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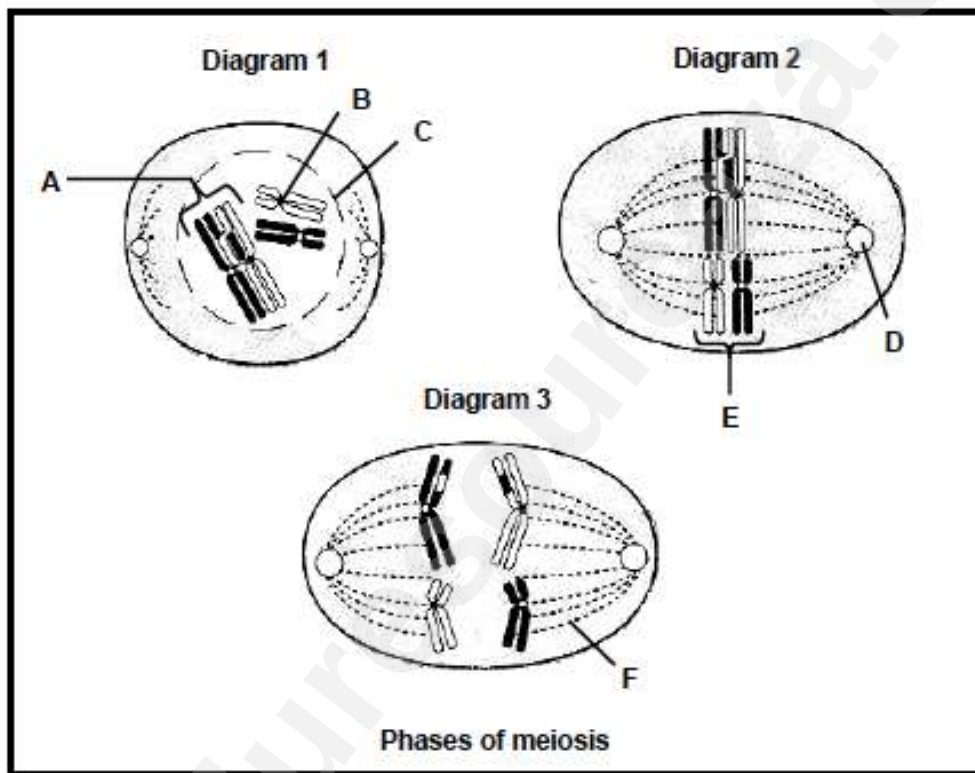
CONSOLIDATION EXERCISES

Learner Note: Please take careful note of the time allocation. You will only be allowed the specific time allocated, to complete each question. When there are diagrams, remember that you must always first write in the labels that you know, onto the diagrams before answering the questions that follow below. Underline important information that is given to you in the question. Remember to underline the words that indicate what the question is asking. Take careful note of the mark allocations.

QUESTION 1: 13 minutes

(Taken from DoE Additional Exemplar 2008 Paper 1)

The diagrams below represent phases of meiosis. **(Remember to first label the diagram before going on to the questions.)**



- 1.1 Name the process taking place at A. (1)
- 1.2 Identify structures B, C, D and E. (4)
- 1.3 State ONE function of F. (2)
- 1.4 What phase of meiosis is represented in Diagram 2? (2)
- 1.5 Give a reason for your answer to QUESTION 2.1.4. (2)
- 1.6 How many chromosomes are shown in Diagram 3? (1)
- 1.7 Name ONE organ in the human female body where the process of meiosis will occur. (1)

QUESTION 2: 7 minutes (Taken from DoE Additional Exemplar 2008 Paper 1)

