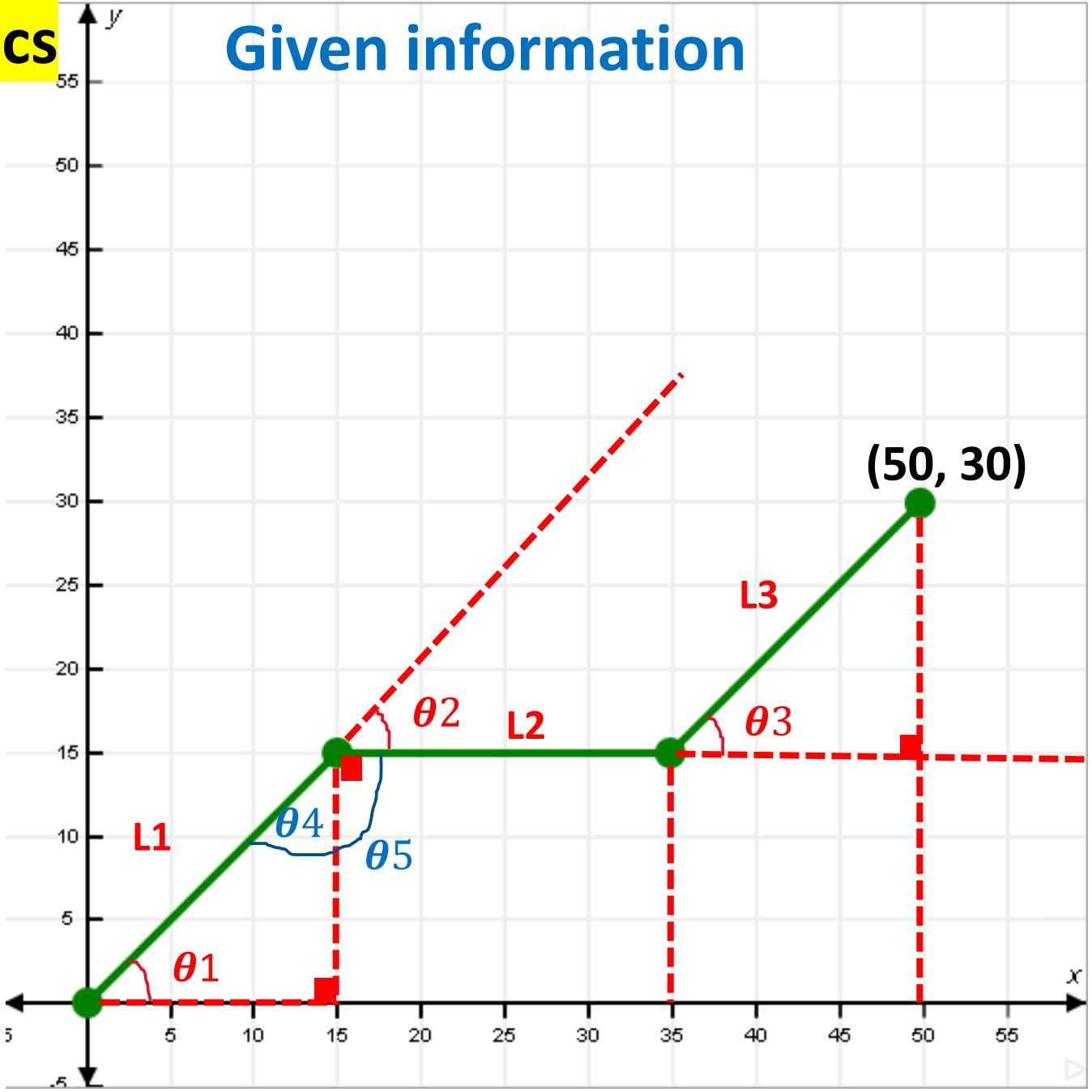
Forward kinematics
&
inverse kinematics

Inverse kinematics

X= 50
Y= 30

Given information



Pythagoras theorem:

$$h^2 = a^2 + b^2$$
$$h^2 = 15^2 + 15^2$$
$$h = \sqrt{15^2 + 15^2}$$
$$h = 21.21$$

