

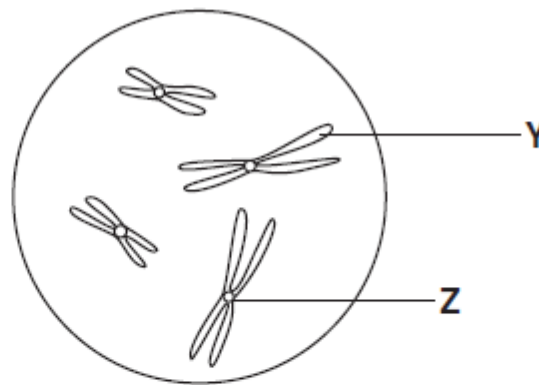
1.

16 What occurs in mitosis?

	homologous chromosomes pair	chromosome number remains the same
A	x	✓
B	✓	x
C	x	x
D	✓	✓

2.

The diagram shows chromosomes in a nucleus.



What are Y and Z?

	Y	Z
A	centromere	centriole
B	centromere	chromatid
C	chromatid	centriole
D	chromatid	centromere

3.	<p>Colchicine is a chemical that stops chromatids from separating during mitosis.</p> <p>Which phase will the cell reach and then stop dividing?</p> <p>A anaphase</p> <p>B interphase</p> <p>C metaphase</p> <p>D telophase</p>
4.	<p>Which statement describes events during interphase of mitosis?</p> <p>A Chromosomes start to coil, becoming shorter and fatter.</p> <p>B Chromosomes line up on the equator of the spindle.</p> <p>C Chromatids are pulled apart by spindle fibres.</p> <p>D Chromosomes are replicated ready for the next division.</p>
5.	<p>Which statement about the strands of a newly replicated DNA molecule is correct?</p> <p>A Both strands are made up of newly assembled nucleotides.</p> <p>B Both strands contain some nucleotides from the original molecule.</p> <p>C One strand is new and the other is part of the original molecule.</p> <p>D The sugar-phosphate chains are conserved and new bases are inserted between them.</p>
6.	<p>During which process does mitosis occur?</p> <p>A the production of antibodies from B-lymphocyte memory cells</p> <p>B the production of cancerous tissue in alveoli</p> <p>C the production of mucus from goblet cells</p> <p>D the production of plaques in atherosclerosis</p>

7.

What happens to chromosomes in prophase of mitosis?

- A** They are formed by replication of DNA.
- B** They attach to the spindle fibres.
- C** They divide to form chromatids.
- D** They shorten and become visible.

8.

The diagram shows the chromosomes of one cell which has been squashed during mitosis.



Which stage of mitosis is shown and what is the haploid chromosome number in this species?

	stage of mitosis	haploid chromosome number
A	anaphase	5
B	anaphase	10
C	metaphase	5
D	metaphase	10

9.

Which cell activity must occur before prophase of mitosis can begin?

- A** breakdown of the nuclear envelope
- B** increased production of mRNA
- C** migration of centrioles to opposite poles
- D** replication of DNA

10. What are the conditions in a human cell just before the cell enters prophase?

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

11. The diagram shows the mitotic cell cycle.

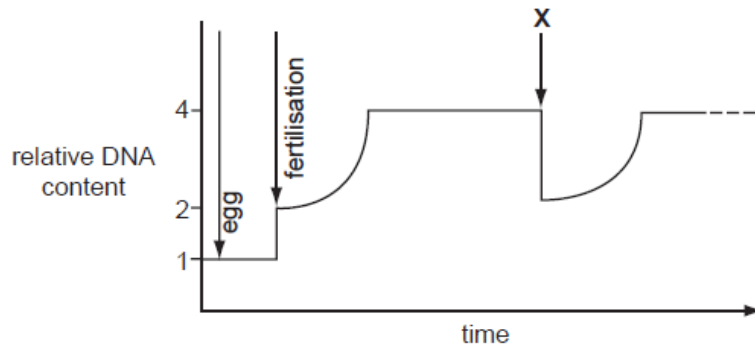
When radioactive nucleotides are supplied to dividing cells, at which point will they be incorporated into the chromosomes?

