF $(x-2)^2+(y-1)^2=25$ $(-2-2)^2+(b-1)^2=25$ $16+b^2-2b+1=25$ $b^2-2b-8=0$ $\therefore b=4$ or $b\neq -2$	✓ equation of the circle ✓substitution of point T ✓simplification ✓ answer (4)
2.2.1	K(2 ; 1 – 5) ∴ K(2 ; –4) Answer only: full marks	✓ x value ✓ y value (2)
2.2.2	$m_{MT}=\frac{4-1}{-2-2}=-\frac{3}{4}$ $m_{PL}=\frac{4}{3}$ [radius ⊥ tangent] $y=\frac{4}{3}x+c$ $4=\frac{4}{3}(-2)+c$ $c=\frac{20}{3}$ $y=\frac{4}{3}x+\frac{20}{3}$	✓ m_{MT} ✓ $m_{PL}=\frac{4}{3}$ ✓ substitution of m_{PL} and the point T ✓ equation (4)

	OR $m_{MT} = \frac{4-1}{-2-2} = -\frac{3}{4}$ $m_{PL} = \frac{4}{3}$ [radius ⊥ tangent] $y - y_1 = \frac{4}{3}(x - x_1)$ $y - 4 = \frac{4}{3}(x+2)$ $y = \frac{4}{3}x + \frac{20}{3}$	✓ m_{MT} ✓ $m_{PL} = \frac{4}{3}$ ✓ substitution of m_{PL} and the point T ✓ equation (4)
	OR P(–11 ; –8) $m_{PL} = \frac{4-(-8)}{-2-(-11)}$ $= \frac{4}{3}$ $y = \frac{4}{3}x + c$ $-8 = \frac{4}{3}(-11) + c$ $c = \frac{20}{3}$ $y = \frac{4}{3}x + \frac{20}{3}$	✓ coordinates of P ✓ $m_{PL} = \frac{4}{3}$ ✓ substitution of m_{PL} and the point P or T ✓ equation (4)
2.2.3	$y_L = \frac{4}{3}(2) + \frac{20}{3} = \frac{28}{3}$ $L\left(2\,;\,\frac{28}{3}\right)$ and $K(2\,;-4)$: $LK = \frac{28}{3} - (-4) = \frac{40}{3}$ <u>Coordinates of P:</u> $\frac{x+2}{2} = -4\frac{1}{2}$ and $\frac{y-4}{2} = -6$ $\therefore x = -11$ $y = -8$ $\therefore P(-11;-8)$ $\perp$ height (PH) $= 2-(-11) = 13$ Area $\Delta PKL = \frac{1}{2}(LK)(PH)$ $= \frac{1}{2}\left(\frac{40}{3}\right)(13)$ $= \frac{260}{3}$ **OR** 86,67 square units 	✓ $y_L = \frac{28}{3}$ ✓ length of LK ✓ x_P ✓ y_P ✓ length of ⊥ height ✓ substitution into the area formula ✓ answer (7)

2.2.3	**OR** $y_L = \frac{4}{3}(2) + \frac{20}{3} = \frac{28}{3}$ $L\left(2\,;\,\frac{28}{3}\right)$ and $K(2\,;-4)$: $LK = \frac{28}{3} - (-4) = \frac{40}{3}$ <u>Coordinates of P:</u> $\frac{x+2}{2} = -4\frac{1}{2}$ and $\frac{y-4}{2} = -6$ $\therefore x = -11$ $\quad y = -8$ $\therefore P(-11;-8)$ $PK^2 = (-11-2)^2 + (-8-(-4))^2$ $PK = \sqrt{185}$ units $m_{PK} = \frac{-8-(-4)}{-11-2} = \frac{4}{13}$ $\tan\theta = \frac{4}{13}$ $\quad \therefore \theta = 17{,}1027...^\circ$ $\therefore P\hat{K}L = 90^\circ + 17{,}1027...^\circ = 107{,}1^\circ$  Area $\Delta PKL = \frac{1}{2}(PK)(LK).\sin P\hat{K}L$ $= \frac{1}{2}\left(\sqrt{185}\right)\left(\frac{40}{3}\right)\sin 107{,}10^\circ$ $= 86{,}67$ square units	✓ $y_L = \frac{28}{3}$ ✓ length of LK ✓ x_P ✓ y_P ✓ $P\hat{K}L$ ✓ substitution into the area rule ✓ answer (7)
2.3	The centres of the two circles lie on the same vertical line $x = 2$. and the sum of the radii $= 10$ $n - 1 = 10$ or $1 - n = 10$ $n = 11$ $\quad n = -9$ Answer only: full marks	✓ correct method ✓ sum of radii = 10 ✓ $n = 11$ ✓ $n = -9$ (4)
		[21]

TOTAL: 40