L1 and L3 are equal 21.21

$$sin\,\theta = \frac{Opposite}{Hypotenuse}$$
$$sin\,\theta = \frac{15}{21.21}$$
$$\theta = arcsin\frac{15}{21.21}$$
$$\theta = 45.01°$$

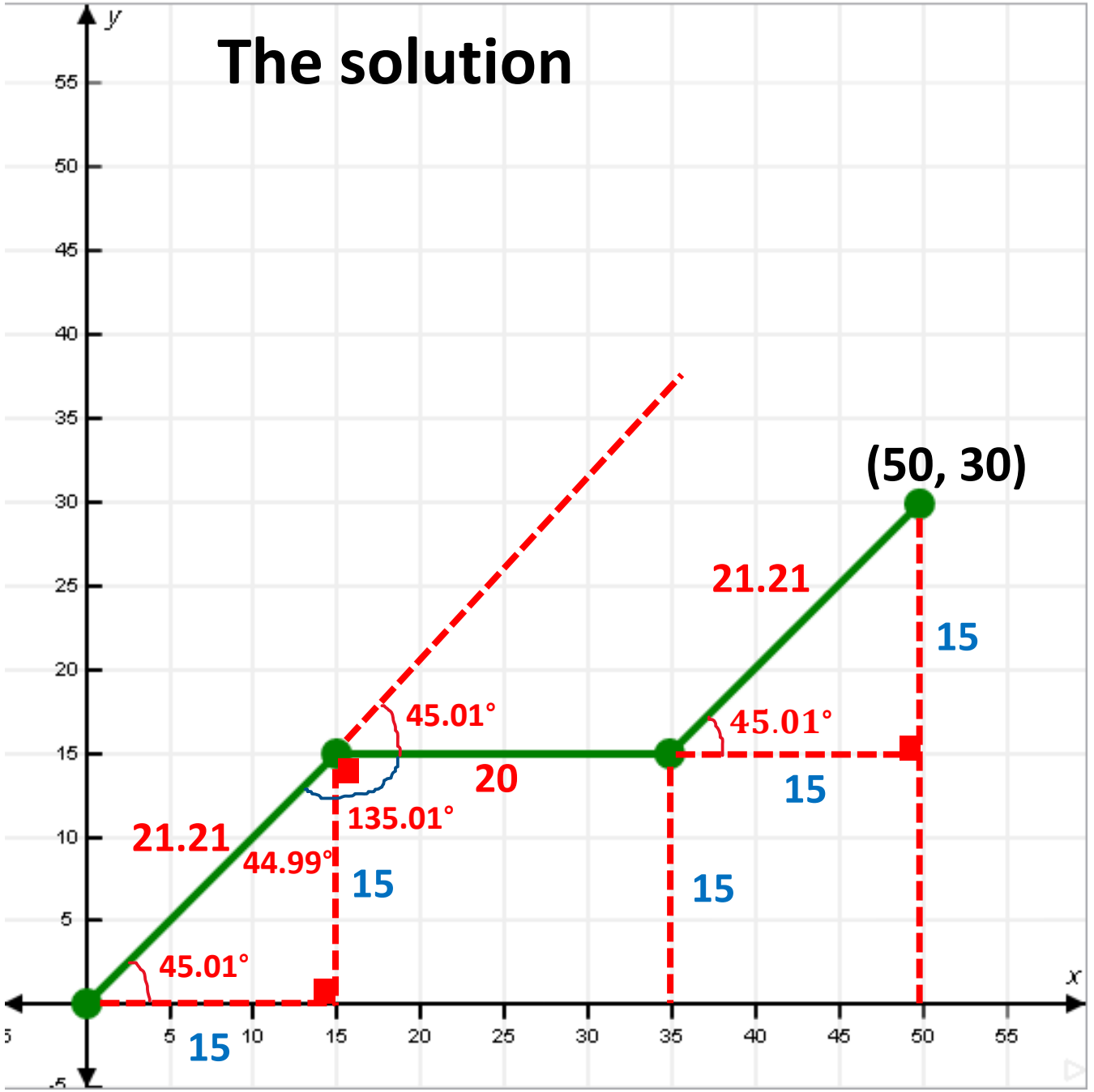
θ1 and θ2 are equal 45.01

$$\theta 4 = 180 - (45.01 + 90)$$
$$\theta 4 = 44.99°$$

$$\theta 5 = 44.99 + 90$$