The diagram shows a circular cell cycle. The large grey area is labeled 'interphase'. The smaller white area is labeled 'mitosis'. The 'mitosis' phase is divided into four segments labeled A, B, C, and D. Arrows indicate the clockwise direction of the cycle.

12. Which processes involve mitosis?
- A** growth, reduction division and asexual reproduction
 - B** growth, repair and asexual reproduction
 - C** growth, repair and semi-conservative replication
 - D** repair, reduction division and asexual reproduction

13.

The graph represents the changes in the quantity of DNA present in one nucleus at different stages in the life cycle.

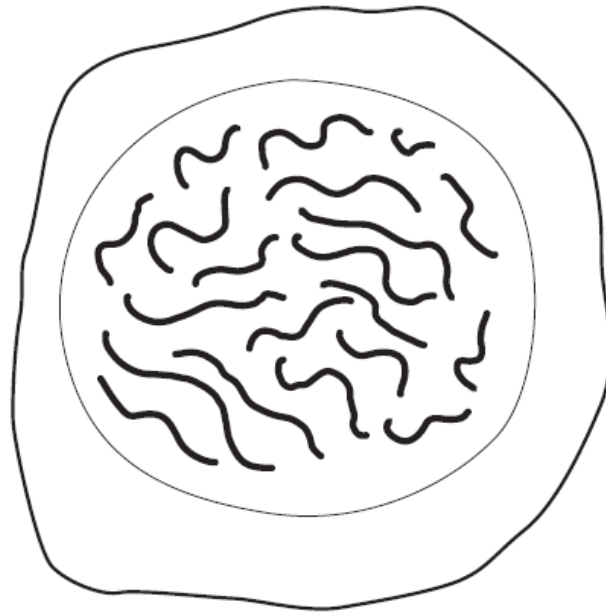


Which stage takes place at X?

- A interphase
- B metaphase
- C prophase
- D telophase

14.

The diagram shows a cell of an organism formed by reduction division.

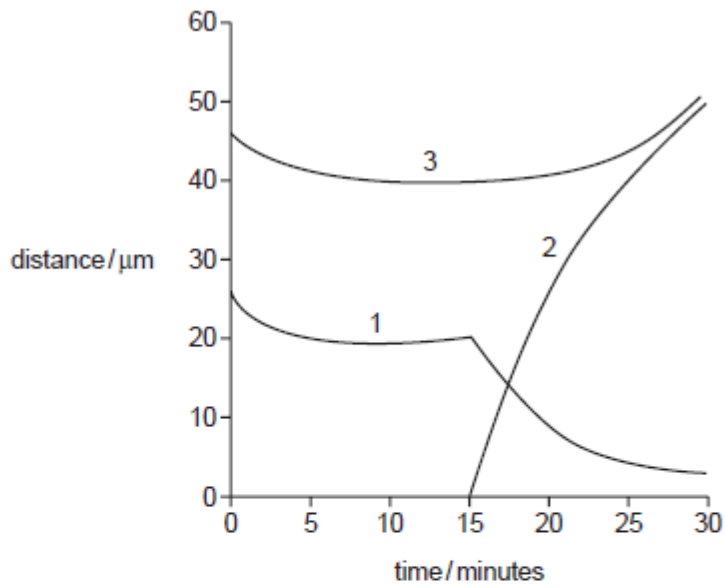


What is the diploid number for this organism?

- A 10
- B 20
- C 40
- D 46

15.

The graph shows three measurements obtained following metaphase of mitosis

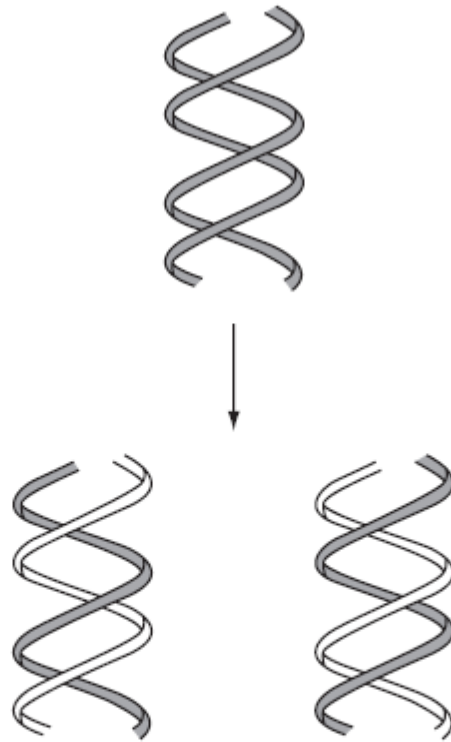


What measurements do the curves represent?

