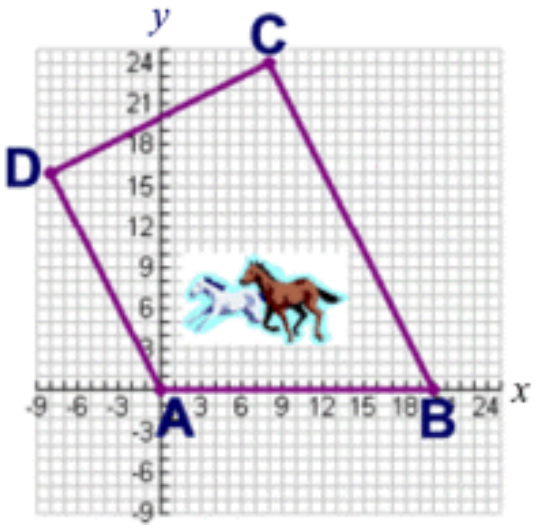
Challenging Problems involving Slopes and Equations of Lines

1. Rancher Kevin has created a new fenced-in pasture for his horses. The corners of the pasture are located at $A(0, 0)$, $B(20, 0)$, $C(8, 24)$ and $D(-8, 16)$.

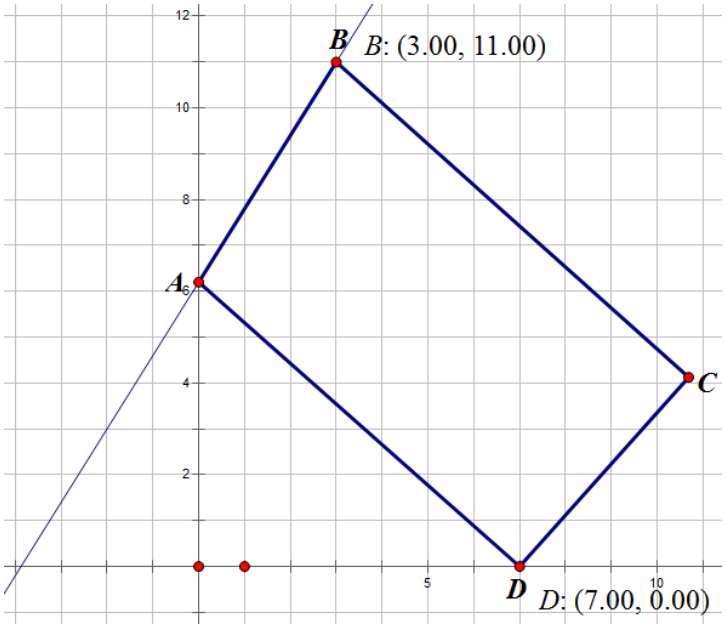


(a) Use slopes to determine the relationships among line segments $\overline{AD}$, $\overline{BC}$ and $\overline{DC}$.

(b) What kind of quadrilateral is *ABCD*? Explain.

(c) What is the length of line segment $\overline{BD}$?

2. Shown at the right is quadrilateral *ABCD*. Take note that the exact co-ordinates of *B* and *D* are given but those of *A* and *C* are not.



(a) Explain why it is not possible to use the diagram to find the ***exact*** co-ordinates of *A* and *C*.

(b) Suppose that the line passing through *A* and *B* has equation $34x - 21y + 129 = 0$, $\angle BCD = 90°$ and that $\overline{AD}$ is parallel to $\overline{BC}$. Determine the ***exact*** co-ordinates of *A* and *C*. (Don't be quick to give up on this problem. It requires a little more thought than the typical problems presented in this unit!)

(c) Calculate the perimeter and area of quadrilateral *ABCD*. (You need to solve (b) before you can tackle this one.)