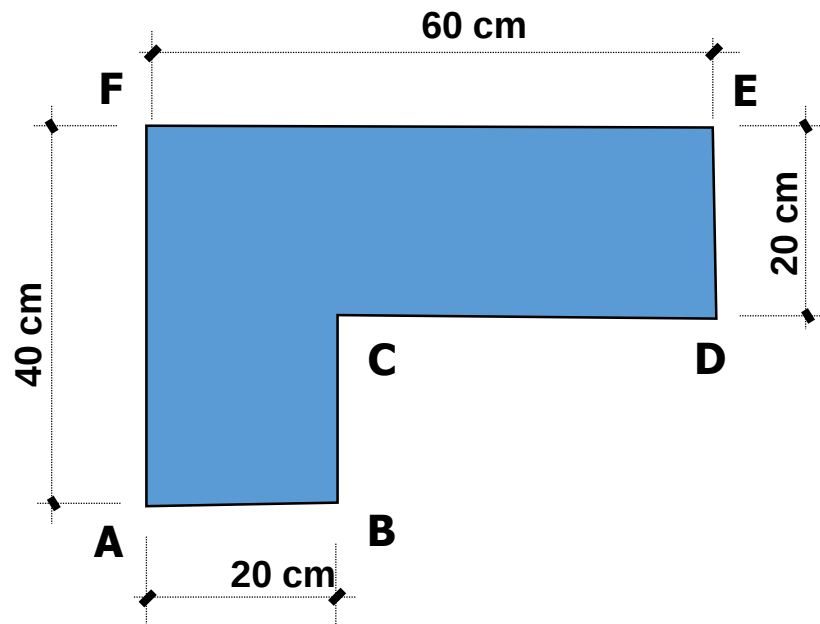
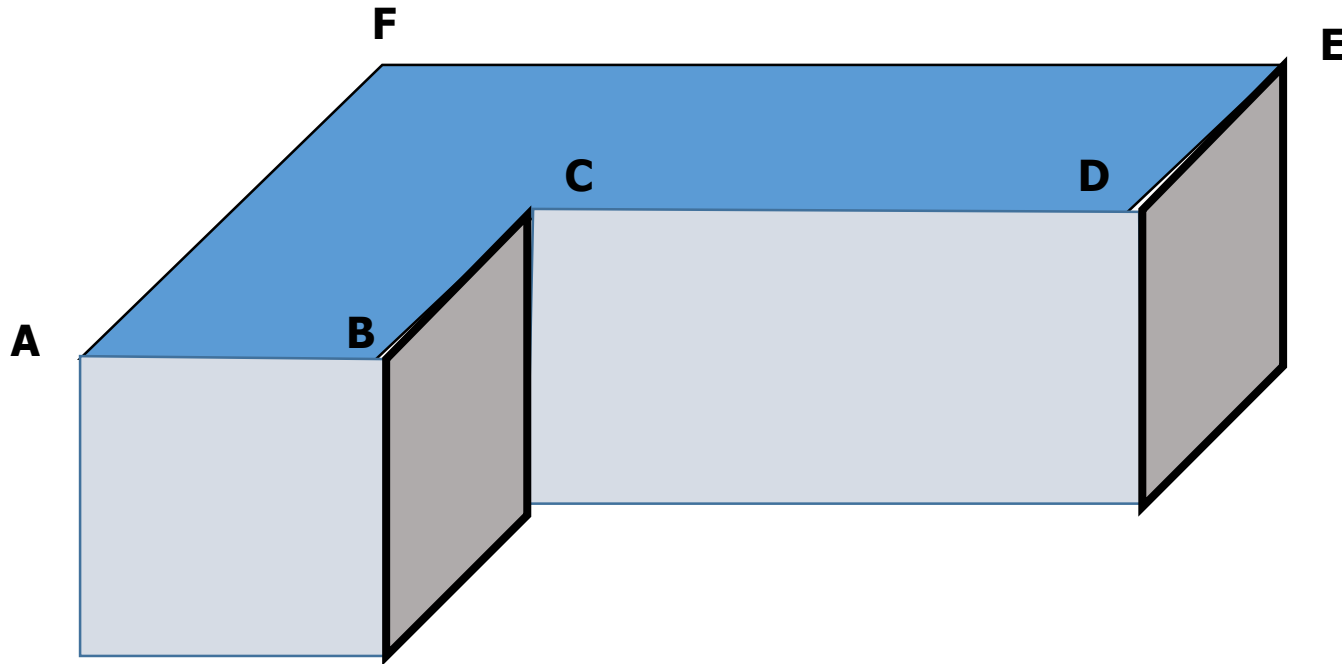
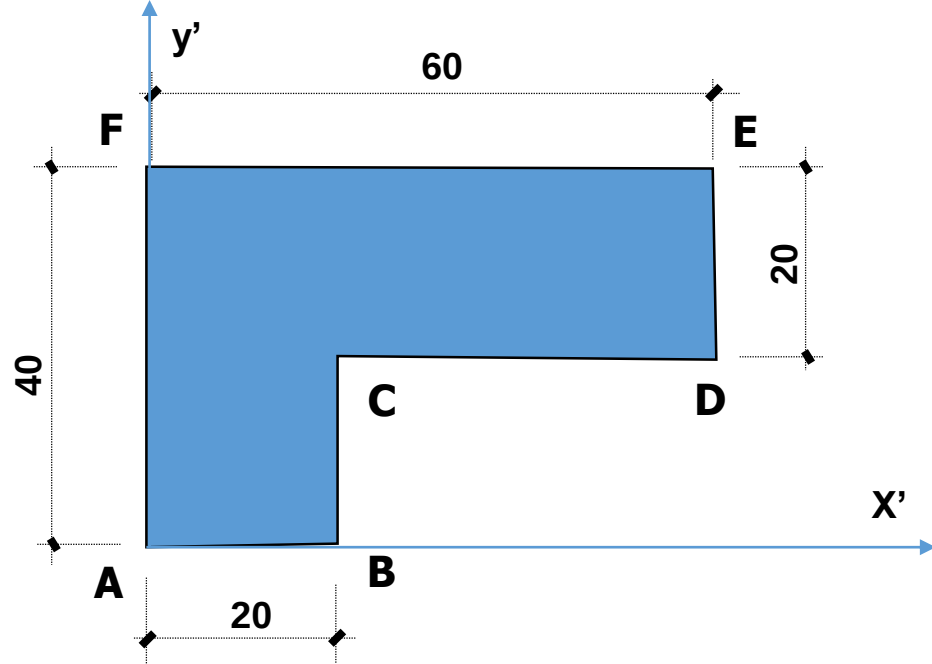


