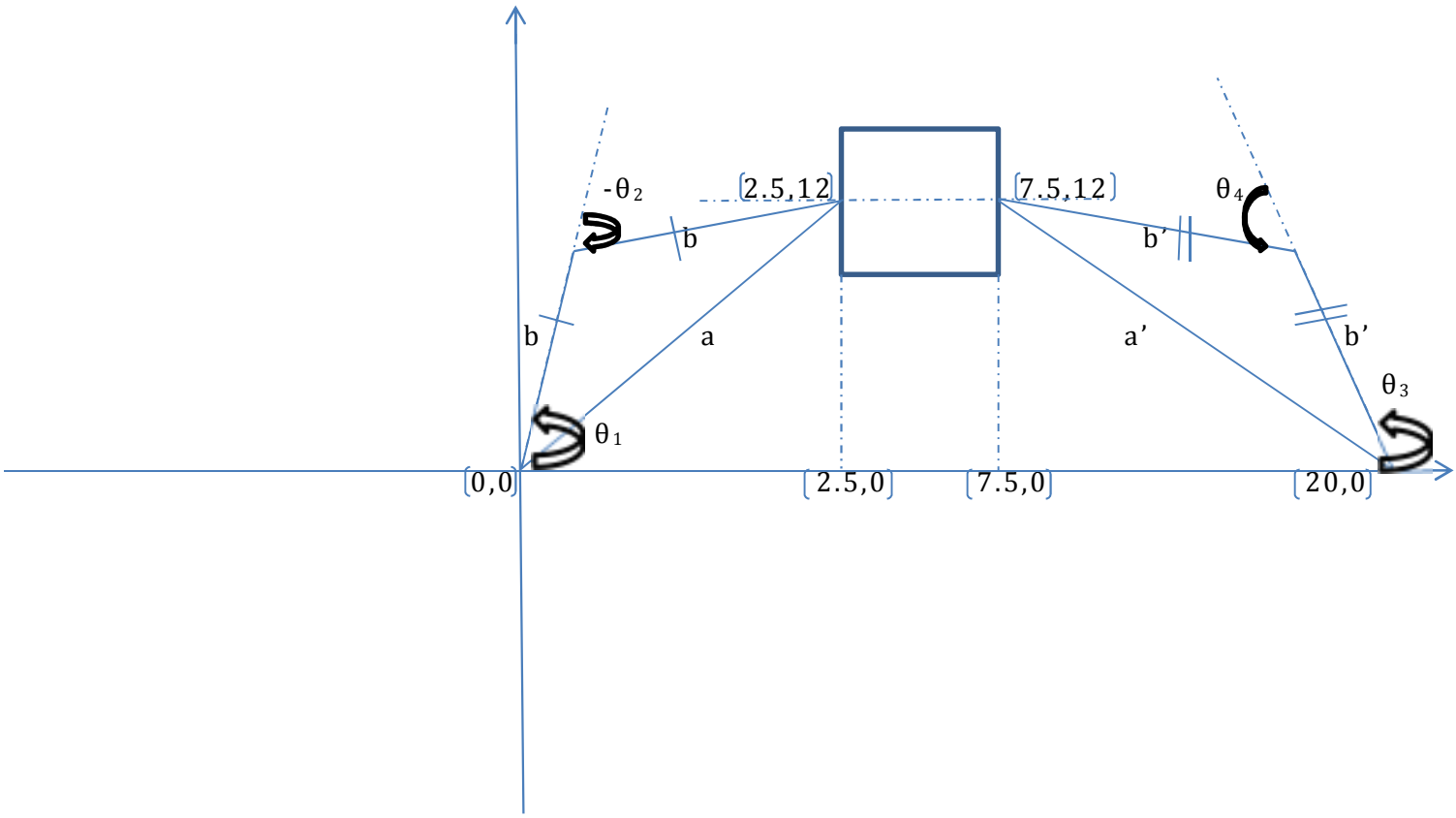
Assignment – 2

B. (3).



A, A', B and B' denotes the angle opposite to the sides a, a' , b and b' respectively in their corresponding triangles.

Given,

$b = b' = 15$

$A + 2B = \pi$

$\Rightarrow \quad B = \pi/2 - A/2$ ---------- (i)

By hypotenuse theorem,

$a = \sqrt{(2.5)^2 + (12)^2}$

$\Rightarrow \quad a = 12.26$

Similarly, $a' = \sqrt{(12.5)^2 + (12)^2}$

$\Rightarrow \quad a' = 17.32$

By Sine Theorem,

$a/\sin(A) = b/(\sin(B))$

$\sin(A)/\sin(B) = a/b$

$\sin(A)/\cos(A/2) = a/b$ -------(From (i))

$2\sin(A/2)\cos(A/2) / \cos(A/2) = a/b$

⇨ $\sin(A/2) = a/2b$

⇨ $A/2 = \sin^{-1}(a/2b)$
$= 0.421\ (24.12^\circ)$

⇨ $B = \pi/2 - A/2$
$= 1.15\ (65.88^\circ)$

$\theta_1 = B + \tan^{-1}(12/2.5)$

$= 1.15 + 1.37$

$= 2.52\ (144.19^\circ)$

$\theta_2 = -(B + B)$

$= -2.30\ (-131.76^\circ)$

Similarly,

$\sin(A'/2) = a'/2b'$

⇨ $A'/2 = \sin^{-1}(a'/2b')$
$= 0.62\ (35.28^\circ)$

$B' = \pi/2 - A/2$

$= 0.95\ (54.72^\circ)$

$\theta_3 = \pi - (B' + \tan^{-1}(12/12.5))$

$= \pi - (0.95 + 0.76)$

$= 1.43\ (81.97^\circ)$

$\theta_4 = B' + B'$

$= 1.91\ (109.44^\circ)$

Results -

$\theta_1 = 2.52\ (144.19^\circ)$

$\theta_2 = -2.30\ (-131.36^\circ)$

$\theta_3 = 1.43\ (81.97^\circ)$

$\theta_4 = 1.91(109.44^\circ)$

Note: All angles are measured in anti-clockwise direction.