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EXAM PREPARATION – PAPER 1**SECTION A: TYPICAL EXAM QUESTIONS – Total Time = 32 minutes ONLY****Question 1****5 minutes***(Taken from DoE Feb/March 2010 Paper 1)*

Various options are given as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1 to 1.5) in the ANSWER BOOK.

- 1.1 In a flowering plant, the fruit develops from the ...
A corolla.
B anther.
C calyx.
D ovary.
- 1.2 Which of the following statements are characteristic of DNA?
(i) Double-stranded helix
(ii) Sugar is deoxyribose
(iii) Found in the nucleus
(iv) Constant amount normally found in all the somatic cells of a particular species
A (i), (ii) and (iii) only
B (i), (ii) and (iv) only
C (ii), (iii) and (iv) only
D (i), (ii), (iii) and (iv)
- 1.3 Menstruation starts when the production of ...
A oestrogen and progesterone decreases.
B oestrogen is at its maximum.
C progesterone is at its maximum.
D oxytocin decreases.
- 1.4 In a breeding experiment between a parent showing the dominant phenotype and a parent showing the recessive phenotype, the offspring showed equal proportions of the dominant and recessive phenotypes. Which ONE of the following statements is TRUE?
A Both parents were heterozygous.
B Both parents were homozygous.
C Both parents carry at least one recessive gene.
D Only one parent carried at least one recessive gene.
- 1.5 In individuals with normal haemoglobin, the mRNA for haemoglobin includes the codon GAA. This sequence is changed in individuals with sickle cell anaemia so that their mRNA has a codon GUA at the same location. This suggests that the DNA has undergone a mutation involving a change of base sequence from ...
A CAA to TAA.
B CTT to CAT.
C CUU to CAT.
D CTT to CTA.

(5 x 1) = (5)

Question 2**5 minutes***(Taken from DoE Feb/March 2010 Paper 1)*

Give the correct biological term for each of the following descriptions. Write only the term next to the question number (2.1 to 2.7) in the ANSWER BOOK.

- 2.1. The period of development of an embryo in the uterus between fertilisation and birth
- 2.2. The structure formed from the Graafian follicle after ovulation
- 2.3. The structure containing enzymes at the tip of a sperm cell that makes contact with the egg cell during fertilisation
- 2.4. The transfer of pollen from anthers to a stigma
- 2.5. A genetic cross involving two characteristics at a time
- 2.6. The process of finding a desirable gene, isolating it and then moving it into the cells of another organism
- 2.7. The process by which amniotic fluid is drawn out of the uterus and examined to determine whether the unborn baby has a genetic disorder (7 x 1) = (7)

Question 3**5 minutes***(Taken from DoE Feb/March 2010 Paper 1)*

Indicate whether each of the statements in COLUMN I applies to A only, B only, both A and B or none of the items in COLUMN II. Write A only, B only, both A and B, or none next to the question number (3.1 –3.6) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Carries genetic material	A genes B chromosomes
1.3.2 The number, shape and arrangement of all chromosomes in the nucleus of a somatic cell	A karyotype B phenotype
1.3.3 An individual that has one dominant gene and one recessive gene for a particular characteristic	A homozygous B heterozygous
1.3.4 Prevents fertilisation	A contraception B conception
1.3.5 The formation of gametes	A spermatogenesis B oogenesis
1.3.6 The genotype of blood group AB	A $I^A i$ B $I^B i$

(6)

