

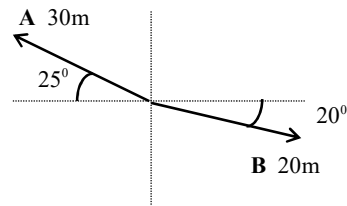
PHY1010 Introductory Physics 2020/21
Tutorial Sheet 01
Vectors

01*. A displacement **D** of 100m from the origin at an angle of 37° above the x-axis is the result of three successive displacements: **d**₁ of 100m along the negative x-axis, **d**₂ of 200m at an angle of 150° above the x-axis, and a displacement **d**₃. Find **d**₃.

[355m, 353.5°]

02*. Find the direction and magnitude of:

- (i) the vector sum **A + B** [10.22m, 145.16°]
- (ii) the vector difference **A - B**, [49.56, 157°] and
- (iii) the vector difference **B - A**. [49.56m, 337°]



03*. A particle undergoes three successive displacements in a plane as follows: 4.0m southwest, 5.0m east, 6.0 m in a direction 60° north of east.

Choose the y-axis pointing north and the x-axis pointing east and find

- i) The components of each displacement,
- ii) The components of the resultant displacement, [5.17m, 2.37m]
- iii) The magnitude and direction of the resultant displacement, [5.69m, 24.63°] and
- iv) Graphically show the approximate displacement of the particle.

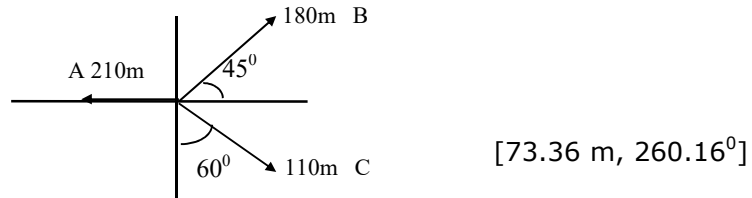
04*. The resultant of two force vectors **A** and **B** has a magnitude of 150 N along the y-axis. If the force vector **B** makes an angle of 60° with the positive x-axis, find the magnitude of **B** and the direction of **A**, given that the x-component of **A** is equal to -60 N.

[120N, 142.48°]

05*. When displacement **B** is added to displacement **A** the result is a displacement **C** that has components **C**_x = -3.0cm, **C**_y = +6.0cm, and **C**_z = +4.0cm. Displacements **A** and **B** are in the same direction, but the magnitude of **A** is only half that of **B**.

Find the components of **A**. [-1, 2, 4/3]

06. The three vectors **A**, **B**, and **C** are as shown. Find the magnitude and direction of a vector **D** which when added to these three vectors will give a zero resultant.



07**. A man pulls a box with a force of 70 N along the positive y -axis, while a boy pulls it with a force of 50 N, making an angle of 80° counter clock-wise with the positive y -axis.

- (i) In what direction should a *second boy* apply a force of 60 N so that the box will move along the positive y -axis? *Hint*: two values are possible.
- (ii) Find the magnitude and direction of the force that a *second man* should apply so that the box does not move at all?

(i) $[34.85^\circ, 325.15^\circ]$, (ii) $[-112.97 \text{ N}, -44.39 \text{ N}]$

8** While exploring a cave, a person starts at the entrance and moves the following successive distances. She goes 75.0 m north, 250 m east, 125 m at an angle 30.0° north of west, and 150 m south. Find the resultant displacement from the cave entrance. Draw a rough diagram. $[R = \sqrt{141.75^2 + (-12.5)^2} = 142.3m]$