2 Magnitude and direction of vectors

DONE

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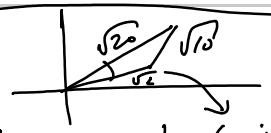
$\underline{a} = \begin{bmatrix} 8 \\ 3 \end{bmatrix} = 8\underline{i} + 3\underline{j}$ ①-⑥

$\therefore |\underline{a}| = \sqrt{8^2+3^2} = \sqrt{73}$

$\therefore \theta = \arctan\left(\frac{3}{8}\right) = 20.6°$

$\therefore (\sqrt{73}, 108°)$ Mag-dir-form

⑦-⑧ 

Method for 3D too

2D vectors

Derived from cosine law

Dot Product Theorem

Draw diagram

↳ θ between $\underline{i}+4\underline{j}$ & $2\underline{i}+4\underline{j}$ — Cosine Rule ↓ $\therefore \theta = 18.4°$

$\overrightarrow{OA} = 2\underline{i}+4\underline{j} \rightarrow \sqrt{20}$

$\overrightarrow{OB} = \underline{i}+\underline{j} \rightarrow \sqrt{2}$

$\overrightarrow{AB} = -\underline{i}-3\underline{j} \rightarrow \sqrt{10}$

3D vectors

$\underline{a} = x\underline{i}+y\underline{j}+z\underline{k}$

$\therefore |\underline{a}| = \sqrt{x^2+y^2+z^2}$

Find third vector
Find lengths
Find angle

Scalar Product

$\underline{a} \cdot \underline{b} = |\underline{a}||\underline{b}|\cos\theta$

↳ Rearrange for θ