Doing Mathematics by Staring

Imagine that you found yourself in a desert. You saw a line in sand and two holes A, B. (See Picture) You only have a very long piece of wood (Let say unmarked ruler). Using the unmarked ruler, you were able to find a point C on the line and you constructed the triangle ACB with minimum perimeter , i.e., if you choose a different point on the line, say d, then the perimeter of ADB >= the perimeter of ACB.

How did you do that? state clearly the steps that you used in construction of such triangle.
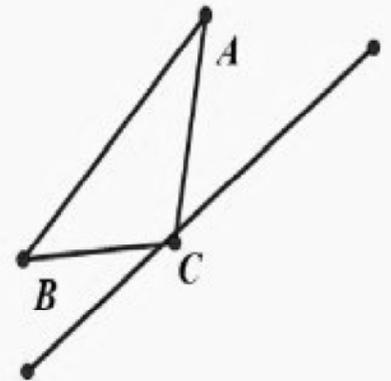
GIVEN: • RULER
• FIGURE BELOW

A •   • B   line ℓ
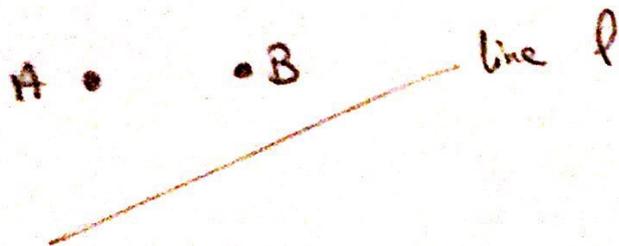
① Draw a perpendicular line from ℓ to B.
② MEASURE $\overline{B\ell}$ w/ ruler and mark the ruler. $(|\overline{B\ell}| = x)$

A.   B
        x

③ Reflect B by drawing a perpendicular line w/ length x on the other side of ℓ. Name it B', then connect A to B'.
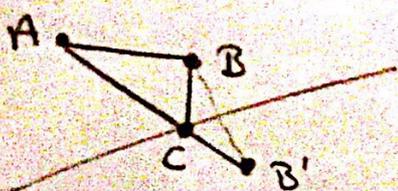
④ The point C is where AB' intersect ℓ.
⑤ Connect ABC

A
  B
 C
   B'

NOTES: • $|\overline{AB}|$ is fixed, $|\overline{AC}|$ and $|\overline{BC}|$ are not
• Shortest path between any 2 points is a line.
∴ $\min(P) = \min(|\overline{AC}| + |\overline{BC}|)$ where P is the perimeter.
shortest path of AB' is a straight line, ∴ intersection with ℓ has to be C.

NOTE: if not using a line, then C will change and you will NOT get the smallest perimeter