Stuff you should know for Quiz 1 (not necessarily an exhaustive list!)

Know the entities and the processes that comprise the central dogma and know their relationships to one another
Know the basic composition of DNA – double strands of nucleotides, strand polarity, bonding specificity
Know and be able to distinguish chromatin, euchromatin and heterochromatin
Know the structure of RNA, the three major kinds, and their functions
Know the basic steps in transcription and the major players (template strand, RNA polymerase, promoter, mRNA processing, exons, introns) and the role of each player
Know the differences between Prokaryotes and Eukaryotes and know how their genomes differ
Know the basic steps in translation and the major players (tRNA, ribosomes), what the genetic code is and its role in transcription / translation, know and distinguish codon and anticodon
Understand what cell differentiation is and how the Waddington model has features that represent the processes of development and cell differentiation
Know the two early hypotheses about how cells of the same organism become differentiated and know the experiments conducted to distinguish them and the evidence each supplied (carrots, nuclear transplantation in Xenopus)
Know the major features of the operon model and the role of each player (promoter, operator, structural gene, regulatory gene, regulatory protein, signal molecule – be able to label these in a diagram).
Be able to distinguish between positive and negative gene regulation and between induction and repression and know when each kind of gene regulation would be expected
Recognize why and how gene regulation differs between Prokaryotes and Eukaryotes
Know the levels at which gene expression can be regulated and the major mechanisms that control expression at each level (see the handout I gave you)
Be able to define the following as used in class: gene amplification, polytene chromosome (=c’some), Barr body, DNA methylation, histone acetylation, control elements, enhancer sequence, transcription factor, initiation factor
Recognize the consequences of regulation at different levels and when regulation at different levels might be favored
Know the roles of male and female gametes and how they are specialized for those roles
Know the sequence of events in sea urchin fertilization
Be able to describe the events and consequences of the acrosomal reaction, the fast block to polyspermy, the cortical reaction, the slow block, egg activation
Know the major features of cleavage including the pattern of cell divisions characteristic of protostomes and deuterostomes. Be able to draw and label diagrams of an unfertilized amphibian egg, a morula, and a blastula
Be able to describe two means by which cells can move
Know the major features of gastrulation and how and why they differ between sea urchins and amphibians
Be able to draw and label a sea urchin gastrula and an amphibian gastrula (labels would include blastopore, archenteron, three primary germ layers, anterior and posterior ends of the embryo, and dorsal and ventral sides)
Know the general fate of each embryonic germ layer (i.e. what organ systems it contributes to in the adult)
Be able to describe the process of neurulation in the amphibian embryo
Know each of the mechanisms that contribute to animal development, including cytoplasmic determinants (including the definition and role of morphogens), cell communication (including induction), pattern formation, and hormones
Know how major axes of symmetry are determined in amphibians and fruit flies (Drosophila)
Know what Holtfreter's work tells us about cell interactions during development
Be able to define the process of induction in animal development
Be able to describe experimental evidence supporting our knowledge of mechanisms in development
Know what hormones are and how they coordinate events in development
Know the role of thyroxin in amphibian development and the experimental evidence supporting this role
Be able to summarize the processes that contribute to determining cell fate in the embryo
Be able to define the cell cycle and describe the differences between Prokaryote and Eukaryote cell cycles
Know the major stages of the Eukaryotic cell cycle and what goes on in each
Know what cyclins and cyclin-dependent kinases are and their roles in the control of the cell cycle and how cell fusion experiments support these roles
Know the four major stages of Mitosis and the events that occur within each
Be able to draw and label a cell in each stage.
Be able to define: spindle, centriole, centrosome, kinetochore, kinetochore fiber, non-kinetochore fiber, aster, chromatid, centromere, cytokinesis