



NATIONAL SENIOR CERTIFICATE EXAMINATION
MAY 2023

MATHEMATICS: PAPER II

MARKING GUIDELINES

Time: 3 hours

150 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

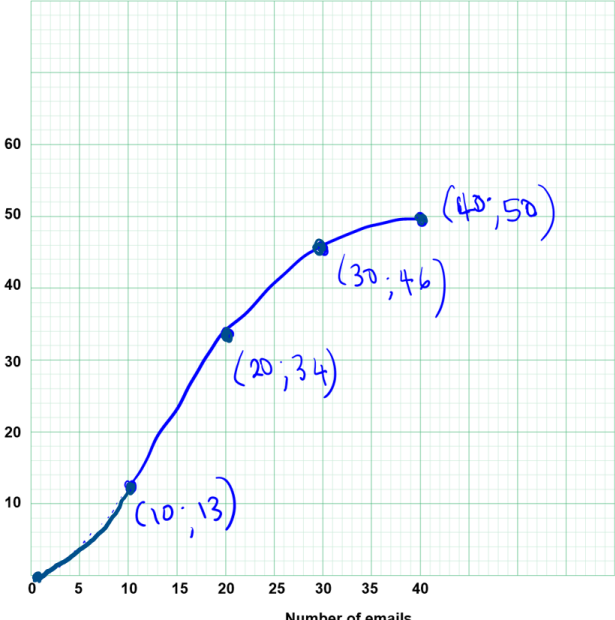
NOTE:

- If a candidate answers a question more than once, only mark the FIRST attempt.
- Consistent Accuracy applies in all aspects of the marking memorandum.

SECTION A**QUESTION 1**

(a)	$A = 14,533$ $B = 0,863$ $y = 14,533 + 0,863x$	$A = 14,533$ $B = 0,863$ $y = 14,533 + 0,863x$
(b)(1)	$r = 0,979 \dots$ $r \approx 1$	$r \approx 1$
(b)(2)	There is a very strong positive correlation.	strong positive correlation
(c)	$y = 14,533 + 0,863(70)$ $y = 74,9$ Alternate: Using calculator: $y = 74,9$	$y = 14,533 + 0,863(70)$ $y = 74,9$
(d)	Interpolation usually results in a fairly reliable prediction. Alternate: $r \approx 1$, hence strong correlation and reliable prediction. Alternate: 70 is not an outlier, hence a reliable prediction.	fairly reliable interpolation

QUESTION 2

(a)	$\bar{x} = \frac{(5 \times 13) + (15 \times 21) + (25 \times 12) + (35 \times 4)}{50}$ $\bar{x} = 16,4$	$\frac{(5 \times 13) + (15 \times 21) + (25 \times 12) + (35 \times 4)}{50}$ $\bar{x} = 16,4$
(b)		Shape Interval endpoints as x-coordinates Cumulative frequency as y-coordinates Co-ordinate endpoint Co-ordinate endpoint
(c)	Median lies in the interval $10 < x \leq 20$ so calculated as 15 (or read off the ogive curve). Mean is calculated as 16,4 in (a). Since mean > median, the data is positively skewed.	median: 15 Mean > median Positively skewed.