	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

16.

The diagram shows a process involving DNA.



What is the name of the process and the stage in the cell cycle at which it occurs?

	process	stage
A	replication	interphase
B	replication	prophase
C	transcription	interphase
D	transcription	prophase

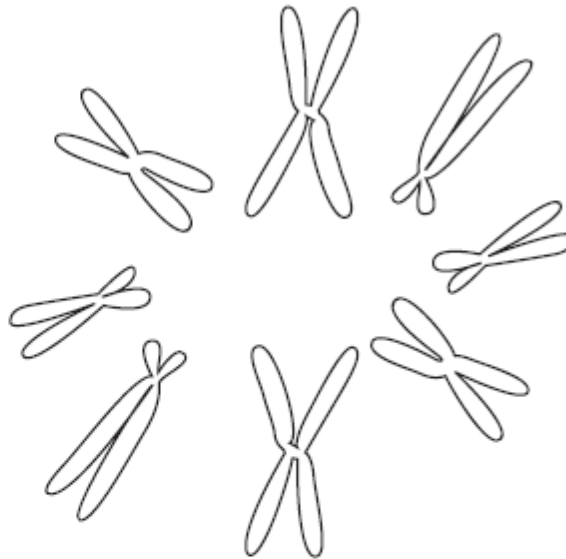
17.

What occurs in anaphase of mitosis?

- A** chromatids line up on the equator of the cell
- B** chromatids reach the poles of the spindle
- C** chromatids separate and move to opposite poles
- D** chromatids start to coil up and become visible

18.

The diagram shows chromosomes at metaphase of mitosis.



What are the diploid and haploid numbers for this species?

	diploid	haploid
A	4	8
B	8	4
C	8	16
D	16	8

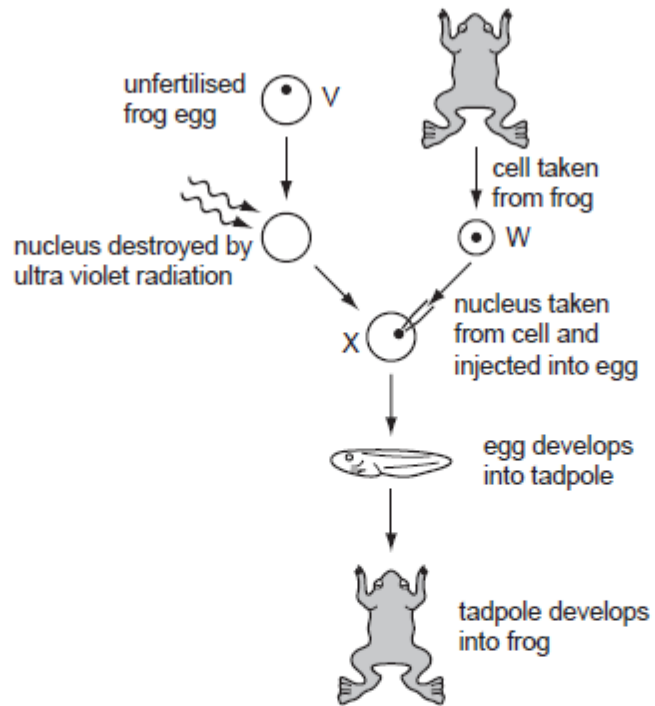
19.

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

20.

The diagram shows how genetically identical frogs can be developed from unfertilised frog eggs. The diploid number ($2n$) for frogs is 26.

