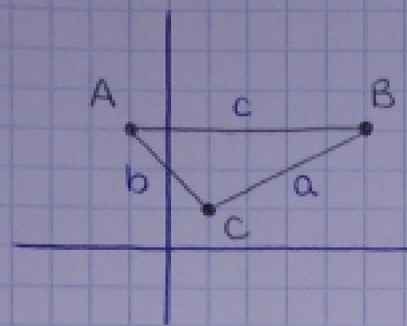
Almudena Rodríguez Lozano B1A.

1.



A $(-1,3)$

B $(5,3)$

C $(1,1)$

a) $a = d(B,C) = |\overline{BC}| = \sqrt{(-4)^2+(-2)^2} = \sqrt{20}\ u = 2\sqrt{5}\ u$

$\overline{BC} = C - B = (-4,-2)$

$b = d(A,C) = |\overline{AC}| = \sqrt{8}\ u = 2\sqrt{2}\ u$

$\overline{AC} = C - A = (2,-2)$

$c = d(A,B) = |\overline{AB}| = \sqrt{6^2} = 6\ u$

$\overline{AB} = B - A = (6,0)$

B

$$\boxed{\begin{array}{l} a = 2\sqrt{5}\,u \\ b = 2\sqrt{2}\,u \\ c = 6\,u \end{array}}$$

$\hat{A}$ ▸ $\overline{AC}\cdot\overline{AB} = |\overline{AC}|\cdot|\overline{AB}|\cdot\cos\hat{A} = 12\sqrt{2}\cdot\cos\hat{A}$

$\overline{AC}\cdot\overline{AB} = (2,-2)\cdot(6,0) = 12 + 0 = 12$

$\cos\hat{A} = \dfrac{\cancel{12}}{\cancel{12}\sqrt{2}} = \dfrac{1}{\sqrt{2}} \longrightarrow \boxed{\hat{A} = 45^\circ}$ B

$\hat{B}$ ▸ $\overline{BA}\cdot\overline{BC} = |\overline{BA}|\cdot|\overline{BC}|\cdot\cos\hat{B} = 6\cdot 2\sqrt{5}\cdot\cos\hat{B}$

$\overline{BA}\cdot\overline{BC} = (-6,0)\cdot(-4,-2) = 24 + 0 = 24$

$\cos\hat{B} = \dfrac{\cancel{24}\,2}{\cancel{12}\sqrt{5}} \longrightarrow \boxed{\hat{B} = 26{,}6^\circ}$ B

$\hat{C}$ ▸ $\hat{C} = 180 - \hat{A} - \hat{B} \longrightarrow \boxed{\hat{C} = 108{,}4^\circ}$ B

b) Altura A (r_1)

$r_1 \begin{cases} A\ (-1,3) \\ \perp\ \overline{BC}\ (-4,-2) \end{cases}$ $\overline{v_1} = (2,-4) \longrightarrow m_1 = -2$

$r_1 \equiv y - 3 = -2(x+1) \longrightarrow \boxed{r_1 \equiv y = -2x+1}$

B

Altura B (r_2)

$r_2 \begin{cases} B\ (5,3) \\ \perp\ \overline{AC}\ (2,-2) \end{cases}$ $\overline{v_2} = (2,2) \longrightarrow m_2 = 1$

$r_2 \equiv y - 3 = 1(x-5) \longrightarrow \boxed{r_2 \equiv y = x-2}$

Ortocentro $\begin{cases} r_1 \equiv y = -2x+1 \\ r_2 \equiv y = x-2 \end{cases}$

$x - 2 = -2x + 1$

$3x = 3$

$x = 1 \rightarrow y = -1$

$\boxed{O(1,-1)}$ **B**

c) Recta que pasa por A y B

$\left.\begin{matrix} A(-1,3) \\ B(5,3) \end{matrix}\right\} \vec{AB} = (6,0) \longrightarrow m = 0$

$y - y_0 = m(x - x_0)$

$r_3 \equiv y - 3 = 0$

$$d(C, r_3) = \frac{|0 \cdot 1 + 1 \cdot 1 - 3|}{\sqrt{1^2}} = 2\,u$$

$\boxed{d = 2u}$

B

$$\text{Área} = \frac{b \cdot h}{2} = \frac{6 \cdot 2}{2} = 6\,u^2$$

$\boxed{\text{Área} = 6\,u^2}$

2. Bisectriz de C (r_4)

$r_4 \longrightarrow d(r_4, AC) = d(r_4, BC)$

$r_{AC} \begin{cases} A(-1,3) \\ C(1,1) \end{cases}$ $\vec{AC} = (2,-2) \longrightarrow m = -1$