QUESTION 3

(a)	$\frac{\sin[(85^\circ + \theta) - (25^\circ + \theta)]}{\sin(60^\circ)}$ $= \frac{\sqrt{3}}{2}$	$\frac{\sin[(85^\circ + \theta) - (25^\circ + \theta)]}{\sin(60^\circ)}$ $= \frac{\sqrt{3}}{2}$
(b)	$-\tan(\theta) \cdot \cos(\theta) + \frac{2 \sin \theta \cdot \cos \theta}{2 \cos(\theta)}$ $-\frac{\sin \theta}{\cos \theta} \cdot \cos \theta + \frac{2 \sin \theta \cdot \cos \theta}{2 \cos \theta}$ $-\sin \theta + \sin \theta$ $= 0$	$-\tan \theta$ $\cos \theta$ $2 \sin \theta \cdot \cos \theta$ $2 \cos \theta$ $-\sin \theta + \sin \theta$ $= 0$
(c)(1)	$y^2 = 1^2 - p^2$ $= \sqrt{1 - p^2}$	$y^2 = 1^2 - p^2$ $= \sqrt{1 - p^2}$
(c)(2)	$= 2 \cos^2 x - 1$ $= 2p^2 - 1$	$= 2 \cos^2 x - 1$ $= 2p^2 - 1$
(d)	$\frac{\sin(x - 30^\circ)}{\cos(x - 30^\circ)} = \frac{1}{2}$ $\tan(x - 30^\circ) = \frac{1}{2}$ $x - 30^\circ \approx 26,6^\circ + k180^\circ; \quad k \in \mathbb{Z}$ $x \approx 56,6^\circ + k180^\circ; \quad k \in \mathbb{Z}$	$\tan(x - 30^\circ) = \frac{1}{2}$ Ref angle: $26,6^\circ$ $x \approx 56,6^\circ + k180^\circ; \quad k \in \mathbb{Z}$

QUESTION 4

(a)		x-intercepts TP endpoints x-intercepts TP endpoints
(b)	$g(x) = \cos x \cdot \cos 30^\circ - \sin x \cdot \sin 30^\circ$ $g(x) = \frac{\sqrt{3}}{2} \cos x - \frac{1}{2} \sin x$ $g(x) = \frac{1}{2} (\sqrt{3} \cos x - \sin x)$	$\cos x \cdot \cos 30^\circ - \sin x \cdot \sin 30^\circ$ $\frac{\sqrt{3}}{2} \cos x - \frac{1}{2} \sin x$
(c)	At the points A and B	Indicating points of intersection Showing the point on the x-axis.

QUESTION 5

(a)	$\hat{A}_1 = \hat{A}DO$ (Radii/∠s opp. = sides) $\therefore \hat{A}_1 = \frac{180^\circ - 40^\circ}{2}$ (int. ∠s of Δ) $\therefore \hat{A}_1 = 70^\circ$	$\hat{A}_1 = \hat{A}DO$ (Radii/∠s opp. = sides) $\therefore \hat{A}_1 = 70^\circ$ (int. ∠s of Δ)
(b)	$\hat{E} = 110^\circ$ (Opp. ∠s of cyclic quad.) Alternate $\hat{O}_2 = 180^\circ - 40^\circ$ (Adj. ∠s on str line) $\hat{O}_2 = 140^\circ$ $\therefore \hat{C}_2 = 70^\circ$ (∠ at centre = $2 \times$ ∠ at circumf.) $\hat{E} = 110^\circ$ (Opp. ∠s of cyclic quad.) Alternate: Reflex. $\hat{D}OB = (\hat{O}_1 + 180^\circ)$ (adj. ∠ on str. line) Reflex. $\hat{D}OB = 220^\circ$ $\hat{E} = 110^\circ$ (∠ at centre = $2 \times$ ∠ at circumf.)	$\hat{E} = 110^\circ$ (Opp. ∠s of cyclic quad.) $\hat{O}_2 = 140^\circ$ $\therefore \hat{C}_2 = 70^\circ$ (∠ at centre = $2 \times$ ∠ at circumf.) $\hat{E} = 110^\circ$ (Opp. ∠s of cyclic quad.) Reflex. $\hat{D}OB = 220^\circ$ $\hat{E} = 110^\circ$ (∠ at centre = $2 \times$ ∠ at circumf.)
(c)	$\hat{C}_1 = 20^\circ$ (∠ at centre = $2 \times$ ∠ at circumf.) Alternate: $\hat{C}_1 + \hat{C}_2 = 90^\circ$ (∠ in semi-circle) and $\therefore \hat{C}_2 = 70^\circ$ (proven) $\therefore \hat{C}_1 = 20^\circ$	$\hat{C}_1 = 20^\circ$ (∠ at centre = $2 \times$ ∠ at circumf.)
(d)	$\hat{B}_1 = 40^\circ$ (corresp ∠s DO//EB)	$\hat{B}_1 = 40^\circ$ (corresp ∠s DO//EB)

