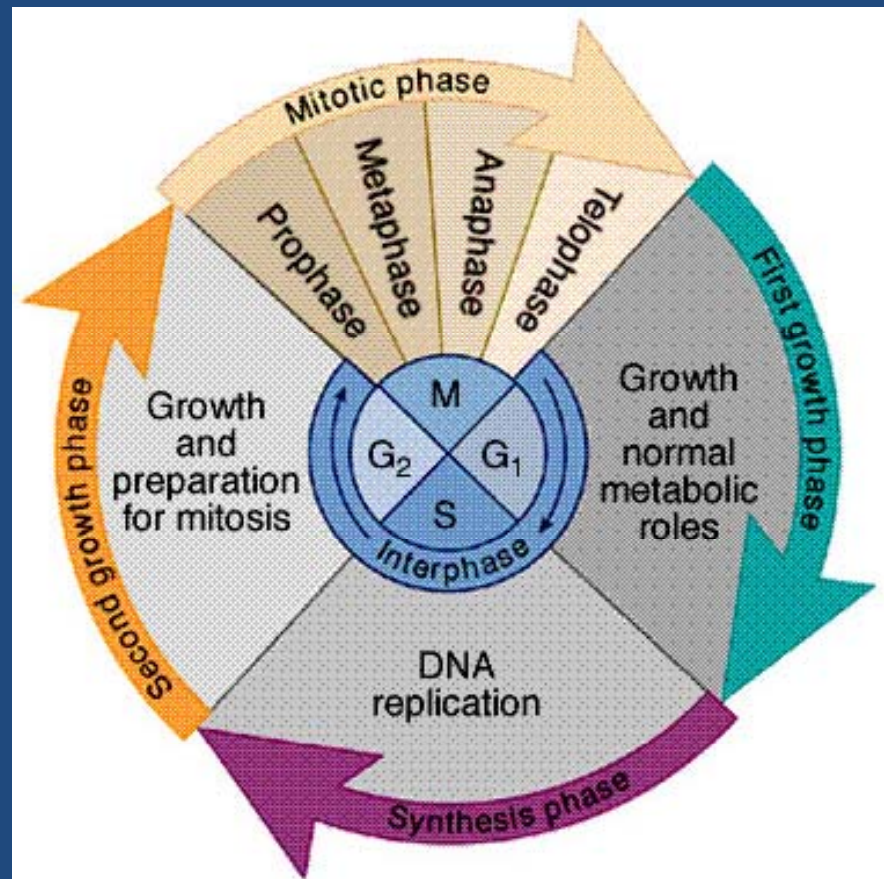


The Cell Cycle

Control,
Phases, &
Cancer

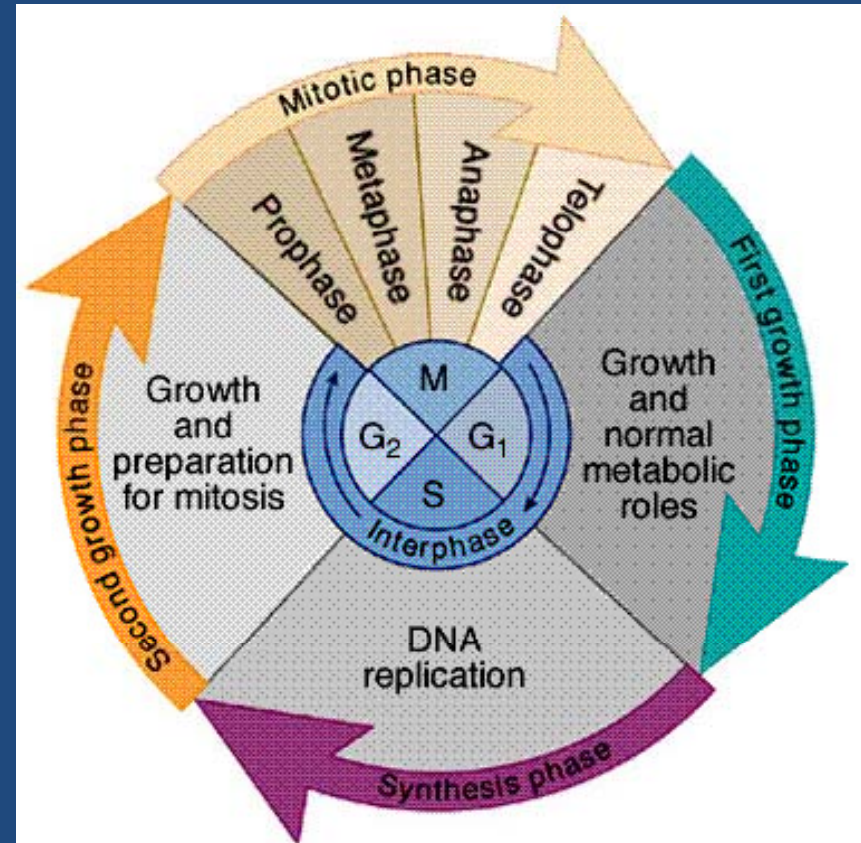


CELL CYCLE

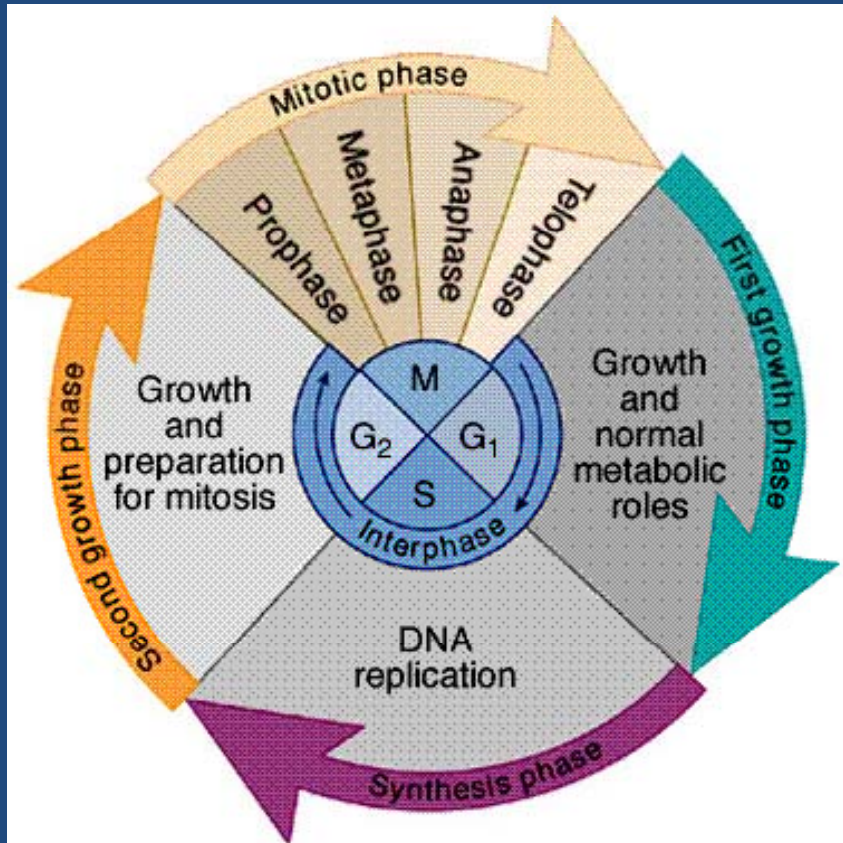
- The cell is a constantly changing structure
 - Keeps up with it's changing environment
 - Maintains homeostasis
- Why does it split?
 - Must reproduce when surface area can no longer support the much larger volume w/nutrients & need to rid of wastes
 - 1ST Stage of the Cell Cycle

