STAEDTLER® No. 937 811E Engineer's Computation Pad

45 Rock *faults* are ruptures along which opposite faces of rock have slid past each other. In Fig. 3-36, points A and B coincided before the rock in the foreground slid down to the right. The net displacement $\vec{AB}$ is along the plane of the fault. The horizontal component of $\vec{AB}$ is the *strike-slip AC*. The component of $\vec{AB}$ that is directed down the plane of the fault is the *dip-slip AD*. (a) What is the magnitude of the net displacement $\vec{AB}$ if the strike-slip is 22.0 m and the dip-slip is 17.0 m? (b) If the plane of the fault is inclined at angle ϕ = 52.0° to the horizontal, what is the vertical component of $\vec{AB}$?

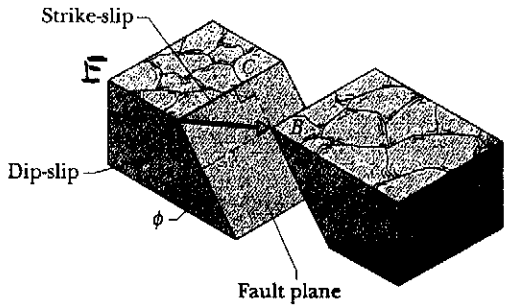
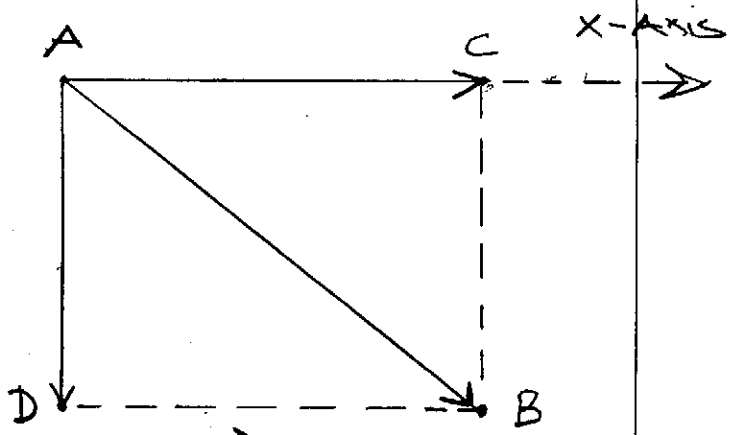


FIG. 3-36 Problem 45.

IN THE FAULT PLANE
LET AC BE AN X-AXIS

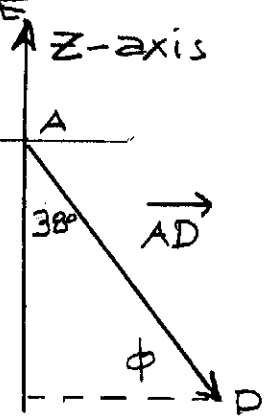


$\vec{AB} = \vec{AC} + \vec{AD}$
& $\vec{AC} \perp \vec{AD}$

$\Rightarrow AB^2 = AC^2 + AD^2 = 22^2 + 17^2 = 773\ m^2$

$AB = 27.8\ m \quad \Rightarrow \vec{AB} = 22\hat{x} + \vec{AD}$

IF THE Z-AXIS IS VERTICAL THEN AE IS THE Y AXIS
THE YZ-PLANE WITH $\vec{AD}$ LOOK LIKE



$\vec{AD} = (AD)_y \hat{y} + (AD)_z \hat{z}$

$(AD)_y = -AD\cos\phi = -17\cos 52°$

$(AD)_z = -AD\sin\phi = -17\sin 52°$

$\vec{AD} = -10.5\hat{y} + -13.4\hat{z}$

THEREFORE $\vec{AB} = \vec{AC} + \vec{AD}$

$\vec{AB} = 22\hat{x} + (-10.5)\hat{y} + (-13.4)\hat{z}$

$AB = \sqrt{(AB)_x^2 + (AB)_y^2 + (AB)_z^2}$

$= \sqrt{\underbrace{22^2}_{(AB)^2} + \underbrace{(-10.5)^2 + (-13.4)^2}_{(AD)^2}}$

$= 27.8\ m$ ✓

