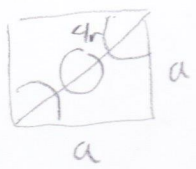
## Lab Section 3

### Crystal Systems and Bravais Lattices:

Build the models for simple cubic (SC) pg. 9, Body Centered Cubic pg., 18, and Face-Centered Cubic pg.27 and answer questions in the table below.

| | Simple Cubic | Body Centered Cubic | Face Centered Cubic |
|---|---|---|---|
| # of atoms in the unit cell? | 1 | 2 | 4 |
| # of lattice points in the unit cell? | 1 | 2 | 4 |
| # of atoms per basis? | 1 | 1 | 1 |
| Coordination Number? | 6 | 8 | 12 |
| Lattice Parameter a? | $2r$ | $\frac{4\sqrt{3}}{3}r$ | $2\sqrt{2}r$ |
| Atomic Packing Factor? | 52% | 68% | 74% |
| # of atoms in the [111] direction | 1/4 | 1 1/4 | 1/4 |
| # of atoms on the (110) plane? | 1/2 | 1/2 | 1 |
| Which plane has the highest atom density? | {100} | {110} | {110} |




$(4r)^2 = a^2 + a^2$

$16r^2 = 2a^2$

$8r^2 = a^2$

$a = 2\sqrt{2}r$

$4 \cdot \frac{4}{3}\pi r^3$ / $(2\sqrt{2}r)^3$

$\frac{\frac{4}{3}\pi}{8\sqrt{2}^3}$