INTERPHASE

- G1
 - Resting stage of the cell
 - Cell is carrying out it's normal/everyday activities (growing)
 - May last days → years depending on the cell type
 - When surface area to volume imbalance occurs... S Phase begins



INTERPHASE

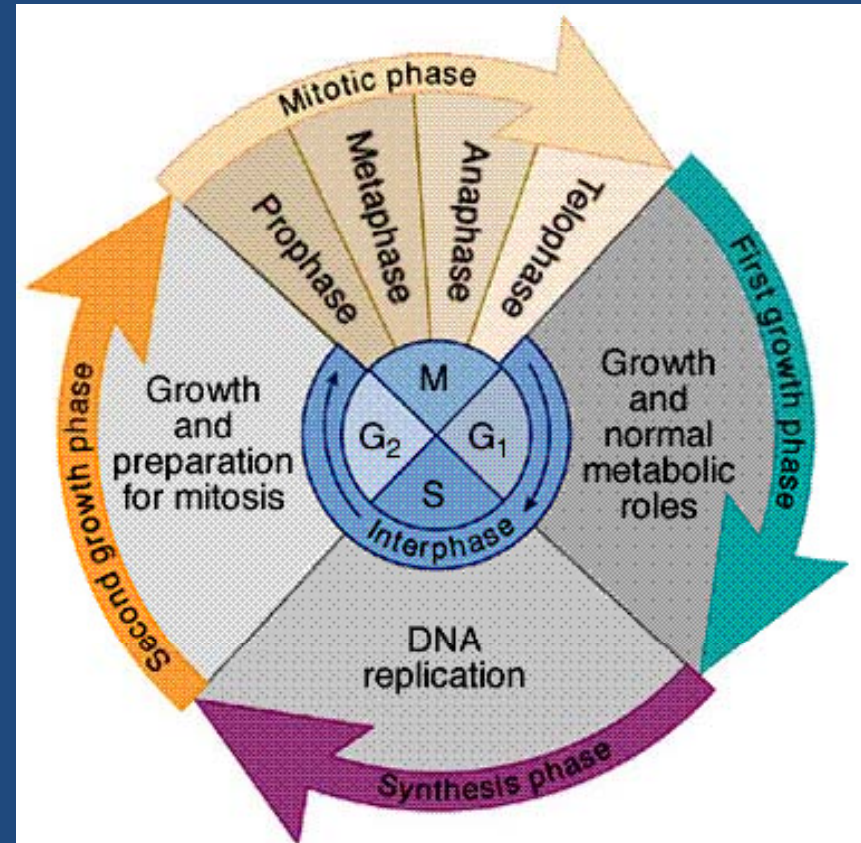


- S PHASE

- Genetic material makes copies of itself
- Gives cell enough genetic material to fully supply 2 cells after division
- Once the cell has replicated (synthesized) genetic material, G2 PHASE begins

INTERPHASE

- G2 PHASE
 - Cellular organelles are produced to supply the new cells
 - After Interphase is complete... MITOSIS begins



MITOSIS

Considered “nuclear division” because the main focus is on the genetic material of the cell