(e)	AF = FE (line from midpoint // to one side) DO ⊥ AE (line from centre to midpoint of chord) In ΔAOF: $\sin 40^\circ = \frac{AF}{4\frac{1}{2}}$ AF ≈ 2,9 units ∴ FE ≈ 2,9 units ∴ AE ≈ 5,8 units Alternate: In ΔABE: $\hat{E} = 90^\circ$ (∠ in semi-circle) Hence: $\sin 40^\circ = \frac{AE}{9}$ ∴ AE ≈ 5,8 units	AF = FE (line from midpoint // to one side) DO ⊥ AE (line from centre to midpoint of chord) In ΔAOF: $\sin 40^\circ = \frac{AF}{4\frac{1}{2}}$ AF ≈ 2,9 units ∴ FE ≈ 2,9 units ∴ AE ≈ 5,8 units
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QUESTION 6

(a)	$\hat{A} = x$ (tan/chord theorem)	$\hat{A} = x$ (tan/chord theorem)
(b)	In $\triangle CBD$ and $\triangle ACD$: $\hat{B}_2 = 90^\circ$ (adj. $\angle$ s on str line) $\hat{ACD} = 90^\circ$ (tan $\perp$ rad) $\hat{C}_2 = \hat{A}$ (tan/chord theorem) $\hat{D}$ is common $\therefore \triangle CBD \sim \triangle ACD$ ($\angle\angle\angle$)	$\hat{C}_2 = \hat{A}$ (tan/chord theorem) $\hat{D}$ is common $\therefore \triangle CBD \sim \triangle ACD$ ($\angle\angle\angle$)
(c)	$\frac{CD}{BD} = \frac{AD}{CD}$ ($\sim \triangle$ s - side in prop) $CD^2 = 9 \times 4$ $\therefore CD = 6$ units	$\frac{CD}{BD} = \frac{AD}{CD}$ ($\sim \triangle$ s - side in prop) $CD^2 = 9 \times 4$ $\therefore CD = 6$

QUESTION 7

(a)	$\hat{B} = 90^\circ$ ($\angle$ in semi $\odot$) $\hat{C}_1 = 45^\circ$ (given) $\therefore \hat{A}_1 = 180^\circ - (90^\circ + 45^\circ)$ (int. $\angle$ s of Δ) $\therefore \hat{A}_1 = 45^\circ$ (isosceles Δ / sides opp = $\angle$ s)	$\hat{B} = 90^\circ$ ($\angle$ in semi $\odot$) $\therefore \hat{A}_1 = 180^\circ - (90^\circ + 45^\circ)$ (int. $\angle$ s of Δ) $\therefore \hat{A}_1 = 45^\circ$ (isos Δ / sides opp = $\angle$ s)
(b)	$\hat{B}_2 = 90^\circ - 67,5^\circ$ ($\angle$ in semi $\odot$) $\hat{B}_2 = 22,5^\circ$ $\therefore \hat{A}_2 = 22,5^\circ$ ($\angle$ in same seg) $\hat{A}_1 = 45^\circ$ (shown) $\therefore \hat{A}_1 = 2 \times \hat{A}_2$	$\hat{B}_2 = 90^\circ - 67,5^\circ$ ($\angle$ in semi $\odot$) $\therefore \hat{A}_2 = 22,5^\circ$ ($\angle$ in same seg) $\hat{A}_1 = 45^\circ$ (shown)

