

## True love

The ring in water is buoyed up by the weight of the displaced fluid. The weights in air and in water are

$$W_a = \rho_m V g \quad \text{and} \quad W_w = (\rho_m - \rho_w) V g,$$

so

$$\frac{W_w}{W_a} = \frac{\rho_m - \rho_w}{\rho_m} = 1 - \frac{\rho_w}{\rho_m}.$$

Thus

$$\rho_m = \frac{\rho_w}{1 - W_w/W_a} = 20.5 \text{ g/cm}^3.$$

Looks like platinum. (Note that there's no need to convert from carats to any more conventional unit of force. Only the dimensionless ratio enters into the problem.)

*Grading:* There are many ways to solve this problem. Any of them earn full credit.