Surname	Centre Number	Candidate Number
First name(s)		4

LEVEL 3 CERTIFICATE / DIPLOMA

4463U10-1

O20-4463U10-1

MONDAY, 12 OCTOBER 2020 – AFTERNOON

MEDICAL SCIENCE

UNIT 1: Human Health and Disease

2 hours

	For Examiner's use only		
	Question	**Maximum Mark**	**Mark Awarded**
Section A	**1-9.**	**25**	
Section B	**10.**	**8**	
	11.	**7**	
	12.	**12**	
	13.	**12**	
	14.	**8**	
	15.	**5**	
	16.	**13**	
	Total	**90**	

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01

ADDITIONAL MATERIALS

You will need the resource folder that contains the pre-release article.

You will need a calculator and ruler for this examination.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The total number of marks for this paper is 90.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

Questions in Section A are based on the pre-release article.

You should show your working to calculations.

Examiner only

SECTION A

Answer **all** *questions.*

1. List **three** possible symptoms of haemophilia. [1]

.....

.....

.....

2. State the term used to describe an inherited genetic condition that usually affects one gender. [1]

.....

3. Cartilage degeneration can occur in haemophiliacs. State the role of cartilage in a synovial joint. [1]

.....

.....

4. Haemophilia is an inherited condition. Using $\mathbf{X^h}$ to represent the haemophilia allele, complete the genotypes and Punnett square below to show the probability of having a female child that suffers from haemophilia when both parents have one mutated gene. [3]

	Mother	Father
Genotype:	.....	.....
Phenotype:	Carrier	Haemophiliac

Probability = ...

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5. Describe how injury to a blood vessel can lead to severe bleeding in haemophilia. [2]

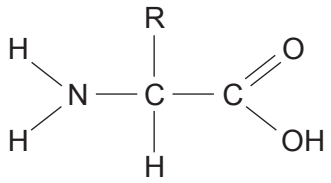
.....

.....

.....

6. Proteins are involved in blood clotting.

(a) The molecule below is a monomer of proteins.



(i) Name this monomer. [1]

.....

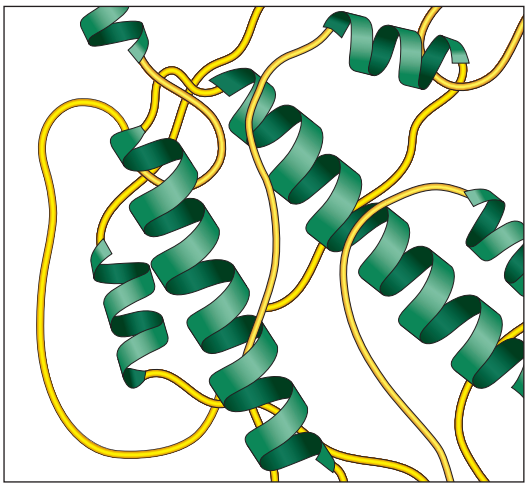
(ii) State the name of the bond that is formed between two of these monomers. [1]

.....

(iii) Name **two** products formed when these monomers are joined. [2]

.....

(b) Factor VIII is a tertiary protein. Part of the structure of Factor VIII is shown below.



(i) Label with an **S** a region of secondary protein structure. [1]

(ii) Name **two** types of bond found within the tertiary structure of this protein. [1]

.....

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7. State what is meant by **preventative** and **on-demand** treatment for haemophilia. [2]

Preventative: .....

.....

On-demand: .....

.....

8. Explain why a haemophiliac is advised not to take blood-thinning medication. [2]

.....

.....

.....

9. *(a)* With reference to **Table 1**, suggest why the total number of mild haemophilia A sufferers on the register is lower than for severe haemophilia A. [2]

.....

.....

(b) With reference to **Table 2**, describe and explain the overall trend in the total number of new cases of haemophilia A with age. [2]

.....

.....

.....

(c) Use **Table 3** to answer the following question.