SECTION B**QUESTION 8**

(a)	Construction: Join AO and BO In $\triangle AOC$ and $\triangle BOC$ OC is a common side AO = BO (radii) $\hat{C}_1 = \hat{C}_2 = 90^\circ$ (given) $\therefore \triangle AOC \equiv \triangle BOC$ (R;H;S) Hence AC = CB	Join AO and BO OC is a common side AO = BO (radii) $\hat{C}_1 = \hat{C}_2 = 90^\circ$ (given) $\therefore \triangle AOC \equiv \triangle BOC$ (R;H;S)
(b)	Let: line perp to AB meet AB at M $\therefore$ CM goes through the centre BM = MA = 4 units (line from centre perp to chord) In $\triangle AOM$: Let OM = x $\therefore$ radius CO = $8 - x$ $\therefore (8 - x)^2 = x^2 + 4^2$ (pythag) $16x = 48$ $x = 3$ $\therefore$ radius is 5 units Alternate: Let the radius be r In $\triangle AOM$: OM = $8 - r$ $\therefore r^2 = (8 - r)^2 + 4^2$ $\therefore 16r = 80$ Hence $r = 5$	BM = MA = 4 units (line from centre perp to chord) $\therefore$ radius CO = $8 - x$ $\therefore (8 - x)^2 = x^2 + 4^2$ (pythag) $x = 3$ $\therefore$ radius is 5 units

QUESTION 9

(a)	In $\triangle ACG$: $\frac{AE}{EC} = \frac{AF}{FG}$ (line $\parallel$ one side of $\triangle$) $\frac{3p}{2p} = \frac{2k}{FG}$ $\therefore FG = \frac{4}{3}k$ In $\triangle BFD$: $\frac{BG}{GF} = \frac{BC}{CD}$ (line $\parallel$ one side of $\triangle$) $\frac{\frac{11}{3}k}{\frac{4}{3}k} = \frac{BC}{CD}$ $\frac{BC}{CD} = \frac{11}{4}$	$\frac{AE}{EC} = \frac{AF}{FG}$ (line $\parallel$ one side of $\triangle$) $\therefore FG = \frac{4}{3}k$ $\frac{\frac{11}{3}k}{\frac{4}{3}k} = \frac{BC}{CD}$ (line $\parallel$ one side of $\triangle$) $\frac{BC}{CD} = \frac{11}{4}$
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QUESTION 10

(a)(1)	$\frac{\sin\theta \cdot \cos 2\theta}{2\sin\theta \cos\theta} \div \left(\frac{\sin\theta}{\cos\theta} - \frac{\cos\theta}{\sin\theta} \right)$ $= \frac{\sin\theta \cdot \cos 2\theta}{2\sin\theta \cos\theta} \div \left(\frac{\sin^2\theta - \cos^2\theta}{\sin\theta \cos\theta} \right)$ $= \frac{\sin\theta \cdot \cos 2\theta}{2\sin\theta \cos\theta} \times \left(\frac{\sin\theta \cos\theta}{-\cos 2\theta} \right)$ $a \ f(\theta) = -\frac{1}{2}\sin\theta$	$\frac{2\sin\theta \cos\theta}{\sin\theta}$ $\frac{\cos\theta}{\left(\frac{\sin^2\theta - \cos^2\theta}{\sin\theta \cos\theta} \right)} \text{ for LCD}$ $-\cos 2\theta$ $= -\frac{1}{2}\sin\theta$
(a)(2)	Values of $\theta \in [0^\circ; 360^\circ]$ for which the identity is not valid: $\tan\theta$ is undefined for: $\{90^\circ; 270^\circ\}$ $\sin 2\theta = 0$ undefined for: $\{0^\circ; 180^\circ; 360^\circ\}$ $\tan\theta - \frac{1}{\tan\theta} = 0$ undefined for: $\{45^\circ; 135^\circ; 225^\circ; 315^\circ\}$	$\{90^\circ; 270^\circ\}$ $\sin 2\theta = 0$ $\{0^\circ; 180^\circ; 360^\circ\}$ $\tan\theta - \frac{1}{\tan\theta} = 0$ $\{45^\circ; 135^\circ; 225^\circ; 315^\circ\}$
(b)	$\hat{A}DC = 180^\circ - (\alpha + \beta)$ (int. $\angle$s of Δ) $\frac{AC}{\sin \hat{A}DC} = \frac{AD}{\sin \beta}$ (sine rule) $\frac{120}{\sin[180^\circ - (\alpha + \beta)]} = \frac{AD}{\sin \beta}$ $\therefore AD = \frac{120 \sin \beta}{\sin(\alpha + \beta)}$ In $\triangle ABD$: $\tan \theta = \frac{BD}{AD}$ $BD = AD \tan \theta$ $\therefore BD = \frac{120 \sin \beta \cdot \tan \theta}{\sin \alpha \cdot \cos \beta + \cos \alpha \cdot \sin \beta}$	$\hat{A}DC = 180^\circ - (\alpha + \beta)$ $\frac{120}{\sin[180^\circ - (\alpha + \beta)]} = \frac{AD}{\sin \beta}$ $\therefore AD = \frac{120 \sin \beta}{\sin(\alpha + \beta)}$ In $\triangle ABD$: $\tan \theta = \frac{BD}{AD}$ $BD = AD \tan \theta$

