**Pure 2**

**Vectors**

Chapter Overview

1:: Distance between two points.

2:: $i,j,k$ notation for vectors

3:: Magnitude of a 3D vector and using it to find angle between vector and a coordinate axis.

4:: Solving Geometric Problems

5:: Application to Mechanics

**Distance from the origin and magnitude of a vector**

 In 2D, how did we find the distance from a point to the origin?

 



**The magnitude of a vector** $a=\left(\begin{matrix}x\\y\\z\end{matrix}\right)$**:**

$$\left|a\right|=\sqrt{x^{2}+y^{2}+z^{2}}$$

**And the distance of** $(x,y,z)$ **from the origin is** $\sqrt{x^{2}+y^{2}+z^{2}}$

**Distance between two 3D points**

 

How do we find the distance between $P$ and $Q$?

**The distance between two points is:**

$$d=\sqrt{\left(Δx\right)^{2}+\left(Δy\right)^{2}+\left(Δz\right)^{2}}$$

 $Δx$ **means “change in** $x$**”**

**Quickfire Questions:**

Distance of $(4,0,-2)$ from the origin:

$$\left|\left(\begin{matrix}5\\4\\-1\end{matrix}\right)\right|=$$

Distance between $(0,4,3)$ and $\left(5,2,3\right).$

Distance between $(1,1,1)$ and $\left(2,1,0\right).$

Distance between $(-5,2,0)$ and $\left(-2,-3,-3\right).$

**Tip**: Because we’re squaring, it doesn’t matter whether the change is negative or positive.

***Test Your Understanding So Far…***

[Textbook] **Find the distance from the origin to the point** $P(7,7,7)$**.**

[Textbook] **The coordinates of** $A$ **and** $B$ **are** $(5,3,-8)$ **and** $\left(1,k,-3\right)$ **respectively. Given that the distance from** $A$ **to** $B$ **is** $3\sqrt{10} $ **units, find the possible values of** $k$**.**

Ex 12A p.338