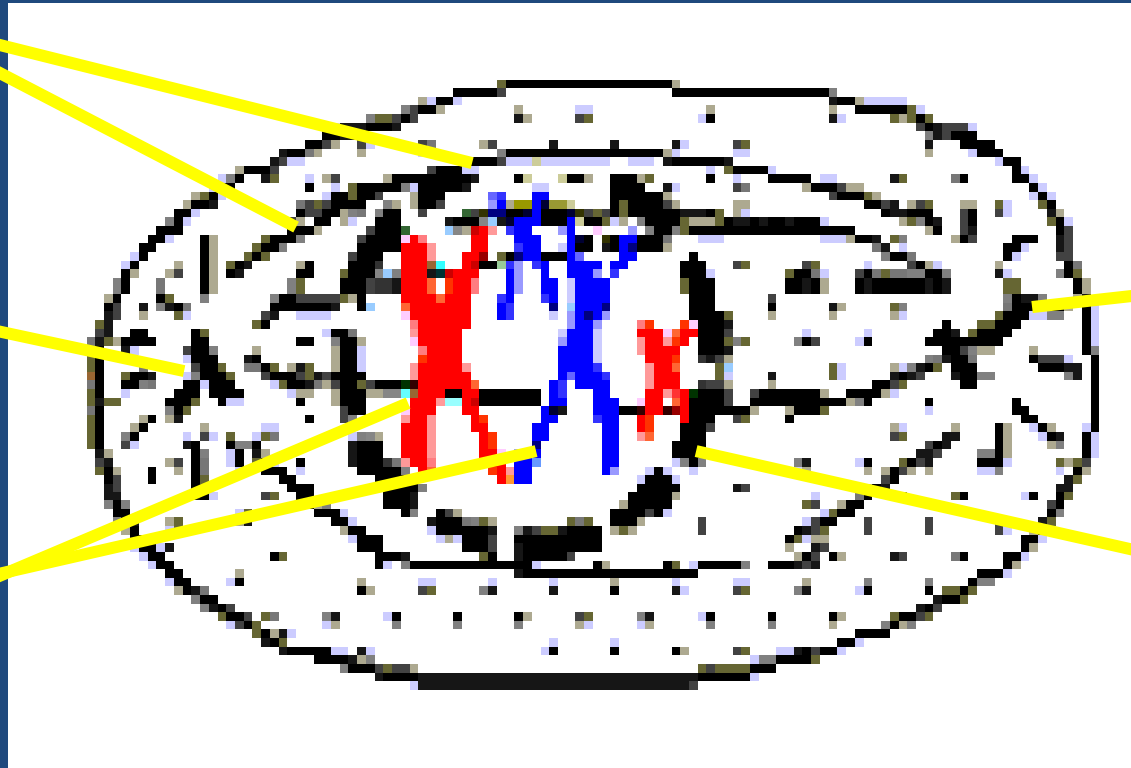
PROPHASE

- Nucleus begins to disappear
- Chromatin pulls together and forms pairs of rope-like structures called chromatid pairs
(aka sister chromatids)
- Chromatid pairs are held together by a centromere
- Spindle fibers begin to appear
- Spindle fibers and centrioles migrate to the poles (opposite ends of the cell)