QUESTION 11

(a)	$(x+4)^2 + (y-5)^2 = r^2$ $F\left(\frac{-4-2}{2}; \frac{5-1}{2}\right)$ $\therefore F(-3;2) \text{ sub. in eq of } \odot$ $(-3+4)^2 + (2-5)^2 = r^2$ $r^2 = 10$ $\text{Eq.: } (x+4)^2 + (y-5)^2 = 10$	$(x+4)^2 + (y-5)^2 = r^2$ $F\left(\frac{-4-2}{2}; \frac{5-1}{2}\right)$ $(-3+4)^2 + (2-5)^2 = r^2$ $r^2 = 10$ $(x+4)^2 + (y-5)^2 = 10$
(b)	$m_{AB} = -\frac{1}{2}$ $m_{BC} = 2$ $\text{Eq. BC: } y = 2x + c \text{ sub. } (-10;3)$ $\therefore c = 23$ $\text{Eq. BC: } y = 2x + 23$ $m_{AC} = -3$ $\text{Eq. AC: } y = -3x + c \text{ sub. } (-2;-1)$ $\therefore c = -7$ $\text{Eq. AC: } y = -3x - 7$ $\text{For C: } -3x - 7 = 2x + 23$ $x = -6$ $\therefore y = 11$ $C(-6;11)$	$m_{AB} = -\frac{1}{2}$ $m_{BC} = 2$ $\therefore c = 23$ $m_{AC} = -3$ $\therefore c = -7$ $\text{For C: } -3x - 7 = 2x + 23$ $x = -6$ $\therefore y = 11$ $C(-6;11)$
(c)	$\text{In } \triangle CDE: DE \perp CE \text{ (tan } \perp \text{ rad)}$ $DE = \sqrt{10}$ $CD = \sqrt{(-4+6)^2 + (5-11)^2}$ $CD = 2\sqrt{10}$ $CE^2 = (2\sqrt{10})^2 - (\sqrt{10})^2 \text{ (pythag)}$ $CE = \sqrt{30}$	$DE \perp CE \text{ (tan } \perp \text{ rad)}$ $CD = 2\sqrt{10}$ $CE^2 = (2\sqrt{10})^2 - (\sqrt{10})^2$ $CE = \sqrt{30}$

