This print-out should have 11 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. The due time is Central time.

Please notice that for your homework to be considered towards your work, it needs to be submitted one hour before the corresponding recitation starts. Work submitted after this time, but before the DUE DATE on top of this page will be accepted but not graded.

PLEASE REMEMBER THAT YOU MUST CARRY OUT YOUR CALCULATIONS TO AT LEAST THREE SIGNIFICANT FIGURES. YOUR ANSWER MUST BE WITHIN ONE PERCENT OF THE CORRECT RESULT TO BE MARKED AS CORRECT BY THE SERVER.

Distance to the Origin

01:12, trigonometry, numeric, > 1 min, normal.

001

The cartesian coordinates of a point in the xy plane are $x = -3.5$ m, $y = -2.5$ m.

Find the distance, r, from the point to the origin. Answer in units of m.

002

Calculate the angle θ between the radius-vector of the point and the positive x axis (measured counterclockwise from the positive x axis, within the limits of -180° to $+180^\circ$). Answer in units of $^\circ$.

Descent Vehicle

03:07, trigonometry, numeric, > 1 min, normal.

003

A descent vehicle landing on the moon has a vertical velocity toward the surface of the moon of 31 m/s. At the same time, it has a horizontal velocity of 51 m/s.

a) At what speed does the vehicle move along its descent path? Answer in units of m/s.

004

b) At what angle with the vertical is its path? Answer in units of $^\circ$.

Magnitude of a Vector

03:06, trigonometry, numeric, > 1 min, normal.

005

Vector $\vec{B}$ has x, y, and z components of 4, 6, and 3 units, respectively.

Calculate the magnitude of $\vec{B}$.

006

What is the angle between $\vec{B}$ and the x- axis? Answer in units of $^\circ$.

Vector Addition 02

03:08, trigonometry, numeric, > 1 min, normal.

007

Two vectors **A** and **B**, are lying in the xy plane and given by

$$\mathbf{A} = A_x\,\mathbf{i} + A_y\,\mathbf{j}$$
$$\mathbf{B} = B_x\,\mathbf{i} + B_y\,\mathbf{j}\,.$$

where $A_x = 2$ m, $A_y = 2$ m, $B_x = 2$ m, $B_y = -4$ m. Let $\mathbf{R} = \mathbf{A} + \mathbf{B}$.

Find the magnitude of **R**. Answer in units of m.

008

Find the angle θ that the vector **R** makes from the positive x axis. Choose your answer to be between -180° and $+180^\circ$. The positive angular direction is counter clockwise measured from the x axis. Answer in units of $^\circ$.

Scalar Product

03:10, calculus, numeric, > 1 min, normal.

009

Vector $\vec{A}$ has a magnitude of 5 units and vector $\vec{B}$ has a magnitude of 9 units. The two vectors make an angle of 50° with each other.

Find $\vec{A} \cdot \vec{B}$. Answer in units of units^2.

Scalar Product 02

03:10, trigonometry, numeric, > 1 min, normal.

010

The vectors $\vec{A}$ and $\vec{B}$ are given by

$$\vec{A} = 2\,\hat{i} + 3\,\hat{j}$$

$$\vec{B} = -1\,\hat{i} + 2\,\hat{j}$$

Find the scalar product $\vec{A} \cdot \vec{B}$.

011

Find the angle between $\vec{A}$ and $\vec{B}$. Answer in units of $^\circ$.