Example: Determine the distance from the point $P(7,5)$ to the line $y = -2x + 4$.

general

$0 = -2x - y + 4$

$$d(P,\ell) = \frac{|Ax + By + C|}{\sqrt{A^2 + B^2}}$$

$$= \frac{|-2(7) - (5) + 4|}{\sqrt{(-2)^2 + (-1)^2}} = \frac{|-14 - 5 + 4|}{\sqrt{4 + 1}}$$

$$= \frac{|-15|}{\sqrt{5}} = \frac{15}{\sqrt{5}}$$

$$= 6.71 \text{ units}$$

Example: Determine the distance from the point $Q(-5,4)$ to the line $\frac{x}{3}-\frac{y}{1}=1$.

$\left(\frac{x}{3}-y-1=0\right)3$

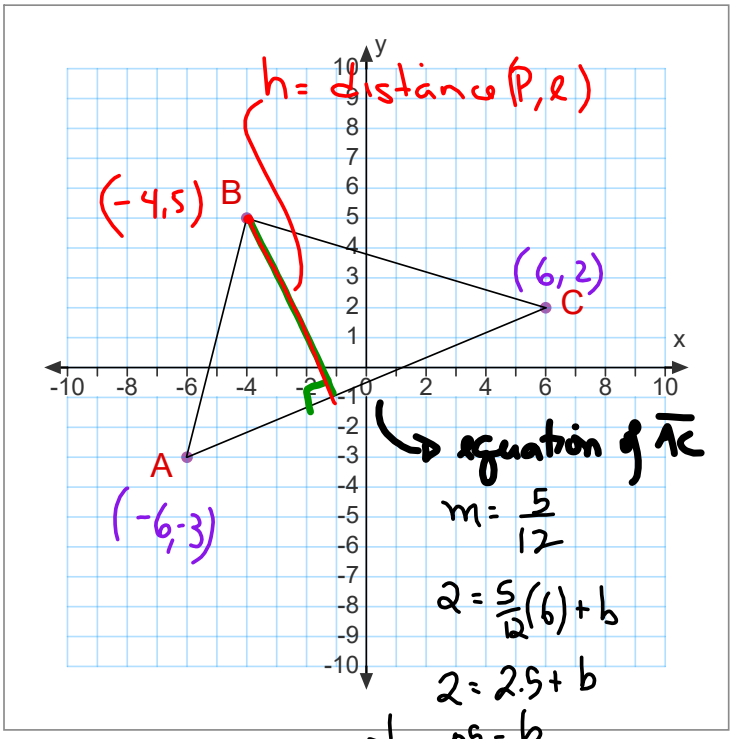
$x-3y-3=0$

$$d(Q,\ell)=\frac{|(-5)-3(4)-3|}{\sqrt{1^2+(-3)^2}}$$

$$=\frac{|-5-12-3|}{\sqrt{1+9}}$$

$$=\frac{|-20|}{\sqrt{10}}=\frac{20}{\sqrt{10}}=6.32 \text{ units}$$

Example: Determine the area of triangle ABC.



$A = \frac{b \cdot h}{2}$

Base: $\overline{AC}$ $m\overline{AC} = ?$

$d(A,C) = \sqrt{(6-6)^2 + (2-(-3))^2}$

$= \sqrt{12^2 + 5^2}$

$= \sqrt{144 + 25}$

$= \sqrt{169}$

$= 13$ units

$y = \frac{5}{12}x - \frac{1}{2} \Rightarrow \left(0 = \frac{5}{12}x - y - \frac{1}{2}\right)$

$0 = 5x - 12y - 6$

$$h = d(B, \overline{AC}) = \frac{|5(-4) - 12(5) - 6|}{\sqrt{5^2 + (-12)^2}}$$

$$= \frac{|-20 - 60 - 6|}{\sqrt{25 + 144}}$$

$$= \frac{|-86|}{\sqrt{169}}$$

$$= \frac{86}{13}$$

$$A_{ABC} = \frac{b \cdot h}{2} = \frac{13 \cdot \frac{86}{13}}{2} = \frac{86}{2} = \underline{\underline{43 \text{ (units)}^2}}$$