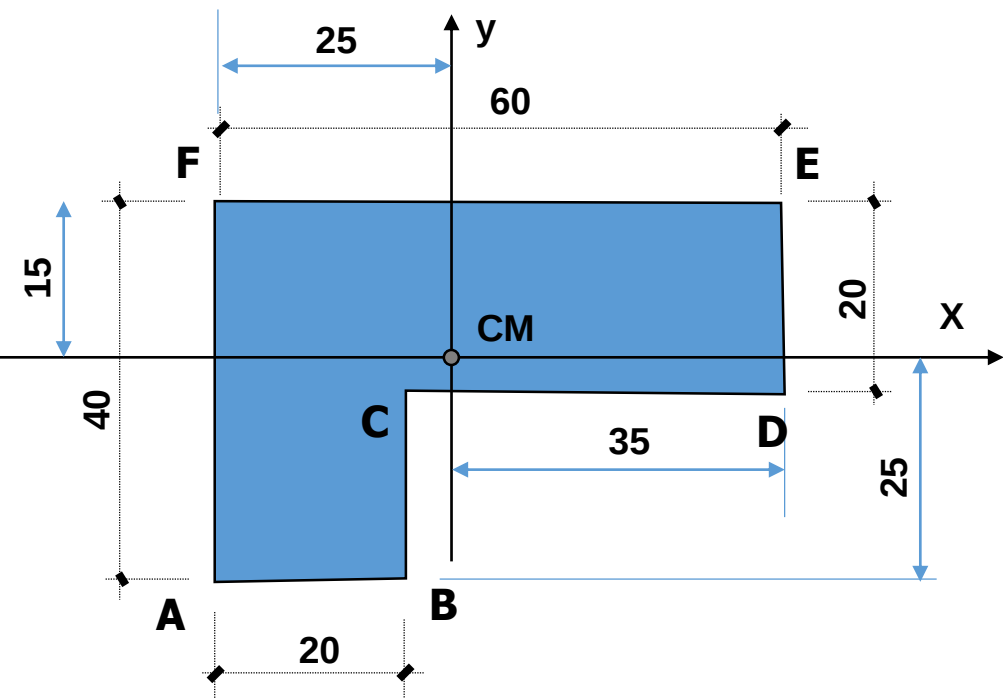


Dado el elemento corto, cuya sección transversal se muestra en la figura. Halle el núcleo central

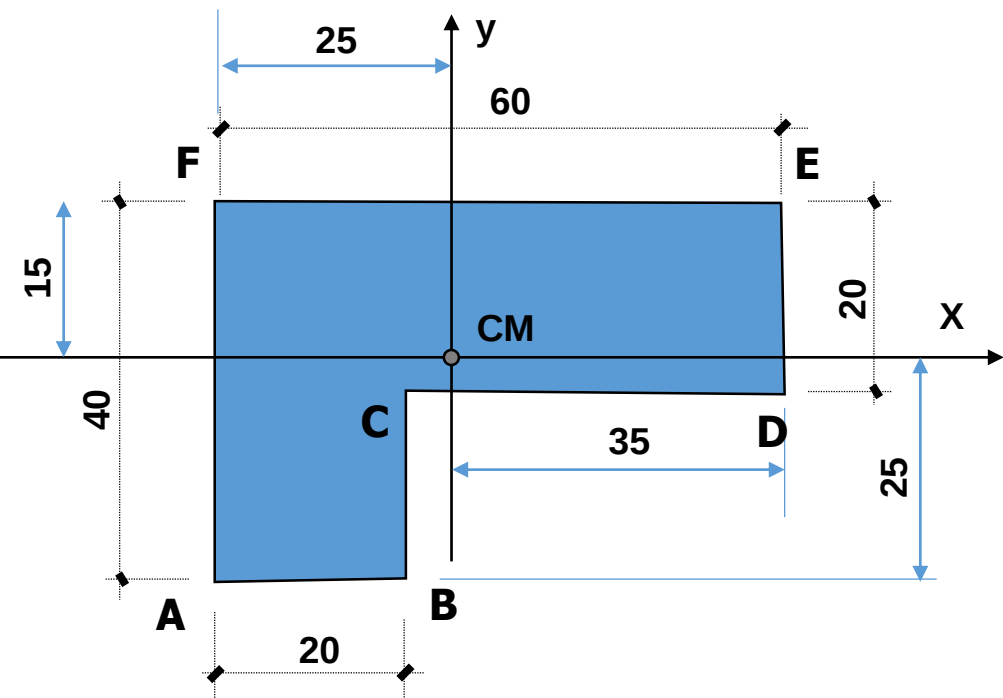
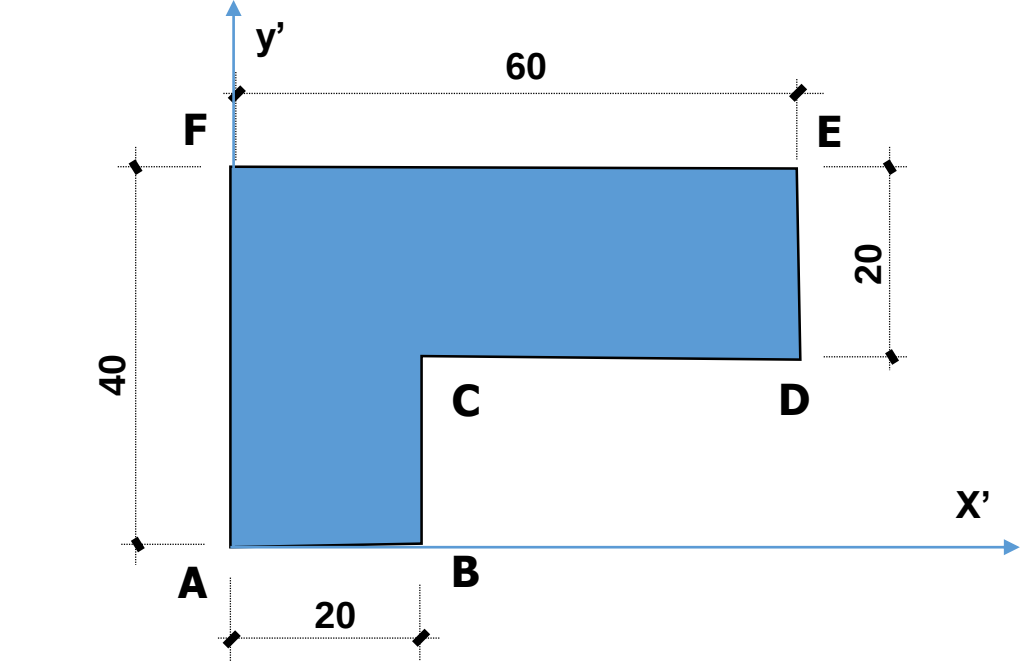




