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Cambridge International AS & A Level

BIOLOGY (9700) P1

TOPIC WISE QUESTIONS + ANSWERS | COMPLETE SYLLABUS

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Chapter 5

The mitotic cell cycle

5.1 Replication and division of nuclei and cells

692. 9700_m20_qp_12 Q: 19

Which cells contain telomeres that are longer than those in a helper T-lymphocyte secreting cytokines?

1 bone marrow stem cells

2 mature red blood cells

3 activated memory B-lymphocytes

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

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693. 9700_m20_qp_12 Q: 20

In which stage of the cell cycle are telomeres needed to prevent the loss of genes?

A prophase

B cytokinesis

C G_1 phase

D S phase

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694. 9700_m20_qp_12 Q: 21

Which row shows **part** of the correct sequence of mitosis?

A	chromosomes condense	→	chromosomes line up at the equator	→	nuclear envelope disappears	→	spindle fibres shorten
B	chromosomes line up at the equator	→	spindle fibres shorten	→	chromosomes condense	→	nuclear envelope reappears
C	chromosomes line up at the equator	→	spindle fibres shorten	→	nuclear envelope reappears	→	chromosomes uncoil
D	chromosomes uncoil	→	nuclear envelope disappears	→	spindle fibres shorten	→	chromosomes line up at the equator

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695. 9700_s20_qp_11 Q: 17

Which feature of stem cells enables them to replace cells in tissues such as the skin?

A They are undifferentiated cells that are present at birth.

B They differentiate to form skin cells.

C They divide by mitosis to supply some cells that can differentiate.

D They have the full number of chromosomes.

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696. 9700_s20_qp_11 Q: 18

During prophase, a scientist stains the chromosomes of a diploid animal cell with a fluorescent dye to stain telomeres. This cell has 32 chromosomes.

How many telomeres will the scientist observe?

A 32 **B** 64 **C** 96 **D** 128

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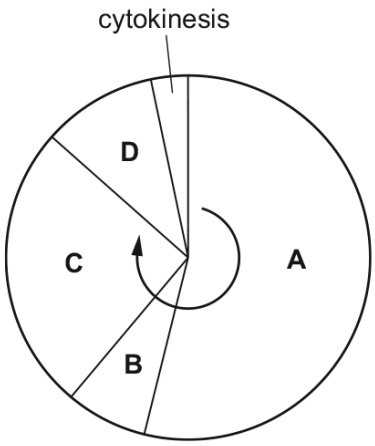
697. 9700_s20_qp_11 Q: 19

The diagram shows the cell cycle.

During which phase do chromosomes condense and become visible?



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698. 9700_s20_qp_12 Q: 19

Which description of chromosome structure is correct?

A A chromosome at the beginning of interphase consists of two identical chromatids, each containing one linear molecule of DNA.

B Telomeres are lengths of non-coding DNA found at one end of each chromatid to prevent loss of genes during cell division.

C The two identical chromatids of a chromosome are held together by a centromere in which there is no DNA.

D The very long DNA molecule of each chromatid is coiled and held together by proteins called histones.

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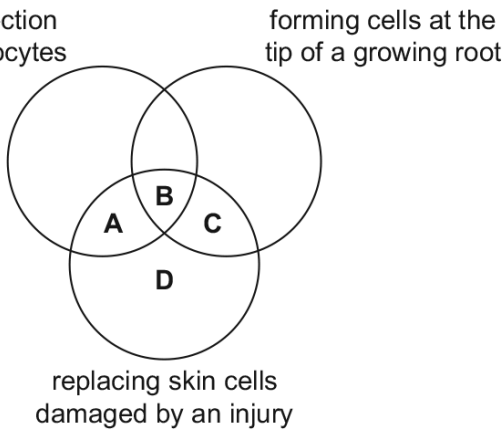
699. 9700_s20_qp_12 Q: 20

Which processes involve mitosis?



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700. 9700_s20_qp_12 Q: 21

A drug has been developed to treat certain types of cancer. It prevents mitosis by binding to the spindle and preventing sister chromatids being separated and moving to opposite poles of the cell.

The photomicrograph shows cells in different phases of mitosis.

What represents the stages of mitosis that will be able to occur in a cell which is entering prophase when treated with this drug?

A 1 and 2 **B** 2 and 3 **C** 2 only **D** 3 and 4

---

701. 9700_s20_qp_13 Q: 17

Which row correctly describes parts of chromosome structure present during mitosis?

	centromere	chromatid	telomere
A	region of a chromosome with no DNA	single DNA polynucleotide with histone proteins	region of DNA with many cytosine and guanine bases
B	region of non-coding DNA holding two chromatids together	double-stranded DNA molecule with histone proteins	region of DNA with many short repeated sequences of bases
C	region of DNA with no histone proteins that allows separation of chromatids during anaphase	DNA molecule coiled round histone proteins to form a chain of nucleosomes	region of DNA with no proteins that protects the end of a chromatid
D	region that attaches to spindle microtubules and divides during prophase	one of two identical DNA molecules that was replicated during interphase	region of non-coding DNA holding the ends of the chromatids together

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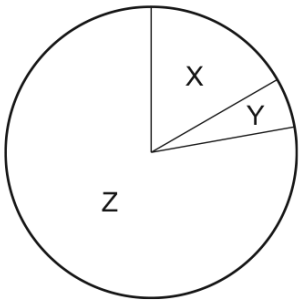
702. 9700_s20_qp_13 Q: 18

The diagram shows the relative time taken for each stage in the cell cycle.



Which row identifies the correct sequence of the stages in the cell cycle?

	cytokinesis	interphase	mitosis
A	X	Y	Z
B	X	Z	Y
C	Y	Z	X
D	Z	X	Y

---

703. 9700_s20_qp_13 Q: 19

Scientists have made a nucleic acid, HNA, that has a sugar with the same number of carbon atoms as glucose instead of deoxyribose. Although genetic information can be stored by HNA, naturally occurring DNA polymerase cannot replicate HNA.

Which statements could explain why naturally occurring DNA polymerase cannot replicate HNA?

1 DNA polymerase cannot form bonds between the sugars of two HNA nucleotides.

2 DNA polymerase cannot form hydrogen bonds between two HNA nucleotides.

3 HNA nucleotides do not fit into the active site of DNA polymerase.

4 The shape of an HNA nucleotide is slightly larger than that of a DNA nucleotide.

A 1, 2, 3 and 4 **B** 1 and 4 only **C** 2 and 3 only **D** 3 and 4 only

---

704. 9700_w20_qp_11 Q: 18

During telophase of mitosis, a scientist stains the chromosomes of a diploid animal cell with a fluorescent dye to observe the telomeres.

This cell has 22 chromosomes.

How many telomeres will the scientist observe in one of the nuclei?

A 22 **B** 44 **C** 66 **D** 88

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705. 9700_w20_qp_11 Q: 19

Methotrexate is a drug used to treat cancer. It can act as an enzyme inhibitor preventing the synthesis of nucleotides containing thymine.

Cells treated with methotrexate are not able to complete the cell cycle.

A cell entering telophase is treated with methotrexate.

Which stage of the cell cycle will be affected by the action of methotrexate?

A anaphase

B interphase

C metaphase

D prophase

---

706. 9700_w20_qp_11 Q: 20

Which stage of mitosis is correctly described?

A In anaphase chromosomes line up across the equator.

B In metaphase the centrosomes replicate.

C In prophase chromatids move to opposite poles.

D In telophase chromosomes uncoil to form chromatin.

---

707. 9700_w20_qp_12 Q: 17

During the cell cycle, the mass of DNA in a cell is doubled.

At which stage in the cell cycle is the mass of DNA in a cell reduced?

A anaphase

B cytokinesis

C interphase

D prophase

---

708. 9700_w20_qp_12 Q: 18

How many of the listed structures typically contain genetic material that has telomeres?

- bacterial cell
- chloroplast
- mitochondrion
- nucleus

A 1 **B** 2 **C** 3 **D** 4

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709. 9700_w20_qp_12 Q: 19

In eukaryotes, the chromosomes become shorter and thicker during mitosis. The thickening may be increased by molecules called protamines. The protamines replace part of the structure of the chromosome.

