10/10.

Seth Williams
worked with Jordan + Matt

#1
P. 2.1

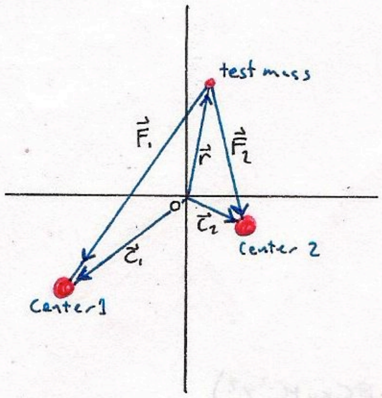

Fig. 1

the motion of the particle will be determined by the sum of the forces that act on it.

$$m\ddot{\vec{r}} = \vec{F}_1 + \vec{F}_2$$

in order to write this equation we will need to be able to write each force in terms of magnitude and direction.

Direction of $\vec{F}_1$ can be written as

$$\vec{c}_1 - \vec{r} \quad \text{by vector subtraction}$$

and then normalized as

$$\frac{\vec{c}_1 - \vec{r}}{|\vec{c}_1 - \vec{r}|},$$

so as to leave our magnitude unchanged.

For the magnitude, we may choose an arbitrary law of attraction, say $f_1(|\vec{c}_1 - \vec{r}|)$ where $|\vec{c}_1 - \vec{r}|$ is the distance from the center of attraction.

So,

$$\vec{F}_1 = \frac{\vec{c}_1 - \vec{r}}{|\vec{c}_1 - \vec{r}|} \cdot f_1(|\vec{c}_1 - \vec{r}|)$$

So similarly we may realize $\vec{F}_2$ in terms of $\vec{c}_2$, and we arrive at

$$m\ddot{\vec{r}} = f_1(|\vec{c}_1 - \vec{r}|)\frac{\vec{c}_1 - \vec{r}}{|\vec{c}_1 - \vec{r}|} + f_2(|\vec{c}_2 - \vec{r}|)\frac{\vec{c}_2 - \vec{r}}{|\vec{c}_1 - \vec{r}|} \quad \blacksquare$$

oK excellante sir!