|    |    |          |    |       |            |                 |
|----|----|----------|----|-------|------------|-----------------|
| b  | h  | A        | Y  | AY    | bh^3/12    | A(Y-Yi)^2       |
| 20 | 40 | 800      | 20 | 16000 | 106666,667 | 20000           |
| 40 | 20 | 800      | 30 | 24000 | 26666,6667 | 20000           |
|    |    | 1600     |    | 40000 | 133333,333 | 40000           |
|    |    | 0,16 m2  |    |       | lx         | 173333,333 cm^4 |
|    |    | Y=25 cm2 |    |       |            | 0,00173333 m^4  |
|    |    |          |    |       |            |                 |
| b  | h  | A        | X  | AX    | bh^3/12    | A(X-Xi)^2       |
| 40 | 20 | 800      | 10 | 8000  | 26666,6667 | 180000          |
| 20 | 40 | 800      | 40 | 32000 | 106666,667 | 180000          |
|    |    | 1600     |    | 40000 | 133333,333 | 360000          |
|    |    | X=25 cm2 |    |       | ly         | 493333,333 cm^4 |
|    |    |          |    |       |            | 0,00493333 m^4  |



|    |    |          |    |       |            |                 |
|----|----|----------|----|-------|------------|-----------------|
| b  | h  | A        | Y  | AY    | bh^3/12    | A(Y-Yi)^2       |
| 20 | 40 | 800      | 20 | 16000 | 106666,667 | 20000           |
| 40 | 20 | 800      | 30 | 24000 | 26666,6667 | 20000           |
|    |    | 1600     |    | 40000 | 133333,333 | 40000           |
|    |    | 0,16 m2  |    |       | lx         | 173333,333 cm^4 |
|    |    | Y=25 cm2 |    |       |            | 0,00173333 m^4  |
|    |    |          |    |       |            |                 |
| b  | h  | A        | X  | AX    | bh^3/12    | A(X-Xi)^2       |
| 40 | 20 | 800      | 10 | 8000  | 26666,6667 | 180000          |
| 20 | 40 | 800      | 40 | 32000 | 106666,667 | 180000          |
|    |    | 1600     |    | 40000 | 133333,333 | 360000          |
|    |    | X=25 cm2 |    |       | ly         | 493333,333 cm^4 |
|    |    |          |    |       |            | 0,00493333 m^4  |



| b  | h  | A                   | Y                    | AY    | $bh^3/12$  | $A(Y-Y_i)^2$               |
|----|----|---------------------|----------------------|-------|------------|----------------------------|
| 20 | 40 | 800                 | 20                   | 16000 | 106666,667 | 20000                      |
| 40 | 20 | 800                 | 30                   | 24000 | 26666,667  | 20000                      |
|    |    | 1600                |                      | 40000 | 133333,333 | 40000                      |
|    |    | 0,16 m <sup>2</sup> |                      |       | $I_x$      | 173333,333 cm <sup>4</sup> |
|    |    |                     | Y=25 cm <sup>2</sup> |       |            | 0,00173333 m <sup>4</sup>  |
| b  | h  | A                   | X                    | AX    | $bh^3/12$  | $A(X-X_i)^2$               |
| 40 | 20 | 800                 | 10                   | 8000  | 26666,667  | 180000                     |
| 20 | 40 | 800                 | 40                   | 32000 | 106666,667 | 180000                     |
|    |    | 1600                |                      | 40000 | 133333,333 | 360000                     |
|    |    |                     | X=25 cm <sup>2</sup> |       | $I_y$      | 493333,333 cm <sup>4</sup> |
|    |    |                     |                      |       |            | 0,00493333 m <sup>4</sup>  |

| Punto | X (m) | Y (m) |
|-------|-------|-------|
| A     | -0,25 | -0,25 |
| B     | -0,05 | -0,25 |
| C     | -0,05 | -0,05 |
| D     | 0,35  | -0,05 |
| E     | 0,35  | 0,15  |
| F     | -0,25 | 0,15  |

| Punto | X (m) | Y (m) |
|-------|-------|-------|
| A     | -0,25 | -0,25 |
| B     | -0,05 | -0,25 |
| C     | -0,05 | -0,05 |
| D     | 0,35  | -0,05 |
| E     | 0,35  | 0,15  |
| F     | -0,25 | 0,15  |

Núcleo Central

$$\sigma = -\frac{P}{A} - \frac{Pex}{I_y}x - \frac{Pey}{I_x}y$$

$$0 = 1 + \frac{Ax}{I_y}ex + \frac{Ay}{I_x}ey$$

$$e_x=0$$

$$e_y = -\frac{I_x}{Ay}$$

$$e_y=0$$

$$e_x = -\frac{I_y}{Ax}$$

| Punto | X (m) | Y (m) |
|-------|-------|-------|
| A     | -0,25 | -0,25 |
| B     | -0,05 | -0,25 |
| C     | -0,05 | -0,05 |
| D     | 0,35  | -0,05 |
| E     | 0,35  | 0,15  |
| F     | -0,25 | 0,15  |