$r_{AC} \equiv y - 1 = -1(x-1)$

$r_{AC} \equiv x + y - 2 = 0$

$$d((x,y), r_{AC}) = \frac{|x+y-2|}{\sqrt{2}}$$

$r_{BC} \begin{cases} B(5,3) \\ C(1,1) \end{cases}$ $\vec{BC} = (-4,-2) \longrightarrow m = 1/2$

$$r_{BC} \equiv y - 1 = \frac{1}{2}(x-1)$$

$$r_{BC} \equiv \frac{1}{2}x - y + \frac{1}{2} = 0$$

$$d((x,y), r_{BC}) = \frac{|1/2\,x - y + 1/2|}{\sqrt{5}/2}$$

$$\frac{|x+y-2|}{\sqrt{2}} = \frac{|1/2\,x - y + 1/2|}{\sqrt{5}/2} \left\langle \begin{matrix} \dfrac{x+y-2}{\sqrt{2}} = \dfrac{1/2\,x - y + 1/2}{\sqrt{5}/2} \\[2ex] \dfrac{x+y-2}{\sqrt{2}} = -\dfrac{1/2\,x - y + 1/2}{\sqrt{5}/2} \end{matrix} \right.$$

① $\frac{\sqrt{5}}{2}x + \frac{\sqrt{5}}{2}y - \sqrt{5} = \frac{\sqrt{2}}{2}x - \sqrt{2}y + \frac{\sqrt{2}}{2}$

$\left(\frac{\sqrt{5}}{2} + \sqrt{2}\right)y = \left(\frac{\sqrt{2}}{2} - \frac{\sqrt{5}}{2}\right)x + \left(\frac{\sqrt{2}}{2} + \sqrt{5}\right)$

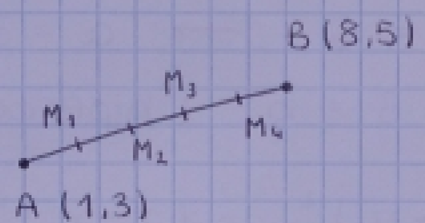
$\cancel{y = -0,16x + 1,16}$ NO VÁLIDA

② $-\frac{\sqrt{5}}{2}x - \frac{\sqrt{5}}{2}y + \sqrt{5} = \frac{\sqrt{2}}{2}x - \sqrt{2}y + \frac{\sqrt{2}}{2}$

$\left(-\frac{\sqrt{5}}{2} + \sqrt{2}\right)y = \left(\frac{\sqrt{2}}{2} + \frac{\sqrt{5}}{2}\right)x + \left(\frac{\sqrt{2}}{2} - \sqrt{5}\right)$

$y = 6,16x - 5,16$ B

3.



$\overrightarrow{AB} = B - A = (7,2)$

$\overrightarrow{AB} = 5\,\overrightarrow{AM_1}$

$(7,2) = 5\,(x_{M_1} - 1,\ y_{M_1} - 3)$

$7 = 5x_{M_1} - 5 \longrightarrow x_{M_1} = 12/5$

$2 = 5y_{M_1} - 15 \longrightarrow y_{M_1} = 17/5$

$\overrightarrow{AM_1} = M_1 - A = (7/5,\ 2/5)$

$M_2 = M_1 + \overrightarrow{AM_1} = (19/5,\ 19/5)$

$M_3 = M_2 + \overrightarrow{AM_1} = (26/5,\ 21/5)$

$M_4 = M_3 + \overrightarrow{AM_1} = (33/5,\ 23/5)$

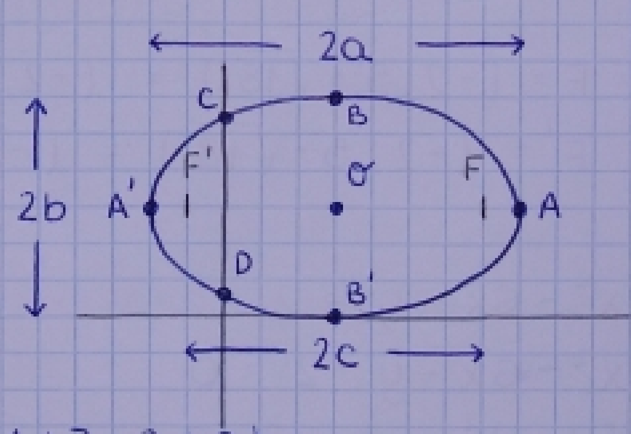
B

$\boxed{\begin{array}{l} M_1\ (12/5,\ 17/5) \\ M_2\ (19/5,\ 19/5) \\ M_3\ (26/5,\ 21/5) \\ M_4\ (33/5,\ 23/5) \end{array}}$

4. $F\,(7,3)$

$F'\,(-1,3)$

$e = 4/5$



$2c = 8$

$c = 4$

$e = \frac{c}{a}$

$\frac{4}{5} = \frac{4}{a}$

$a = 5$

$O = \frac{F + F'}{2} = \frac{(-1+7,\ 3+3)}{2} = (3,3)$

$a^2 = b^2 + c^2$

$5^2 - 4^2 = b^2$

$9 = b^2$

$b = 3$

$\frac{(x-x_0)^2}{a^2} + \frac{(y-y_0)^2}{b^2} = 1$

$\boxed{\frac{(x-3)^2}{5^2} + \frac{(y-3)^2}{3^2} = 1}$

B

PUNTOS :

