

All questions are to be attempted
All questions have the same maximum marks
Your solutions are not subject to scrutiny by the Turnitin software system

1. ABCD is a timber frame for a

concrete base. It is shown to be

parallelgram in shape; with

$AB=CD=10.000m$;

$AC=BD=7.500m$. It should be a

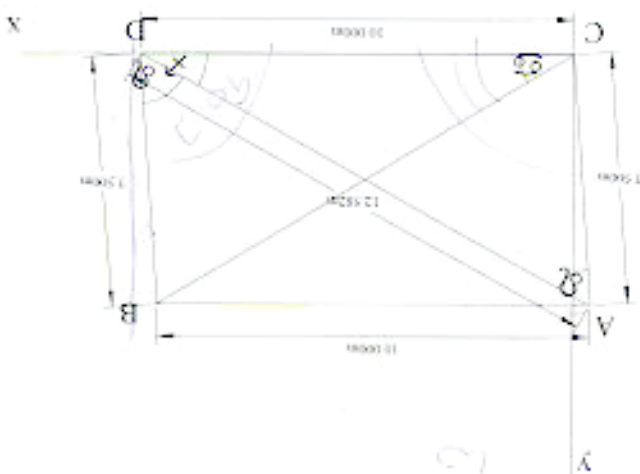
rectangle.

How far, in the x direction, does corner A (or

corner B) of the frame have to be moved to

create a rectangle shape. Calculate to a

precision of 1 mm.



Given the following system of three equations

$$3x - 2y + z = -12$$

$$-x + y - 2z = 10$$

$$4x + 3y + 2z = -1$$

Find the values of x, y, and z by

- Cramer's rule
- Matrix inversion

3. Angle and distance measurements have been made to four points (A,B,C,D) from a point O with coordinates 1000mE, 2000mN. The angles are measured with respect to a reference point which is directly North of O. The measurements are given below.

Angles:

$$\angle NOA = 14^\circ 18' 31'', \angle NOB = 39^\circ 22' 02'',$$

$$\angle NOC = 71^\circ 07' 19'', \angle NOD = 44^\circ 19' 27'',$$

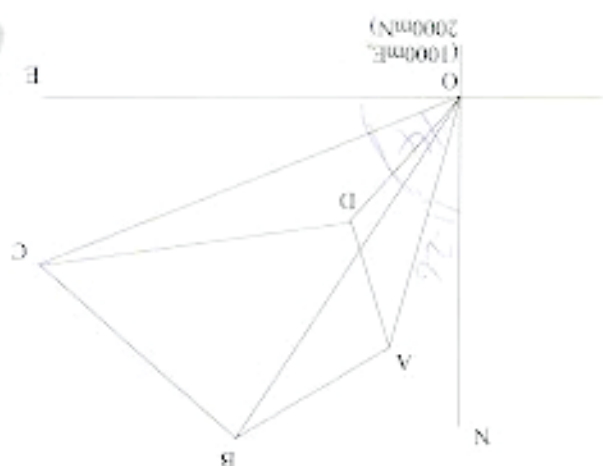
Distances:

$$OA = 11.261m, OB = 18.117m,$$

$$OC = 21.612m, OD = 8.104m.$$

(R)

(A)



Calculate, to a precision of 1mm, the coordinates of points A, B, C, and D and the distances between them (the lengths AB, BC, CD, DA).

$$(r \cos \alpha, r \sin \alpha)$$