Finding components

Friday, 29 January, 2021 21:11

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.
J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.
H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.
H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

A small airplane leaves an airport on an overcast day and is later sighted $215\,km$ away, in a direction making an angle of 22° east of due north. How far east and north is the airplane from the airport when sighted?

Finding magnitude and direction-1

Friday, 29 January, 2021 21:33

A person walks 3 km due east and then $2\,km$ due north. What is his displacement vector?

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.

J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.

H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.

H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

Finding magnitude and direction-2

Friday, 29 January, 2021 21:33

A cross-country skier skis $1\ km$ north and then $2\ km$ east on a horizontal snowfield. How far and in what direction is she from the starting point?

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.

J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.

H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.

H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

Using unit vectors - 1

Sunday, 13 June, 2021 15:18

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.
J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.
H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.
H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

Given the following three displacements:

$$\vec{A} = 72.4\,m, 32^{\circ}\ East\ of\ North$$
$$\vec{B} = 57.3\,m, 36^{\circ}\ South\ of\ West$$
$$\vec{C} = 17.8\,m, South$$

Find the magnitude and direction of the resultant displacement.

Using unit vectors - 2

Sunday, 13 June, 2021 15:08

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.
J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.
H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.
H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

A car travels $20\,km$ due north and then $35\,km$ in a direction 60° west of north. Find the magnitude and direction of the car's resultant displacement.

Using unit vectors - 3

Friday, 29 January, 2021 21:33

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.
J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.
H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.
H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

Find the sum of two displacement vectors $\vec{A}$ and $\vec{B}$ lying in the xy plane and given by: $\vec{A} = (2\hat{\imath} + 2\hat{\jmath})\ m$ and $\vec{B} = (2\hat{\imath} - 4\hat{\jmath})\ m$.

Using unit vectors - 4

Friday, 29 January, 2021 21:33

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.
J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.
H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.
H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

A particle undergoes three consecutive displacements: $\vec{A} = (15\hat{\imath} + 30\hat{\jmath} + 12\hat{k})\ cm$, $\vec{B} = (23\hat{\imath} - 14\hat{\jmath} - 5\hat{k})\ cm$ and $\vec{C} = (-13\hat{\imath} + 15\hat{\jmath})\ cm$. Find unit-vector notation for the resultant displacement and its magnitude.

Using unit vectors - 5

Friday, 29 January, 2021 21:33

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.
J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.
H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.
H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

Given the two displacements: $\vec{A} = \left(15\hat{\imath} + 30\hat{\jmath} + 12\hat{k}\right)\ cm$ and $\vec{B} = \left(23\hat{\imath} - 14\hat{\jmath} - 5\hat{k}\right)\ cm$. Find the magnitude of the displacement $2\vec{A} - \vec{B}$.

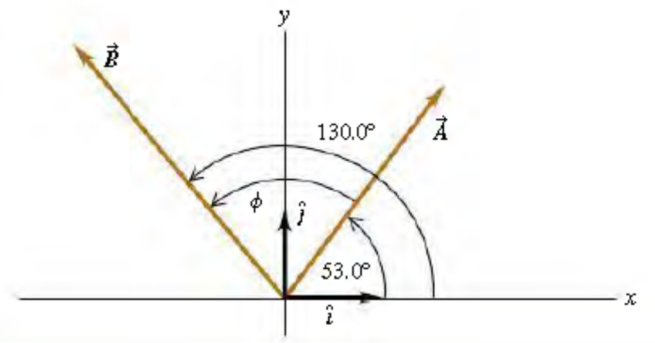
The scalar product-1

Sunday, 13 June, 2021 16:12

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.
J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.
H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.
H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

Find the scalar product of the two vectors shown in the figure. The magnitudes of the vectors are $A = 4$ and $B = 5$.



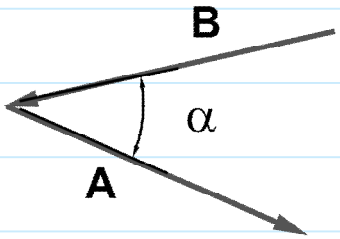
The scalar product-2

Friday, 29 January, 2021 21:33

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.
J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.
H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.
H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

The figure shows two vectors lying in the xy plane, if $|\vec{A}| = 6$, $|\vec{B}| = 5$ and $\alpha = 40^{\circ}$. Determine the scalar product of them.



The scalar product-3

Friday, 29 January, 2021 21:33

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.
J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.
H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.
H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

Vectors $\vec{A}$ and $\vec{B}$ have magnitudes of 3 units and 4 units, respectively.

- What is the angle between the directions of $\vec{A}$ and $\vec{B}$ if $\vec{A} \cdot \vec{B} = 0$
- What is the angle between the directions of $\vec{A}$ and $\vec{B}$ if $\vec{A} \cdot \vec{B} = 12$
- What is the angle between the directions of $\vec{A}$ and $\vec{B}$ if $\vec{A} \cdot \vec{B} = -12$

Angle between two vectors using dot products

Friday, 29 January, 2021 21:33

Lecturer: Mustafa Al-Zyout, Philadelphia University, Jordan.

R. A. Serway and J. W. Jewett, Jr., *Physics for Scientists and Engineers*, 9th Ed., CENGAGE Learning, 2014.

J. Walker, D. Halliday and R. Resnick, *Fundamentals of Physics*, 10th ed., WILEY,2014.

H. D. Young and R. A. Freedman, *University Physics with Modern Physics*, 14th ed., PEARSON, 2016.

H. A. Radi and J. O. Rasmussen, *Principles of Physics For Scientists and Engineers*, 1st ed., SPRINGER, 2013.

The vectors $\vec{A}$ and $\vec{B}$ are given by: $\vec{A} = 3\hat{\imath} - 4\hat{\jmath} + \hat{k}$ and $\vec{B} = -2\hat{\imath} + 3\hat{k}$.

- Find the magnitude of the two vectors.
- Determine the scalar product $\vec{A} \cdot \vec{B}$.
- Find the angle between the directions of two vectors.
- Find the angle between $\vec{A}$ and the positive x-axis.