QUESTION 1
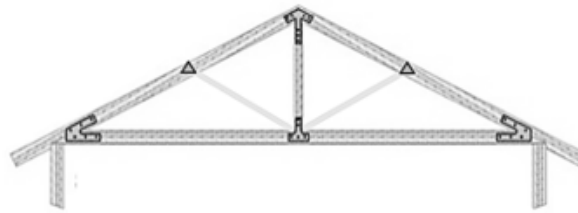
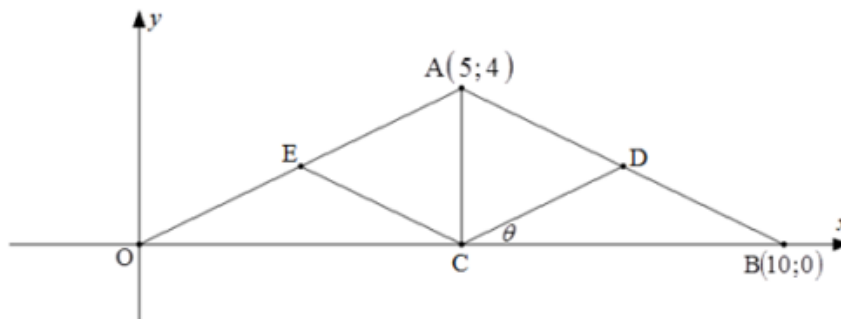|		
1.1	$M_{AB} = \dfrac{y_2 - y_1}{x_2 - x_1}$ $= \dfrac{4-(2)}{-6-(2)}$ $= \dfrac{2}{-8} = -\dfrac{1}{4}$	✔ Formula ✔ Subst ✔ Answer (3)
1.2	$D\left(\dfrac{x_1 + x_2}{2}; \dfrac{y_1 + y_2}{2}\right)$ $D\left(\dfrac{-6-6}{2}; \dfrac{4-2}{2}\right)$ $D(-6; 1)$	✔ formula ✔ Subst ✔ answer (3)
1.3	$M_{BD} = \dfrac{Y_2 - Y_1}{X_2 - X_1} = \dfrac{1}{8}$ $y = \dfrac{1}{8}x + c \quad (1)$ $subt.(2;2)\,into\,(1)$ $2 = (\dfrac{1}{8})(2) + c$ $2 = \dfrac{1}{4} + c$ $c = \dfrac{7}{4}$ $y = \dfrac{1}{8}x + \dfrac{7}{4}$	✔ grad. of BD ✔ correct subst. in formula ✔ Value of c ✔ Answer (4)
1.4	$D_{BC} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(-6-2)^2 + (-2-2)^2}$ $= \sqrt{(-8)^2 + (-4)^2}$ $= \sqrt{80}$	✔ formula ✔ substitution ✔ answer (3)

1.5	$M_{nc} = \dfrac{y_2 - y_1}{x_2 - x_1}$ $= \dfrac{-2 - 2}{-6 - 2}$ $= \dfrac{-4}{-8}$ M $= \dfrac{1}{2}$ $\tan\theta = \dfrac{1}{2}$ $\theta = 26{,}57^\circ$	✓Subst. ✓$\dfrac{1}{2}$ ✓angle (3)
1.6	$\theta + 90^\circ + C = 180^\circ$ OR $\hat{C} + 90^\circ = 180^\circ$ $\hat{C} = 90^\circ - 26{,}57^\circ$ $\hat{C} = 90^\circ - \theta$ $= 63{,}43^\circ$ $= 63{,}43^\circ$	✓✓ using sum of ∠ of Δ ✓ −26.57° ✓ Angle (4)
1.7	$y = mx + c$ $y = -\dfrac{1}{4}x + c \ldots\ldots(1)$ subst$(-6, 1)$ into (1) $1 = (-\dfrac{1}{4})(-6) + c$ Gradient of the line $= -\dfrac{1}{4}$ $1 = \dfrac{3}{2} + c$ $c = -\dfrac{1}{2}$ $y = -\dfrac{1}{4}x - \dfrac{1}{2}$	✓ subst. of $-\dfrac{1}{4}$ ✓ subst. ✓ value of c ✓ Answer (4) [24]

QUESTION 1

The picture alongside shows
a roof truss design.

The diagram below, NOT drawn to scale, models the above roof truss design in a Cartesian plane. $A(5;4)$, $B(10;0)$ and $O(0;0)$ are the vertices of $\triangle ABO$. Points E and D are midpoints of OA and AB respectively. $AC \perp OB$ with C on OB. The angle of inclination formed by the positive x-axis and CD is θ.

1.1	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(4-0)^2 + (5-10)^2}$ $= \sqrt{41}$ $= 6.4 \text{ units}$	✓ correct substitution in correct formula ✓ simplify ✓ answer (3)
1.2	$D = \left(\dfrac{5+10}{2} ; \dfrac{4+0}{2} \right)$ $= (7,5 ; 2)$	✓ correct substitution in correct formula ✓ answer (2)
1.3	$m_{DC} = \dfrac{2-0}{7,5-5}$ $= \dfrac{2}{2.5}$ $= \dfrac{4}{5}$	✓ correct substitution in correct formula ✓ answer (2)

1.4	$\tan \theta = \dfrac{4}{5}$ $\theta = 38,66°$	✓ $\tan \theta = \dfrac{4}{5}$ ✓ answer	(2)
1.5	$m_{OA} = \dfrac{4-0}{5-0}$ $= \dfrac{4}{5}$ $c = 0$ $y = \dfrac{4}{5}x$	✓ gradient ✓ y- intercept ✓ answer	(3)
1.6	$m_1 = m_{CD} = \dfrac{4}{5}$ $y = mx + c$ $0 = \left(\dfrac{4}{5}\right)(10) + c$ $c = -8$ $y = \dfrac{4}{5}x - 8$	✓ lines are parallel ✓ substitution ✓ y-intercept ✓ equation	(4)
1.7	$x = 10$	✓✓ answer	(2)
1.8	$y = 4$	✓✓ answer	(2)
			[20]