(i) Suggest a reason for the number of patients being treated for haemophilia in London's Great Ormond Street Children's hospital being significantly higher than the other centres. [1]

.....

.....

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(ii) Calculate the number of clotting factor units used in Cardiff as a percentage of the total number of units used in all selected centres. [2]

Answer = ... %

25

Examiner only

SECTION B

Answer **all** *questions.*

10. Physiological measurement testing is essential in the diagnosis of medical conditions.

(a) Describe the method used for measuring peak flow. [3]

.....

.....

.....

.....

.....

.....

(b) Describe **one** limitation for each of the following tests. [3]

Peak flow: .....

.....

Blood pressure: .....

.....

Electrocardiogram: .....

.....

(c) Data collected from physiological testing is compared with standard values. Define the terms **primary** and **secondary** data. [2]

Primary data: .....

.....

Secondary data: .....

.....

8

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11. DNA undergoes semi-conservative replication.

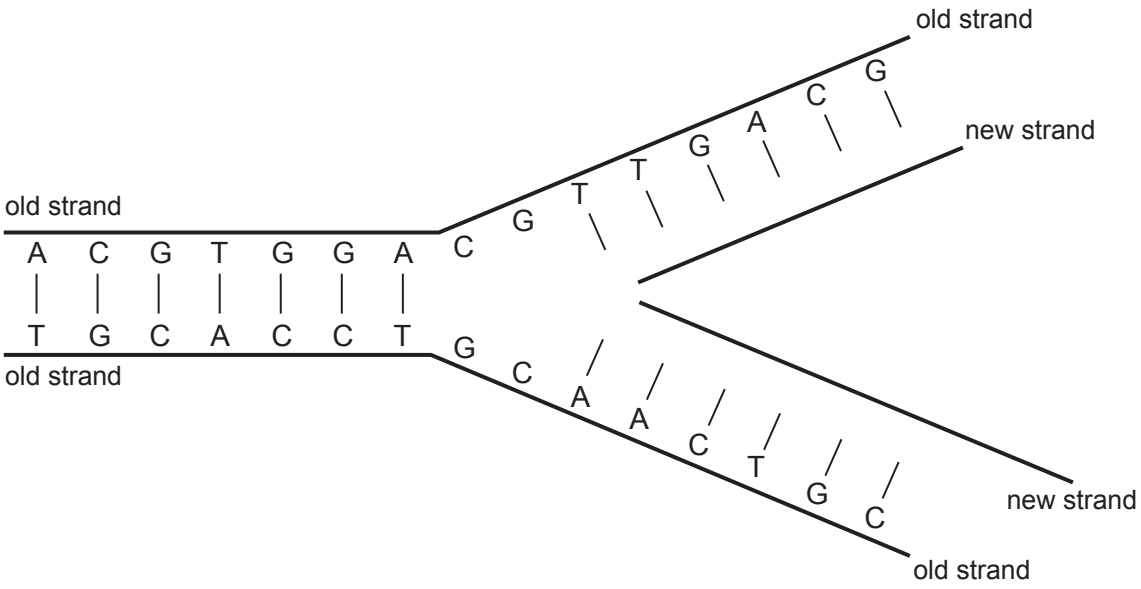
(a) State what is meant by the term *semi-conservative replication*. [2]

.....

.....

.....

A diagram of the replication fork for DNA is shown below.



(b) Add bases to complete the new DNA strands on the replication fork. [1]

(c) Describe the role of the following enzymes in replication.

(i) DNA helicase. [2]

.....

.....

(ii) DNA polymerase. [2]

.....

.....