Which part of the chromosome is replaced by protamines?

A centromeres

B chromatids

C histones

D telomeres

---

710. 9700_w20_qp_13 Q: 19

Three parts of a chromosome and their functions are listed.

part		function	
p1	centromere	f1	holds the coils of DNA together
p2	histone proteins	f2	holds two chromatids together
p3	telomere	f3	prevents loss of genes

Which part is matched with its correct function?

A p1 and f2 **B** p2 and f2 **C** p2 and f3 **D** p3 and f1

---

711. 9700_w20_qp_13 Q: 21

Some events in the cell cycle are listed.

Which events are part of mitosis?

1 interphase

2 metaphase

3 cytokinesis

A 1, 2 and 3 **B** 1 and 3 only **C** 1 only **D** 2 only

---

712. 9700_m19_qp_12 Q: 19

During mitosis in animal cells, which process occurs after prophase?

A Centrioles move towards the poles of the cell.

B Centromeres attach to spindle microtubules.

C Chromatids join to form chromosomes.

D Chromosomes condense and become visible.

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713. 9700_m19_qp_12 Q: 20

Embryonic stem cells are able to replicate continuously.

What happens to the telomeres during repeated mitotic cell cycles of embryonic stem cells?

A Their lengths increase.

B Their lengths decrease.

C They are completely lost.

D They stay the same length.

---

714. 9700_s19_qp_11 Q: 18

A scientist stains the chromosomes of a diploid plant cell with a fluorescent dye to observe the telomeres.

This cell has 38 chromosomes.

How many telomeres will the scientist observe in one of the nuclei during telophase of mitosis?

A 38 **B** 76 **C** 114 **D** 152

---

715. 9700_s19_qp_11 Q: 20

Which events listed are part of mitosis?

1 interphase

2 prophase

3 cytokinesis

A 1, 2 and 3

B 1 and 2 only

C 1 only

D 2 only

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716. 9700_s19_qp_12 Q: 15

Three parts of a chromosome and their functions are listed.

part	function
P1 centromere	F1 holds the coils of DNA together
P2 histone proteins	F2 holds two chromatids together
P3 telomere	F3 prevents loss of genes

Which part is matched with its correct function?

A P1 and F1 **B** P2 and F1 **C** P2 and F3 **D** P3 and F2

---

717. 9700_s19_qp_12 Q: 16

The enzyme telomerase prevents loss of telomeres after many mitotic cell cycles.

Which cells need to transcribe telomerase enzyme?

1 cancer cells

2 stem cells

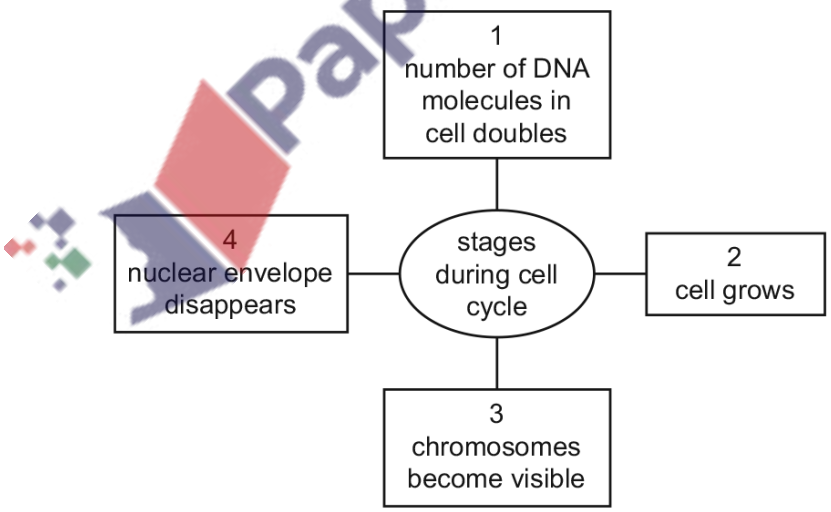
3 activated memory B-lymphocytes

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

718. 9700_s19_qp_12 Q: 17

The diagram shows some of the stages which take place during the cell cycle.



Which two stages take place during interphase?

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

---

719. 9700_s19_qp_13 Q: 21

Some parts of a typical human chromosome are more numerous than others.

Which of the parts are listed in order from the most numerous to the least numerous?

A centromere, nucleotide, histone

B DNA molecule, telomere, centromere

C histone, telomere, DNA molecule

D telomere, centromere, nucleotide

---

720. 9700_s19_qp_13 Q: 22

The enzyme telomerase prevents loss of telomeres after many mitotic cell cycles.

Which cells need to transcribe telomerase enzyme?

1 stem cells

2 activated memory B-lymphocytes

3 helper T-lymphocytes secreting cytokines

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

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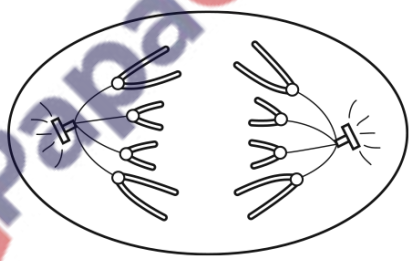
721. 9700_s19_qp_13 Q: 23

The diagram shows a cell during mitosis.



Which description correctly identifies the cell?

A a plant cell during anaphase

B a plant cell during metaphase

C an animal cell during anaphase

D an animal cell during metaphase

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722. 9700_w19_qp_11 Q: 19

The enzyme telomerase prevents loss of telomeres after many mitotic cell cycles.

Which cells transcribe a high concentration of telomerase?

1 neutrophils

2 mature red blood cells

3 activated memory T-lymphocytes

A 1 and 2 **B** 1 and 3 only **C** 1 only **D** 3 only

---

723. 9700_w19_qp_11 Q: 20

At which stage of mitosis do these events occur?

	centromeres separate	chromosomes become shorter and thicker
A	anaphase	interphase
B	anaphase	prophase
C	metaphase	interphase
D	metaphase	prophase

---

724. 9700_w19_qp_12 Q: 20

Which row shows the correct number of each component of a single chromosome during prophase of mitosis?

	centromeres	chromatids	polynucleotide strands	telomeres
A	1	0	2	2
B	1	2	4	4
C	2	0	4	2
D	2	2	2	4

---

725. 9700_w19_qp_12 Q: 21

The cell cycle includes mitosis.

Which are features of nuclear division?

1 forms cells of equal size to the parent cell

2 forms genetically identical nuclei

3 semi-conservative replication of DNA

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 only

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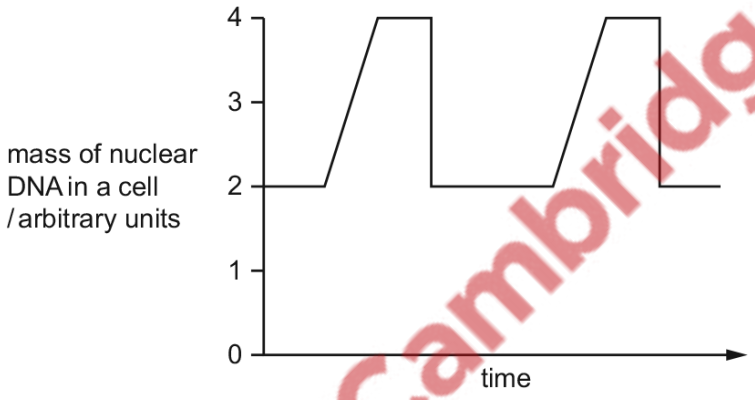
726. 9700_w19_qp_13 Q: 17

Which processes that occur in cell division are represented in the diagram?



A DNA replication and nuclear division only

B DNA replication, nuclear division and cytokinesis

C mitosis and cytokinesis

D mitosis only

---

727. 9700_w19_qp_13 Q: 18

What happens to the telomeres during mitosis of a cancer cell?

A The length increases.

B The length decreases.

C They are completely lost.

D They stay the same length.

