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EXAM PREPARATION – PAPER 1**SECTION A: TYPICAL EXAM QUESTIONS****Question 1:** **10 marks** **10 minutes** (*Taken from DoE Feb/March 2010 Paper 1*)

In rabbits the dominant allele (B) produces black fur and the recessive allele (b) produces white fur. Study the table below showing the genotypes of four rabbits.

Rabbit	1	2	3	4
Genotype	BB	Bb	Bb	bb

- 1.1. What are the phenotypes for rabbits 2 and 4 respectively? (2)
- 1.2. State the genotypic ratio that is shown in the table above. (1)
- 1.3. If rabbits 1 and 4 were mated together and had 12 offspring, how many of these would you expect to be black? (1)
- 1.4. Rabbit 2 was allowed to breed with rabbit 3. Use a genetic cross to show the possible phenotypes and genotypes of the F1 generation for fur colour. (6)

[10]**Question 2:** **8 marks** **8 minutes** (*Taken from DoE Feb/March 2010 Paper 1*)

Study the table below which shows the relationship between the age of a mother and the risk of having a Down's syndrome baby.

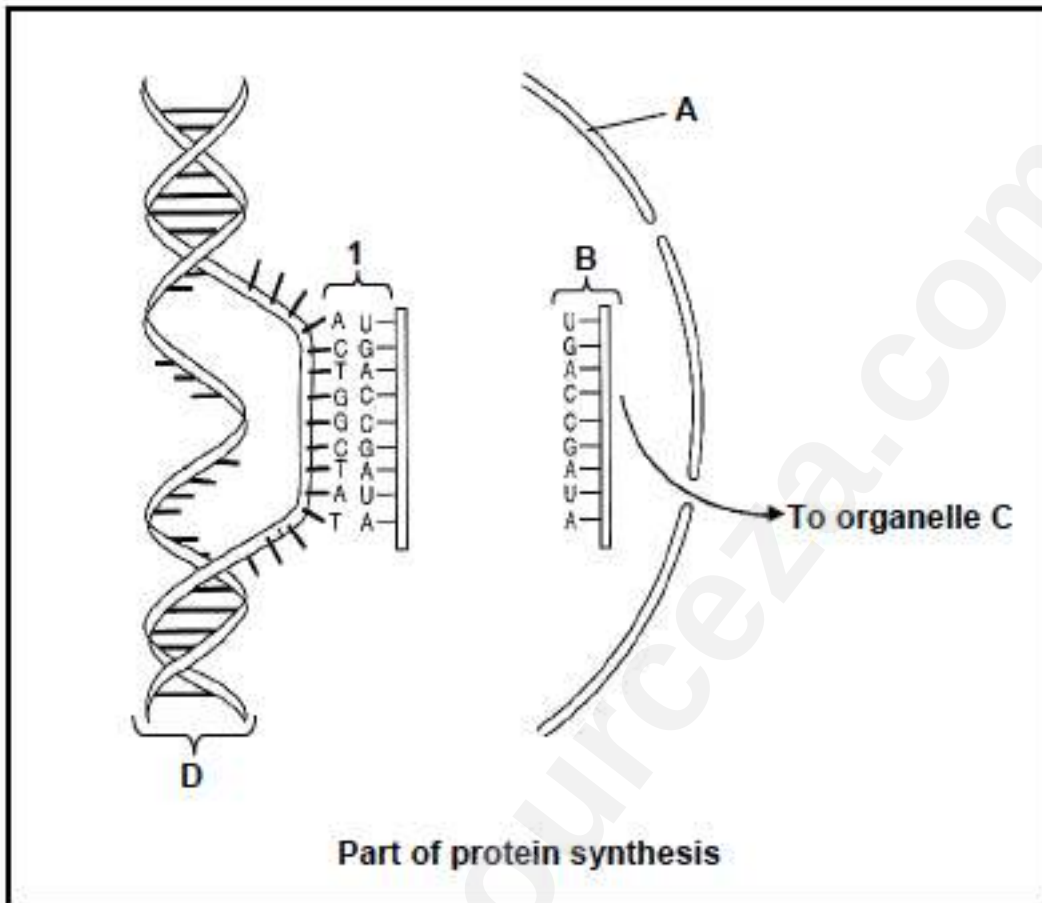
Age of mother (years)	Risk of Down's syndrome baby (per 10 000 births)
25	8
35	25
45	200

- 2.1. State the relationship between the mother's age and the chance of having a baby with Down's syndrome. (2)
- 2.2. By how many times does the risk of having a baby with Down's syndrome increase between 35 and 45 years of age? (1)
- 2.3. How many chromosomes are present in a cell of the body of a baby with Down's syndrome? (1)
- 2.4. Explain why a person with Down's syndrome has an abnormal number of chromosomes. (4)

[8]

Question 3: 13 marks 12 Minutes (Taken from DoE Feb/March 2010 Paper 1)

Study the diagram that follows; it shows part of the process of protein synthesis.