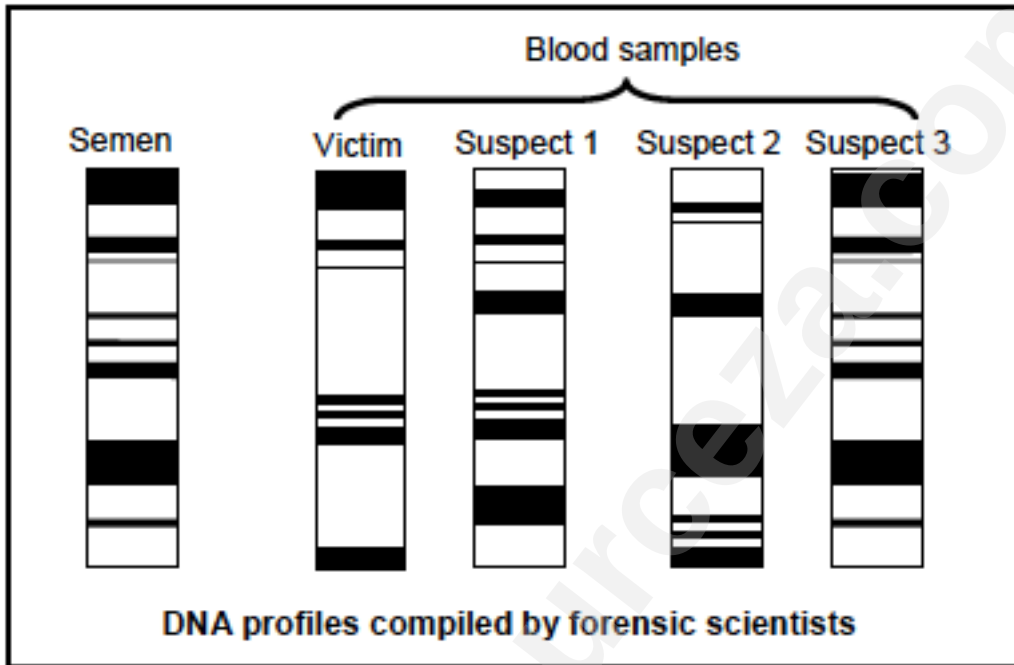
Question 4

8 minutes

(Taken from DoE Feb/March 2010 Paper 1)

Study the diagram below which shows the following DNA profiles/genetic fingerprints:

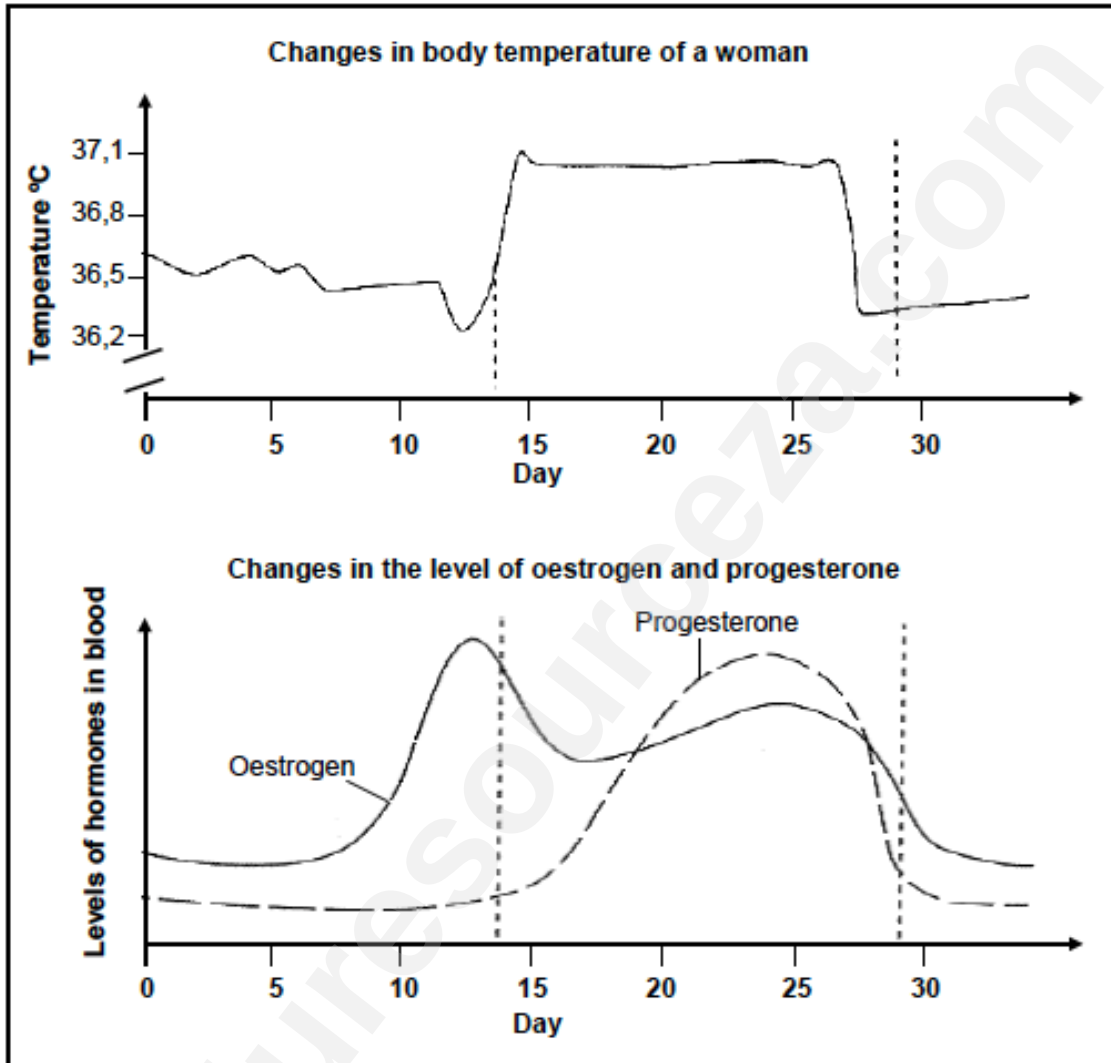
- Blood of a raped female victim
- Blood of three suspects
- Semen found on the female victim



