

A Level Biology B

H422/01 Fundamentals of biology

Question Set 23

Module 3 Cell division, development and disease control.

Multiple Choice Questions

- 1 A section of plant tissue was examined to determine the percentage of cells in each stage of the cell cycle. There were 115 cells in total. Some of the results are shown in the table below.

Stage of cell cycle	Number of cells
anaphase	4
cytokinesis	2
G ₁ phase	41
G ₂ phase	17
prophase	3
metaphase	3
S phase	36
telophase	9

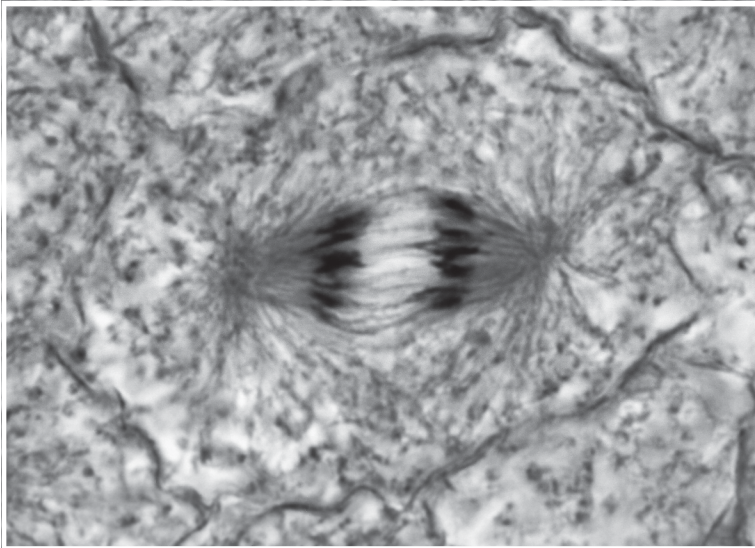
Which of the options, **A** to **D**, is the percentage of cells in nuclear division?

- A** 2
- B** 17
- C** 18
- D** 82

Your answer

[1]

2 The micrograph below shows a cell in mitosis.



Which of the options, **A** to **D**, identifies the stage of mitosis shown in the micrograph?

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

Your answer

[1]

3 Meiosis II pauses in the secondary oocyte and is only completed if fertilisation occurs.

Which of the options, **A** to **D**, is a description of the **last** meiotic stage prior to fertilisation?

- A** Homologous chromosomes align to the equator of the oocyte.
- B** Homologous chromosomes migrate to opposite poles of the oocyte.
- C** Single chromosomes align to the equator of the oocyte.
- D** Sister chromatids migrate to opposite poles of the oocyte.

Your answer

[1]

4 Head circumference (HC) is a key indicator of fetal size and is estimated from two ultrasound measurements:

- biparietal diameter (BPD)
- occipitofrontal diameter (OFD).

$$HC = 1.62 \times (BPD + OFD)$$

The table below shows BPD and OFD measurements from a fetus.

Measurement	Length (mm)
BPD	76 ± 4.2
OFD	98 ± 6.5

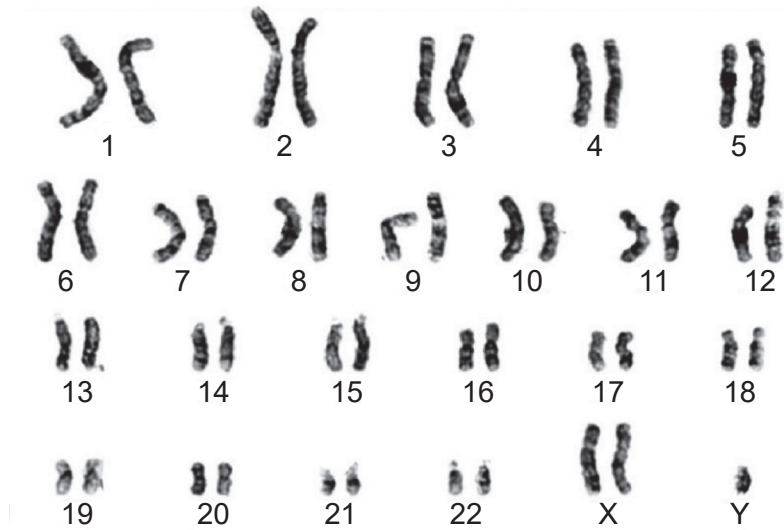
Which of the options, **A** to **D**, is the percentage uncertainty for the HC measurement of this fetus?

- A** 6.1
- B** 10.7
- C** 12.2
- D** 37.0

Your answer

[1]

5 The diagram below is a karyotype prepared from a human cell.



Which of the following statements is/are correct?

- 1 The cell could have been obtained from amniotic fluid.
- 2 The karyotype shows evidence of Turner's syndrome.
- 3 The cell was in interphase.

