

1. Write the equations used to calculate the following:

a. The volume of a cylinder with radius,  $R$  and height,  $h$ .

$$V_{\text{cyl}} = \pi R^2 h$$

b. The surface area of the curved side of a cylinder with radius,  $R$  and height,  $h$ .

$$A_{\text{cyl}} = 2\pi R h$$

c. The volume of a sphere of radius,  $R$ .

$$V_{\text{sph}} = \frac{4}{3}\pi R^3$$

d. The surface area of a sphere of radius,  $R$ .

$$A_{\text{sph}} = 4\pi R^2$$

2. A hollow sphere has an inner radius,  $a$  and an outer radius,  $2a$ .

a. What is the volume of the solid part of the hollow sphere? (simplify!)

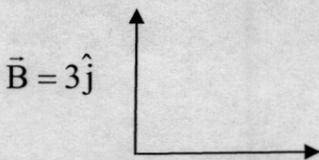
$$V = \frac{4}{3}\pi (2a)^3 - \frac{4}{3}\pi a^3 = \frac{4}{3}\pi (7a^3) = \frac{28}{3}\pi a^3$$

b. If the solid part of the sphere has a uniform charge density,  $\rho$ , how much charge is in this sphere?

$$q = \rho V = \rho \frac{28}{3}\pi a^3$$

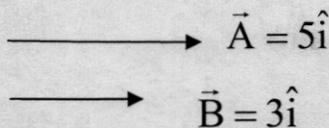
3. Find  $\vec{A} \cdot \vec{B}$ .

a.



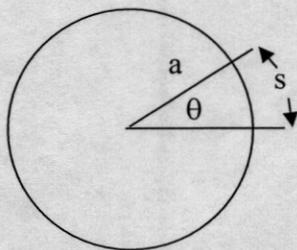
$$\vec{A} \cdot \vec{B} = 0$$

b.



$$\vec{A} \cdot \vec{B} = 15$$

4. What is the relationship between the radius,  $a$ , the angle  $\theta$ , and the subtended arc length,  $s$ ?



$$s = a\theta$$