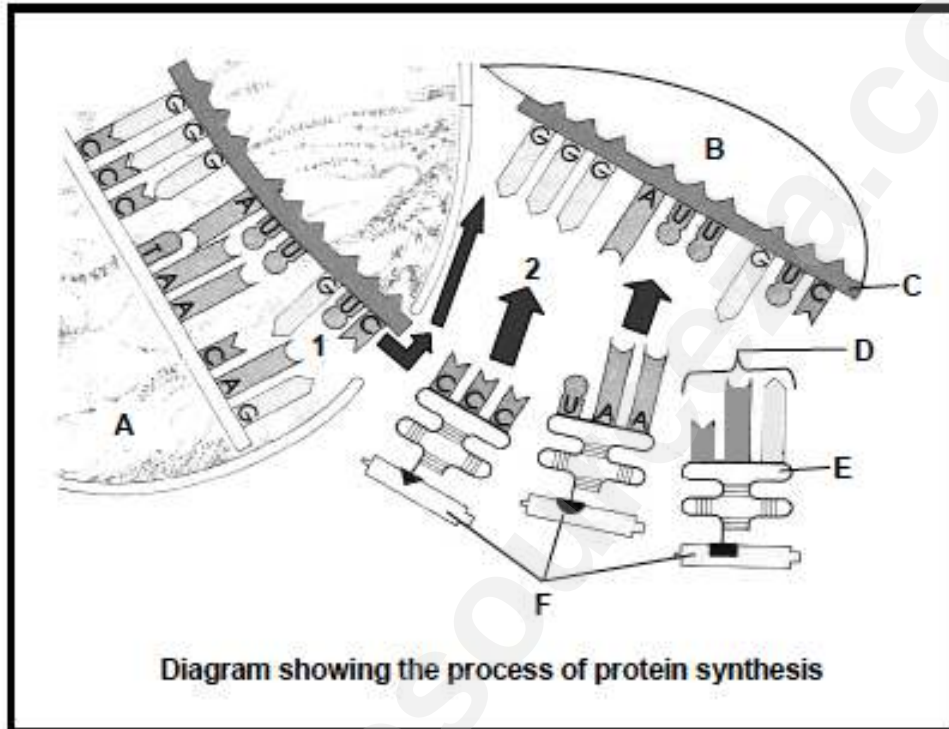
Tabulate THREE differences between DNA and RNA.

(Remember to give your table a suitable heading/caption. Compare the same characteristics for each of the columns. (7)

QUESTION 3: 10 minutes (Taken from DoE Additional Exemplar 2008 Paper 1)

Study the diagram below which shows the process of protein synthesis.

(Remember to label the diagram first and then move onto the questions.)



- 3.1 Identify organelles A and B respectively. (2)
- 3.2 Label structures C, E and F respectively. (3)
- 3.3 Which stage of protein synthesis is represented at:
 - (a) 1 (1)
 - (b) 2 (1)
- 3.4 Write down the anticodon that reads from left to right at D. (3)

QUESTION 4: 10 minutes

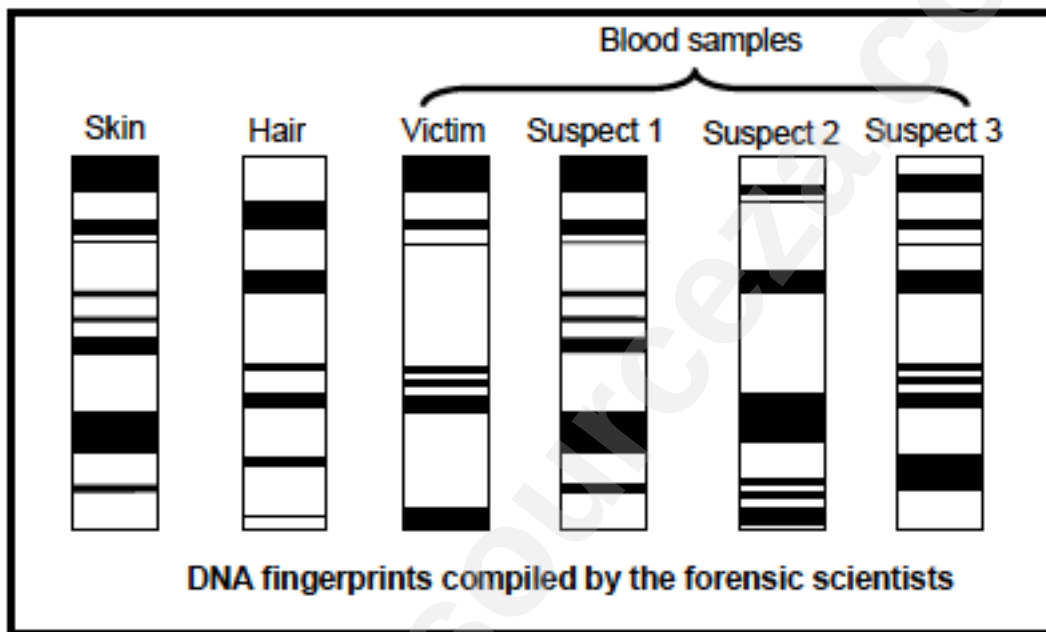
(Taken from DoE Exemplar 2008 Paper 1)

A woman was found stabbed to death in a hotel. The police found a few strands of hair in her one hand. There was also skin tissue under her long nails.

