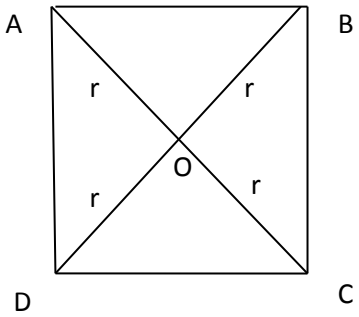
Answer on Question #67497, Physics / Mechanics | Relativity

four particles of mass 'm' are kept at four vertices of a square of side 'a'. Then the gravitational force acting on a particle of same mass 'm' placed at centre is

Solution:



Force on the mass at the centre 'O' due to mass at A is: $\mathrm{F_A} = \mathrm{G}\frac{\mathrm{m}^2}{\mathrm{r}^2}$ (1), where r is OA

Force on the mass at the centre 'O' due to mass at B is: $\mathrm{F_B} = \mathrm{G}\frac{\mathrm{m}^2}{\mathrm{r}^2}$ (2), where r is OB

Force on the mass at the centre 'O' due to mass at C is: $\mathrm{F_C} = \mathrm{G}\frac{\mathrm{m}^2}{\mathrm{r}^2}$ (3), where r is OC

Force on the mass at the centre 'O' due to mass at D is: $\mathrm{F_D} = \mathrm{G}\frac{\mathrm{m}^2}{\mathrm{r}^2}$ (4), where r is OD

The forces F_A and F_C are equal and opposite and hence their resultant force: $\mathrm{F_A} - \mathrm{F_C} = 0$ (5)

The forces F_B and F_D are equal and opposite and hence their resultant force: $\mathrm{F_B} - \mathrm{F_D} = 0$ (6)

Of (5) and (6) $\Rightarrow$ the net resultant force acting on mass m at centre is zero.

Answer:

Zero