- 4.1. Which suspect was most likely the rapist? (1)
- 4.2. Explain your answer to QUESTION 4.1. (2)
- 4.3. Give ONE reason why this evidence may be considered reliable. (1)
- 4.4. Give TWO reasons why this evidence may not be considered reliable. (2)
- 4.5. Name TWO benefits of DNA profiling other than for solving crimes. (2)

Question 5**9 minutes***(Taken from DoE Feb/March 2010 Paper 1)*

The following two graphs show the changes in temperature in a woman's body and the level of the hormones oestrogen and progesterone during the menstrual cycle. The release of the ovum takes place when there is a very small increase in body temperature.



- 5.1. What was the temperature of the woman on day 15? (2)
- 5.2. Calculate by how many degrees Celsius her temperature varied in one menstrual cycle. Show ALL workings. (2)
- 5.3. From the graph, name THREE factors that indicate that ovulation occurred. (3)
- 5.4. Explain the importance of the higher level of progesterone from day 15 onwards. (2)

SECTION B: SOLUTIONS AND HINTS SESSION 34

HINT: When answering multi-choice questions, read the question first and underline the important words, while covering the 4 possible answers. Think of the correct answer, and then check the answers available. Place a tick if the answer is correct and a x if the answer is wrong. Select the correct answer and write the letter next to the correct number. Do not doubt yourself. Do NOT waste time trying to figure it out. You only have 1 minute for each question.

Question 1**Example:**

1.1 The human testes are protected by the ...

- A scrotum. ✓
- B prostate gland. x
- C bladder. x
- D seminal vesicles. x

1.1 A ✓

1.2 D ✓

1.3 D ✓

1.4 B ✓

1.5 C ✓

5 x 1 = (5)

Question 2**HINT:**

Read the question and underline the important words. Think of the correct answer. Write the word down. When you have completed all the biological terms, check that you still agree with the answer. Write the numbers down on your answer sheet and then write the correct term next to each one.

Example:

2.1. The offspring produced from a fertilised egg cell or zygote which subsequently divides into two separate balls of cells

- 2.1 Identical twins /monozygotic twins/ maternal twins ✓
- 2.2 Amniocentesis ✓
- 2.3 Genome ✓
- 2.4 Haemophilia ✓
- 2.5 Chiasma ✓
- 2.6 Labour ✓

(6)

Question 3

HINT:

When doing column A and B, read through ALL the statements in Column A and underline the important words. Then read through the answer options in Column B. Then go back and read each statement. Now look at the options in Column B and select the most correct answer. Write the letter next to the number of the statement on your question paper and cross out the option that you selected in Column B, so that you do not get confused or have to read through all the options for each new statement.)