A $(3+5, 3) \rightarrow$ A $(8,3)$

A' $(3-5, 3) \rightarrow$ A' $(-2,3)$

B $(3, 3+3) \rightarrow$ B $(3,6)$

B' $(3, 3-3) \rightarrow$ B' $(3,0)$

C $(0, 5'4)$

D $(0, 0'6)$

B

$x = 0$

$$\frac{(0-3)^2}{5^2} + \frac{(y-3)^2}{3^2} = 1$$

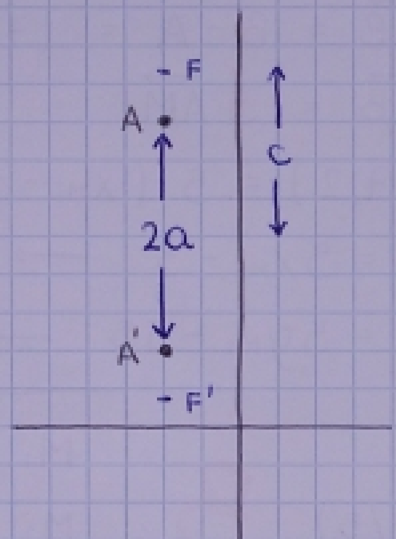
$$\frac{(y-3)^2}{9} = 1 - \frac{9}{25} = \frac{16}{25}$$

$$(y-3)^2 = \frac{144}{25}$$

B

$$y-3 = \pm 2{,}4 \begin{cases} y = 5{,}4 \\ y = 0{,}6 \end{cases}$$

5.



$2a = 6 \longrightarrow a = 3$

$a = 3 = b$ (hipérbola equilátera)

$$\frac{(y-y_0)^2}{a^2} - \frac{(x-x_0)^2}{b^2} = 1$$

$$\boxed{\frac{(y-5)^2}{3^2} - \frac{(x+2)^2}{3^2} = 1}$$

B

$$\frac{A + A'}{2} = O = (-2, 5)$$

$b^2 + a^2 = c^2$

$3^2 + 3^2 = c^2 \longrightarrow c = \sqrt{18}$

$F = (-2, 5 + \sqrt{18}) = (-2, 9'24)$

$F' = (-2, 5 - \sqrt{18}) = (-2, 0'75)$

B

$$\boxed{\begin{array}{l} F(-2, 9'24) \\ F'(-2, 0'75) \end{array}}$$

6. $x^2 - 6x - y = 2$

$x^2 - 6x - y - 2 = 0$

$\left.\begin{array}{l} A = 1 \\ B = 0 \end{array}\right\}$ PARÁBOLA

$(x-3)^2 = y + 2 + 9$

$(x-3)^2 = (y+11)$

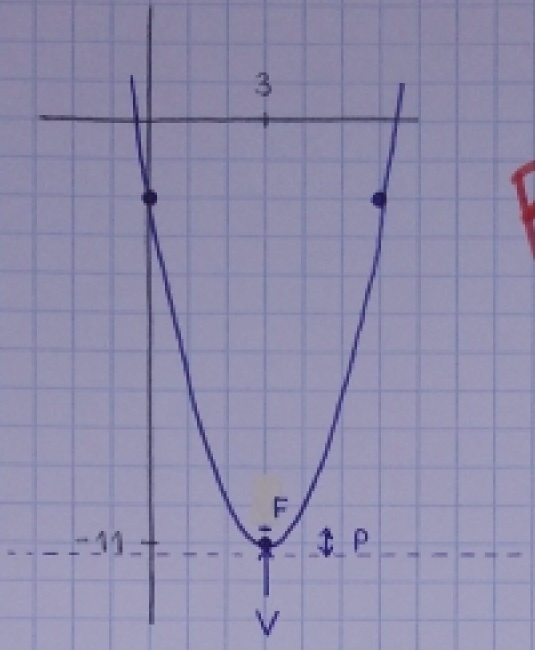
$V(3, -11)$ $\quad d \blacktriangleright y = -11 - 1/4 = -11.25$

$p = 1/2$ $\quad F(3, -11 + 1/4) = (3, -10.75)$

$$\frac{p}{2} \rightarrow \frac{1}{4}$$

B

$$\boxed{\begin{array}{ll} V(3, -11) & d \blacktriangleright y = -11{,}25 \\ p = 1/2 & F(3, -10'75) \end{array}}$$



B

d ($y = -11,25$)

Representar:

$x = 0 \rightsquigarrow y = -2$

↳ $0^2 - 6 \cdot 0 - 2 = y$

$x = 6 \rightsquigarrow y = -2$

↳ $6^2 - 6 \cdot 6 - 2 = y$

7. Su forma es de paraboloide de sección circular, figura en 3D obtenida girando una parábola respecto de un eje vertical que pasa por su foco.
Tiene esta forma porque todos los rayos paralelos al eje de simetría de la parábola son reflejados por la misma hacia su foco.
Si colocamos un receptor de señal en el foco del paraboloide podremos enviar señales paralelas al eje del mismo con la seguridad de que todas ellas serán recibidas por el receptor. Es decir, con un receptor pequeño obtenemos una gran recepción de señal gracias a toda la sup del paraboloide.