



National  
Qualifications  
SPECIMEN ONLY

**S840/76/12**

**Human Biology  
Paper 1 — Multiple choice**

Date — Not applicable

Duration — 40 minutes

**Total marks — 25**

Attempt ALL questions.

**You may use a calculator.**

Instructions for the completion of Paper 1 are given on *page 02* of your answer booklet S840/76/02.

Record your answers on the answer grid on *page 03* of your answer booklet.

Space for rough work is provided at the end of this booklet.

Before leaving the examination room you must give your answer booklet to the Invigilator; if you do not, you may lose all the marks for this paper.



\* S 8 4 0 7 6 1 2 \*

Total marks — 25  
Attempt ALL questions

1. If 10% of the bases in a molecule of DNA are adenine, what is the ratio of adenine to guanine in the same molecule?

- A 1:1
- B 1:2
- C 1:3
- D 1:4

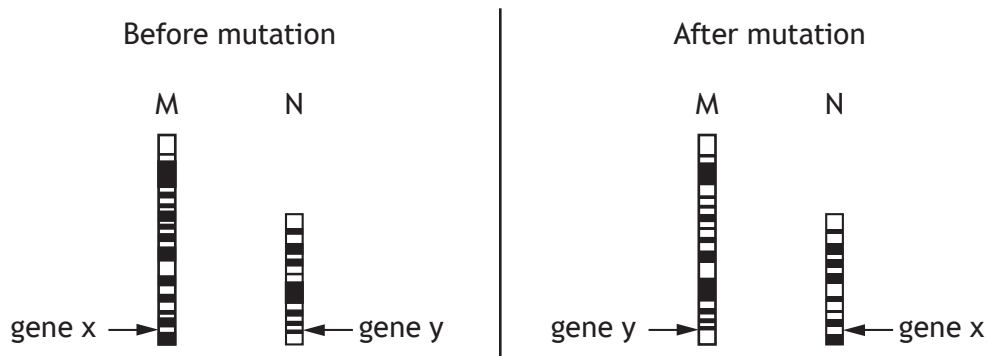
2. The following is a list of single gene mutations.

- 1 Nonsense
- 2 Missense
- 3 Frameshift

Which of these gene mutations is the result of a single-nucleotide substitution?

- A 1 only
- B 3 only
- C 1 and 2 only
- D 1, 2 and 3

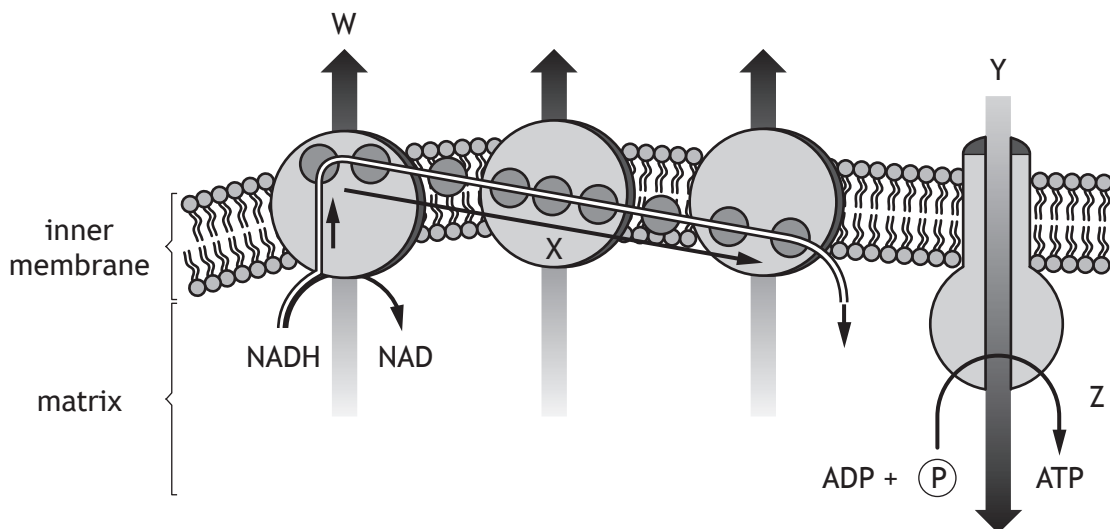
3. The diagram shows two chromosomes, M and N, before and after a chromosomal mutation.