Example:

	COLUMN A	COLUMB B
1.3.1 B	The <u>appearance</u> of an organism as a result of its genetic makeup <i>Then move on to the next statement and follow the same process</i>	A genotype B ~~phenotype~~ C homozygous

- 3.1 B ✓
 3.2 D ✓
 3.3 E ✓
 3.4 H ✓
 3.5 F ✓

(5)

Question 4

HINT:

Make sure that you learn diagrams and know the labels. When you learn diagrams, write down the function of each of the parts next to the label. This way, you will learn the labels and the functions at the same time. It will assist you when you learn how the parts work because you will already know the structure - where it is situated and what it does.

REMEMBER:

Mitosis is for growth, repair, replacement and reproduction in single-celled organisms.

Meiosis is for sexual reproduction – so the chromosome pairs must separate, so that the 2 halves = haploid gametes (1 from male and 1 from female) will join to make 1 whole diploid zygote when fertilization takes place.

Meiosis has two parts:

1. Division of nucleus/ halving of the chromosome number – 2 haploid structures
2. Duplication of the haploid gametes.

Interphase (chemical change in the cell to get ready for cell division); Prophase (crossing over at chiasma of chromosomes, for exchange of genetic material and genetic variation, and chromosomes are scattered all around the nucleus – not ordered); Metaphase (chromosomes are lined up and ordered on the equator, karyokinesis takes place – meaning splitting of nucleus); Anaphase (chromosomes are ordered but are located near the poles); Telophase (chromosomes are located at the poles and cell plate begins to form in plant cells and in animal cells, an invagination forms). Late Telophase, the nucleus divides into two separate structures). Remember that for meiosis, 4 haploid gametes result that are unidentical.]

- 4.1 (a) Spindle fibres ✓ (1)
- (b) Centromere ✓ (1)
- 4.2 (a) Metaphase 2 ✓ (1)
- (b) Anaphase 1 ✓ (1)
- 4.3 Crossing over ✓ (1)
- 4.4 2 ✓ (1)
- 4.5 - Exchange of genetic material ✓ introduces genetic variation ✓
 - Reduction of chromosome number to haploid number ✓ to keep the chromosome number constant from generation to generation ✓
 - Forms four haploid cells ✓ which function as gametes ✓ - Independent Assortment ✓ to cause genetic variation ✓ **any 2 x 2** (4)

[10]

Question 5

HINT:

When you are given a pedigree chart, carefully look at the key. In this case, a **bent little finger** is the dominant gene trait/characteristic, so the only individuals you can be sure of, will be the **homozygous recessive gene trait**/characteristic. Now mark all the homozygous recessive (ff) individuals based on the information on the pedigree chart on the question paper – this will mean that all the unshaded/white $\square + O$ will be ff. Now, if a child is produced that is unshaded/white $\square$ or O (ff) and both parents are shaded/black – then the parents MUST EACH have a recessive gene present PLUS a dominant gene – so parents will be Ff. Parents with Ff can produce children that are FF, Ff and ff. From this, you will be able to answer the questions very easily.

- 5.1 10 ✓ (1)
- 5.2 Heterozygous ✓ (1)
- 5.3 Bent little finger ✓ (1)
- 5.4 Only two parents showing dominant features ✓ can produce offspring showing both ✓ phenotypes ✓/bent and straight little finger
OR
 Two parents with straight little fingers ✓ must be homozygous recessive ✓ to produce offspring all with only straight little fingers ✓ (3)
- 5.5 25 ✓✓% ✓ / $\frac{1}{4}$ ✓✓ / 1:4 ✓✓ (2)
- 5.6 No ✓ (1) [Explanation: a boy (G) and a girl (F) have different sexes and genes. This means that there were two eggs fertilised - this is called fraternal or dizygotic twins (2 zygotes were formed)] – see answer to 5.7.
- 5.7 - G is male and F is female ✓ / different sexes/non-identical/fraternal/dizygotic
 - F has a bent little finger and G has a straight little finger ✓
(Mark first TWO only) (2)