- 3.1. Provide labels for structures A, B and D respectively. (3)
 - 3.2. State ONE function of molecule D. (1)
 - 3.3. Which part of protein synthesis takes place at 1? (1)
 - 3.4. Name the type of proteins that control the process named in QUESTION 2.3. (1)
 - 3.5. Identify organelle C. (1)
 - 3.6. Name and describe the part of protein synthesis that takes place at organelle C. (6)
- [13]**

Question 4: 6 marks 6 Minutes (Taken from DoE Feb/March 2010 Paper 1)

An investigation was conducted by grade 12 learners on fruit flies to determine the genotypic and phenotypic ratios of the F₂ generation. They placed 12 homozygous red-eyed females in a flask with 12 homozygous white-eyed males. The flask contained a ripe fruit and the opening of the flask was covered with cotton wool. After three weeks the F₁ offspring were crossed and the results (F₂) are shown in the table on the following page.

	Number of offspring (F ₂)
Red-eyed	27
White-eyed	9

- 4.1. Give TWO reasons why cotton wool was used. (2)
- 4.2. State ONE way in which the reliability of the results could be improved. (1)
- 4.3. Using the symbols R and r to represent the alleles for eye colour, state all the possible genotypes of the:
- (a) Red-eyed fruit fly of the F₂ offspring
- (b) White-eyed fruit fly of the F₂ offspring (3)

[15]

SECTION B: SOLUTIONS AND HINTS TO SESSION 35

Question 1

[**Hint:** When answering Multi-choice: read the question first and underline the important words, while covering the 4 possible answers. Think of the correct answer, 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.]

Example:

- 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) ✓ - Written on the question paper

- 1.1 D✓
- 1.2 D✓
- 1.3 A✓
- 1.4 C✓
- 1.5 B✓

[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 period of development of an embryo in the uterus between fertilisation and birth

2.1 Gestation / pregnancy ✓

2.2 Corpus luteum ✓

2.3 Acrosome ✓

2.4 Pollination ✓

2.5 Dihybrid ✓

2.6 Genetic engineering ✓/biotechnology/gene manipulation/genetic modification/DNA recombination

2.7 Amniocentesis ✓

[7]

Question 3

[Hint: When doing Column I and II, read through ALL the statements in Column I and underline the important words. Then read through the answer options in Column II next to each statement. Then go back and read each statement. Now look at the options in Column II and ✓ the correct answer and □ the wrong answer that does not relate to the statement. Then you will be able to see if it is A or B or A and B or neither statement.]

Example:

	COLUMN A	COLUMB B
1.3.1	Carries genetic material A and B	A genes ✓ B chromosomes ✓

3.1 Both A & B ✓/A & B

3.2 A only ✓/A

3.3 B only ✓/B

3.4 A only ✓/A

3.5 Both A & B ✓/A & B

3.6 None ✓

[6]

Question 4

[Hint: for any question that shows a genetic profile, read the information given carefully first. Then take a look at the DNA profiles. ALWAYS use a ruler. Now, for this question, align the ruler with the semen sample and Suspects 1 to 3. Tick next to each of the same line widths that you find. There must be 4 or more of the same profile 'lines' (DNA markers) to link the Suspect and the sample. In this question, it is very clear that Suspect 3 is the rapist]

4.1 3 ✓

(1)

4.2 The DNA profile of the semen ✓ found on the female victim matches the DNA profile of the blood of suspect 3 ✓

(2)

- 4.3 Everybody, except for identical siblings/twins, has a unique/individual DNA profile ✓(1)
- 4.4 Require a large length of DNA to get accurate profile ✓
 Deliberate swapping of specimens in the laboratory ✓
 Human error in laboratory ✓ **any (2) (Mark first TWO only)** (2)
(The question is actually not correct. It asks for two reasons why genetic profiling evidence may be considered not reliable, when, in fact, the genetic evidence is always accepted by a Court of Law, if the sample was taken by a legal authority, like a district surgeon, in a legally accepted manner and proper facility. It will also need to be reported that the sample was not tampered with in any way between collection and DNA profiling. However, the Defence may argue that this Suspect 3 had consensual sex but that the real rapist used a condom, etc, but the point is that DNA profile will always be accepted as reliable evidence if proper protocols were followed.)
- 4.5 Determine genetic disorders ✓
 Paternity tests ✓
 Determine identity of dead persons ✓
 Research into variation in populations ✓
 Tracking individuals in population e.g. cycads in South Africa ✓ **(Mark first TWO only)** (2)
[8]

Question 5

[**Hint:** Always use a ruler to read information from a graph. If you are provided with two graphs, check whether they are linked. Remember that ovulation occurs on about the 14th day when oestrogen levels are high. You are informed that the body temperature increases slightly when the ovum (egg cell) is released. Always read any information given in a question carefully and underline operative (important) words. Read the information a 2nd time if you need to ensure that you understand it. Only then do you move on to the questions.]

- 5.1 37 ✓ °C ✓ (accept 36,9 to 37,1) (2)
- 5.2 (37,1 – 36,2) ✓ = 0,9 ✓ °C (2)
- 5.3 The temperature rose ✓
 The oestrogen level has started to decrease ✓
 The progesterone levels starts to increases ✓ **(Mark first THREE only)** (3)

[**Hint:** the important word in this question is that ovulation 'occurred'. They want you to show understanding of the changes that start to take place **after** ovulation and not before or during. All the clues are found in the graphs and will show your skill and ability to read data and then draw a conclusion based on the facts as they are represented in the graphs.]

- 5.4 Progesterone is secreted/released to maintain the thickness ✓ of the endometrium
 /uterus lining ✓/prepare the uterus lining for the embryo ✓ (2)
[9]