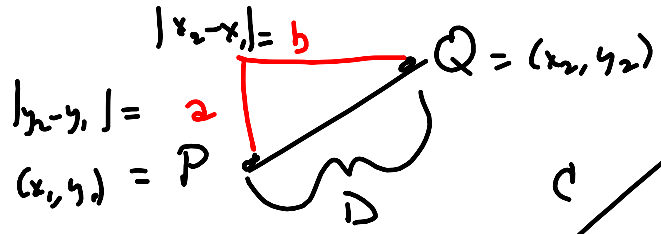
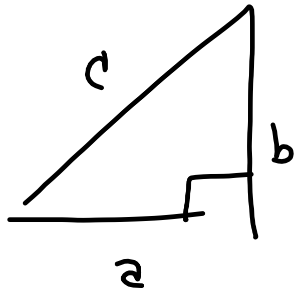
Distance: $P(x_1, y_1)$ $Q(x_2, y_2)$





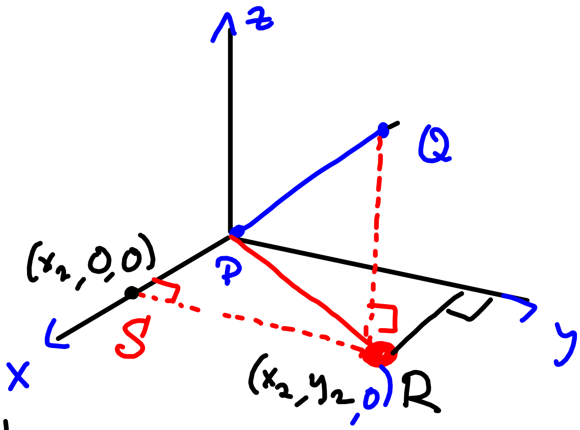
$$\sqrt{c^2} = |c|$$

$$\sqrt{a^2+b^2} = \sqrt{c^2} = |c|$$

$$c = \pm\sqrt{a^2+b^2}$$

$\Rightarrow c = \sqrt{a^2+b^2}$ if we assume the length is positive.

$$D = \sqrt{a^2+b^2}$$
$$= \sqrt{|y_2-y_1|^2 + |x_2-x_1|^2}$$
$$= \sqrt{(y_2-y_1)^2 + (x_2-x_1)^2}$$



Right-hand rule.

$P^*(x_1^*, y_1^*, z_1^*)$

$Q^*(x_2^*, y_2^*, z_2^*)$

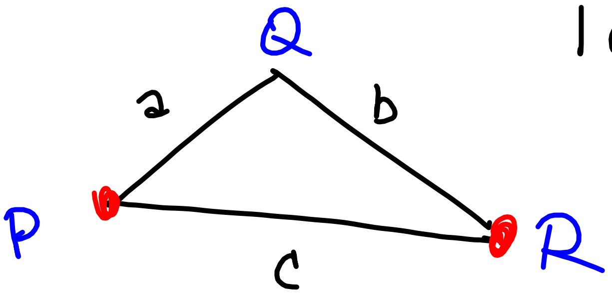
Distance in 3-D:

$P(0,0,0)$

$Q(x_2, y_2, z_2)$

$$|\overrightarrow{PR}| = \sqrt{|\overrightarrow{PS}|^2 + |\overline{SR}|^2}$$

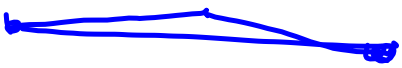
$$|PQ| = \sqrt{|PR|^2 + |\overline{RQ}|^2}$$
$$= \sqrt{|\overline{PS}|^2 + |SR|^2 + |\overrightarrow{RQ}|^2}$$
$$= \sqrt{(x_2-0)^2 + (y_2-0)^2 + (z_2-0)^2}$$

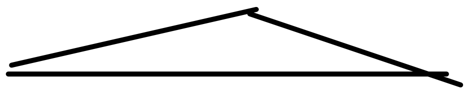


$|c| < |a| + |b|$

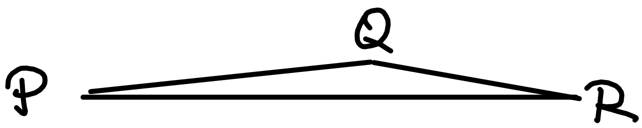
In general, $|c| \le |a| + |b|$

Only "=" when Q & R lie on the same line.





This is the triangle inequality.



if and only if

$\Longleftrightarrow$

Q & R lie on the SAME line iff

$|\overrightarrow{PQ}| + |\overrightarrow{QR}| = |\overrightarrow{PR}|$ (Otherwise $|A| + |B| > |C|$)

See §12.1 #9

A circle is the set of all points equidistant from a fixed point (called the "center") and the distance in question is called the "radius."

Let (x_1, y_1, z_1) be the center

and let (x, y, z) be any point

and r = the radius.

Then $r = \sqrt{(x-x_1)^2 + (y-y_1)^2 + (z-z_1)^2}$

i.e., $(x-x_1)^2 + (y-y_1)^2 + (z-z_1)^2 = r^2$

is the equation of a SPHERE.

Completing the Square Skill:

$x^2+y^2+z^2-6x+4y-2z=11$

Show that this is a sphere.
State its center & radius.

$x^2-6x+3^2+y^2+4y+2^2+z^2-2z+1^2=11+9+4+1$

$(x-3)^2+(y+2)^2+(z-1)^2=25=5^2$

$(h,k,w)=\text{center}=(3,-2,1)$

& $r=5$

$P(2,3,4)$ has position vector

$\boxed{\bar{v}=\langle 2,3,4\rangle}$.

has size & direction