Forensic scientists took blood samples from three suspects to compile DNA fingerprints. DNA fingerprints were also compiled from the victim's blood and the hair and skin tissue found in the victim's hands.

The following diagram shows the DNA fingerprints of the hair sample, the skin tissue sample and blood from the victim and the three suspects.

(Remember to use a ruler horizontally so that you do not make a mistake when comparing the VNTR markers.)



- 4.1 Did the DNA from the hair and skin tissue come from the same person? (1)
- 4.2 What conclusion can you make from QUESTION 4.1 about the possible number of people involved in the murder? (2)
- 4.3 Which of the three suspects might have been involved in the murder? (1)
- 4.4 Give a reason for your answer to QUESTION 4.3. (1)
- 4.5 Do you think that the DNA evidence on its own is enough to convict a suspect? (1)
- 4.6 Give a reason for your answer to QUESTION 4.5. (2)
- 4.7 Explain whether the collection of DNA from every citizen in South Africa to create a DNA fingerprint database is a good idea or not. (2)

SECTION B: SOLUTIONS

- 1.1 Crossing over (1)
- 1.2 B – Centromere (1)
C – Nuclear membrane (1)
D – Centrosome/centriole (1)
E – Homologous chromosomes (1)
- 1.3 Part F/Spindle threads contract✓ to move chromosomes✓ towards opposite poles
Allow for the attachment✓ of chromosomes✓ (any 1 x 2) (2)
(Mark first ONE only)
- 1.4 Metaphase1 ✓✓
- 1.5 Chromosomes arranged along the equator✓ in homologous pairs✓ (2)
(Mark first one only)
- 1.6 4 (1)
- 1.7 Ovary(1)
(Mark first ONE only)

2.

DNA	RNA
1. Double helix/double stranded	1. Single strand
2. Sugar is deoxyribose	2. Sugar is ribose
3. Thymine is a base	3. Uracil is a base
4. Equal number of A = T and G = C	4. Bases in any number and ratio
5. Occurs in the nucleus only	5. Occurs in the nucleus and cytoplasm

any 3 x 2 = 6+1 for table

(Mark first THREE differences only) (7)

- 3.1 A –Nucleus✓
B –Ribosome✓ (2)
- 3.2 C –mRNA✓
E –tRNA✓
F - Amino acids✓ (3)
- 3.3 (a) Transcription (1)
(b) Translation (1)
- 3.4 C✓A✓G✓(3)

- 4.1 No (1)
 4.2 There was more than 1 person involved in the murder✓✓/possibly 2✓✓ (2)
 4.3 Suspect 1 (1)
 4.4 The DNA fingerprint of the skin found under the victim's fingernail matches the DNA fingerprint of suspect 1 (1)
 4.5 No (1)
 4.6 - The hair/skin tissue could have been planted✓ at the crime scene✓
OR
 - The DNA from the skin tissue could have been under the victim's finger nails✓
 - before the murder✓
OR
 - The suspect may have an identical twin✓ who has the same DNA fingerprint✓
OR
 - The samples taken may be mixed✓ with others✓ in the laboratory (2)
 4.7 Tracing criminals✓ would be made easier✓
OR
 It infringes on the rights of people✓ who might not want their fingerprint done✓
OR
 It would cost the country too much money✓ which could be used for basic needs like food/housing✓ (2)

SECTION E: SOLUTIONS TO SESSION 12 HOMEWORK

1.

✓P₁ phenotype
 genotype

Brown x Grey ✓
 Bb x bb✓

✓Meiosis

G₁

B, b x b✓

✓Fertilization

F₁ genotype
 phenotype

Bb ; bb✓
 1 brown; 1 grey✓

OR

gametes	b
B	Bb
b	bb

1 mark for correct gametes
 1 mark for correct genotypes

Allocation of marks

Showing the P₁(parents), G₁(gametes) and F₁(offspring) generation – 1 mark

Showing meiosis – 1 mark

Showing fertilisation – 1 mark

Each correct step of problem – 5 marks

(8)

2.

P₁ ✓ phenotype
genotype

Red x white ✓
RR x rr ✓

Meiosis

G

R x r ✓
V
Rr ✓
red ✓

gametes	R	r
R	RR	Rr
r	Rr	rr

1 mark for correct gametes
1 mark for correct genotypes

Fertilization

F₁ ✓ genotype
phenotype

max (6)