3. Which of the following statements about prokaryotic versus eukaryotic chromosomes and cell division is FALSE?

(a) In both prokaryotes and plants, a new cell wall is laid down between daughter cells

(b) Separation of chromosomes is performed by the cytoskeleton in both prokaryotes and eukaryotes

(c) DNA replication occurs prior to cell division

(d) The length of the cell cycle in eukaryotes is much longer than in prokaryotes due to the much larger amount of DNA found in eukaryotes

(e) Both eukaryotic and prokaryotic chromosomes are associated with proteins that aid in their compaction

7. Which of the following is NOT a risk factor for cancer?

(a) Tobacco smoke T

(b) Heredity T (eg tumor suppressor heterozygotes - p53, RB, BRCA1

(c) UV light T

(d) Hormones T

(e) High fibre foods F

2. What would be the most likely consequence(s) on protein function of a nonsense mutation very early in a gene sequence? (i.e. close to the start of the coding sequence of the gene)

(a) No effect on protein function
(b) The protein will be truncated
(c) The protein will be non-functional
(d) 'a' and 'b'
(e) 'b' and 'c'

→ Nonsense mutation
amino acid coding codon to stop codon
→ leads to truncated protein (b)
→ if truncate protein close to start of amino acid sequence would expect protein to be nonfunctional (c)

9. Which of the following statements about cancer is TRUE?

(a) Proto-oncogenes are genes that naturally cause cancer in their unmutated form F

(b) Tumor suppressor genes are genes that, when hyperactive, prevent cancer F

(c) The normal (functional) version of the p53 gene prevents cancer by both preventing replication in the presence of DNA damage and promoting apoptosis if DNA damage cannot be repaired T

(d) Viruses can promote cancer by encoding their own tumor suppressor genes F

(e) Mutations in DNA repair genes are not implicated in cancer

(a) hyperactive mutations of proto-oncogenes make them into cancer-causing oncogenes

(b) tumor suppressor genes normally prevent cancer (in their non-mutated form)

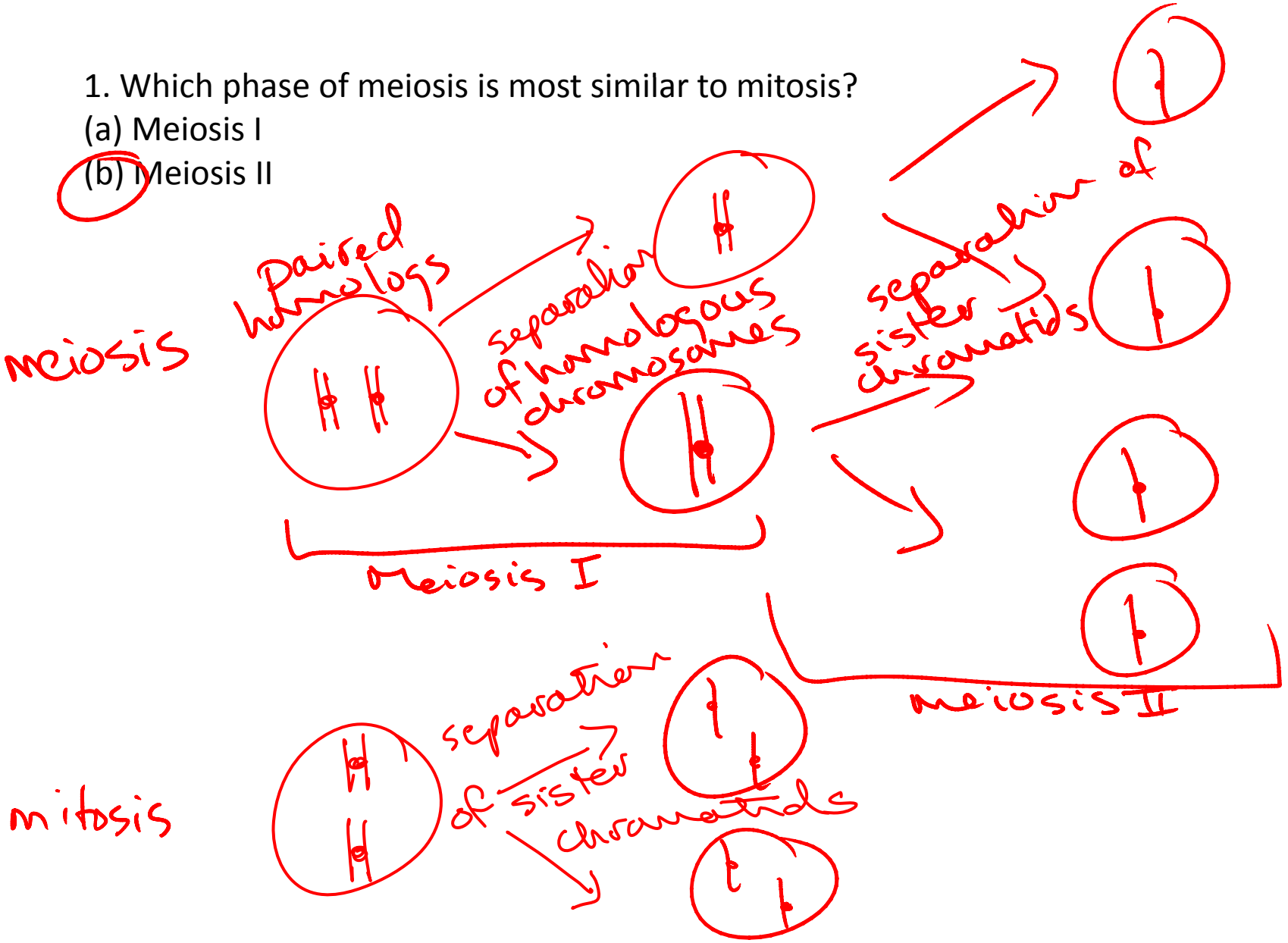
(d) viruses encode proteins to inhibit tumor suppressors

