Full Name:	Civics group: 21S	Index no.:	Date:

Core Idea 2: Genetics and Inheritance

Cancer

Marked Assignment – Peer marking

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Describe the development of cancer as a **multi-step process.**

1 Loss of function mutation of tumour suppressor gene ;
2 **mutated** tumour suppressor alleles behave like recessive alleles / mutations must **affect** both/two alleles in a cell's genome to produce abnormal /non-functional (defective) tumour suppressor protein
3 **whose protein products** are unable to arrest arrest of cell division or repair DNA in response to DNA damage or trigger apoptosis ;

4 Gain-of-function mutation of proto-oncogene ;
5 oncogenes behave as dominant alleles / only need one mutated allele to produce abnormal protein ;
6 lead to over-stimulation of the cell cycle / cell keeps dividing ;

7 This allows for subsequent accumulation of many other mutations ;

8 Cells will be able to progress through the cell cycle checkpoints unchecked;

9 Some mutations may cause activation of telomerase gene ;
Telomerase enzyme prevents the shortening of the chromosome ends / cell can continue to divide indefinitely ;

10 Some mutations cause a loss of ability to differentiate ;

11 Some mutations cause cells to no longer exhibit anchorage dependence / loss of cell adhesion ;

12 Some mutations cause a loss of contact inhibition / density-dependence (and cells do not stop dividing) ;
These accumulation of mutations may results in the formation of benign tumours ;

13 Mutations can also lead to angiogenesis / formation of new network of blood vessels to the cancer cells ;
Blood vessels provide the cancer cells oxygen and nutrients for growth and to remove any waste products ;

14 Angiogenesis and some mutations allow metastasis to occur / cancer cells are able to break loose and travel in the bloodstream and invade other tissues to form secondary tumors
At this point, the tumour is considered malignant.