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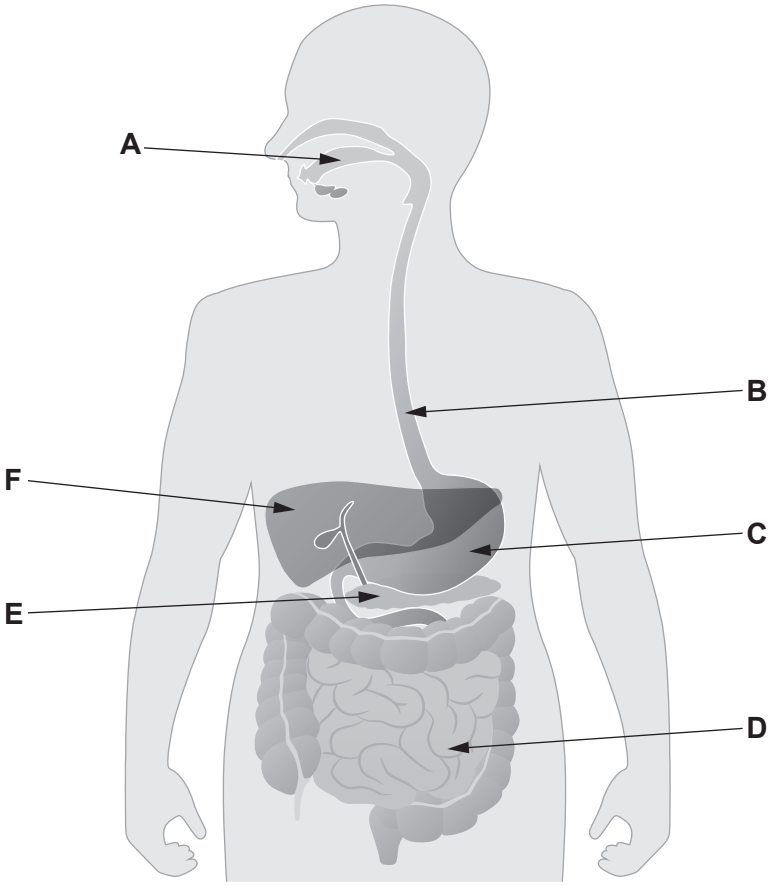
12. A diagram of the digestive system is shown below.



(a) Match the statement with **one** correct letter from the diagram. [4]

The site where digestion is completed. ☐

The structure that produces pepsinogen. ☐

A site of mechanical digestion. ☐

A structure that produces amylase. ☐

(b) Explain the role of bile in digestion. [2]

.....

.....

.....

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(c) Describe the role of mucus in digestion. [2]

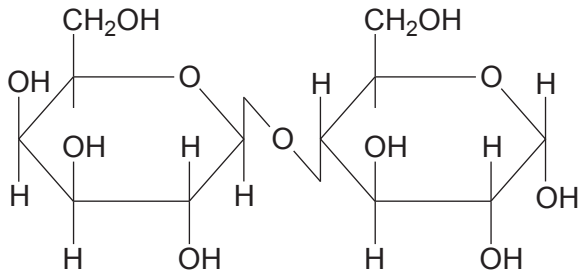
.....

.....

.....

.....

(d) The diagram below shows a lactose molecule.



(i) Name the bond that is broken during the digestion of lactose. [1]

.....

(ii) Name the enzyme that digests lactose and state the products of this digestion. [3]

Enzyme: .....

Products: .....

12

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13. Chlamydia cases are monitored on an annual basis.

(a) (i) Name the **type** of microorganism that causes chlamydia. [1]

.....

(ii) State the mode of transmission for chlamydia. [1]

.....

(iii) State **two** effects of chlamydia on the body. [2]

.....

.....

(b) The table below shows the number of chlamydia diagnoses for selected areas across Wales.

Area	Gender	Number of diagnosed cases of chlamydia		% Change in number of cases diagnosed between 2016 and 2017
		2016	**2017**	
Abertawe Bro Morgannwg	Female	384	343	–11
	Male	285	225	–21
Betsi Cadwaladr	Female	251	309	23
	Male	216	237	10
Cardiff & Vale	Female	428	524	22
	Male	332	426	28
Hywel Dda	Female	185	200	8
	Male	150	130	.....

(i) Complete the table. [2]

Use the space below for your workings.