---

728. 9700_m18_qp_12 Q: 20

How many copies of each different DNA molecule will be found in a cell at the start of each of these stages of the mitotic cell cycle?

	G_2 of interphase	prophase	cytokinesis
A	1	1	2
B	1	2	1
C	2	1	2
D	2	2	2

---

729. 9700_m18_qp_12 Q: 21

Three parts of a chromosome and their functions are listed.

part

P1 centromere

P2 histone proteins

P3 telomere

function

F1 packages DNA into compact structures

F2 holds two chromatids together

F3 prevents loss of genes

Which combination is correct?

A P1 and F1 **B** P1 and F3 **C** P2 and F2 **D** P3 and F3

---

730. 9700_s18_qp_11 Q: 19

Which of these events are part of mitosis?

1 interphase

2 telophase

3 cytokinesis

A 1, 2 and 3 **B** 1 and 3 only **C** 1 only **D** 2 only

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731. 9700_s18_qp_11 Q: 20

During which phase of the cell cycle does DNA replication take place?

A G_1 **B** G_2 **C** M **D** S

---

732. 9700_s18_qp_11 Q: 21

Which row is correct for guanine?

	has a double ring structure	is a purine	joins its complementary base with three hydrogen bonds
A	✓	✓	✓
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

key
✓ = correct
✗ = incorrect

---

733. 9700_s18_qp_12 Q: 18

One of the chromosomes in a nucleus has a telomere which contains many repeats of the base sequence TTAGGG.

This chromosome was extracted from four different cells and the total number of bases in the telomere was determined.

Which total number of bases was found in the cell that had undergone the most mitotic divisions?

A 5548 **B** 5580 **C** 5645 **D** 5700

---

734. 9700_s18_qp_12 Q: 19

The chromosome content of each daughter cell must be identical to that of the mother cell for successful cell replacement when repairing tissues.

Which stages of mitosis make sure that each daughter cell receives one chromatid from each chromatid pair?

A prophase and metaphase

B metaphase and anaphase

C anaphase and telophase

D telophase and interphase

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735. 9700_s18_qp_12 Q: 20

Which of these statements about cytokinesis is always true?

1 Cell structures replicate.

2 Cell structures are shared between two cells.

3 Nuclear envelope reforms.

A 1, 2 and 3 **B** 1 and 3 only **C** 2 only **D** 3 only

---

736. 9700_s18_qp_12 Q: 21

Which statement is correct about the number of telomeres present in prophase of a human body cell?

A 46 as there is one telomere at the end of 46 chromosomes

B 92 as there is one telomere at each end of 46 chromosomes

C 92 as there is one telomere at the end of 92 chromatids

D 184 as there is one telomere at each end of 92 chromatids

---

737. 9700_s18_qp_12 Q: 22

Which statement explains why DNA replication is described as semi-conservative?

A Half of each original strand is conserved in each new molecule of DNA.

B Half of the base sequence of each strand is conserved in each new molecule of DNA.

C Only one strand of DNA is used as a template during replication.

D The template for each new molecule of DNA is one strand of the original molecule.

---

738. 9700_s18_qp_13 Q: 19

Which features of an organism are affected by a drug that stops mitosis?

1 cell repair

2 cell replacement

3 number of stem cells

4 tissue repair

5 tumour formation

A 1, 2, 3, 4 and 5

B 1, 2 and 3 only

C 1, 4 and 5 only

D 2, 3, 4 and 5 only

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739. 9700_w18_qp_11 Q: 19

How many copies of each DNA molecule will be found in a cell at each stage of the mitotic cell cycle?

	G_1 of interphase	cytokinesis
A	1	1
B	1	2
C	2	1
D	2	2

---

740. 9700_w18_qp_11 Q: 20

Which metabolic processes will be very active in a cell that has just completed cytokinesis?

1 ATP formation

2 DNA replication

3 protein synthesis

A 1, 2 and 3 **B** 1 and 3 only **C** 2 only **D** 3 only

---

741. 9700_w18_qp_11 Q: 21

A mutation occurs in a gene which prevents the production of telomerase.

What is the effect of this mutation if it occurs in bone marrow stem cells?

A a rapid increase in the production of lymphocytes

B a tumour grows in the bone marrow

C bone marrow stem cells eventually no longer divide

D the total blood cell count will be unchanged

---

742. 9700_w18_qp_11 Q: 22

What are the products when a DNA molecule replicates?

A two molecules of DNA each made of a paired sequence of bases

B two molecules of DNA each made of a paired sequence of nucleotides

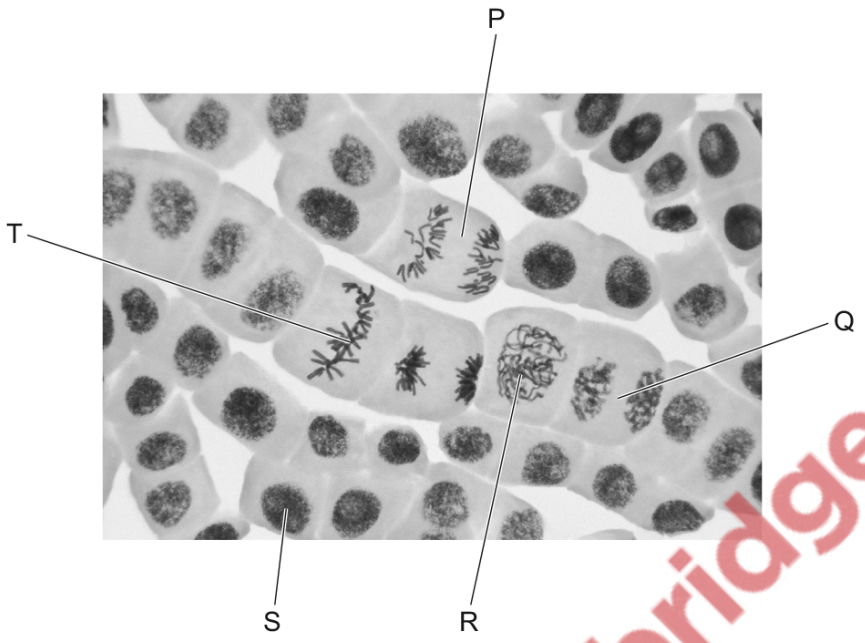
C two strands of DNA each made of a paired sequence of bases

D two strands of DNA each made of a paired sequence of nucleotides

---

743. 9700_w18_qp_12 Q: 20

The photomicrograph shows cells in different stages of mitosis.



Which statements are correct?

1 Cell T shows metaphase.

2 DNA replication occurs in cell R.

3 The amount of DNA in cell P is the same as in cell T.

4 The correct order for the stages is S → R → T → P → Q.

A 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

---

744. 9700_w18_qp_12 Q: 21

Which changes in a group of mammalian cells, dividing by mitosis, would be necessary for the formation of a tumour?

1 Mitosis is no longer inhibited by cell to cell contact.

2 Cells acquire the ability to migrate and set up new colonies.

3 Cells become able to divide indefinitely.

A 1 and 2 **B** 1 and 3 **C** 1 only **D** 2 and 3

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745. 9700_w18_qp_13 Q: 20

How many copies of each DNA molecule will be found in a cell at each stage of the mitotic cell cycle?

	G_2 of interphase	metaphase	cytokinesis
A	1	1	1
B	1	2	2
C	2	1	1
D	2	2	2

---

746. 9700_w18_qp_13 Q: 21

Centromere, chromatids and telomeres are parts of a chromosome in a eukaryotic cell.

Which row correctly describes these structures?

	centromere	chromatid	telomere
A	binds the two sister chromatids of a chromosome together	contains histone proteins and a molecule of double-stranded DNA	protects the tips of each chromatid from shortening at each mitotic division
B	site of attachment of spindle microtubules	contains histone proteins and a molecule of single-stranded DNA	prevents the genes nearest the ends of each chromatid from being lost
C	site of production of spindle microtubules	contains a molecule of double-stranded DNA with no associated histone proteins	contains DNA with many repeats of short base sequences
D	splits at metaphase of mitosis	contains a molecule of single-stranded DNA with no associated histone proteins	ensures that when DNA is replicated, the ends of the molecule are included

---

747. 9700_m17_qp_12 Q: 20

Some stem cells divide and give rise to phagocytes.

