Question #74302, Physics / Other

Given that vector c=a-b , vector c has a magnitude of 10 units and direction 270, vector a has a magnitude of 2 units and direction 150.

A) write the vector c in terms of unit vectors i,j,k.

B) write the vector a in terms of unit vectors i,j,k.

C) write the vector b in terms of unit vectors i,j,k.

D) find the magnitude and direction of the vector b.

Solution

A) Vector components are determined as follows.

$c_x = 10 \times \cos 270° = 0$

$c_y = 10 \times \sin 270° = -10$

$c = -10j$

B) $a_x = 2 \times \cos 150° = -1.73$

$a_y = 2 \times \sin 150° = 1$

$a = -1.73i + j$

C) $b = a - c = -1.73i + j - (-10j) = -1.73i + 11j$

D) Vector magnitude is calculated as follows.

$$magnitude = \sqrt{(-1.73)^2 + 11^2} = 11.14$$

$$direction = \cos^{-1}\left(\frac{-1.73}{11.14}\right) = 98.93°$$