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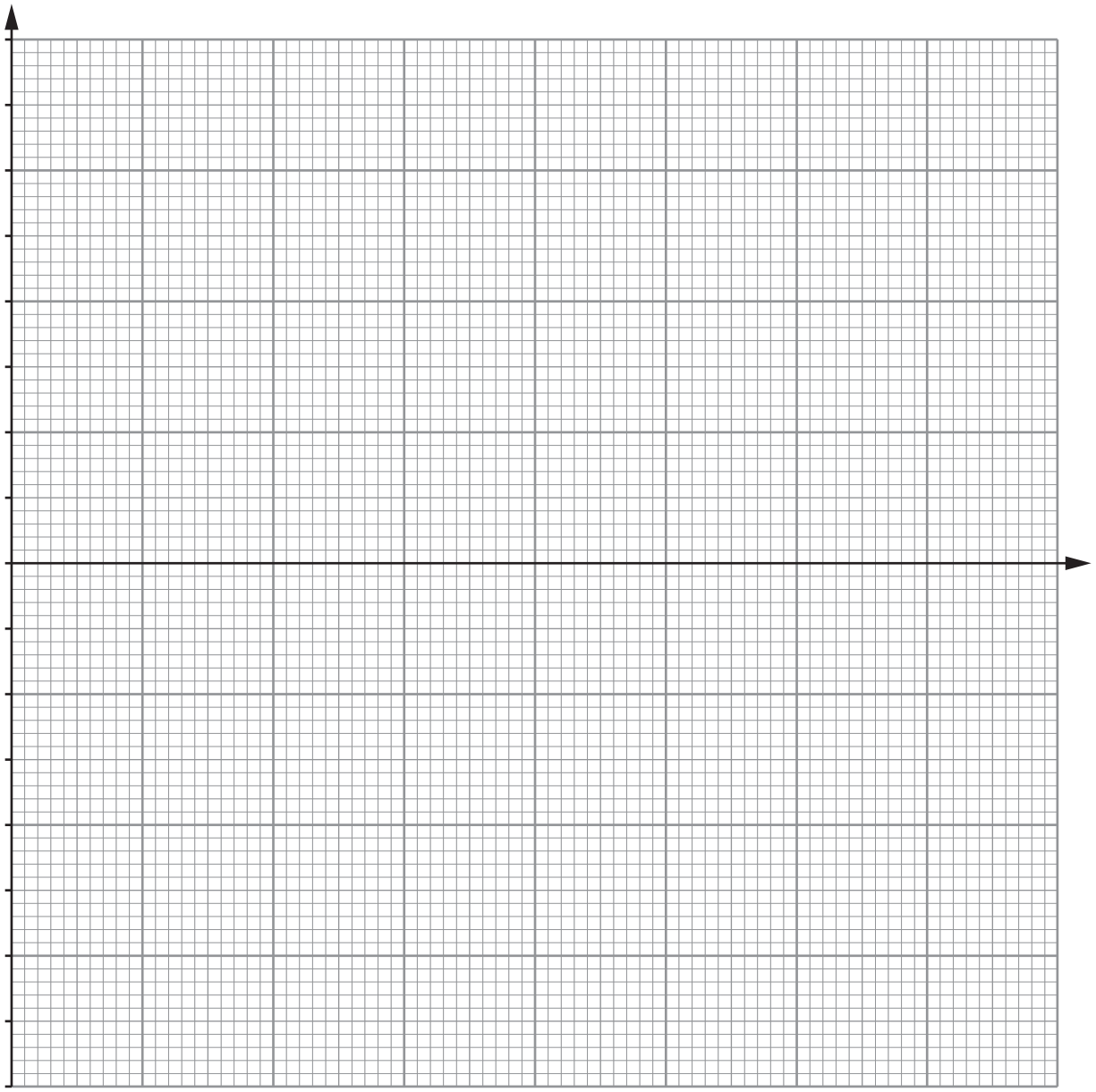
(ii) Plot a graph of percentage change in number of cases diagnosed for both males and females for each area on the grid below. [4]



(iii) Compare the trends for **Abertawe Bro Morgannwg** and **Betsi Cadwalader** areas. [2]

.....

