

Answers to examination-style questions

Answers	Marks	Examiner's tips
<p>1 (a) two strands therefore semi-conservative replication possible; base pairing/hydrogen bonds holds strands together; hydrogen bonds weak/easily broken, allow strands to separate; base sequence act as template; A with T, C with G/complementary copy; new DNA – one parent and one new strand;</p> <p>(b) chromosomes shorten/thicken/supercoiling; chromosomes consist of two identical chromatids due to replication; chromosomes move to equator/middle of the spindle/cell; attach to individual spindle fibres; spindle fibres contract/centromeres divide/repel; sister chromatids separate and move to opposite poles/ends of the spindle; each pole receives identical copies of each chromosome; nuclear envelope forms around each group of chromosomes/chromatids;</p> <p>(c) cancer cells killed, normal body cells survive; cancer cells linked to low oxygen as blood supply cannot satisfy demand;</p>	<p>4 max</p> <p>7 max</p> <p>2</p>	<p>To gain full marks you must relate the structure to how it aids replication. Simply describing DNA replication is not sufficient.</p> <p>There is some debate over the use of the terms 'chromatids' and 'chromosomes'. A chromosome consists of two chromatids but after the chromatids separate they may be referred to as chromosomes.</p> <p>Some cancerous cells produce chemicals which stimulate the development of blood vessels to supply the cells with nutrients and oxygen.</p>
<p>2 (a) (i) anaphase;</p> <p>(ii) sister/identical chromatids separate; move to opposite poles/ends of the cell;</p> <p>(b) (i) interphase;</p> <p>(ii) ATP production/protein synthesis/replication of centrioles;</p> <p>(c) short duration of interphase;</p>	<p>1</p> <p>2</p> <p>1</p> <p>1</p> <p>1</p>	<p>It is essential to refer to <i>chromatids</i> for the first point and to provide some indication that they are identical.</p> <p>Although other organelles may be replicated it is advisable to refer to the replication of centrioles (in animal cells) or to ATP/protein synthesis.</p> <p>A common error is to refer to the short time required to complete anaphase!</p>
<p>3 (a) each strand copied/acts as a template; each new DNA molecule has one new strand and one original/parent strand;</p>	<p>2</p>	

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(b) (i) ^{15}N /tube B (DNA), more/greater density;	1	References to heavier DNA would not be credited.
(ii) DNA with one heavy and one light strand; new/synthesised strand, made with ^{14}N /light strand;	2	
(c) 32; 28, 32, 26;	2	This requires understanding of complementary base pairing during DNA replication, i.e. A–T and C–G. Be careful and look at the headings in the table. As percentage of bases is referred to, each strand must add up to 100 per cent.