**SPINDLE
FIBERS
(MADE OF
PROTEIN)**

CENTRIOLES

**CHROMATID
PAIRS WITH
CENTROMERE**

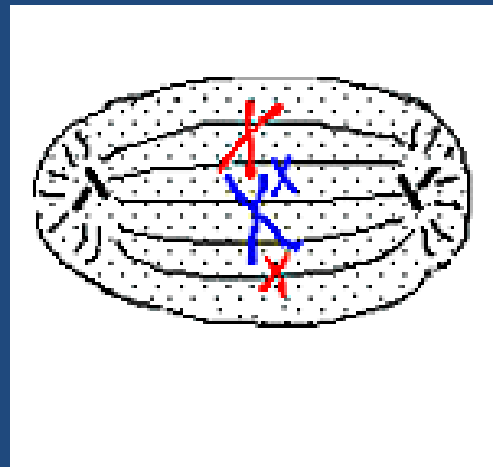


CENTRIOLES

**NUCLEAR
ENVELOPE**

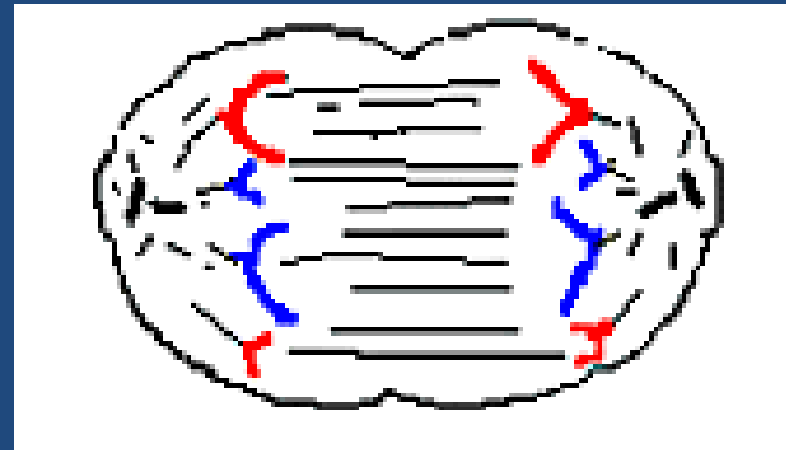
METAPHASE

- Begins when the chromatid pairs line up along the center (equatorial plate in plant cells) of the cell
- Lining up along the equator makes it possible for the chromatids to position themselves so they can migrate to the opposite poles of the cell



ANAPHASE

- Phase where the chromatids actually migrate to the opposite poles of the cell
- Chromatid pairs split (“karyokinesis”), spindle fibers contract pulling each chromosome toward the pole
- Nucleus reappears
- Spindle fibers begin to disappear

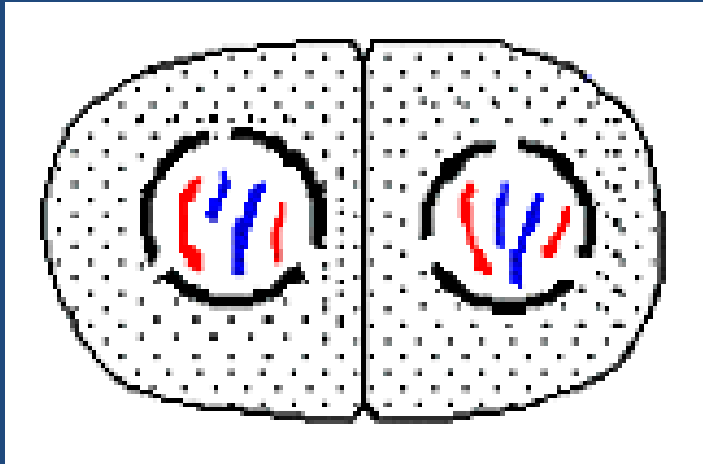


Remember:

“karyo” = nucleus/center

“kinesis” = to move

TELOPHASE



Remember:

“cyto” = cell

“kinesis” = to move

- Begins when the nucleus has reappeared and the spindle fibers are gone
- Continues until the cell splits in 2
- Cytokinesis = splitting of cells
- Results in 2 daughter cells in mitosis
- Identical in # & type of chromosomes
- Smaller than the original cell
- Develop; starting interphase again...

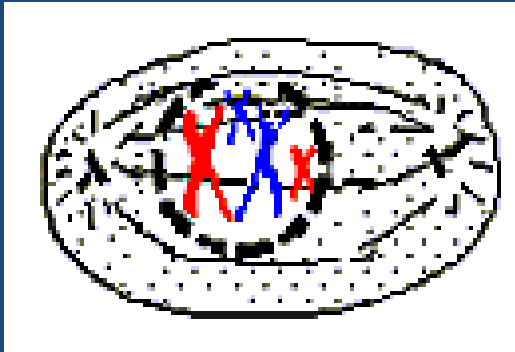
QUIZ TIME ! ! !