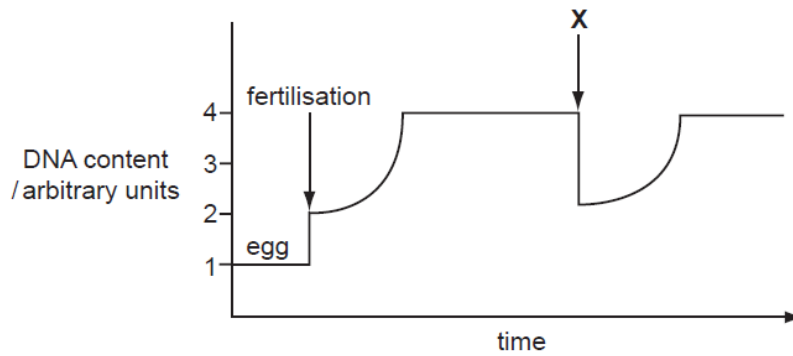


Which combination of numbers correctly identifies the number of chromosomes in each of the types of cell in the diagram?

	V	W	X
A	13	13	26
B	13	26	13
C	13	26	26
D	26	26	13

21.

The graph represents the changes in the quantity of DNA present in one nucleus at different stages in the life cycle of a mammal.



Which stage takes place at X?

- A interphase
- B metaphase
- C prophase
- D telophase

22.

At which stage of mitosis do these events occur?

	centromeres separate	spiralisation and condensation of DNA
A	anaphase	interphase
B	anaphase	prophase
C	metaphase	interphase
D	metaphase	telophase

23.

During which process does only mitosis occur?

- A** the production of antibodies from B-lymphocyte memory cells
- B** the production of cancerous tissue in alveoli
- C** the production of gametes
- D** the production of root hairs

24.

At which stage of mitosis do these events occur?

	centromeres separate	spiralisation and condensation of DNA
A	anaphase	interphase
B	anaphase	prophase
C	metaphase	interphase
D	metaphase	telophase

25.

During which process does only mitosis occur?

- A** the production of antibodies from B-lymphocyte memory cells
- B** the production of cancerous tissue in alveoli
- C** the production of gametes
- D** the production of root hairs

26.

Which is always true of cytokinesis?

- 1 Cell organelles replicate.
- 2 Cell organelles are divided between two cells.
- 3 Nuclear envelope reforms.

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

27.

The diagram shows chromosomes taken from the nucleus of a cell.

Which diagram represents a pair of homologous chromosomes?



A



B

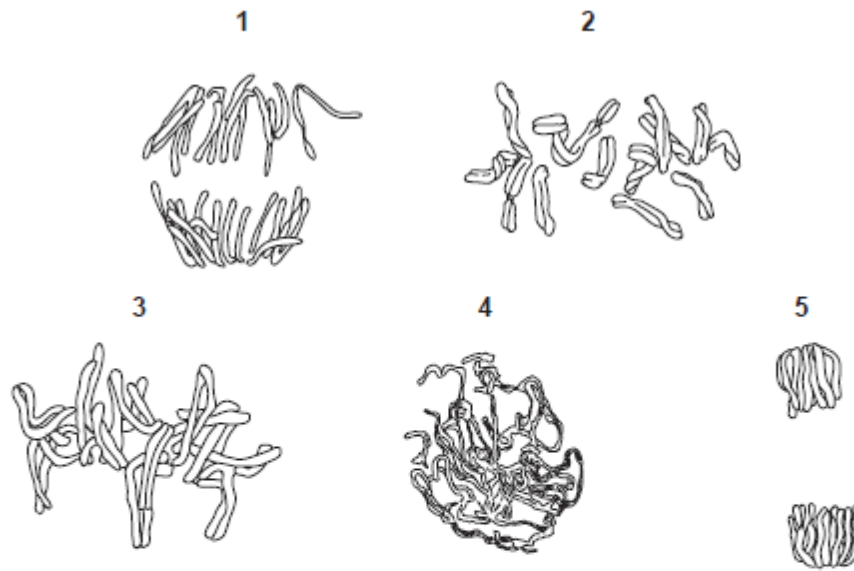


C



D

28. } The drawings show stages of the mitotic cell cycle.



In which order do the stages occur?