Núcleo Central

$$\sigma = -\frac{P}{A} - \frac{Pex}{I_y}x - \frac{Pey}{I_x}y$$

$$0 = 1 + \frac{Ax}{I_y}ex + \frac{Ay}{I_x}ey$$

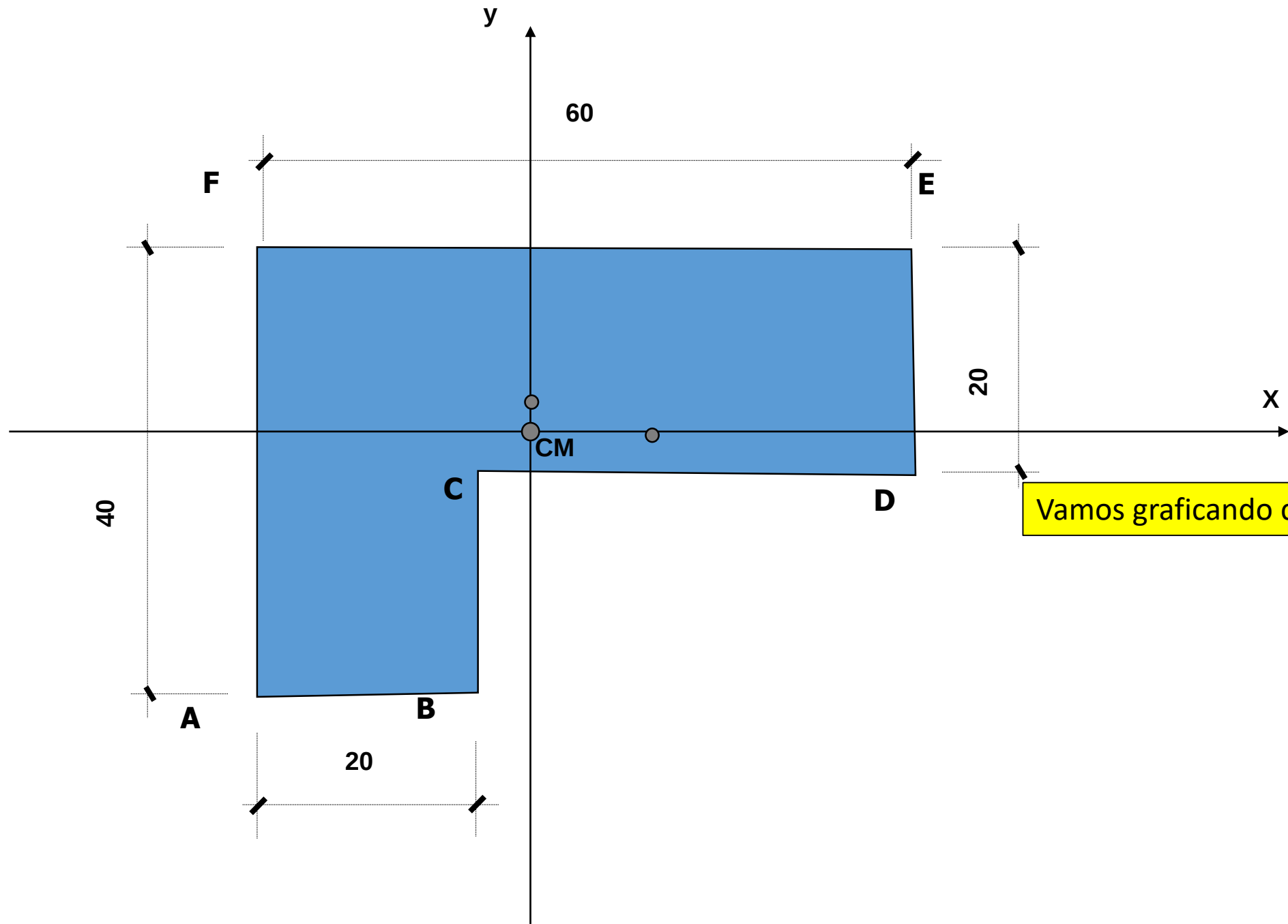
$$e_x=0$$

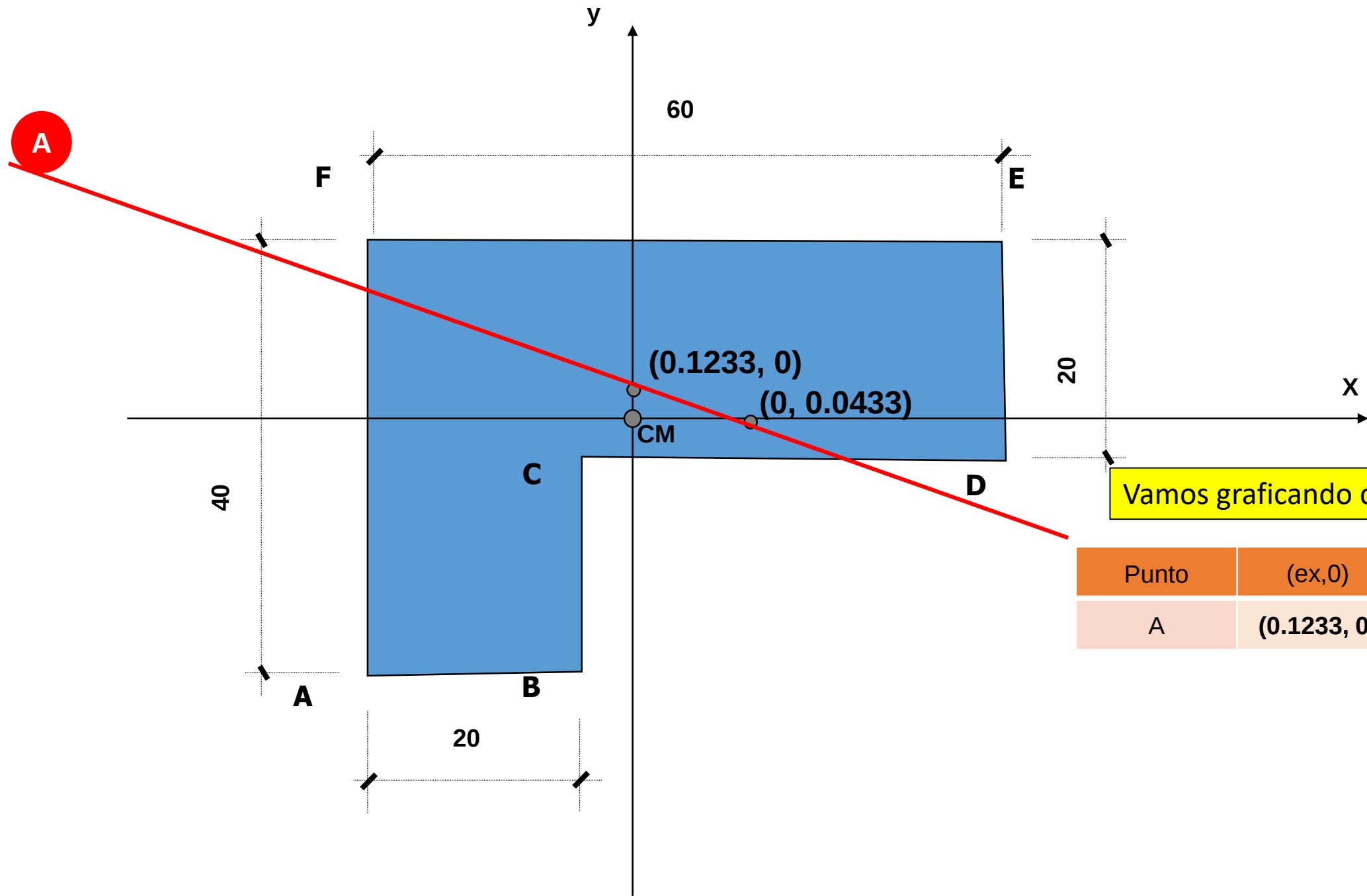
$$e_y = -\frac{I_x}{Ay}$$

$$e_y=0$$

$$e_x = -\frac{I_y}{Ax}$$

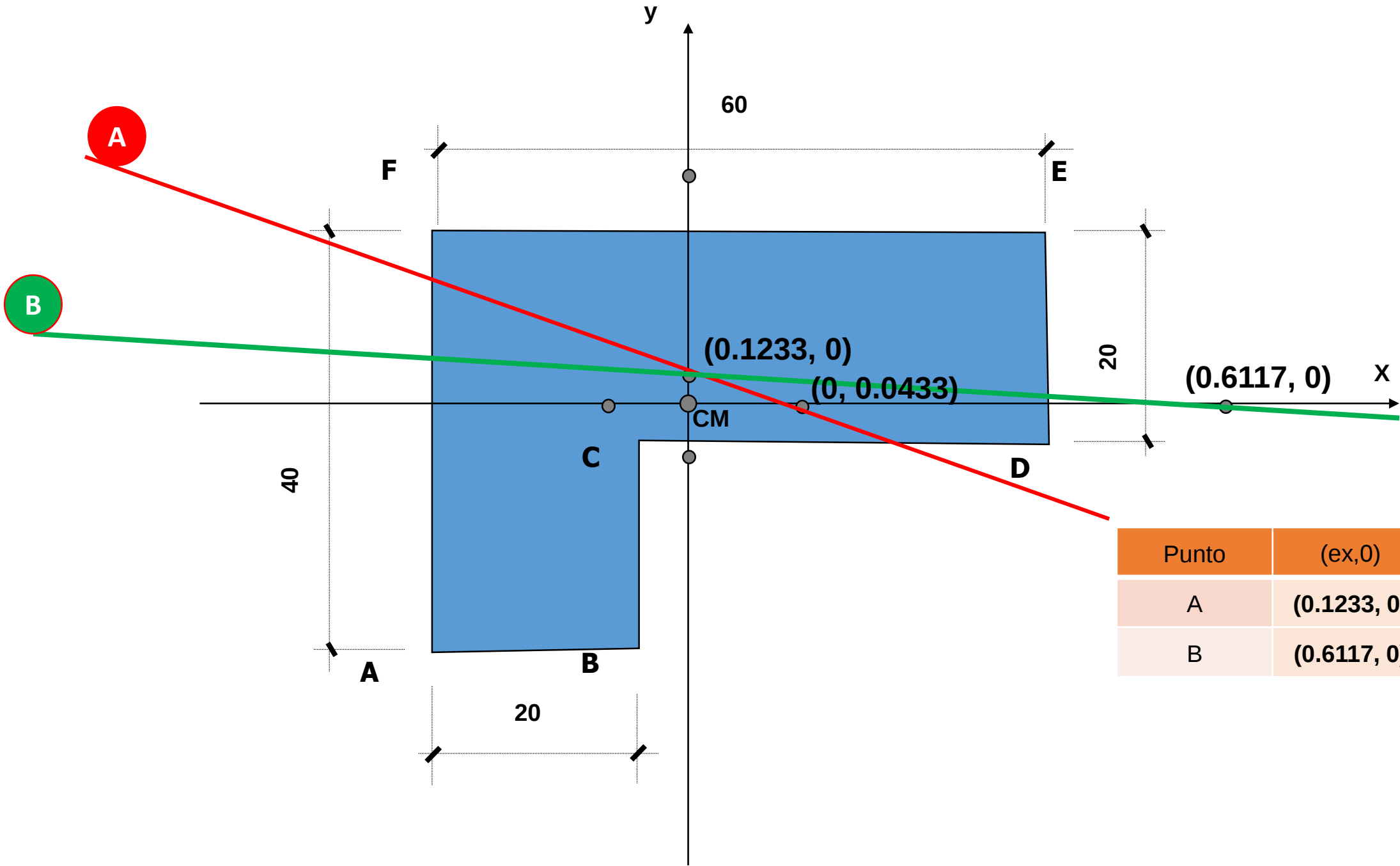
| Punto | X (m) | Y (m) | ex, ey=0    | (ex,0)       | ex=0; ey    | (o, ey)      |
|-------|-------|-------|-------------|--------------|-------------|--------------|
| A     | -0,25 | -0,25 | 0,12333333  | (0.1233, 0)  | 0,04333333  | (0, 0.0433)  |
| B     | -0,05 | -0,25 | 0,61666667  | (0.6117, 0)  | 0,04333333  | (0, 0.0433)  |
| C     | -0,05 | -0,05 | 0,61666667  | -            | -           | -            |
| D     | 0,35  | -0,05 | -0,08809524 | (-0.0881, 0) | 0,21666667  | (0, 2167)    |
| E     | 0,35  | 0,15  | -0,08809524 | (-0.0881, 0) | -0,07222222 | (0, -0.0722) |
| F     | -0,25 | 0,15  | 0,12333333  | (0.1233, 0)  | -0,07222222 | (0, -0.0722) |