$$\theta 5 = 134.99\,°$$

$$\theta 2 = 180 - 134.99$$
θ2 = 45.01 °

θ2 and θ3 are equal 45.01 °



L1= 21.21

L2= 20

L3=21.21

θ1= 45.01°

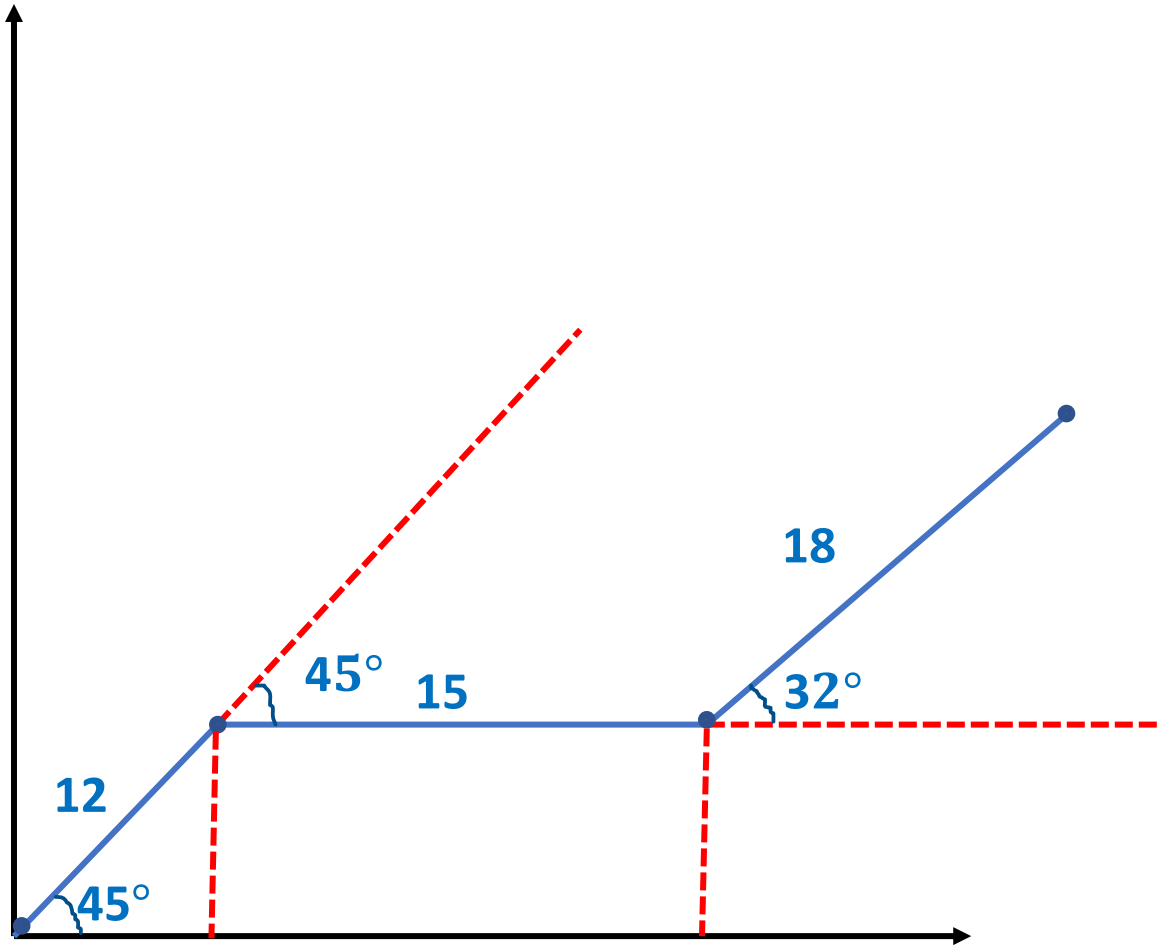
θ2= 45.01°

θ3= 45.01°

Forward kinematics:

Given information

- L1= 12
- L2= 15
- L3= 18
- $\theta 1 = 45°$
- $\theta 2 = 45°$
- $\theta 3 = 32°$