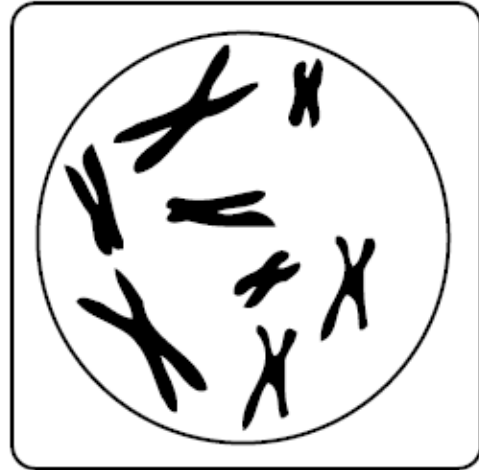
	first	→			last
A	2	1	3	5	4
B	2	4	1	5	3
C	4	2	1	3	5
D	4	2	3	1	5

29. Immediately after which stage in mitosis in an animal cell does the cytoplasm start to divide?

- A anaphase
- B metaphase
- C prophase
- D telophase

30.

The diagram shows a diploid cell during mitosis.

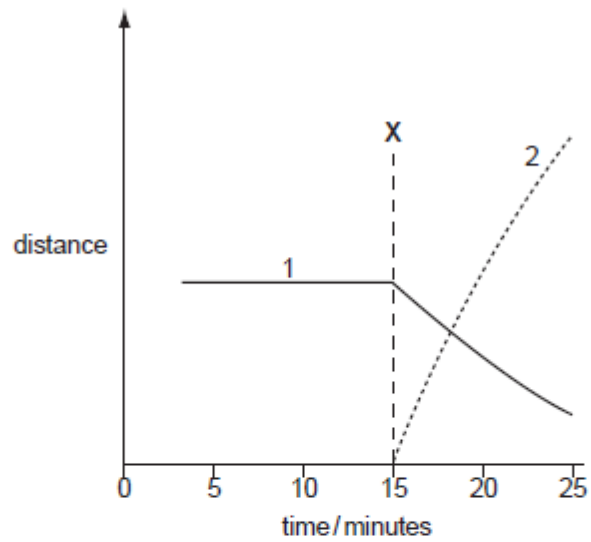


Which stage of mitosis is shown?

- A** anaphase
- B** metaphase
- C** prophase
- D** telophase

31.

The graph shows measurements taken during one mitotic cell cycle.

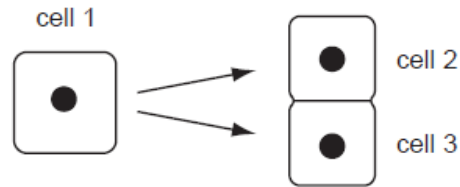


Which stage of mitosis begins at **X** and which measurements are shown by curves 1 and 2?

	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

32. Human cells contain 46 chromosomes.

The diagram shows a human cell in prophase of mitosis (cell 1) and the daughter cells just after telophase (cells 2 and 3).



How many DNA molecules are there in the nucleus of cell 1 and cell 2?

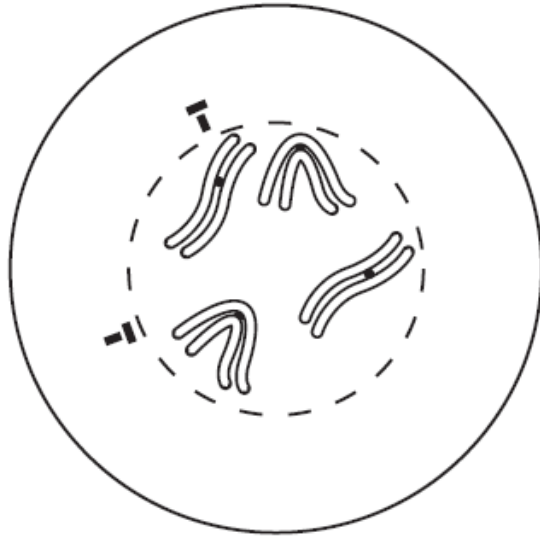
	cell 1	cell 2
A	46	23
B	46	46
C	92	23
D	92	46

33. Which process occurs during prophase of mitosis in an animal cell?

- A** division of centromeres
- B** formation of chromosomes
- C** replication of DNA
- D** separation of centrioles

34.