- Put your name, hour & date at the top.
- Number your paper 1 - 4

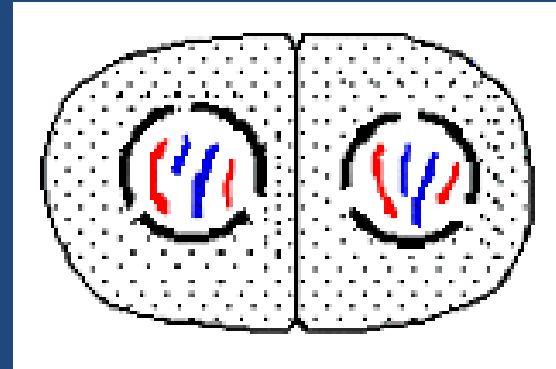


Identify each stage of the cell cycle.

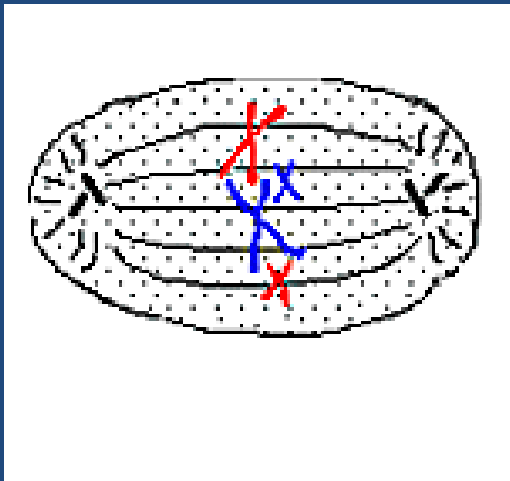
1.



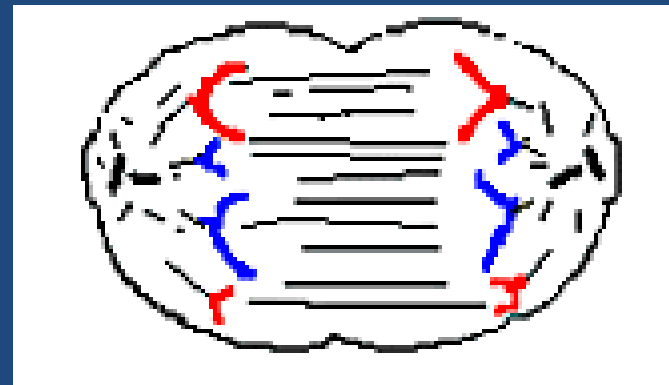
2.



3.



4.



Identify each stage of the cell cycle.