What form of mutation has taken place?

- A Translocation
- B Duplication
- C Insertion
- D Deletion

4. Which of the following processes occurs during RNA splicing?
- A Introns are added
  - B Exons are added
  - C Exons are removed
  - D Introns are removed
5. Metabolic pathways can be controlled by feedback inhibition where
- A an end product binds to an enzyme found at the start of the pathway
  - B an end product binds to an enzyme found at the end of the pathway
  - C an enzyme binds to a substrate found at the start of the pathway
  - D an enzyme binds to a substrate found at the end of the pathway.
6. The diagram represents some of the processes that occur at the inner membrane of a mitochondrion.



Which letter represents the flow of hydrogen ions through ATP synthase?

- A W
- B X
- C Y
- D Z

[Turn over

7. A function of the interstitial cells in the testes is to produce

- A sperm
- B testosterone
- C seminal fluid
- D follicle stimulating hormone (FSH).

8. Nicotine is a chemical that may affect antenatal development.

The diagram shows the stages of development when major and minor malformations of organs may occur if there is exposure to nicotine.

Key

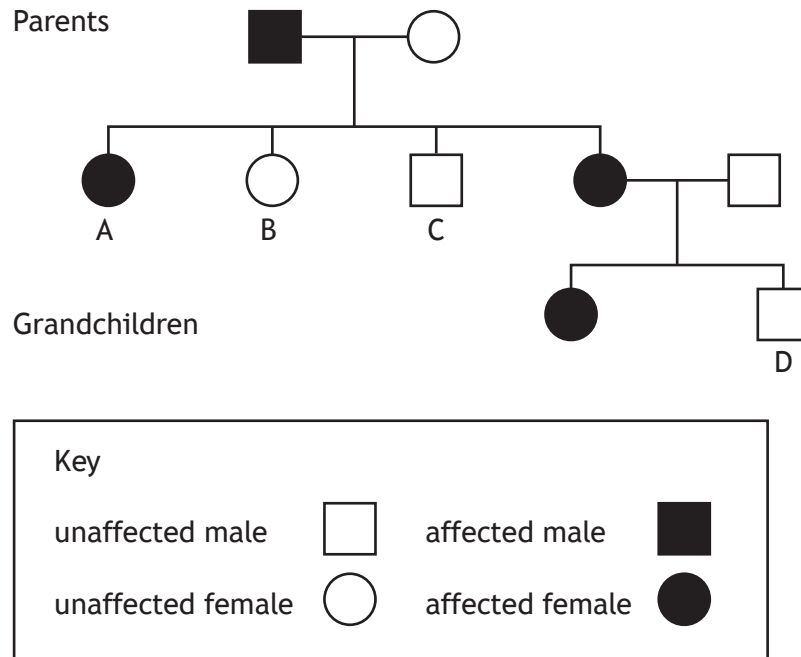
- major malformation
- minor malformation

	Stage of development (weeks after fertilisation)																
	Ball of cells		Embryo (organ formation)						Fetus (organ growth and development)								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
brain																	
ear																	
limbs																	
genitalia																	

For how many weeks during pregnancy is there a possibility of major malformations to organs during development?

- A 6
- B 7
- C 9
- D 13

9. A genetic disorder is caused by an autosomal dominant allele. The diagram shows the inheritance of the disorder through three generations of a family. Which individual confirms that this disorder is autosomal?



10. The following procedures can be used in the treatment of infertility.
- 1 pre-implantation genetic diagnosis (PGD)
  - 2 intracytoplasmic sperm injection (ICSI)
  - 3 artificial insemination

Which of these procedures involve *in vitro* fertilisation (IVF)?

- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 1, 2 and 3

[Turn over

11. Which of the following forms of contraception causes thickening of the cervical mucus?

- A Mini-pill
- B Barrier methods
- C Morning-after pill
- D Intra-uterine device

12. The table contains information about four semen samples.  
Which semen sample has the lowest number of active sperm?

	Semen sample			
	A	B	C	D
Number of sperm in sample (millions/cm <sup>3</sup> )	40	30	20	60
Active sperm (%)	50	60	75	40
Abnormal sperm (%)	30	65	10	70

13. During antenatal screening, which two techniques can be used to obtain cells for production of a karyotype?

- A Chorionic villus sampling (CVS) and amniocentesis
- B Amniocentesis and pre-implantation genetic diagnosis (PGD)
- C Intra-cytoplasmic sperm injection (ICSI) and chorionic villus sampling (CVS)
- D Pre-implantation genetic diagnosis (PGD) and intra-cytoplasmic sperm injection (ICSI)

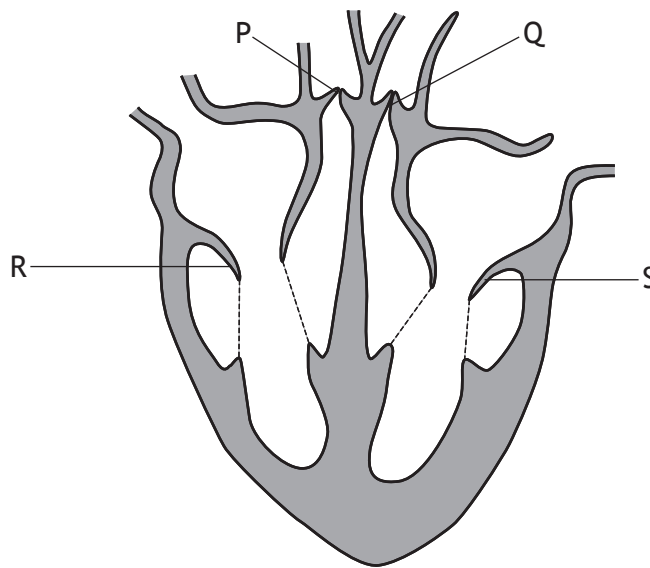
14. The duration of the stages in an individual's cardiac cycle are shown in the table.

Stage	Duration (s)
Diastole	0.4
Atrial systole	0.1
Ventricular systole	0.3

What is the heart rate of this individual?

- A 48 beats per minute
- B 75 beats per minute
- C 80 beats per minute
- D 150 beats per minute

15. The diagram shows a cross-section of the heart.



Which statement describes the movement of the valves during ventricular systole?

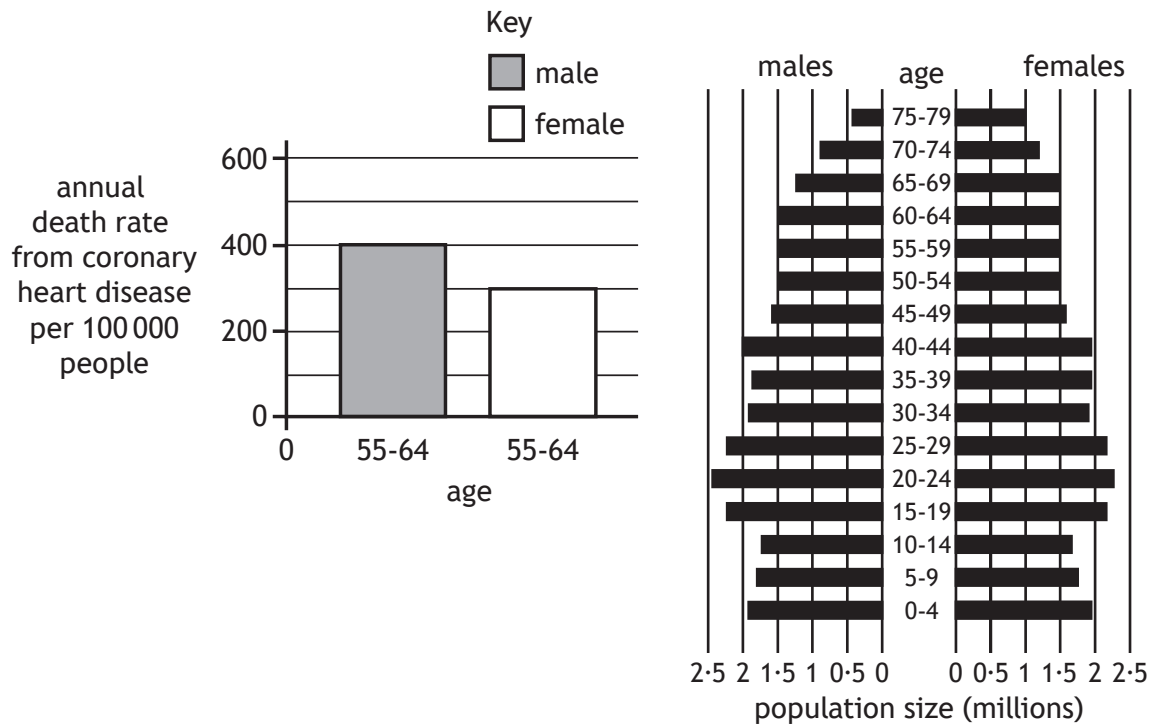
- A Valves P and Q open and valves R and S close.
- B Valves P and R open and valves Q and S close.
- C Valves P and Q close and valves R and S open.
- D Valves P and R close and valves Q and S open.