The diagram shows an animal cell which is undergoing mitotic division.



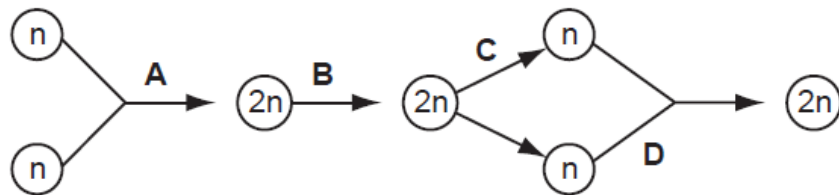
Which stage of mitosis has been reached?

- A** anaphase
- B** metaphase
- C** prophase
- D** telophase

35.

The diagram represents the life cycle of an animal.

At which stage in the life cycle does mitosis occur?



36. To which of the processes shown does mitosis make a contribution?

	genetic variation	increase in cell number	replacement of damaged cells
A	X	✓	✓
B	✓	X	X
C	✓	✓	X
D	X	X	✓

key

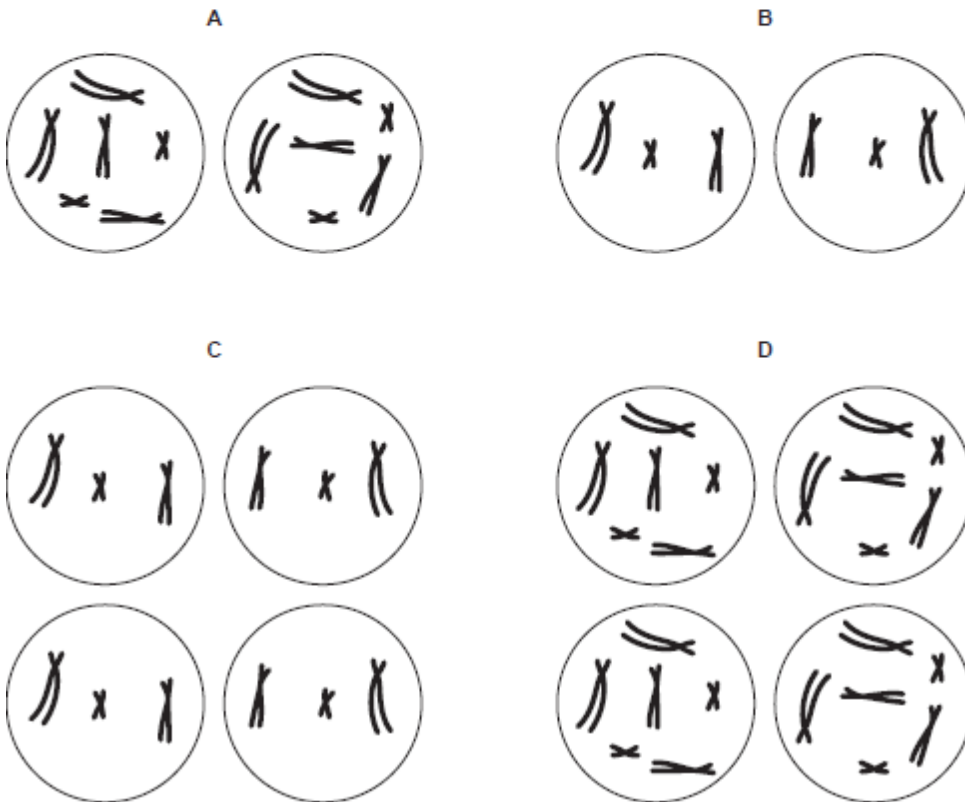
✓ contributes to process

X does not contribute to process

37. The diagram shows the chromosomes of a cell at late prophase of mitosis.



What will be the appearance of the products of this cell division as they enter prophase of their next division?



38. A diploid nucleus in a species of fruit fly has 8 chromosomes.

How many DNA molecules are present in the nucleus at the end of interphase?