(e) Yes, DNA repair genes are involved in cancer eg xeroderma pigmentosum genes

1. Which phase of meiosis is most similar to mitosis?

(a) Meiosis I

(b) Meiosis II



7. In guinea pigs, rough coat (R) is dominant to smooth coat (r). A rough-coated guinea pig is bred to a smooth one, giving 8 rough and 7 smooth progeny in the F1 generation. What are the genotypes of the parents of this cross?

(a) rough (RR) x smooth (rr)
(b) rough (Rr) x smooth (rr)
(c) rough (RR) x smooth (Rr)
(d) rough (rr) x smooth (Rr)
(e) rough (rr) x smooth (RR)

R rough > r smooth

rough R_ x smooth rr

↓

F1 8 rough R_
7 smooth rr

→ smooth parent has to be rr because smooth recessive

→ rough parent has to be Rr to see smooth progeny in F1

5. Which of the following statements about multifactorial inheritance is FALSE?

(a) Height in humans is an example of multifactorial inheritance T

(b) Multifactorial inheritance is the norm for inheritance of most phenotypes and conditions T

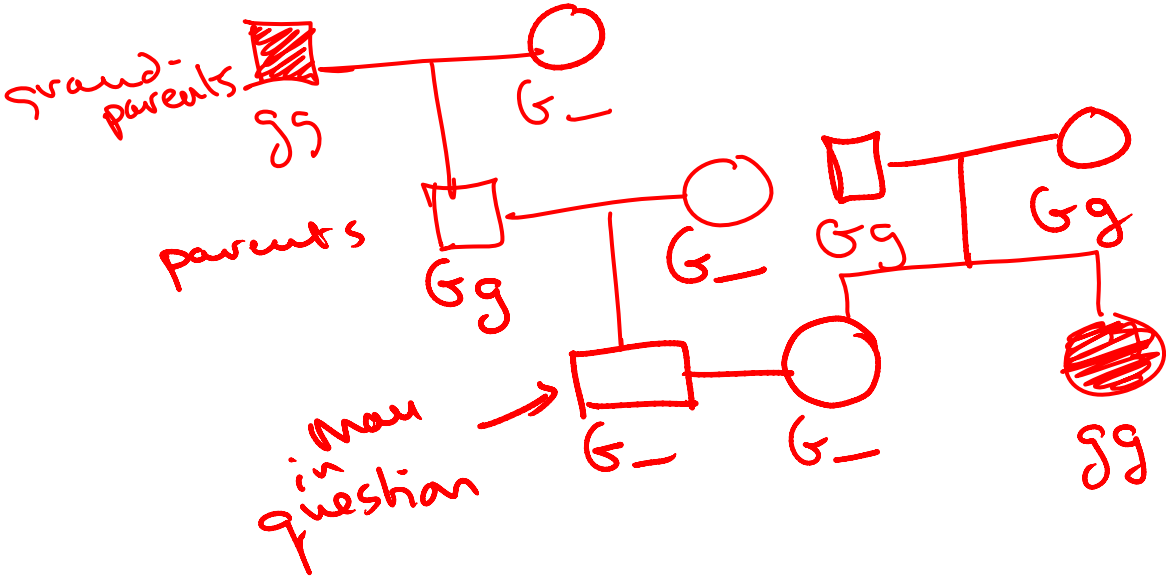
(c) In multifactorial inheritance, both genetics and environment play a role in the phenotype T

(d) The dual influence of genes and environment evens things out such that all individuals will look the same F

(e) In multifactorial inheritance – multiple genes are involved, i.e. multifactorial traits are also polygenic T

7. Galactosemia is a rare autosomal recessive disease caused by the inability to process the sugar galactose, leading to muscle, nerve and kidney malfunction. A man's paternal grandfather has galactosemia. This man in turn, has married a woman whose sister had galactosemia. Draw the pedigree.

recessive G=normal
g= disease



→ have also added genotypes though not requested in question

10. Which of the following well known conditions is sex-linked?

(a) Cystic fibrosis – autosomal, recessive

(b) Red-green colourblindness – X-linked (sex-linked), recessive

(c) Huntington disease – autosomal, dominant

(d) Albinism – autosomal, recessive

(e) Achondroplasia-type dwarfism – autosomal, dominant

→ another sex (X-linked) from class

(1) Haemophilia

(2) Duchennes muscular distrophy (DMD)