- A** 1, 2 and 3 are correct
B only 1 and 2 are correct
C only 2 and 3 are correct
D only 1 is correct

Your answer

[1]

6 A karyotype of a person with a genetic disorder is shown below.



Which of the options, A to D, correctly identifies the genetic disorder shown in the karyotype?

- A Down's syndrome
- B Klinefelter's syndrome
- C Nail-patella syndrome
- D Turner's syndrome

Your answer

[1]

7 Here are three statements about the evolution of language:

- 1 Sequencing the genome of extinct human ancestors helps to indicate the origins of language.
- 2 The evolution of language will have been influenced by reproductive (mating) preferences.
- 3 The 'gossip' hypothesis relies on trust between animals for the acceptance of unfamiliar sounds.

Which of the statements is/are correct?

- A 1, 2 and 3 are correct
- B only 1 and 2 are correct
- C only 2 and 3 are correct
- D only 1 is correct

Your answer

[1]

8 The genetic diversity of monkey populations in a forest ecosystem was studied. The data for one population are shown in the table below.

Total genes studied	Genes with one allele	Genes with two alleles	Genes with more than two alleles
49	33	5	11

Which of the options, **A** to **D**, is the proportion of polymorphic genes in the monkey population?

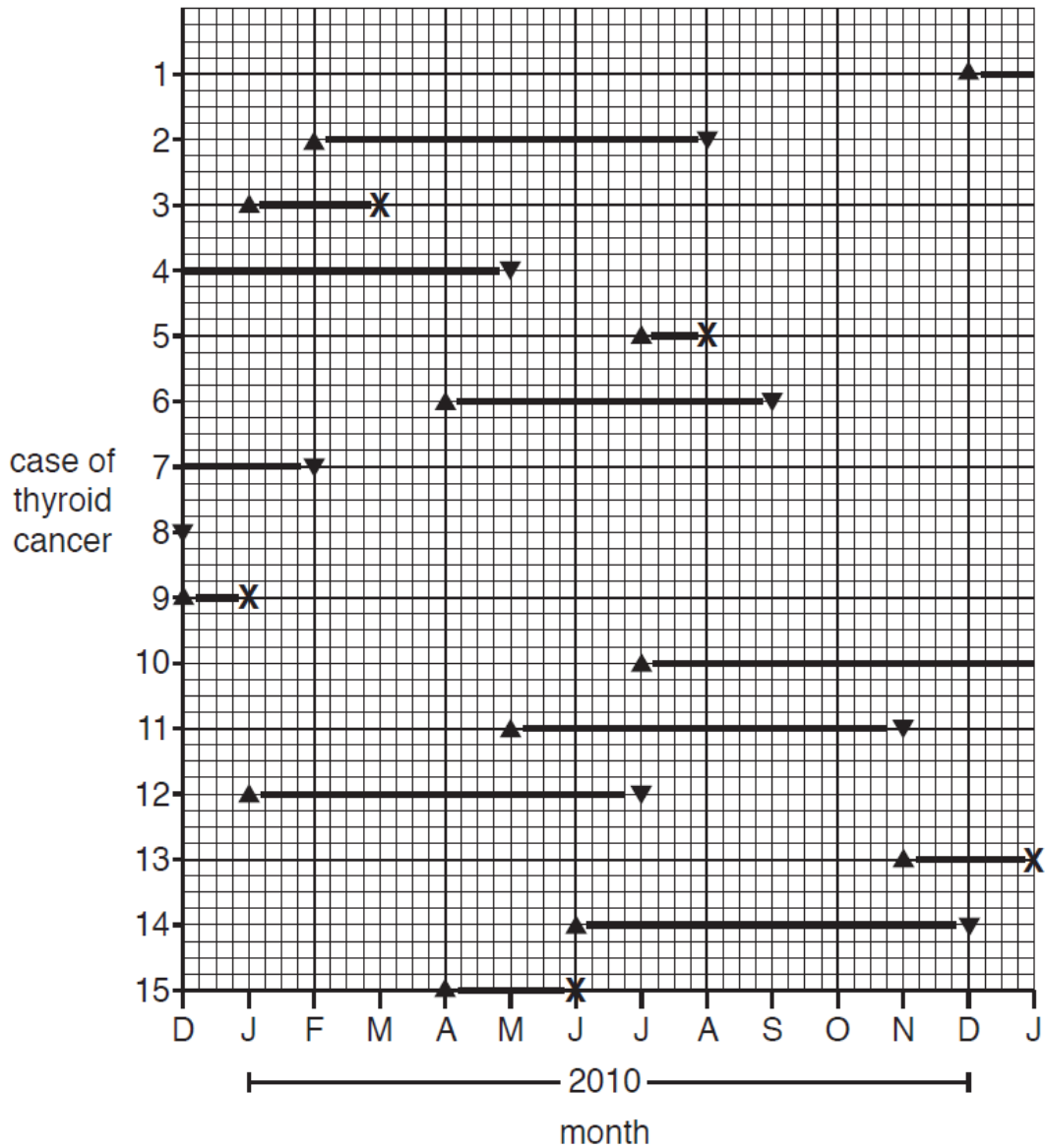
- A 0.11
- B 0.33
- C 0.67
- D 0.78

Your answer

[1]

- 9 15 cases of thyroid cancer were recorded in Iceland between December 2009 and January 2011.

