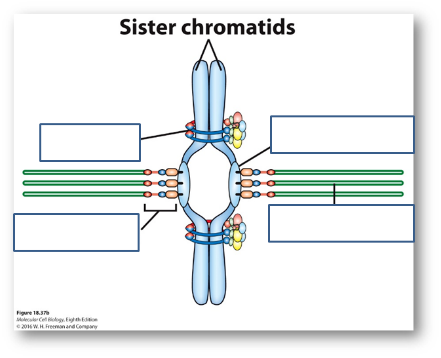
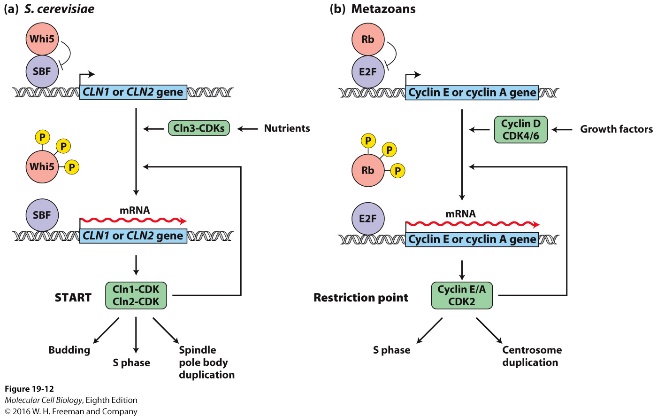
**Cell Biology and Physiology Study Guide**

**Exam 4 and Final**

* **Review study guides from previous exams for the comprehensive portion!!**
* Microtubules
  + What is the major protein?
  + Where do microtubules originate?
  + Are the polar?
  + What are the associated motor proteins?
  + What is anterograde and retrograde transport?
* Label:



* Intermediate filaments
  + Are the polar?
  + Where do you find them?
  + What are lamins?
* Cell cycle – what are the 4 main phases?
  + What are mitogens?
  + What are cyclin dependent kinases? How do they function?
  + Explain what is happening here:



* Embryo development, in mice and humans, what is the 8-cell stage? What is the 16-cell stage? What is the blastocyst? What are the parts of the blastocyst?
* Where are embryonic stem cells located? What is pluripotent?
* What are adult stem cells? What is multipotent? What are examples found in humans?
* What are Par proteins?
* Apoptosis – genes involved in cell death encode proteins with 3 distinct functions, what are these?