

Microworld Vectors instruction

The aim of this microworld is to introduce different ways of presenting vectors: graphic representation, analytic representation in Cartesian coordinates system, analytic by length and direction (circular coordinates system) and by means of colors (model of space of colors). The exercises show the connections between different vector representations and help to understand what is vector and how it can be represented.

The exercises are “open”. There are possibilities of different kinds of activity, gathering the experience, answering questions: what will happen when we change...?

Microworld pages

1. Vector and its components

Exercise.

Change vector dragging the arrow. Look at the changes of components.

On screen:

pane with vector,
text field with vector components (analytic vector representation),
hidden text fields with length and direction of vector,
5 buttons allowing to jump to the other pages.

2. Fit vector to given components

Exercise.

Press **new** button for new components. Fit to them vector by dragging the arrow. Check how it fits (press **check** button).

On screen:

pane with red vector (to adjust by dragging the arrow),
text field with vector components (black numbers),
button **new** – picking the new components to fit the vector (arrow) to them,
button **check** – checking red vector components (showing text field with this components),
hidden text field with vector components (red numbers),
hidden text fields with length and direction of vector.

3. Fit vector to a given one

Exercise.

Pick at random a new vector (green) and try to fit to it the red vector on the left pane (by dragging the arrow). Check how it fits (press **check** button).

On screen:

pane with red vector (to adjust by dragging the arrow),
pane with green vector (on the left side),
button **new** – picking the new green vector,
button **check** – showing green vector components, its length and direction,
text field with red vector components (red numbers),
hidden text field with green vector components (green numbers),
hidden text fields with length and direction of red vector,
hidden text fields with length and direction of green vector.

4. Fit components to the vector.

Exercise.

Try how vector (arrow) changes when you change the components (press **try** button and use the sliders). Take new vector (press **new** button) and fit its components using sliders. Check how it fits (press **check** button).

On screen:

pane with green vector (to adjust by the sliders),
slider to set X component of the green vector,
text fields with X and Y components of a green vector,
slider to set Y component of the green vector,
button **try** – allowing to adjust green vector using sliders,
button **new** – picking the new red vector (arrow) to set its components using sliders,
button **check** – showing the green vector (arrow) and field with red vector components.

5. Fit length and direction to the vector

Exercise.

Try how vector (arrow) changes when you change the length and direction (press **try** button and use the sliders). Take new vector (press **new** button) and fit its length and direction using sliders. Check how it fits (press **check** button).

On screen:

pane with green vector (to adjust by the sliders),
slider to set the length of the green vector,
text fields with the length and direction of a green vector,
slider to set the direction of the green vector,
button **try** – allowing to adjust green vector using sliders,
button **new** – picking the new red vector (arrow) to set its length and direction using sliders,
button **check** – showing the green vector (arrow) and field with red vector length and direction.

6. Fit a color to a given one

Exercise.

Set square color to the background color using basic colors sliders. Look at the numbers under the square. Check how the color fits (press **ready** button). Pick the new background color (press **go** button).

On screen:

pane with a background color picked at random and on it:
text field with instruction,
3 sliders to set basic colors intensity: red, green and blue,
button **go** / **ready** picking new background color (**go**) and checking how it is fitted (**ready**),
square pane to set color using sliders,
text field with color vector (basic colors intensity)
button – green square – showing a picture on the square pane.

Buttons:



Jump to the main page, project icon.



Show / hide the axes of coordinates system.



Show / hide the grid.



Show / hide the vector components (arrows).



Show / hide the field with vector length.



Show / hide the field with vector direction (in degrees).



Jump to the next page (exercise).