.....

12

Turn over.

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14. In Wales there has been a 71% increase in the number of hospital admissions related to cannabis use and an 81% increase in admissions for cocaine use since 2015.

Despite new advice issued in 2016, suggesting a reduced recommended weekly intake of no more than 14 units a week, hospital admissions associated with alcohol use are still twice as high as those associated with drug use.

(a) Suggest **three** reasons why alcohol use has a higher risk associated to it than drug use. [3]

.....

.....

.....

.....

(b) State **two** possible health consequences of cocaine misuse. [2]

.....

.....

.....

(c) Explain how housing and employment could have an effect on the increase in the number of people misusing alcohol or drugs. [2]

Housing: .....

.....

Employment: .....

.....

(d) Suggest a further initiative that could be introduced to reduce alcohol consumption. [1]

.....

.....

8

Examiner only

15. A clinical trial compares the effect of treatments. This information is used by doctors to help them to understand how to treat a condition. At the end of a trial the research is published and made available to everyone that took part and to any person that wishes to know the result.

(a) Define the following terms associated with clinical trials.

(i) Independent variable [1]

.....

.....

.....

(ii) Extraneous variable [1]

.....

.....

.....

(iii) Self-selected sampling [1]

.....

.....

.....

(iv) Null hypothesis [1]

.....

.....

.....

(b) Suggest **one** way that a researcher could reduce bias when selecting their sample for a clinical trial. [1]

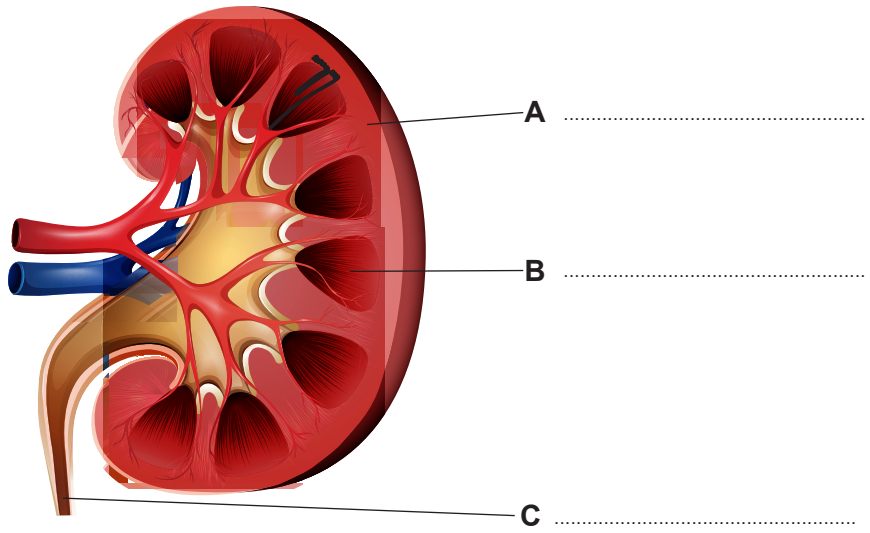
.....

.....

5

Examiner only

16. A diagram of a kidney is shown below.



(a) (i) Label **A**, **B** and **C** on the diagram. [3]

(ii) Circle the nephron. [1]

(iii) State the body system that contains the kidney. [1]

.....

(b) (i) Selective reabsorption of glucose occurs in the nephron. Name the mechanism by which the glucose moves across a membrane. [1]

.....

(ii) State the part of the nephron where selective reabsorption occurs. [1]

.....

(iii) Water is also reabsorbed in the nephron. State the process by which the water will be reabsorbed back into the blood stream. [1]

.....

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(c) Describe and explain the role of ADH in osmoregulation. [5]

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13

END OF PAPER