A 4

B 8

C 16

D 32

39.	<p>Mammalian skin cells in tissue culture were supplied with a source of radioactive thymine.</p> <p>At which stage in the cell cycle will the thymine be used in the nuclei?</p> <p>A interphase B metaphase C prophase D telophase</p>																														
40.	<p>Which of the following is true of cancer?</p> <p>A Each mitotic division produces more than two daughter cells. B Mitosis has stopped. C Mitosis is uncontrolled. D Mitosis results in cells with variable numbers of chromosomes.</p>																														
41.	<p>Each of the following events takes place during mitosis.</p> <ol style="list-style-type: none"> 1 centromeres divide 2 chromatids move to opposite poles of the cell 3 chromosomes line up along the equator of the spindle 4 chromosomes uncoil 5 two chromatids are joined by a centromere <p>In which order do the events take place?</p> <table border="1" data-bbox="297 1528 1073 1881"> <thead> <tr> <th></th> <th>first</th> <th colspan="3" style="text-align: center;">—————→</th> <th>last</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>1</td> <td>2</td> <td>4</td> <td>5</td> <td>3</td> </tr> <tr> <td>B</td> <td>3</td> <td>1</td> <td>2</td> <td>4</td> <td>5</td> </tr> <tr> <td>C</td> <td>4</td> <td>5</td> <td>3</td> <td>1</td> <td>2</td> </tr> <tr> <td>D</td> <td>5</td> <td>3</td> <td>1</td> <td>2</td> <td>4</td> </tr> </tbody> </table>		first	—————→			last	A	1	2	4	5	3	B	3	1	2	4	5	C	4	5	3	1	2	D	5	3	1	2	4
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B	3	1	2	4	5																										
C	4	5	3	1	2																										
D	5	3	1	2	4																										

42.	<p>Which statement describes events during interphase of the mitotic cell cycle?</p> <p>A Chromatids are pulled apart by spindle fibres.</p> <p>B Chromosomes are replicated ready for the next division.</p> <p>C Chromosomes line up on the equator of the spindle.</p> <p>D Chromosomes start to coil, becoming shorter and fatter.</p>																									
43.	<p>Chromosome telomeres promote DNA replication and are not completely replaced during mitosis. A substance X is known that completely replaces telomeres during mitosis.</p> <p>What will be the effect of growing a cell culture with and without substance X?</p> <table border="1" data-bbox="289 695 1143 999"> <thead> <tr> <th></th> <th>with substance X</th> <th>without substance X</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>cells divide continually</td> <td>cell division eventually slows and stops</td> </tr> <tr> <td>B</td> <td>cells divide more rapidly</td> <td>cells divide continually</td> </tr> <tr> <td>C</td> <td>cell division eventually slows and stops</td> <td>cell division stops immediately</td> </tr> <tr> <td>D</td> <td>cell division stops immediately</td> <td>cells divide continually</td> </tr> </tbody> </table>		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										
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44.	<p>What is a correct description of the centrioles, nuclear envelope and spindle during mitosis in animal cells?</p> <table border="1" data-bbox="285 1115 1287 1360"> <thead> <tr> <th></th> <th>phase</th> <th>centrioles</th> <th>nuclear envelope</th> <th>spindle</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>anaphase</td> <td>replicate</td> <td>absent</td> <td>present</td> </tr> <tr> <td>B</td> <td>metaphase</td> <td>present</td> <td>reforms</td> <td>present</td> </tr> <tr> <td>C</td> <td>prophase</td> <td>move apart</td> <td>breaks up</td> <td>forms</td> </tr> <tr> <td>D</td> <td>telophase</td> <td>replicate</td> <td>breaks up</td> <td>breaks up</td> </tr> </tbody> </table>		phase	centrioles	nuclear envelope	spindle	A	anaphase	replicate	absent	present	B	metaphase	present	reforms	present	C	prophase	move apart	breaks up	forms	D	telophase	replicate	breaks up	breaks up
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B	metaphase	present	reforms	present																						
C	prophase	move apart	breaks up	forms																						
D	telophase	replicate	breaks up	breaks up																						
45.	<p>Which statement describes a cell that is capable of reproduction and belonging to a haploid organism?</p> <p>A It has chromosomes that contain one polynucleotide chain.</p> <p>B It is capable of carrying out a reduction division to form gametes.</p> <p>C It possesses two copies of each gene as a result of fertilisation.</p> <p>D It will undergo cell division by mitosis during asexual reproduction.</p>																									