Where in the human body do these stem cells divide?

1 blood

2 bone marrow

3 lymph nodes

A 1, 2 and 3 **B** 1 and 3 only **C** 2 only **D** 3 only

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748. 9700_m17_qp_12 Q: 21

What is the correct sequence of stages in the mitotic cell cycle?

A G1 → G2 → mitosis → S → cytokinesis

B G1 → G2 → S → mitosis → cytokinesis

C G1 → S → G2 → mitosis → cytokinesis

D S → G1 → mitosis → G2 → cytokinesis

---

749. 9700_m17_qp_12 Q: 22

The enzyme telomerase repairs telomeres. It stops the telomeres from getting shorter each time a chromosome is replicated.

Telomerase is not normally active in human body cells, but in some diseases telomerase can be activated.

In which disease is the enzyme telomerase activated?

A cancer

B HIV/AIDS

C malaria

D myasthenia gravis

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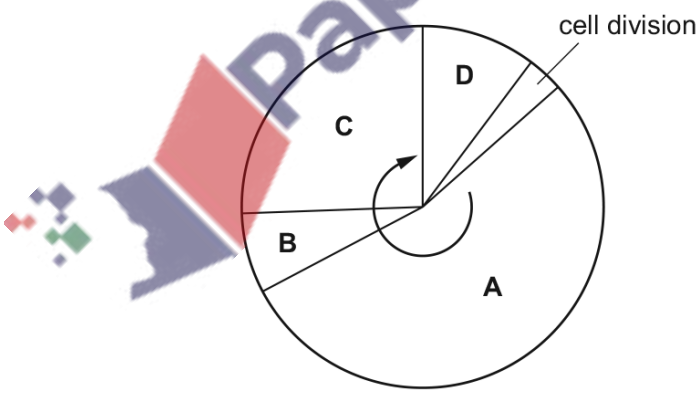
750. 9700_s17_qp_11 Q: 21

The diagram shows the mitotic cell cycle.

During which phase is DNA replicated?



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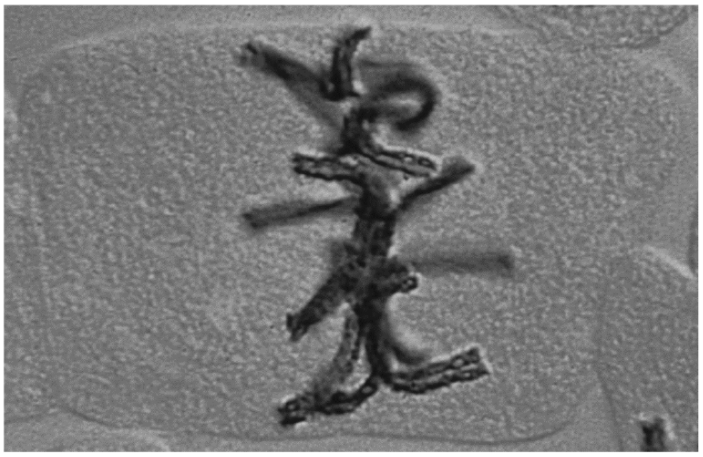
751. 9700_s17_qp_12 Q: 16

The photomicrograph shows a stage of mitosis.



What would be correct for the next stage in mitosis?

	paired chromatids	nuclear membrane
A	absent	absent
B	absent	re-forming
C	present	absent
D	present	breaking down

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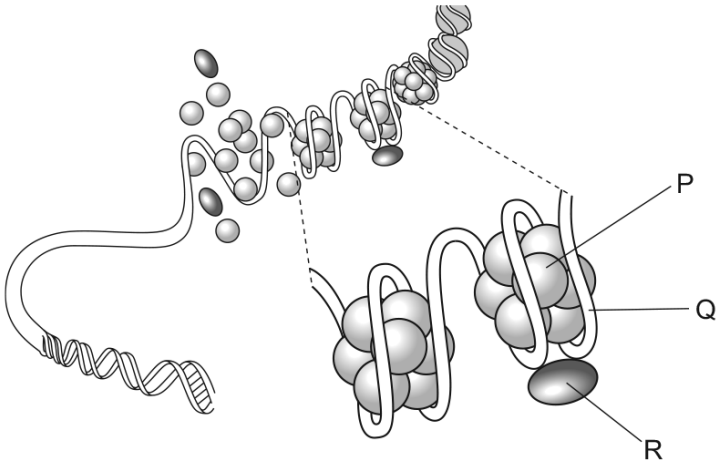
752. 9700_s17_qp_12 Q: 17

The diagram shows part of the organisation of a DNA molecule and the associated histones.



Which statement about the features labelled P, Q and R during prophase of mitosis is correct?

A The coiled DNA molecule forms Q and wraps around the histones of R to form small clusters held in place by histone P.

B The groups of histones, P, and its associated DNA, Q, move closer together as the chromosome condenses around R.

C The histones P and R are made of protein around which the DNA molecule, Q, is wrapped so that the DNA molecule can fit inside the nucleus.

D The linked groups of histones P and R and the associated DNA, Q, form strands that fold and twist together to form a chromatid.

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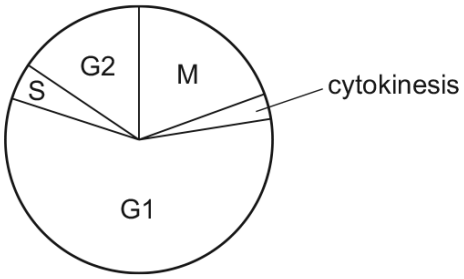
753. 9700_s17_qp_13 Q: 16

The diagram shows the cell cycle of a mammalian cell.



Checkpoints in the cell cycle of mammals prevent the cycle from continuing when mistakes are made or DNA is damaged.

Four of the checkpoints are described.

1 Mitosis is blocked if DNA replication is incomplete.

2 Anaphase is blocked if the assembly of chromatids on the spindle is unsuccessful.

3 DNA replication is blocked if DNA is damaged.

4 DNA replication stops if damage to DNA has not been repaired.

In which phases of the cell cycle do these checkpoints occur?

	checkpoint			
	1	2	3	4
A	M	G1	S	G2
B	G2	M	G1	S
C	G2	S	G1	M
D	S	G2	M	G1

---

754. 9700_w17_qp_11 Q: 17

Colchicine is a chemical that stops chromatids from separating during mitosis.

A cell is treated with colchicine.

Which stage of mitosis will this cell reach but not complete?

A anaphase

B metaphase

C prophase

D telophase

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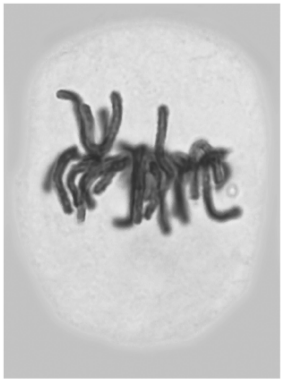
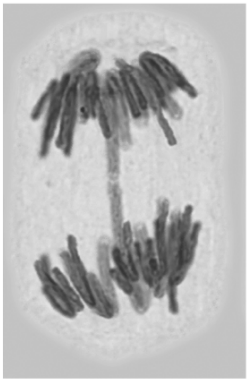
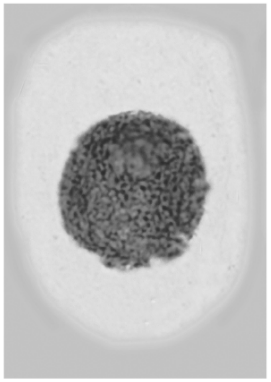
755. 9700_w17_qp_12 Q: 19

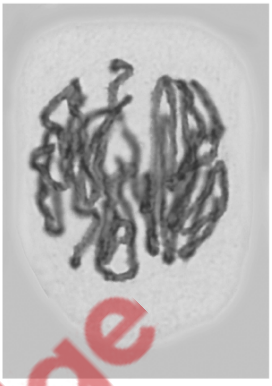
The photomicrographs show cells in various stages of the cell cycle.