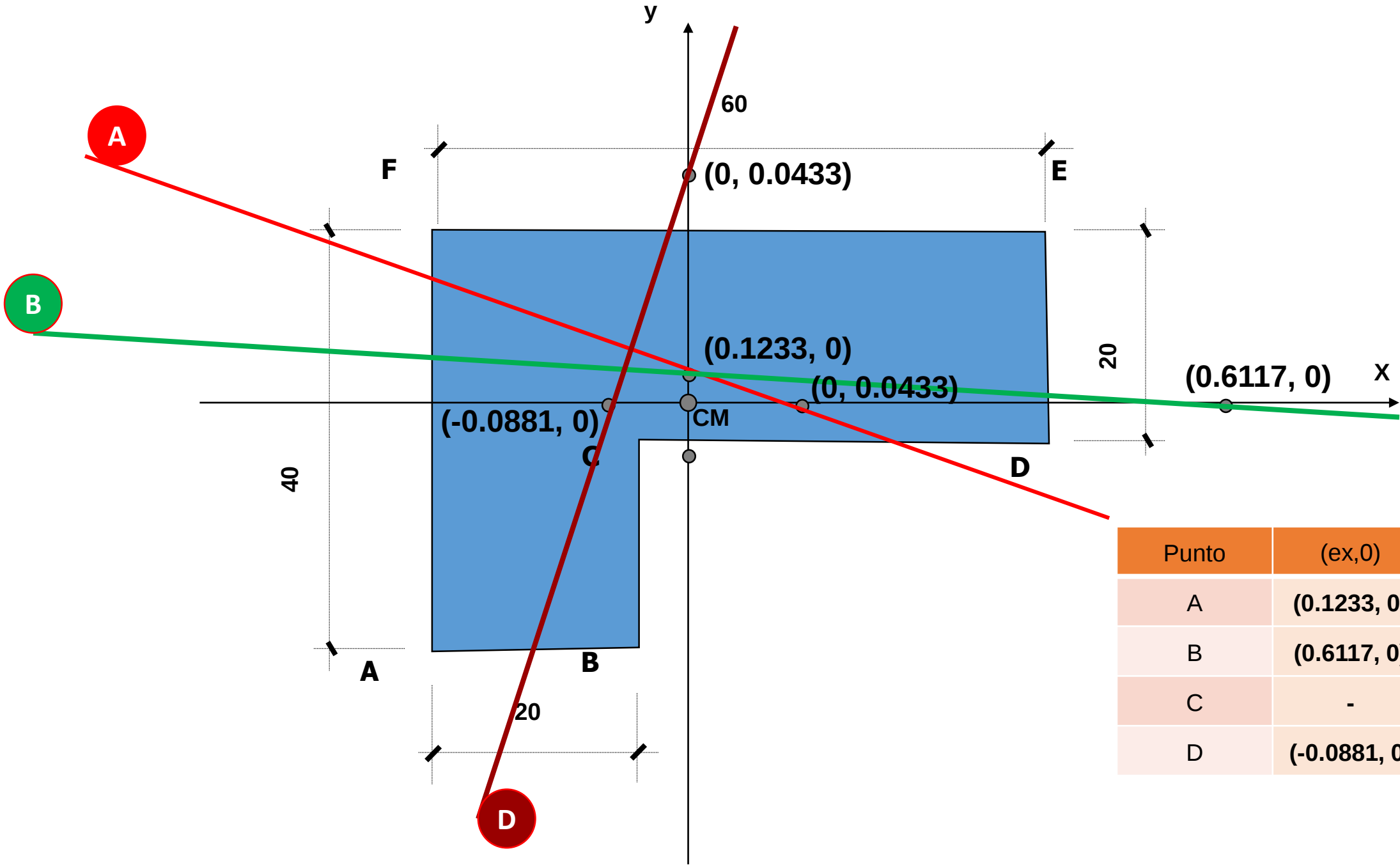


Vamos graficando cada punto

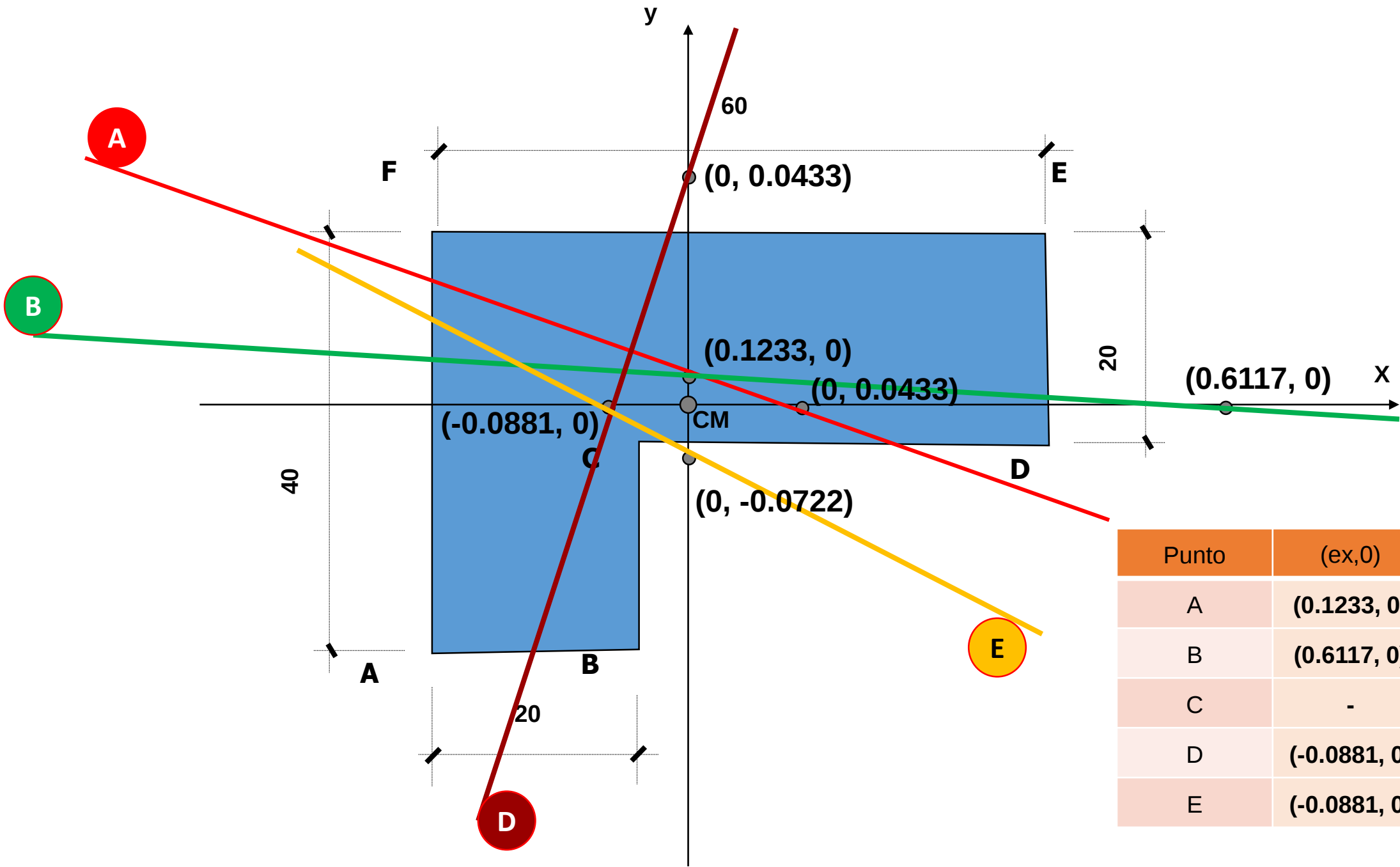
| Punto | (ex,0)      | (o, ey)     |
|-------|-------------|-------------|
| A     | (0.1233, 0) | (0, 0.0433) |