QUESTION 12

(a)	$(x-7)^2 + (y-1)^2 = -46 + 49 + 1$ $(x-7)^2 + (y-1)^2 = 4$ Centre: (7;1) Radius: 2 units	$(x-7)^2 + (y-1)^2 =$ $-46 + 49 + 1$ Centre: (7;1) Radius: 2 units
(b)	$m_{PA} = -\sqrt{3}$ $\therefore m_{\tan} = \frac{1}{\sqrt{3}}$ $y = \frac{1}{\sqrt{3}}x + c \quad \text{sub } (6; \sqrt{3} + 1)$ $c = 1 - \sqrt{3}$ $y = \frac{1}{\sqrt{3}}x + 1 - \sqrt{3}$	$m_{PA} = -\sqrt{3}$ $\therefore m_{\tan} = \frac{1}{\sqrt{3}}$ $c = 1 - \sqrt{3}$ $y = \frac{1}{\sqrt{3}}x + 1 - \sqrt{3}$
(c)(1)	$(x-7)^2 + (y-1)^2 = 4$ LHS = $(x-7)^2 + (y-1)^2 \quad \text{sub } (8; -\sqrt{3} + 1)$ LHS = $(8-7)^2 + (-\sqrt{3} + 1 - 1)^2$ LHS = 4 LHS = RHS $\therefore$ point lies on the circle	LHS = $(x-7)^2 + (y-1)^2$ sub $(8; -\sqrt{3} + 1)$ LHS = $(8-7)^2 + (-\sqrt{3} + 1 - 1)^2$ LHS = 4 LHS = RHS $\therefore$ point lies on the circle
(c)(2)	Dist AB = $\sqrt{(8-6)^2 + (-\sqrt{3} + 1 - \sqrt{3} - 1)^2}$ Dist AB = 4 This is twice the radius, therefore AB is a diameter.	Dist AB = $\sqrt{(8-6)^2 + (-\sqrt{3} + 1 - \sqrt{3} - 1)^2}$ Dist AB = 4 This is twice the radius, therefore AB is a diameter.

QUESTION 13

(a)	$\triangle BEM \equiv \triangle CEM \quad (R;H;S)$ $\therefore BM = MC = 4 \text{ cm}$ $\tan \hat{E}_1 = \frac{4}{6}$ $\hat{E}_1 = 33,7^\circ$ $\therefore \hat{BEC} = 67,4^\circ$ Snow will build up on the roof. Alternate: In $\triangle BCE$: $BE^2 = 4^2 + 6^2 \quad (\text{pythag})$ $BE = 2\sqrt{13}$ Cosine Rule: $\hat{A} = \cos^{-1} \left(\frac{8^2 - (2\sqrt{13})^2 - (2\sqrt{13})^2}{-2(2\sqrt{13})(2\sqrt{13})} \right)$ $\hat{A} = 67,4^\circ$	$\tan \hat{E}_1 = \frac{4}{6}$ $\hat{E}_1 = 33,7^\circ$ $\therefore \hat{BEC} = 67,4^\circ$
(b)	$DM^2 = 12^2 + 4^2 \quad (\text{pythag})$ $DM = 4\sqrt{10}$ In $\triangle EDM$: $DE^2 = 6^2 + (4\sqrt{10})^2$ $DE = 14 \text{ cm}$ $\sin \hat{DEC} = \frac{12}{14}$ $\hat{DEC} = 59^\circ$ Alternate: In $\triangle MEC$: $CE^2 = 4^2 + 6^2 \quad (\text{pythag})$ $CE = 2\sqrt{13}$ $DC = 12 \text{ cm}$ $DE^2 = 12^2 + (2\sqrt{13})^2$ $DE = 14 \text{ cm}$ $\sin \hat{DEC} = \frac{12}{14}$ $\hat{DEC} = 59^\circ$	$DM = 4\sqrt{10}$ $\triangle EDM$: $DE^2 = 6^2 + (4\sqrt{10})^2$ $DE = 14 \text{ cm}$ $\sin \hat{DEC} = \frac{12}{14}$ $\hat{DEC} = 59^\circ$