In which stage does semi-conservative replication of DNA take place?

A 

B 

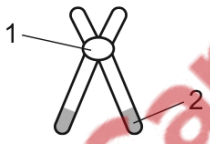
C 

D 

---

756. 9700_w17_qp_12 Q: 20

The diagram shows the structure of one chromosome.



Which row is correct?

	1	2	number of DNA strands
A	centromere	chromatid	2
B	centromere	telomere	4
C	chromatid	telomere	2
D	telomere	chromatid	4

---

757. 9700_w17_qp_12 Q: 21

Cancer cells may divide by far more divisions than other cells found in humans.

Which statement about cancer cells is correct?

A They are able to synthesise the enzyme telomerase.

B They have a mutation in the telomeres so DNA is not hydrolysed.

C They have DNA polymerase so can replicate their DNA without telomere loss.

D They increase the number of copies of repeated DNA sequences in the telomeres.

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758. 9700_w17_qp_13 Q: 20

What describes a telomere?

A a cell structure composed mainly of protein and involved in cell division

B a protein that associates with DNA to help condense it

C a region of DNA that links two sister chromatids together

D a region of repetitive nucleotide sequences at the end of a chromatid

---

759. 9700_w17_qp_13 Q: 21

Uncontrolled cell division can form tumours.

Which statement is correct for tumour cells **only**?

A Metaphase does not take place.

B Cytokinesis does not occur.

C Interphase takes less time.

D They have mutated DNA.

---

760. 9700_w17_qp_13 Q: 22

Which of these events are part of mitosis?

1 interphase

2 anaphase

3 cytokinesis

A 1, 2 and 3 **B** 1 and 3 only **C** 1 only **D** 2 only

---

761. 9700_m16_qp_12 Q: 16

Which statements about the cell cycle are correct?

1 The cell cycle consists of both interphase and mitosis.

2 DNA replication takes place in interphase.

3 A cell can remain in interphase for several months.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

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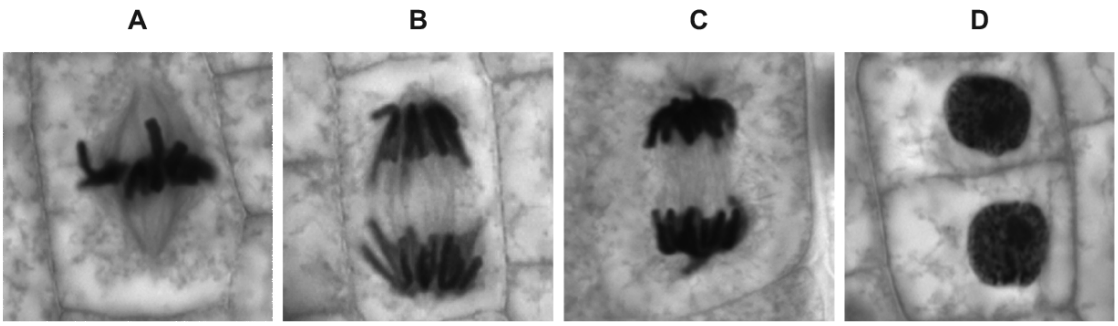
762. 9700_m16_qp_12 Q: 17

The diagram shows cells in different stages of the cell cycle.

Which is the last stage before cytokinesis?



---

763. 9700_m16_qp_12 Q: 18

How many of the listed structures typically contain genetic material that has telomeres?

- bacterial cell
- chloroplast
- mitochondrion
- nucleus

A 1 **B** 2 **C** 3 **D** 4

---

764. 9700_s16_qp_11 Q: 18

The protein p53 is produced in a cell in response to DNA damage. This protein stops the cell cycle for a short time just before the DNA is replicated, so that the DNA can be repaired.

At which phase of the cell cycle will this stop occur?

A M **B** G1 **C** S **D** G2

---

765. 9700_s16_qp_11 Q: 19

Which feature of stem cells enables them to replace cells in tissues such as the skin?

A They are undifferentiated cells that are present at birth.

B They differentiate to form skin cells.

C They divide by mitosis to supply some cells that can differentiate.

D They have the full number of chromosomes.

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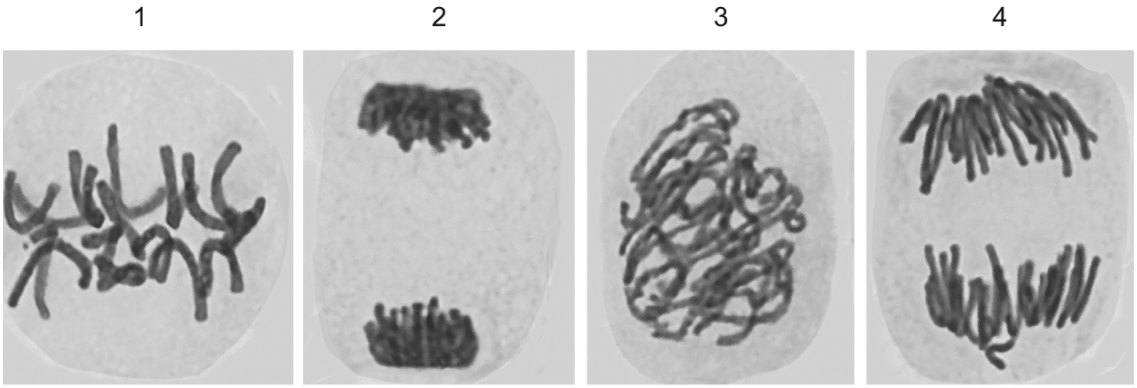
766. 9700_s16_qp_12 Q: 16

The photomicrographs show cells in various stages of the cell cycle.



Which cells contain twice as many DNA molecules as a cell from the same organism after cytokinesis?

A 1, 2, 3 and 4

B 1, 2 and 4 only

C 1 and 3 only

D 2 and 4 only

---

767. 9700_s16_qp_12 Q: 17

A group of chemicals used to treat cancer prevents the formation of the spindle during mitosis.

Which phase of mitosis is the **first** to be affected?

A anaphase

B metaphase

C prophase

D telophase

---

768. 9700_s16_qp_12 Q: 18

Mitosis is an important process for organisms.

Which features of mitosis are important for single-celled organisms?

1 asexual reproduction

2 growth

3 production of genetically identical cells

A 1, 2 and 3 **B** 1 and 3 only **C** 2 and 3 only **D** 1 only

---

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769. 9700_s16_qp_13 Q: 17

Which process occurs during prophase of the mitotic cell cycle in an animal cell?

A division of centromeres

B formation of chromosomes

C replication of DNA

D separation of centrioles

---

770. 9700_s16_qp_13 Q: 18

Which processes occur in bone marrow cells that are in a mitotic cell cycle?

1 phosphate groups bind to ADP molecules to form ATP

2 bonds form between nucleotides in a DNA strand

3 tRNA anticodons hydrogen bond with codons on mRNA

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 only

---

771. 9700_w16_qp_11 Q: 17

Which row is correct for a human cell just before the cell enters prophase of mitosis?

	number of chromatids	number of molecules of DNA in nucleus	spindle present	nuclear envelope present
A	46	46	yes	no
B	46	92	yes	yes
C	92	46	no	yes
D	92	92	no	yes

---

772. 9700_w16_qp_11 Q: 18

Which event is part of the mitotic cell cycle?

A anaphase

B cytokinesis

C DNA replication

D interphase

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773. 9700_w16_qp_12 Q: 21

Which group of cells can all divide by mitosis?

A bacterial cells, cancer cells, stem cells

B bacterial cells, lymphocytes, stem cells

C cancer cells, lymphocytes, red blood cells

D cancer cells, lymphocytes, stem cells

---

774. 9700_w16_qp_13 Q: 17

Chromosome telomeres are essential for DNA replication and are **not** completely replaced during mitosis.

Substance X completely replaces telomeres during mitosis.