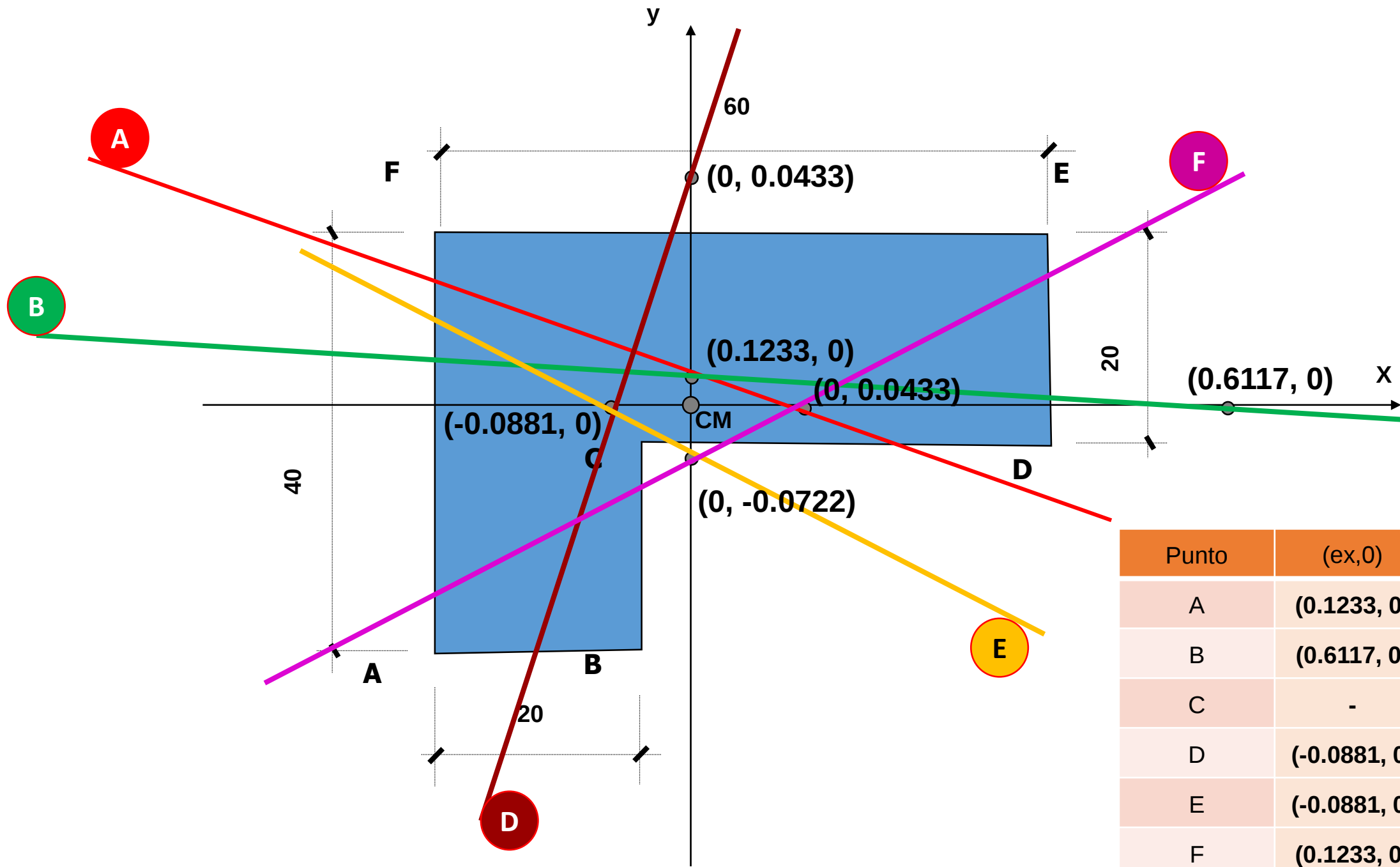
| Punto | (ex,0)      | (o, ey)     |
|-------|-------------|-------------|
| A     | (0.1233, 0) | (0, 0.0433) |
| B     | (0.6117, 0) | (0, 0.0433) |