ANAPHASE

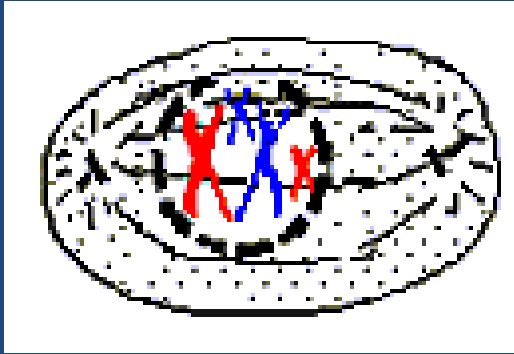
INTERPHASE

METAPHASE

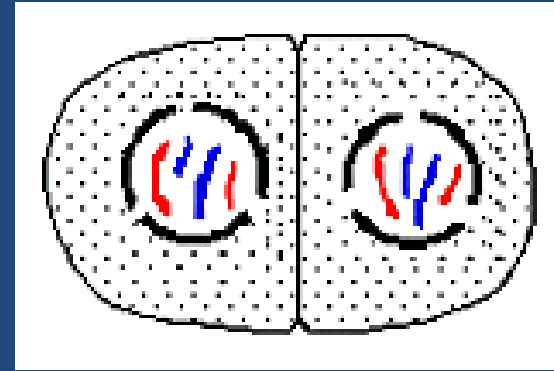
PROPHASE

TELOPHASE

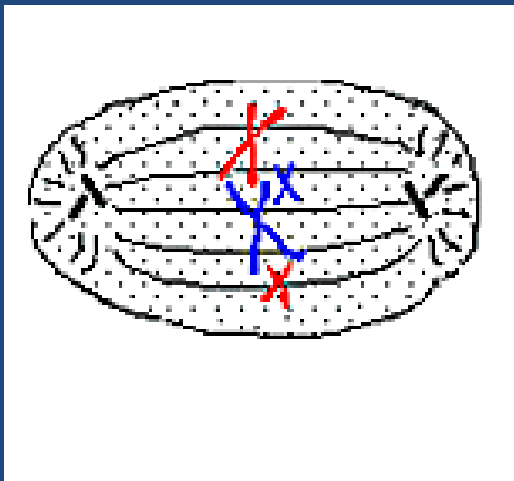
1.



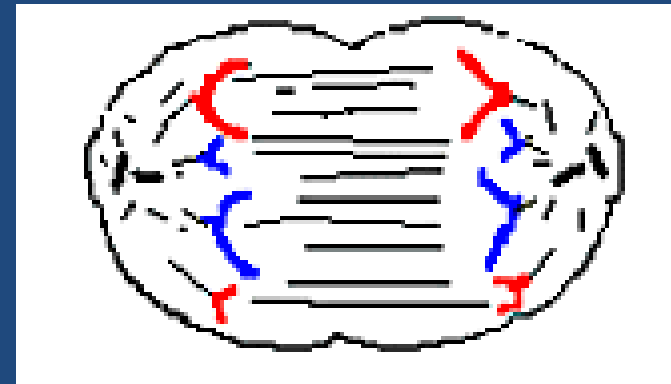
2.



3.



4.



Normal Control of the Cell Cycle

- A) Enzymes
 - 1. enzymes are proteins
 - 2. production is controlled by genes on chromosomes
 - 3. control each step in the cell cycle

Normal Control of the Cell Cycle

- B) Contact Inhibition
 - 1. cell-to-cell communication
 - 2. cells give each other chemical signals
 - 3. when cells touch each other, they stop dividing

Cancer – A mistake in the cell cycle

- A) Cancer = uncontrolled division of cells
- B) At cell level – caused by wrong signal given by genes controlling enzymes

Cancer – A mistake in the cell cycle

- C) Results in tumors –
 - 1. masses of tissue
 - 2. deprive normal cells of nutrients
 - 3. disrupt the functions of organs
- D) Second leading cause of death in the U.S.
(only heart disease is higher)

Cancer – A mistake in the cell cycle

- E) Causes
 - 1. Genetic factors
 - 2. Environmental factors
 - a) Different countries have different cancer rates
 - b) When people move, cancer rates follow the patterns of the country in which they live
 - c) Environmental factors include:
 - Cigarette/cigar smoking
 - Air/water pollution
 - Exposure to UV radiation from the sun
 - Infection with certain viruses