What will be the effect of growing cells with and without substance X?

	with substance X	without substance X
A	cells divide continually	cell division eventually slows and stops
B	cells divide more rapidly	cells divide continually
C	cell division eventually slows and stops	cell division stops immediately
D	cell division stops immediately	cells divide continually

---

775. 9700_w16_qp_13 Q: 19

The information describes some events of mitosis.

1 chromosomes undergo condensation and spiralisation

2 centromeres are pulled by shortening of spindle fibres

3 sister chromatids are orientated across the centre of the cell

4 centrioles separate from each other

5 spindle fibres disperse

Which row correctly identifies the stages of mitosis in which these events occur?

	1	2	3	4	5
A	metaphase	telophase	prophase	metaphase	anaphase
B	prophase	anaphase	metaphase	prophase	telophase
C	prophase	metaphase	anaphase	telophase	telophase
D	telophase	metaphase	prophase	anaphase	prophase

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776. 9700_s15_qp_12 Q: 18

The protein p53 is produced in a cell in response to DNA damage.

A scientist exposed three groups of cells, X, Y and Z, to different conditions.

group of cells	conditions cells were exposed to
X	ionising radiation
Y	ultra-violet light
Z	nicotine

In which groups of cells would the scientist find large quantities of p53 mRNA?

A X, Y and Z **B** X and Y only **C** Y and Z only **D** Y only

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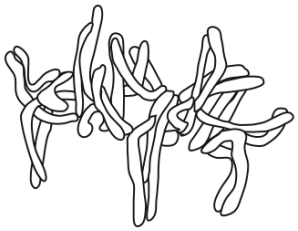
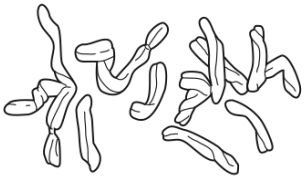
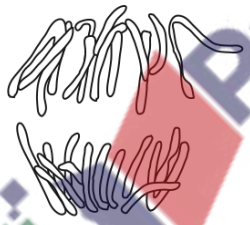
777. 9700_s15_qp_12 Q: 19

Which row is correct?

	diagram	stage
A		interphase
B		metaphase
C		telophase
D		anaphase

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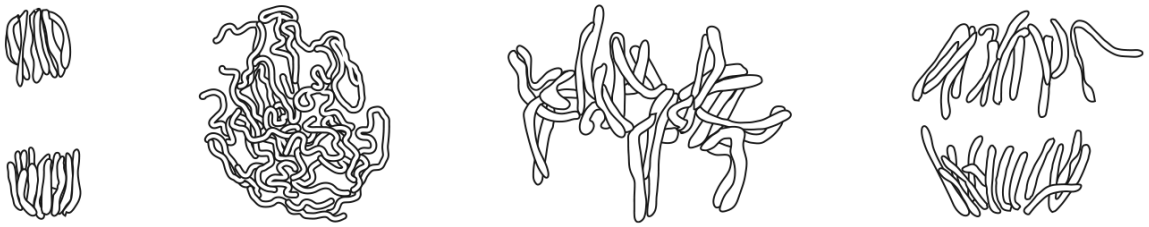
778. 9700_s15_qp_13 Q: 18

The diagrams show chromosomes at different stages of mitosis.

W X Y Z



Which shows the correct order of the cell cycle?

A W → X → Y → Z

B X → Y → Z → W

C Y → Z → W → X

D Z → W → X → Y

---

779. 9700_w15_qp_12 Q: 18

Which statements about a diploid cell are correct?

1 can divide by mitosis to repair itself

2 has two complete sets of chromosomes

3 can undergo a reduction division to form haploid cells

4 can undergo mitotic division to allow growth to occur

A 1, 2 and 3 **B** 1, 2 and 4 **C** 1, 3 and 4 **D** 2, 3 and 4

5.2 Chromosome behaviour in mitosis

780. 9700_w20_qp_13 Q: 20

Which features of mitosis are important for a single-celled organism?

1 asexual reproduction

2 production of genetically identical cells

3 growth

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

---

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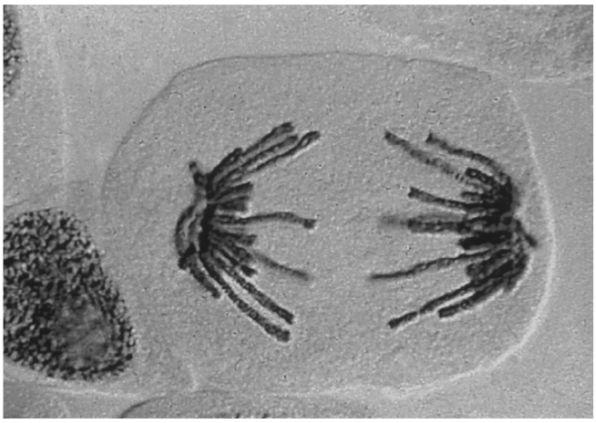
781. 9700_s19_qp_11 Q: 19

The photomicrograph shows a cell during mitosis.



What is happening in this cell?

1 Centrioles are replicating.

2 Spindle microtubules are shortening.

3 Chromatin is condensing.

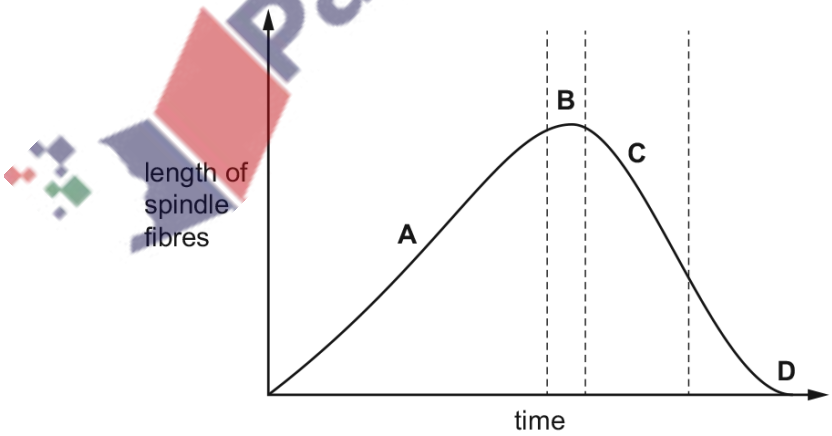
A 1, 2 and 3 **B** 1 and 2 only **C** 2 only **D** 3 only

---

782. 9700_s19_qp_11 Q: 21

The graph shows the length of the spindle fibres during mitosis.

Which region of the graph shows when all the centromeres have detached from the spindle fibres?



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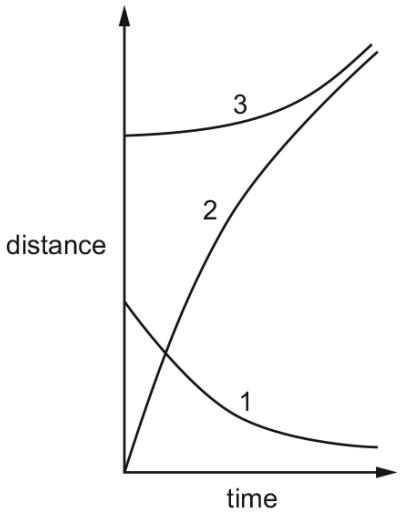
783. 9700_w19_qp_13 Q: 19

The graph shows three measurements obtained after metaphase of mitosis.