[Turn over

16. Which statement about lipoproteins is correct?

- A Low density lipoproteins (LDLs) transport cholesterol from body cells to the heart.
- B Low density lipoproteins (LDLs) transport cholesterol from body cells to the liver.
- C High density lipoproteins (HDLs) transport cholesterol from body cells to the heart.
- D High density lipoproteins (HDLs) transport cholesterol from body cells to the liver.

17. The graphs contain information about the population of Britain.



The number of British women between 55 and 64 years of age who die from coronary heart disease annually is

- A 300
- B 4500
- C 9000
- D 12 000.

18. The conversion of information into a form that memory can process is called

- A storage
- B encoding
- C retrieval
- D rehearsal.

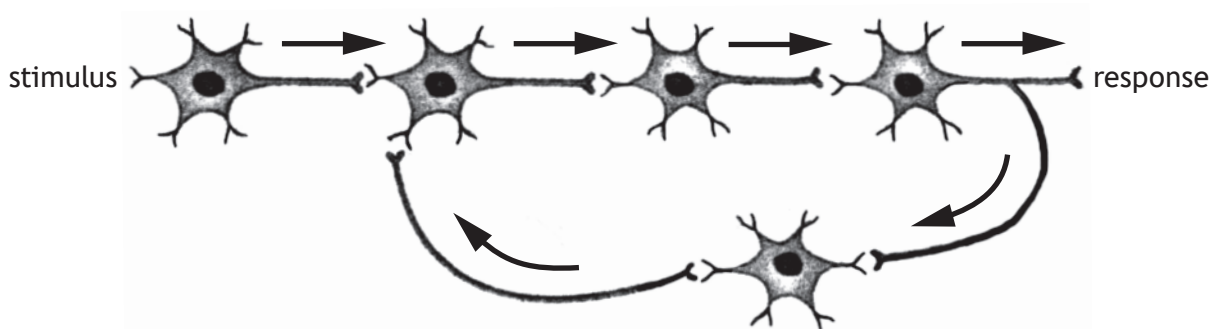


19. By calculating body mass index (BMI), it can be determined whether an individual is obese. The table contains information about four individuals.

Individual	Height (m)	Mass (kg)
1	1.60	90
2	2.10	130
3	1.80	100
4	1.30	56

Which of these individuals would be classified as obese?

- A 2 only
  - B 2 and 3 only
  - C 1, 3 and 4 only
  - D 1, 2, 3 and 4
20. The diagram represents a neural pathway.

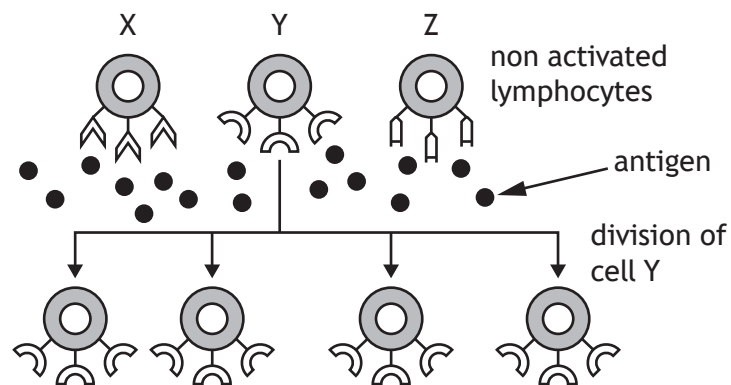


The type of pathway shown is a

- A sensory neural pathway
- B diverging neural pathway
- C converging neural pathway
- D reverberating neural pathway.