The solution

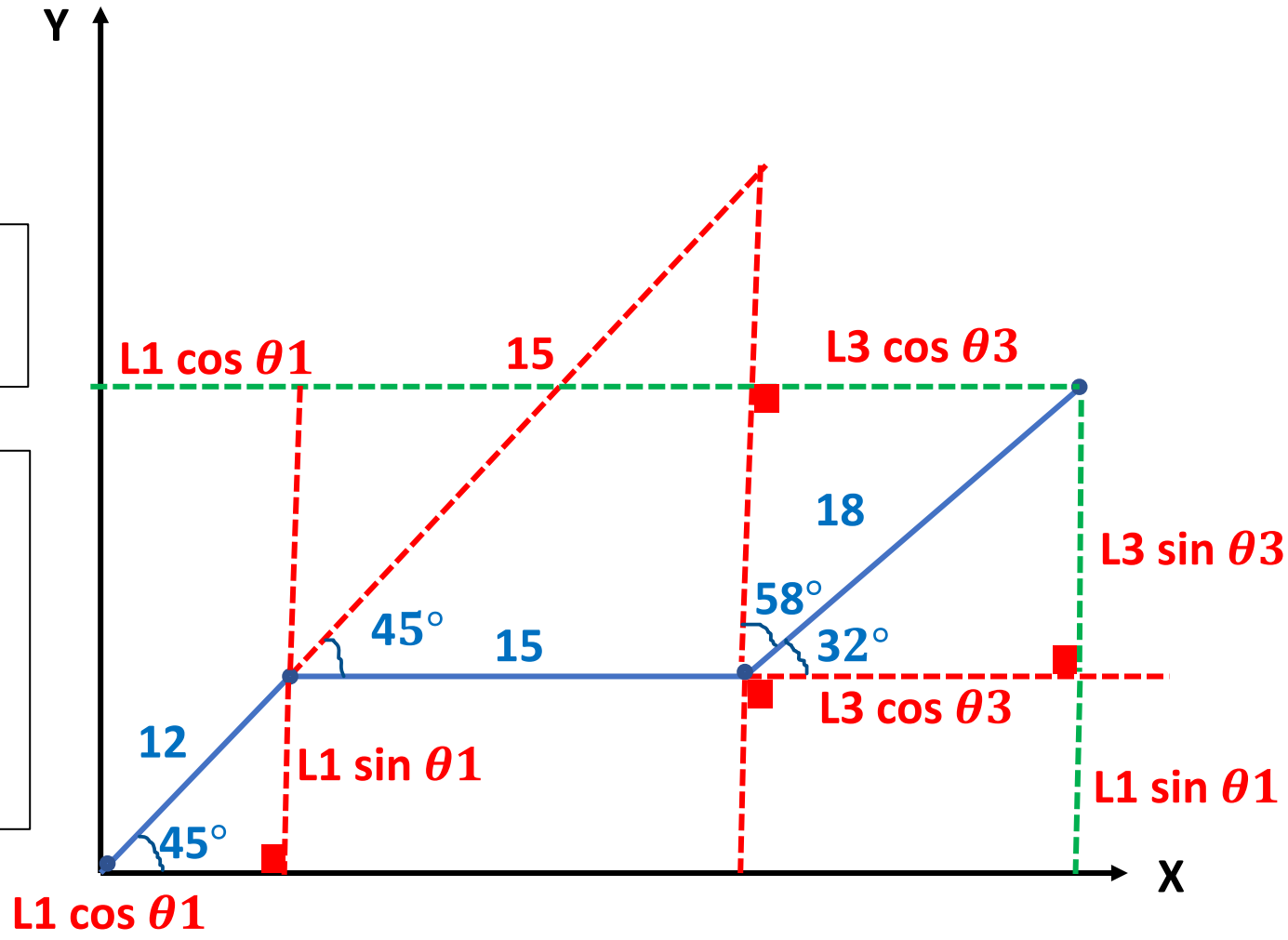
$X = (L1 \cos \theta 1) + L2 + (L3 \cos \theta 3)$

$Y = (L1 \sin \theta 1 + L3 \sin \theta 3)$

$X = (12 \cos 45) + 15 + (18 \cos 32)$

$X = 38.75$

$Y = (12 \sin 45 + 18 \sin 32)$

$Y = 18.02$

$(x,y) = (38.75, 18.02)$