What measurements do the curves represent?

	distance between centromeres and poles of spindle	distance between centromeres of sister chromatids	distance between poles of spindle
A	1	2	3
B	1	3	2
C	3	1	2
D	3	2	1

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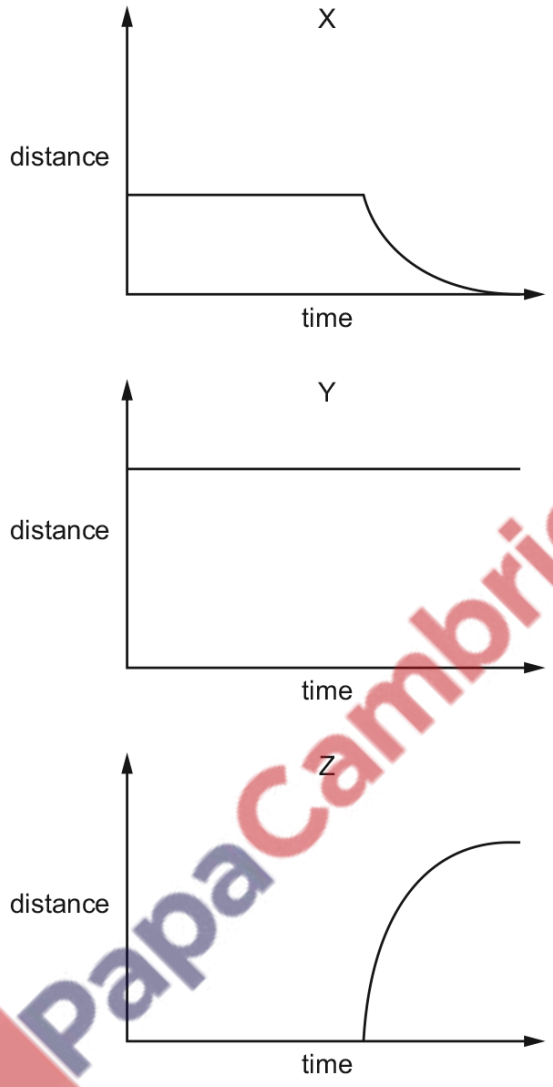
784. 9700_m18_qp_12 Q: 22

The graphs show various distance measurements taken from metaphase of mitosis onwards. The graphs are to scale when compared to one another.



Which row correctly identifies the distance measurement for each graph?

	X	Y	Z
A	distance between poles of spindle	distance between sister chromatids	distance of centromeres from poles of spindle
B	distance between poles of spindle	distance of centromeres from poles of spindle	distance between sister chromatids
C	distance of centromeres from poles of spindle	distance between poles of spindle	distance between sister chromatids
D	distance of centromeres from poles of spindle	distance between sister chromatids	distance between poles of spindle

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785. 9700_s18_qp_11 Q: 18

A student observed the cells in the growing region (meristem) of an onion root and obtained the data shown.

stage	number of cells
interphase	886
prophase	73
metaphase	16
anaphase	14
telophase	11

Which percentage of cells contains chromosomes that appear as two chromatids?

A 7.3 **B** 8.9 **C** 95.9 **D** 97.5

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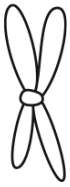
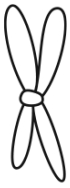
786. 9700_s18_qp_13 Q: 20

Which row shows the appearance of a chromosome at the beginning of prophase of mitosis and the number of DNA strands in the chromosome?

	appearance of one chromosome	number of DNA strands
A		2
B		4
C		1
D		2

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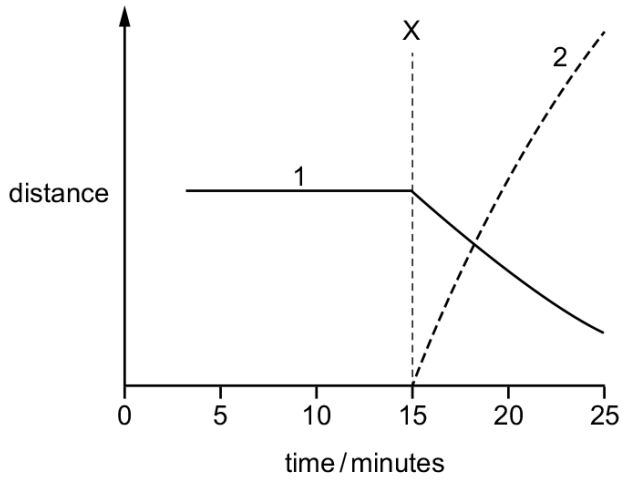
787. 9700_s18_qp_13 Q: 21

The graph shows measurements taken during one mitotic cell cycle.



Which stage of mitosis begins at X and which measurements are shown by curves 1 and 2?

	stage beginning at X	distance between centromeres of chromosomes and poles of spindle	distance between centromeres of sister chromatids
A	anaphase	1	2
B	anaphase	2	1
C	metaphase	1	2
D	metaphase	2	1

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788. 9700_w18_qp_12 Q: 22

Which row shows some of the events during a mitotic cycle in the correct time sequence?

	time →			
A	centromere of each chromosome splits	nucleoli become visible	nuclear envelope breaks into small vesicles	spindle microtubules produced
B	nuclear envelope breaks into small vesicles	spindle microtubules produced	centromere of each chromosome splits	nucleoli become visible
C	nucleoli become visible	nuclear envelope breaks into small vesicles	spindle microtubules produced	centromere of each chromosome splits
D	spindle microtubules produced	centromere of each chromosome splits	nucleoli become visible	nuclear envelope breaks into small vesicles

---

789. 9700_m17_qp_12 Q: 23

The statements describe events during the mitotic cell cycle.

1 Chromosomes migrate to opposite poles of the spindle.

2 Chromosomes arrange themselves at the equator of the spindle.

3 Chromosomes condense and the nuclear membrane disappears.

4 Centromeres divide.

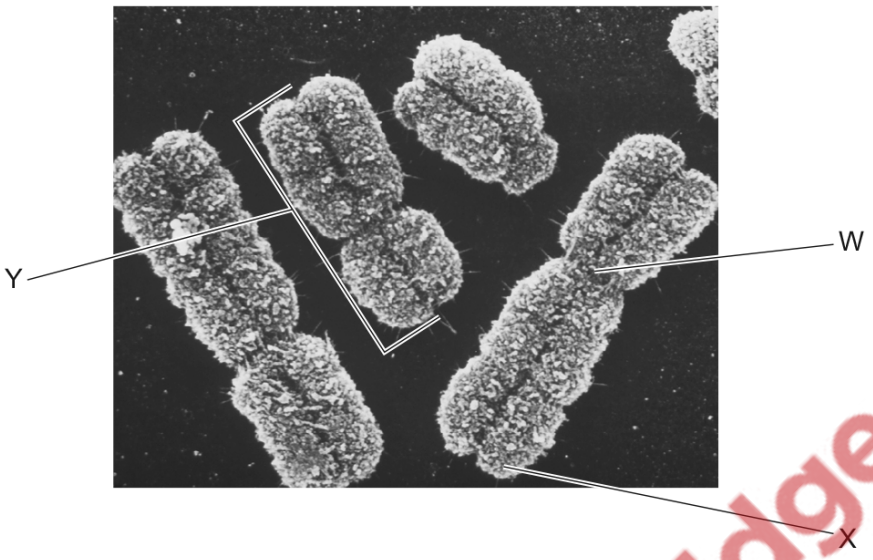
What is the correct order of three of these events in the mitotic cell cycle?

A $2 \rightarrow 3 \rightarrow 4$ **B** $3 \rightarrow 2 \rightarrow 4$ **C** $3 \rightarrow 4 \rightarrow 2$ **D** $4 \rightarrow 2 \rightarrow 1$

---

790. 9700_s17_qp_11 Q: 22

The electron micrograph shows a group of human chromosomes.



Which label is correct for each of the structures labelled W, X and Y?

	W	X	Y
A	centriole	centromere	chromatid
B	centriole	centromere	microtubule
C	centromere	telomere	chromatid
D	centromere	telomere	microtubule

---

791. 9700_s17_qp_11 Q: 23

Which statement about the behaviour of chromosomes during mitosis is correct?

A They attach to the spindle fibres to contain them within the nucleus.

B They condense to prevent further translation of genes.

C They reach the poles of the cell and become longer and thinner.

D They replicate to produce sufficient DNA to form two new nuclei.