Risk Factors Associated With Cancer

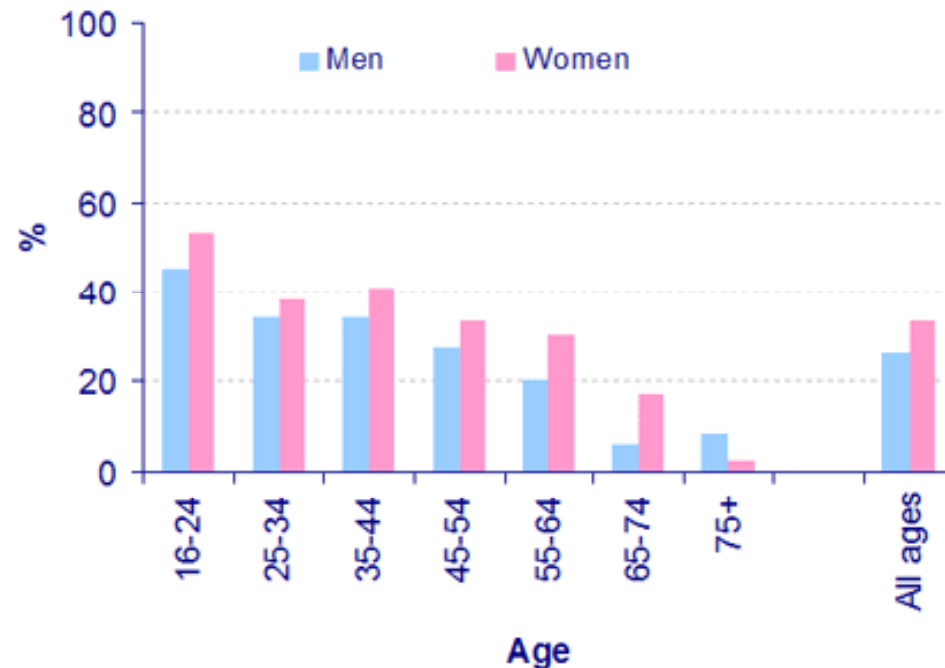
- Tobacco use
- UV Radiation
- Diet – high in meat / fat
- Alcohol – heavy use
- Ionizing radiation – (x-rays + other radiation)
- Chemicals and other substances
(ex. pesticides + asbestos)
- Close relatives with certain cancer types - melanoma, breast, ovarian, prostate, colon, testicular

Warning Signs of Cancer

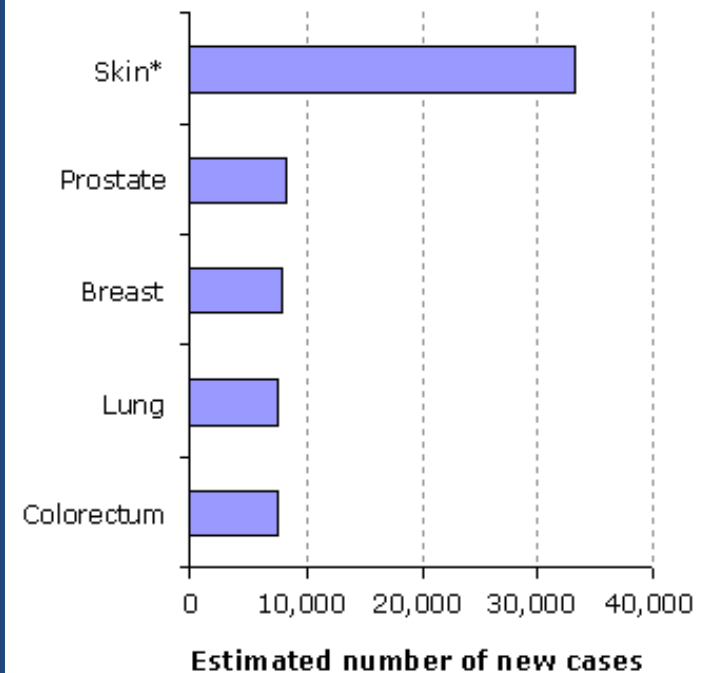
- Thickening or lump in the breast or any other body part
- Obvious change in a wart or mole
- A wound or sore that does not heal
- Nagging cough or hoarseness
- Changes in bowel or bladder habits
- Indigestion or difficulty swallowing
- Unexplained changes in weight
- Unusual bleeding or discharge

Create 6 multiple choice questions with your table partner regarding the graphs below...

Figure 4.2: Percentage of men and women who used a sunbed or tanning machine in the past 6 months, Great Britain, 1999



Most common cancers in Ontario, 2005



Source: Canadian Cancer Statistics 2005

* including melanoma

WED 11/9 → REMAINDER OF CLASS (after quiz):

- READ THE ARTICLE ON CANCER DEATH RATES
 - Follow the directions on the agree/disagree anticipation chart BEFORE and AFTER you read the article
 - Complete the article review sheet attached to the back of the packet
 - Anticipation chart and article review sheet are both due MONDAY at the beginning of the hour!