Equation sheet for 1st exam. You do not need to bring this to the exam, another one will be provided. No other notes, texts will be permitted.

If θ is the angle of a vector with respect to the x-axis, than
$A_x = |\mathbf{A}| \cos\theta$, $A_y = |\mathbf{A}| \sin\theta$ and $|\mathbf{A}|^2 = A_x^2 + A_y^2$, $\tan\theta = A_y/A_x$

If $\mathbf{A} = \mathbf{B} + \mathbf{C}$, then $A_x = B_x + C_x$ and $A_y = B_y + C_y$

Net force $\mathbf{F}_{net} = \Sigma\, \mathbf{F} = \mathbf{F}_1 + \mathbf{F}_2 + \ldots.$

Gravity: $F = G\, m_1 m_2 / r^2$
r is distance from center, $G = 6.67 \times 10^{-11}$ N-m^2/kg^2
At surface of earth: F = Weight = mg $\quad g = 9.8$ m/sec^2

Static friction: f_s is less than or equal to $\mu_s N$ (N is normal force)

Kinetic friction: $f_k = \mu_k N$

$\mathbf{v}_{average} = \Delta\mathbf{r}/\Delta t, \quad \mathbf{a}_{average} = \Delta\mathbf{v}/\Delta t$

Newton's second law: $\mathbf{F}_{net} = m\mathbf{a}$, so $(F_{net})_x = ma_x$, $(F_{net})_y = ma_y$

Relative velocity: $\mathbf{v}_{AC} = \mathbf{v}_{AB} + \mathbf{v}_{BC}$ where $\mathbf{v}_{AC}$ is the velocity of A with respect to C, etc.

One-dimensional motion: $v_f = v_i + a\,t \qquad \Delta x = v_i\, t + (1/2)\, a\, t^2$

$v_f^2 = v_i^2 + 2\, a\, \Delta x \qquad \Delta x = (1/2)\,(v_i + v_f)\, t$

Projectile motion: $(v_f)_x = (v_i)_x \qquad \Delta x = (v_i)_x\, t$
$(v_f)_y = (v_i)_y - gt \qquad \Delta y = (v_i)_y - (1/2)gt^2$