

PHYS101.14
QUIZ#3- CHAPTER 3
DATE: 24/3/09

Name:

Key

Id#:

For the following vectors: $\vec{A} = 3i + 4j - 2k$ and $\vec{B} = -4i - 2j + 3k$.

Find the magnitude and ~~direction~~ of vector \vec{C} such that $2\vec{A} - 3\vec{B} + \frac{\vec{C}}{2} = 0$

$$\vec{C} = 6\vec{B} - 4\vec{A}$$

$$= (-24\hat{i} + 12\hat{j} + 18\hat{k}) - (12\hat{i} + 16\hat{j} - 8\hat{k})$$

$$\vec{C} = -36\hat{i} - 28\hat{j} + 26\hat{k}$$

magnitude $|\vec{C}| = \sqrt{(-36)^2 + (-28)^2 + (26)^2}$

$$|\vec{C}| = 52.5$$

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 QUIZ#3- CHAPTER 3
 DATE: 22/3/09

Name: Key Id#: _____

Three vectors \vec{a} , \vec{b} , and \vec{c} have equal magnitudes of 20 m. Find the magnitude and direction of the **sum** of these vectors.

$$\vec{a} = 20 \cos 30^\circ \hat{i} + 20 \sin 30^\circ \hat{j}$$

$$\vec{b} = 20 \cos 40^\circ \hat{i} - 20 \sin 40^\circ \hat{j}$$

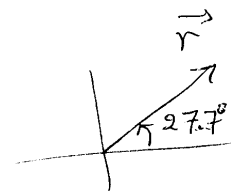
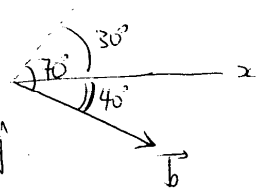
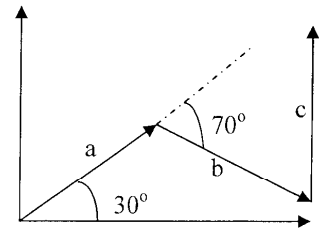
$$\vec{c} = 0 \hat{i} + 20 \hat{j}$$

$$\vec{r} = \vec{a} + \vec{b} + \vec{c} = (a_x + b_x + c_x) \hat{i} + (a_y + b_y + c_y) \hat{j}$$

$$\vec{r} = 32.6 \hat{i} + 17.1 \hat{j} \text{ (m)}$$

magnitude: $r = \sqrt{(32.6)^2 + (17.1)^2} = \boxed{36.8 \text{ m}}$

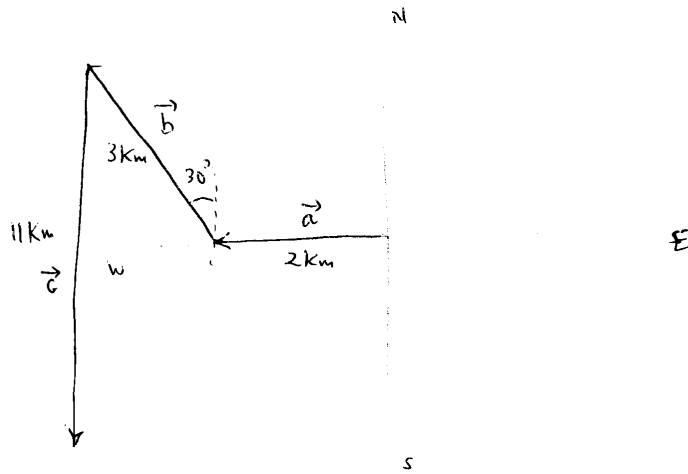
direction: $\theta = \tan^{-1} \left(\frac{17.1}{32.6} \right) = \boxed{27.7^\circ}$



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A man walks 2.0 km due West, then 3.0 km in the direction 30° West of North and finally 11.0 km due South. Find the magnitude and direction of the resultant vector.



$$\vec{r} = \vec{a} + \vec{b} + \vec{c}$$

$$r_x = -2 - 3 \sin 30^\circ = -3.5 \text{ km}$$

$$r_y = 0 + 3 \cos 30^\circ - 11 = -8.4 \text{ km}$$

$$\vec{r} = -3.5 \hat{i} - 8.4 \hat{j} \text{ (km)}$$

Magnitude: $|\vec{r}| = \sqrt{(-3.5)^2 + (-8.4)^2} = \boxed{9.1 \text{ km}}$

direction: $\theta = \tan^{-1} \left(\frac{-8.4}{-3.5} \right) = 67.3^\circ$

$$\theta = 180^\circ + 67.3^\circ$$

$$\boxed{\theta = 247.3^\circ}$$