QUESTION 14

(a)	$B(x; -2x)$ $\text{Dist OB} = \sqrt{(x-0)^2 + (-2x-0)^2}$ $\sqrt{(x-0)^2 + (-2x-0)^2} = \sqrt{125}$ $5x^2 = 125$ $x = \pm 5$ $B(-5; y) \quad \text{sub } x = -5 \text{ in } f(x)$ $\therefore B(-5; 10)$	$B(x; -2x)$ $\sqrt{(x-0)^2 + (-2x-0)^2} = \sqrt{125}$ $x = \pm 5$ $\therefore B(-5; 10)$
(b)	$m_{OB} = -2$ $\therefore m_{BE} = \frac{1}{2}$ $\text{Eq BE: } y = \frac{1}{2}x + c \quad \text{sub } (-5; 10)$ $c = \frac{25}{2}$ $\therefore E\left(0; 12\frac{1}{2}\right)$ $m_{EC} = -2 \quad (// \text{ lines})$ $\text{Eq EC: } y = -2x + \frac{25}{2}$ $\text{For C: } -2x + \frac{25}{2} = 2x$ $x = \frac{25}{8}$ $\therefore y = \frac{25}{4}$ $C\left(\frac{25}{8}; \frac{25}{4}\right)$ $\text{Dist EC} = \sqrt{\left(\frac{25}{8} - 0\right)^2 + \left(\frac{25}{4} - \frac{25}{2}\right)^2}$ $\text{Dist EC} = \frac{25\sqrt{5}}{8}$ $\text{Dist BE} = \sqrt{(-5-0)^2 + \left(10 - \frac{25}{2}\right)^2}$ $\text{Dist BE} = \frac{5\sqrt{5}}{2}$	$m_{OB} = -2$ $\therefore m_{BE} = \frac{1}{2}$ $c = \frac{25}{2}$ $x = \frac{25}{8}$ $\therefore y = \frac{25}{4}$ $\text{Dist EC} = \frac{25\sqrt{5}}{8}$ $\text{Dist BE} = \frac{5\sqrt{5}}{2}$ $= \frac{1}{2} \times \left(\sqrt{125} + \frac{25\sqrt{5}}{8} \right) \times \frac{5\sqrt{5}}{2}$ $\approx 50,8 \text{ units}^2$

$$\text{Area of Trap} = \frac{1}{2} \times \left(\sqrt{125} + \frac{25\sqrt{5}}{8} \right) \times \frac{5\sqrt{5}}{2}$$

$$\text{Area of Trap} = \frac{1625}{32}$$

$$\approx 50,8 \text{ units}^2$$

Alternate:

In $\triangle BOE$:

$$m_{OB} = -2$$

$$\therefore \tan \theta = 2 \quad \therefore \theta = 63,4^\circ$$

$$\therefore \hat{BOE} = 90^\circ - 63,4^\circ$$

$$\therefore \hat{BOE} = 26,6^\circ$$

$$\text{Eq BE: } y = \frac{1}{2}x + c \text{ sub } (-5;10)$$

$$c = \frac{25}{2}$$

$$\therefore E \left(0; 12\frac{1}{2} \right)$$

$$\therefore EO = 12\frac{1}{2} \text{ units and } OB = \sqrt{125}$$

$$\text{Area } \triangle BOE = \frac{1}{2} \left(12\frac{1}{2} \right) (\sqrt{125}) \sin 26,6^\circ$$

$$\text{Area } \triangle BOE = 31,2881 \text{ units}^2$$

In $\triangle EOC$: $\hat{CEO} = 26,6^\circ$ (alt. $\angle$ s, $BO \parallel EC$)

$$m_{EC} = -2 \text{ (// lines)}$$

$$\text{Eq EC: } y = -2x + \frac{25}{2}$$

$$\text{For C: } -2x + \frac{25}{2} = 2x$$

$$x = \frac{25}{8}$$

$$\therefore y = \frac{25}{4}$$

$$C \left(\frac{25}{8}; \frac{25}{4} \right)$$

	$\text{Dist EC} = \sqrt{\left(\frac{25}{8} - 0\right)^2 + \left(\frac{25}{4} - \frac{25}{2}\right)^2}$ $\text{Dist EC} = \frac{25\sqrt{5}}{8}$ $\text{Area } \triangle EOC = \frac{1}{2} \left(12\frac{1}{2}\right) \left(\frac{25\sqrt{5}}{8}\right) \sin 26,6^\circ$ $\text{Area } \triangle EOC = 19,555$ $\text{Area of Trap} = 31,2881 + 19,555$ $\approx 50,8 \text{ units}^2$	
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Total: 150 mark