The graph below shows, for each case, the month of diagnosis (▲) and month of recovery (▼) or death (X) from the disease.



Iceland has a population of 330 000 people.

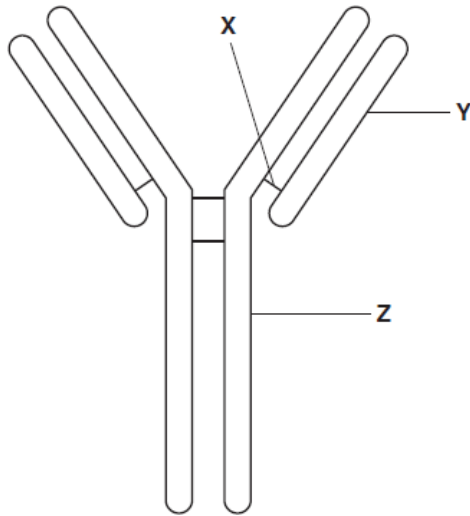
Which of the options, **A** to **D**, was the incidence rate (per 100 000) of thyroid cancer in 2010?

- A 2.1
- B 2.7
- C 3.3
- D 4.2

Your answer

10 The general structure of an antibody is shown below.

Three features are labelled **X**, **Y** and **Z**.



Which of the statements, **A** to **D**, is correct?

- A** **X** is a disulfide bond that connects the constant region of **Y** and the variable region of **Z**.
- B** **X** is a disulfide bond that connects the constant regions of **Y** and **Z**.
- C** **X** is a hydrogen bond that connects the constant region of **Y** and the variable region of **Z**.
- D** **X** is an ionic bond that connects the constant regions of **Y** and **Z**.

Your answer

[1]

11 An initial exposure to an allergen prepares the immune system for a rapid response upon repeated exposure. This process is known as sensitisation.

Which of the options, **A** to **D**, results in sensitisation to an allergen?

- A** binding of IgE to mast cells
- B** differentiation of B cells into plasma cells
- C** recognition of allergenic antigen by B and T cells
- D** secretion of IgE by plasma cells

Your answer

[1]

12 Scientists are producing a vaccine against a disease-causing bacterium.

The table below shows the locations and mutation rates of four proteins, **A** to **D**, in the bacterium.

	Protein location	Mutation rate (per amino acid)
A	cell membrane	2.1×10^{-4}
B	cell wall	4.3×10^{-4}
C	pilus	7.7×10^{-4}
D	ribosome	1.8×10^{-4}

Which of the proteins, **A** to **D**, is most suitable as the basis of a vaccine against this bacterium?

Your answer

[1]

13 Which of the options, **A** to **D**, is a cellular target of a bacteriostatic antibiotic?

- A** cell wall
- B** plasma membrane
- C** 70S ribosome
- D** 80S ribosome

Your answer

[1]

14 Here are three statements about the BRCA1 gene:

- 1 Women with mutations in BRCA1 are at increased risk of breast cancer.
- 2 BRCA1 mutations can be inherited by males.
- 3 BRCA1 is a proto-oncogene.

Which of the statements is/are correct?

- A** 1, 2 and 3 are correct
- B** only 1 and 2 are correct
- C** only 2 and 3 are correct
- D** only 1 is correct

Your answer

[1]

15 A mutation in a gene may cause the protein for which the gene codes to become inactive.

Which of the proteins, **A** to **D**, would promote the development of cancer if it were inactivated?

A EPO

B Myc

C p53

D Ras

Your answer

[1]

16 Which of the options, **A** to **D**, is a cancer therapy that damages **only** cancer cells?

A chemotherapy

B immunotherapy

C radiotherapy

D surgery

Your answer

[1]

17 The statements below relate to the causes and effects of emphysema.

Which of the following statements is/are correct?

1 Ventilation is impaired due to the destruction of elastic lung tissue.

2 The partial pressure of oxygen in the blood is decreased.

3 Tissue destruction is mediated by monocytes.

A 1, 2 and 3 are correct

B only 1 and 2 are correct

C only 2 and 3 are correct

D only 1 is correct

Your answer

[1]

18 Which of the options, **A** to **D**, is a molecule that requires vitamin C for its synthesis?

- A** collagen
- B** deoxyribonucleic acid
- C** haemoglobin
- D** rhodopsin

Your answer

[1]

Total Marks for Question Set 3: 18

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