46.	<p>During which stage of the mitotic cell cycle is DNA replicated?</p> <p>A anaphase</p> <p>B interphase</p> <p>C prophase</p> <p>D telophase</p>															
47.	<p>Cancer cells divide out of control, forming tumours.</p> <p>Which statement describes the difference between a cancer cell and a normal cell?</p> <p>A Cancer cells do not undergo cytokinesis.</p> <p>B Cancer cells have a shorter interphase.</p> <p>C Cancer cells do not have metaphase.</p> <p>D Only cancer cells have mutated DNA.</p>															
48.	<p>Male bees are haploid. They develop from unfertilised eggs. Female bees are diploid.</p> <p>Which statements are correct?</p> <p>1 All male bees are genetically identical.</p> <p>2 Male bee sperm cells are produced by mitosis.</p> <p>3 New combinations of genes only occur in female bees.</p> <p>A 1 and 2 only B 1 and 3 only C 2 and 3 only D 1, 2 and 3</p>															
49.	<p>What describes the behaviour of the nuclear envelope and the cell membrane during mitosis?</p> <table border="1" data-bbox="289 1419 850 1684"> <thead> <tr> <th></th> <th>nuclear envelope</th> <th>cell membrane</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>breaks down</td> <td>breaks down</td> </tr> <tr> <td>B</td> <td>breaks down</td> <td>remains intact</td> </tr> <tr> <td>C</td> <td>remains intact</td> <td>breaks down</td> </tr> <tr> <td>D</td> <td>remains intact</td> <td>remains intact</td> </tr> </tbody> </table>		nuclear envelope	cell membrane	A	breaks down	breaks down	B	breaks down	remains intact	C	remains intact	breaks down	D	remains intact	remains intact
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50. 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 cells
- 3 semi-conservative replication of DNA

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

51. In which process does mitosis **not** have an important role in living things?

A asexual reproduction
B growth of cells
C increase in size
D repair to damaged tissues

52. The diagram shows the chromosomes of a typical plant cell at the metaphase stage of mitosis.



Which row describes this cell during metaphase?

	diploid number (2n) for the plant	structures present at metaphase		
		cell wall	centriole	spindle
A	4	✓	x	✓
B	8	x	✓	✓
C	8	✓	x	✓
D	16	✓	✓	x

53. The table shows the percentages of bases in DNA from various types of cell.

source of DNA	percentage of bases in DNA			
	adenine	guanine	thymine	cytosine
calf thymus	28.2	21.5	27.8	22.5
bull spleen	27.9	22.7	27.3	22.1
bull sperm	28.6	22.2	27.2	22.0
rat bone marrow	28.7	21.4	28.4	21.5
yeast	31.3	18.7	32.9	17.1

What is a valid deduction from these data?

- A** All cells from the same species have approximately the same content of DNA.
- B** Small differences in DNA from different cells have large effects.
- C** The four bases show complementary base pairing.
- D** The structure of DNA is different in yeast and animal cells.

54. What describes the behaviour of the nuclear envelope and the cell membrane during mitosis?

	nuclear envelope	cell membrane
A	breaks down	breaks down
B	breaks down	remains intact
C	remains intact	breaks down
D	remains intact	remains intact

55. Which statement about a diploid cell is **not** correct?

- A** It can undergo a mitotic division to allow growth to occur.
- B** It can undergo a mitotic division to repair a cell.
- C** It can undergo a reduction division to form haploid cells.
- D** It is one that possesses two complete sets of chromosomes.

56.

Meiosis and mitosis are two types of cell division.

A cell has 10 chromosomes before it divides.

How many chromosomes will it have after dividing by meiosis or mitosis?

	meiosis	mitosis
A	5	10
B	5	20
C	10	5
D	20	5

57.

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

Which region of the graph shows when the centromeres detach from the spindle fibres?

