1. If y varies inversely as the square of x, and $y = 5$ when $x = 2$, find y when $x = 10$.

$$y = \frac{k}{x^2}$$

① Find k (plug in $y=5$, $x=2$):

$$5 = \frac{k}{2^2}$$

$$5 = \frac{k}{4}$$

$$k = 20$$

$$y = \frac{20}{x^2}$$

② Plug in $x = 10$

$$y = \frac{20}{10^2}$$

$$= \frac{20}{100}$$

$$= \boxed{\frac{1}{5}} \quad (\text{or } 0.2)$$

2. For a given base, the volume of a pyramid varies directly as its height. A pyramid with height 50 m has volume 1000 m^3. Find the volume of a pyramid when the height is 40 m.

Let V = volume
h = height

$$V = kh$$

① Find k (plug in $V=1000$, $h=50$):

$$1000 = k \cdot 50$$

$$k = 20$$

$$V = 20h$$

② Plug in $h=40$

$$V = 20 \cdot 40$$

$$= \boxed{800 \text{ m}^3}$$

Q: Your sock drawer contains ten pairs of white socks and ten pairs of black socks. If you're only allowed to take one sock from the drawer at a time and you can't see what color sock you're taking until you've taken it, how many socks do you have to take before you're guaranteed to have at least one matching pair?