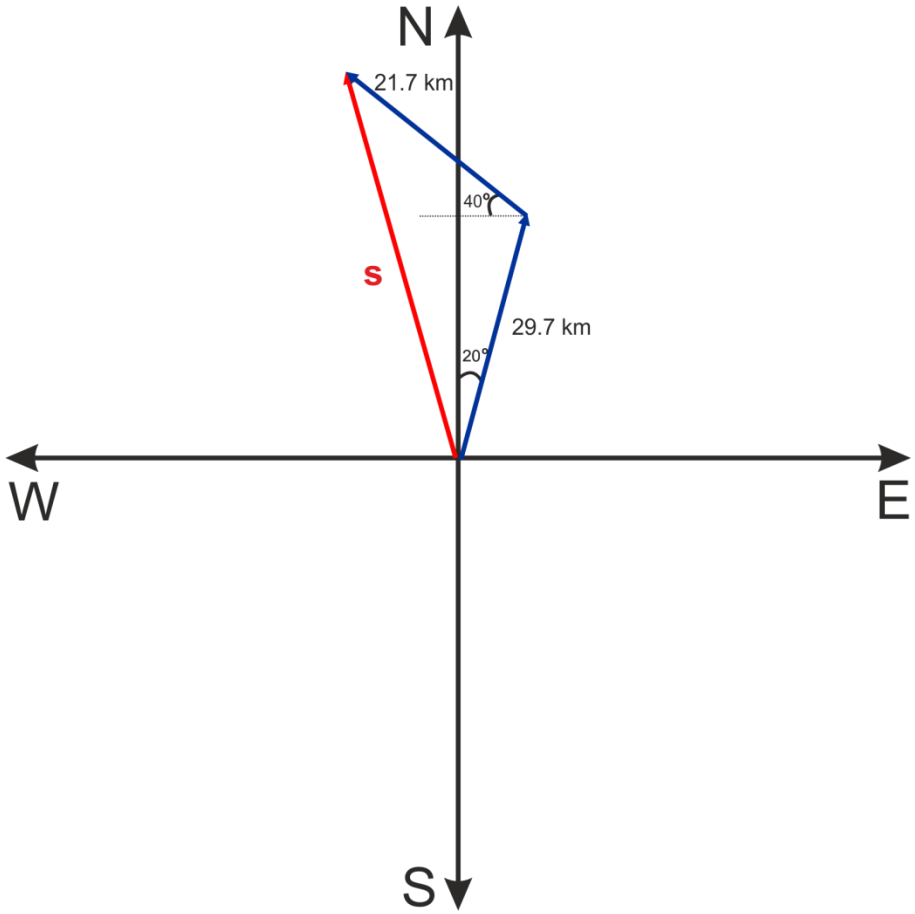
Answer on Question #80877 Physics / Other

Suppose you first walk 29.7 m in a direction 20 degrees east of north and then 21.7 m in a direction 40 degrees north of west. How far are you from your starting point, and what is the compass direction of a line connecting your starting point to your final position?

Solution:



The components of a displacement

$$s_x = 29.7 \sin 20° - 21.7 \cos 40° = -6.47 \text{ km}$$

$$s_y = 29.7 \cos 20° + 21.7 \sin 40° = 41.9 \text{ km}$$

Therefore

(a) The absolute value of the displacement

$$s = \sqrt{s_x^2 + s_y^2} = \sqrt{(-6.47)^2 + 41.9^2} = 42.4 \text{ km}$$

(b) The direction

$$\tan\theta = \frac{s_y}{s_x} = \frac{41.9}{-6.47} = -6.48, \quad \theta = 98.8°$$

or 81.2 degrees north of west.

Answers: 42.4 km, 81.2 degrees north of west