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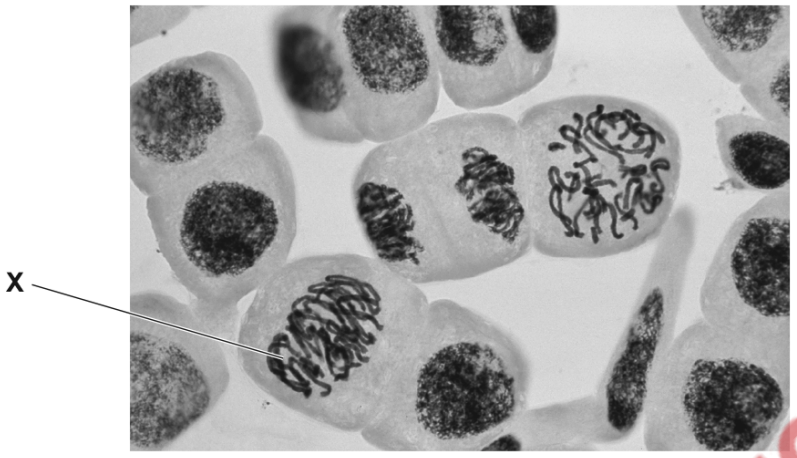
792. 9700_s17_qp_13 Q: 17

The photomicrograph shows cells undergoing mitosis.



Which statement describes what will happen next in cell **X**?

A Chromatin coils up tightly, and the nuclear envelope breaks down.

B Chromosomes line up along the equator of the cell and attach to the spindle.

C Sister chromatids move towards opposite poles, pulled by the spindle fibres.

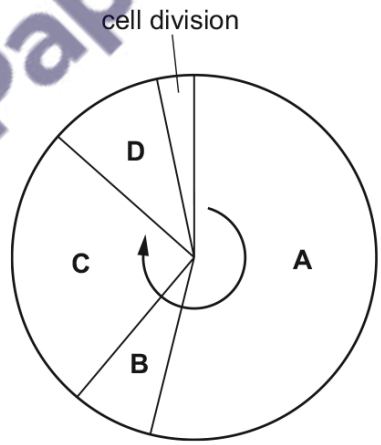
D Spindle fibres break down, and the cell prepares for cytokinesis.

---

793. 9700_w17_qp_11 Q: 16

The diagram shows the cell cycle.

During which phase do chromosomes condense and become visible?



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794. 9700_s16_qp_11 Q: 17

Which processes occur during prophase of the mitotic cell cycle in an animal cell?

	centrioles replicate	chromosomes condense	spindle fibres form
A	✓	✓	✗
B	✓	✗	✗
C	✗	✓	✓
D	✗	✗	✓

key
✓ = true
✗ = false

---

795. 9700_w16_qp_12 Q: 20

Which row correctly shows the behaviour of the nuclear envelope, the centrioles and the spindle during a stage of mitosis?

	stage of mitosis	behaviour of organelle		
		nuclear envelope	centrioles	spindle
A	prophase	disappears	replicate	spindle microtubules begin to form
B	metaphase	not present	begin to move to poles of cell	spindle microtubules fully formed
C	anaphase	begins to reform	at opposite poles of the cell	some spindle microtubules shorten
D	telophase	reforms	one beside each nucleus	spindle microtubules break down

---

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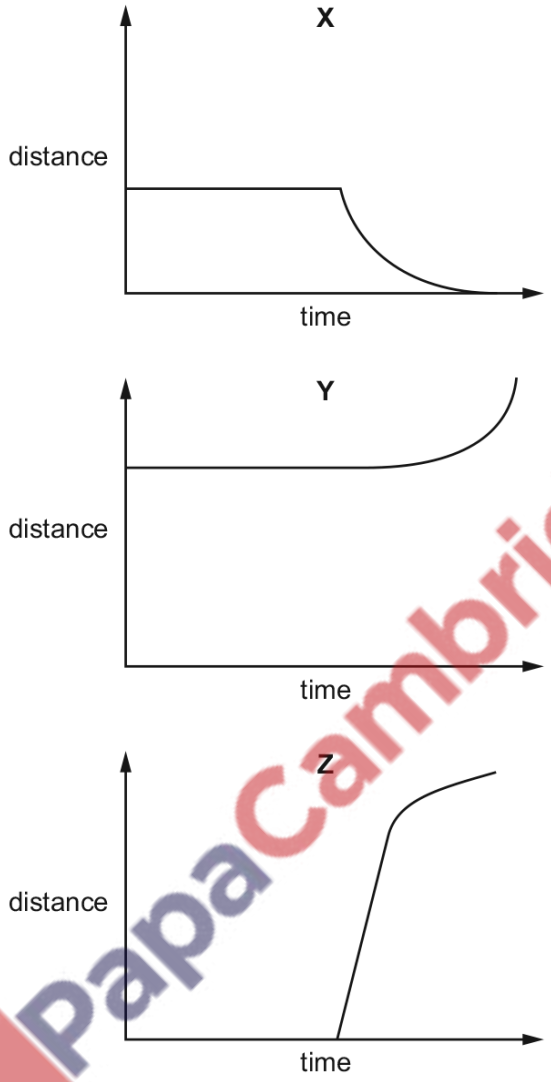
796. 9700_s15_qp_11 Q: 18

The graphs show various measurements taken from metaphase of mitosis onwards. The graphs are to scale when compared to one another.



Which row correctly identifies each graph?

	X	Y	Z
A	distance between poles of spindle	distance between sister chromatids	distance of centromere from pole of spindle
B	distance between poles of spindle	distance of centromere from pole of spindle	distance between sister chromatids
C	distance of centromere from pole of spindle	distance between poles of spindle	distance between sister chromatids
D	distance of centromere from pole of spindle	distance between sister chromatids	distance between poles of spindle

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797. 9700_s15_qp_11 Q: 19

A scientist counted 22 chromosomes in each of the root cells of a xerophytic plant.

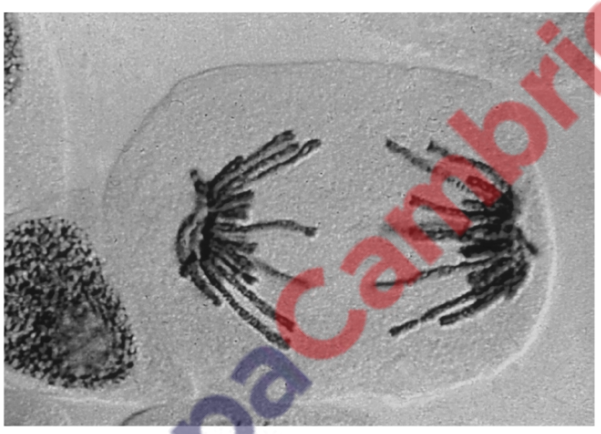
What is the diploid and haploid number of chromosomes for this species?

	diploid number	haploid number
A	11	22
B	22	11
C	22	44
D	44	22

---

798. 9700_w15_qp_11 Q: 18

The photomicrograph shows a cell during mitosis.



What is happening in this cell?

1 Centrioles are replicating.

2 Spindle microtubules are shortening.

3 Chromatin is condensing.

A 1, 2 and 3 **B** 1 and 2 only **C** 2 only **D** 3 only

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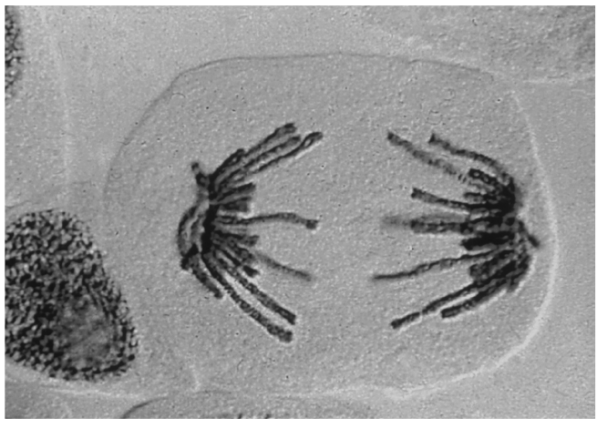
799. 9700_w15_qp_13 Q: 18

The photomicrograph shows a cell undergoing mitosis.



What is happening in this cell?

A Centrioles are replicating.

B Chromatin is condensing.

C DNA is replicating.

D Spindle microtubules are shortening.

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