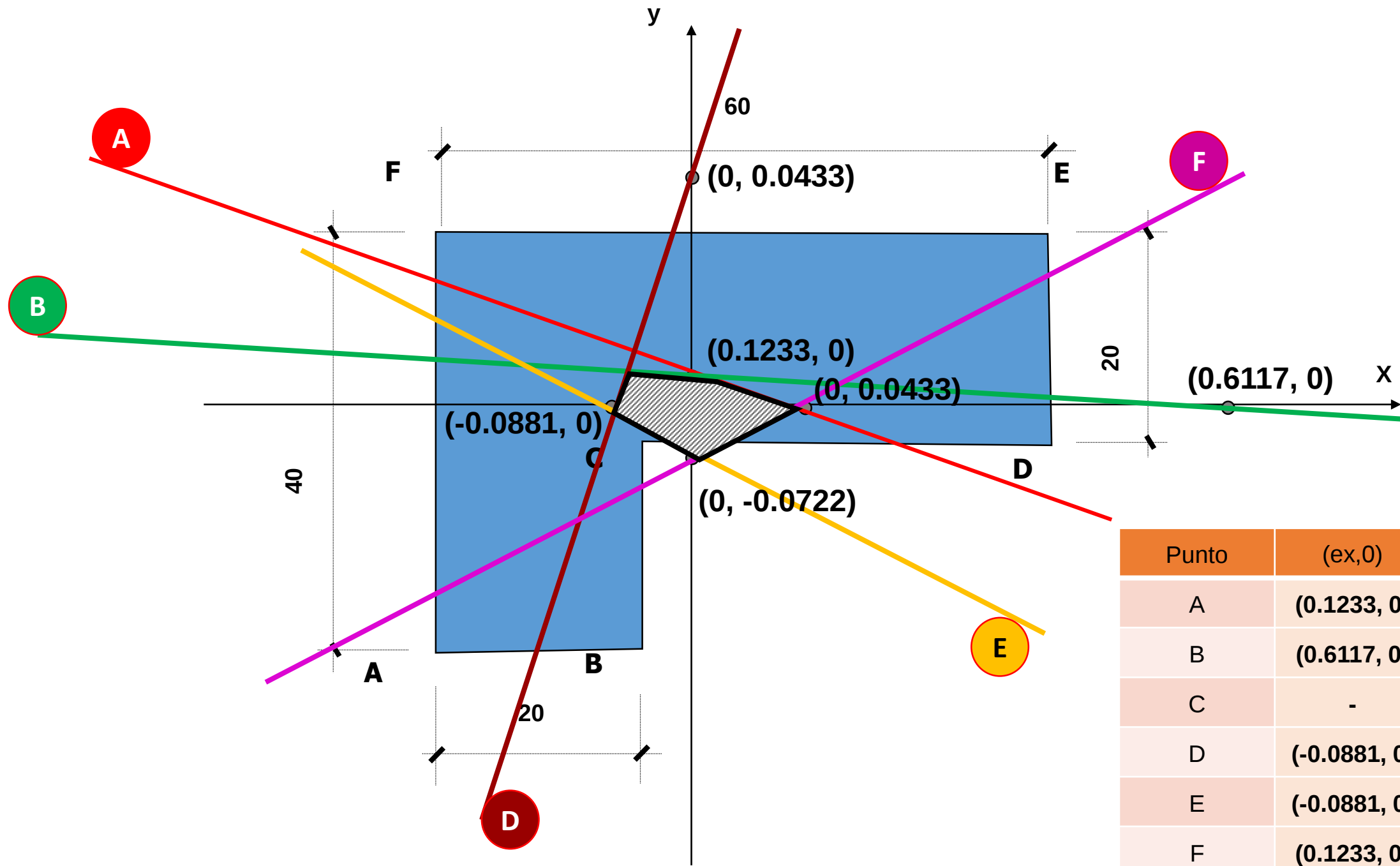


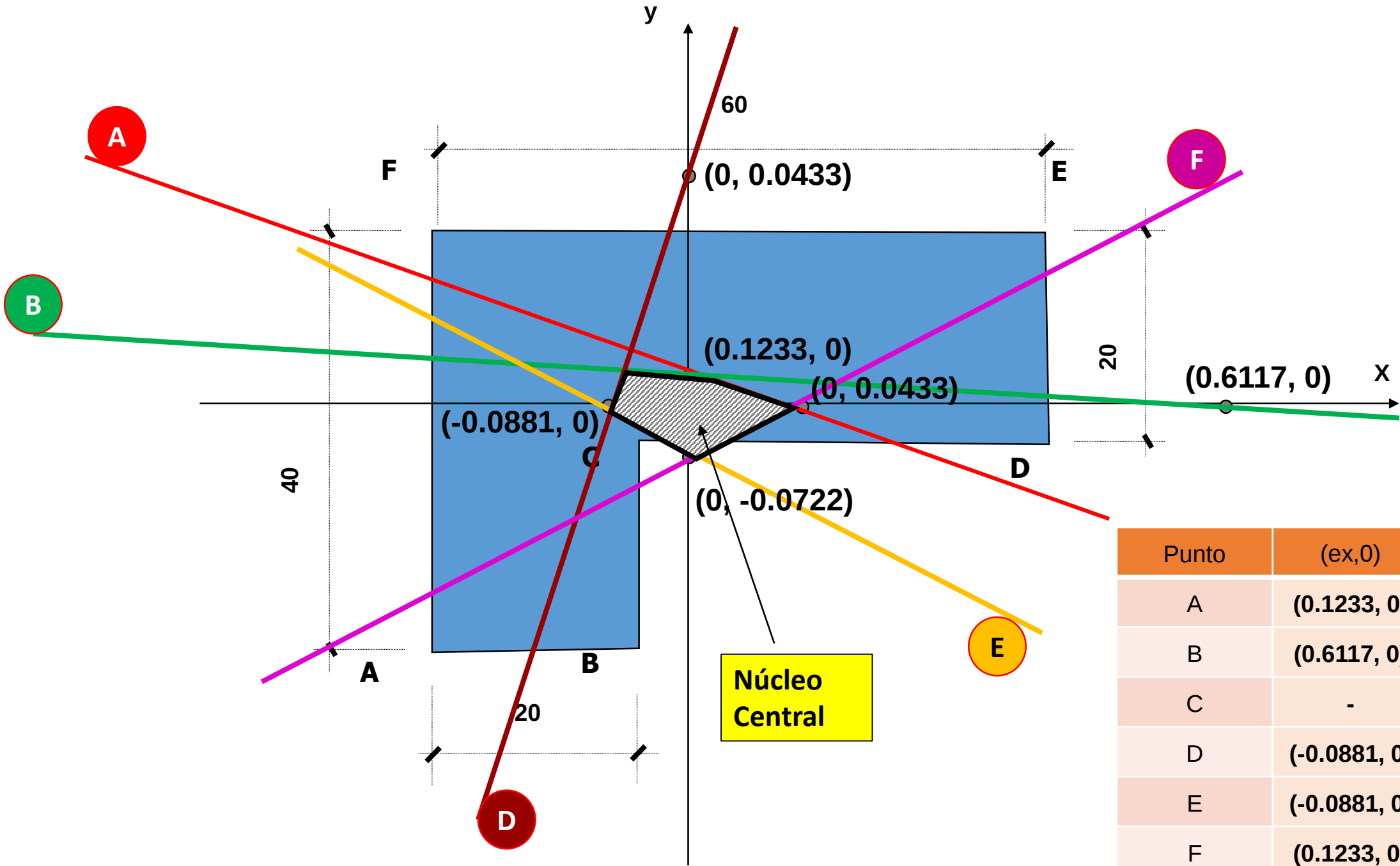
| Punto | (ex,0)       | (o, ey)     |
|-------|--------------|-------------|
| A     | (0.1233, 0)  | (0, 0.0433) |
| B     | (0.6117, 0)  | (0, 0.0433) |
| C     | -            | -           |
| D     | (-0.0881, 0) | (0, 2167)   |



| Punto | (ex,0)       | (o, ey)      |
|-------|--------------|--------------|
| A     | (0.1233, 0)  | (0, 0.0433)  |
| B     | (0.6117, 0)  | (0, 0.0433)  |
| C     | -            | -            |
| D     | (-0.0881, 0) | (0, 2167)    |
| E     | (-0.0881, 0) | (0, -0.0722) |







| Punto | (ex,0)       | (o, ey)      |
|-------|--------------|--------------|
| A     | (0.1233, 0)  | (0, 0.0433)  |
| B     | (0.6117, 0)  | (0, 0.0433)  |
| C     | -            | -            |
| D     | (-0.0881, 0) | (0, 2167)    |
| E     | (-0.0881, 0) | (0, -0.0722) |
| F     | (0.1233, 0)  | (0, -0.0722) |