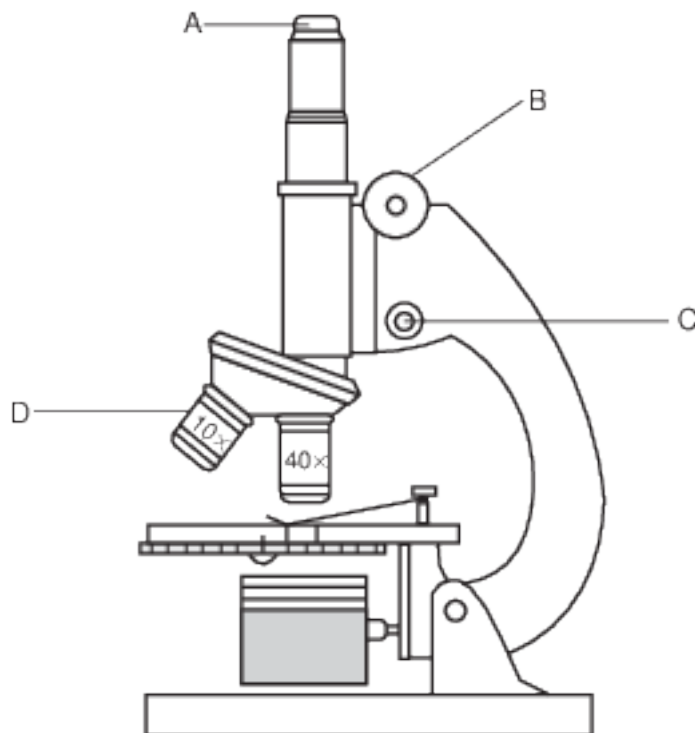


Base your answers to questions 7 on the information and diagram below and on your knowledge of biology.

A student used a microscope like the one represented below to observe cell division in onion cells.



- 7 The student noticed that as the new cells formed, they contained rod-shaped chromosomes. It is necessary for onion cells to contain chromosomes because chromosomes
- (1) are composed of genes that contain the instructions for an organism's traits
 - (2) are made of carbohydrates and are needed as an energy source
 - (3) direct the production of inorganic molecules within the cell
 - (4) are composed of lipids that contain stored nutrients for the new cell
- 8 A scientist analyzed a segment of DNA from a human chromosome and found that the percentage of thymine molecular bases (T) was 35%. Which row in the chart below contains the correct percentages of the other molecular bases in the DNA segment?

Row	Guanine (G)	Cytosine (C)	Adenine (A)
(1)	15%	25%	25%
(2)	25%	25%	15%
(3)	15%	15%	35%
(4)	35%	15%	15%

- (1) 1
- (2) 2

- (3) 3
- (4) 4

- 9 The DNA of a fly and the DNA of a gorilla are made up of subunits that are
- (1) arranged in the same order in both species
 - (2) arranged in chains of the same length in both species
 - (3) different bases in each of the two species
 - (4) in different sequences in each of the two species
- 10 Which statement is an accurate description of genes?
- (1) Proteins are made of genes and code for DNA.
 - (2) Genes are made of proteins that code for nitrogen bases.
 - (3) DNA is made of carbohydrates that code for genes.
 - (4) Genes are made of DNA and code for proteins.
- 11 A sample of DNA from a human skin cell contains 32% cytosine (C) bases. Approximately what percentage of the bases in this sample will be thymine (T)?
- (1) 18
 - (2) 24
 - (3) 32
 - (4) 36
- 12 Researchers use a variety of techniques to learn more about the function of a specific gene in an organism. In one type of experiment, called a loss-of-function experiment, the gene being investigated is eliminated. In a gain-of-function experiment, extra copies of the gene being investigated are inserted. The cell process most directly affected in both experiments is
- (1) protein synthesis
 - (2) waste disposal
 - (3) transport of materials
 - (4) breakdown of nutrients

Base your answers to questions 13 on the DNA base sequence below and on your knowledge of biology.

AAC–GCC–GTC–CGC–TAG

13 Identify the mRNA codons that would be produced using this DNA as a template. [1]

DNA base sequence: AAC GCC GTC CGC TAG

mRNA codons: _____

Base your answers to questions 14 on the information below and on your knowledge of biology.

DNA samples were taken from three different species and used to determine the amino acid sequence for a portion of a particular protein. The amino acids were then compared in order to determine which species were most closely related. Some of the information is shown on the table below.

TGA ACU

TGA ACU THR AGA UCU SER

Species A	DNA base sequence	GAC	TGA	CTC	CAC
	mRNA base sequence	CUG	ACU	GAG	GUG
	amino acid sequence	LEU	THR	_____	VAL
Species B	DNA base sequence	GAC	AGA	CTT	CAC
	mRNA base sequence	_____	UCU	GAA	_____
	amino acid sequence	LEU	_____	_____	VAL
Species C	DNA base sequence	GAC	TGC	CAC	CTC
	mRNA base sequence	CUG	_____	GUG	_____
	amino acid sequence	LEU	THR	VAL	GLU

biology worksheet

- 14 State one specific effect on the protein produced if an mRNA code is changed from AGU to AGA. [1]
- 15 A double-stranded DNA sample was analyzed to establish the percentage of different molecular bases present. The data table below shows the percentage of adenine bases found. Calculate the percentage of each of the three remaining molecular bases, and write the percentages of each in the chart. [1]

Base	Percent Found (%)
A (Adenine)	20
T (Thymine)	_____
G (Guanine)	_____
C (Cytosine)	_____

Answer Keys

1 1

2 2

3 4

4 1

5 3

6 2

7 1

8 3

9 4

10 4

11 1

12 1

13 Allow 1 credit for completing the chart as shown below.

- DNA base sequence: AAC
- GCC
- GTC
- CGC
- TAG
- UUG CGG CAG GCG AUC mRNA codons: _____
- _____
- _____
- _____
- _____

14 Allow 1 credit. Acceptable responses include, but are not limited to:

- — The amino acid ARG will be substituted for SER.
- — The shape of the protein might change.
- — The protein might not work.

15 Allow 1 credit for correctly filling in the missing results.

- | Base | Percent Found (%) |
|--------------|-------------------|
| A (Adenine) | 20 |
| T (Thymine) | <u> 20 </u> |
| G (Guanine) | <u> 30 </u> |
| C (Cytosine) | <u> 30 </u> |