[Turn over

21. Which statement about the action of recreational drugs on brain neurochemistry is correct?
- A Desensitisation results from an increase in the number of neurotransmitter receptors due to the use of drugs that are agonists.
  - B Desensitisation results from an increase in the number of neurotransmitter receptors due to the use of drugs that are antagonists.
  - C Sensitisation results from an increase in the number of neurotransmitter receptors due to the use of drugs that are agonists.
  - D Sensitisation results from an increase in the number of neurotransmitter receptors due to the use of drugs that are antagonists.
22. Which of the following is **not** part of the inflammatory response?
- A Vasodilation
  - B Release of histamine
  - C Production of antibodies
  - D Increased capillary permeability
23. The diagram represents the production of a clonal population of lymphocytes.



The division of cell Y is stimulated by

- A the presence of lymphocytes X and Z
- B the presence of an antigen in the blood
- C the binding of antibodies to receptors on the cell membrane
- D the binding of antigens to receptors on the cell membrane.

24. Two groups of subjects were used when carrying out clinical trials of a vaccine. One group was given the vaccine, while the other group was given a placebo. The purpose of the placebo was to
- A reduce experimental error
  - B ensure a valid comparison
  - C allow a statistical analysis of the results
  - D ensure that researchers are unaware who has been vaccinated.
25. The table contains information about the number of influenza cases over five years.

Year	Number of influenza cases in January	Number of influenza cases in July
2001	580	120
2002	620	345
2003	1200	350
2004	120	145
2005	400	100

Which of the following conclusions can be drawn from the data in the table?

- A There are always more influenza cases in January than in July.
- B The number of influenza cases decreased by 75% between January and July of 2005.
- C The greatest percentage decrease in influenza cases occurred between January and July of 2003.
- D The greatest percentage increase in influenza cases occurred between July 2002 and January 2003.

[END OF SPECIMEN QUESTION PAPER]

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

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National  
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Mark

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**S840/76/02**

**Human Biology  
Paper 1 — Multiple choice  
Answer booklet**

Date — Not applicable

Duration — 40 minutes



Fill in these boxes and read what is printed below.

Full name of centre

--

Town

--

Forename(s)

--

Surname

--

Number of seat

--

Date of birth

Day

--	--

Month

--	--

Year

--	--

Scottish candidate number

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Instructions for the completion of Paper 1 are given on *page 02*.

Record your answers on the answer grid on *page 03*.

**You may use a calculator.**

Use **blue** or **black** ink.

Before leaving the examination room you must give your answer booklet to the Invigilator; if you do not, you may lose all the marks for this paper.



The questions for Paper 1 are contained in the question paper S840/76/12.

Read these and record your answers on the answer grid on *page 03*.

Use **blue** or **black** ink. Do NOT use gel pens or pencil.

1. The answer to each question is **either** A, B, C or D. Decide what your answer is, then fill in the appropriate bubble (see sample question below).
2. There is **only one correct** answer to each question.
3. Any rough working should be done on the space for rough work at the end of the question paper S840/76/12.

### Sample question

The digestive enzyme pepsin is most active in the

- A mouth
- B stomach
- C duodenum
- D pancreas.

The correct answer is **B** — stomach. The answer **B** bubble has been clearly filled in (see below).

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Changing an answer

If you decide to change your answer, cancel your first answer by putting a cross through it (see below) and fill in the answer you want. The answer below has been changed to **D**.

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

If you then decide to change back to an answer you have already scored out, put a tick (✓) to the **right** of the answer you want, as shown below:

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	or	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>		<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>





	A	B	C	D
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>







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**S840/76/12**

**Human Biology  
Paper 1 — Multiple choice**

## Marking Instructions

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These marking instructions have been provided to show how SQA would mark this specimen question paper.

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Marking instructions for each question

Question	Answer	Max mark
1.	D	1
2.	C	1
3.	A	1
4.	D	1
5.	A	1
6.	C	1
7.	B	1
8.	B	1
9.	B	1
10.	A	1
11.	A	1
12.	C	1
13.	A	1
14.	B	1
15.	A	1
16.	D	1
17.	C	1
18.	B	1
19.	C	1
20.	D	1
21.	D	1
22.	C	1
23.	D	1
24.	B	1
25.	B	1

[END OF SPECIMEN MARKING INSTRUCTIONS]