

# GAUTENG DEPARTMENT OF EDUCATION EXEMPLAR 2020

# LIFE SCIENCES P2

**OCTOBER/ NOVEMBER** 

**QUESTION PAPER** 

**GRADE** : 11

TIME : 2½ hours MARKS : 150

NUMBER OF PAGES : 19

#### Grade 11 NSC GAUTENG DEPARTMENT OF EDUCATION EXEMPLAR

#### INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

- 1. Answer ALL the questions.
- 2. Write ALL the answers in your ANSWER BOOK.
- 3. Start the answers to each question at the top of a NEW page.
- 4. Number the answers correctly according to the numbering system used in this question paper.
- 5. Present your answers according to the instructions of each question.
- 6. ALL drawings should be done in pencil and labelled in blue or black ink.
- 7. Draw diagrams or flow charts only when asked to do so.
- 8. The diagrams in this question paper are NOT necessarily drawn to scale.
- 9. Do NOT use graph paper.
- 10. You must use a non-programmable calculator, protractor and a compass.
- 11. Write neatly and legibly.

### **SECTION A**

#### **QUESTION 1**

- 1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.10) in your ANSWER BOOK, for example 1.1.11 D.
  - 1.1.1 The group of organisms that most relies on water for reproduction is...
    - A angiosperms.
    - B gymnosperms.
    - C fungi.
    - D mosses.
  - 1.1.2 What is the relationship between pollination and fertilization in a flower?
    - A Pollination is sexual and fertilization is asexual
    - B Fertilization and pollination are the same activity
    - C Pollination must occur before fertilization
    - D Pollination and fertilization occur simultaneously
  - 1.1.3 Alternation of generations in plants means that ...
    - A the plant alternates between autotrophic and heterotrophic nutrition.
    - B the plant reproduces asexually.
    - C the plant alternates between a haploid and a diploid stage.
    - D new plants are produced every second generation.
    - 1.1.4 Which statement best describes the relationship between a parasite and its host?
      - A The host is harmed while the parasite benefits
      - B The parasite is harmed while the host benefits
      - C Both host and parasite benefit
      - D The parasite benefits and the host is not affected at all

- 1.1.5 A group of grade 11 learners decided to carry out a survey to see how many people in their community suffered from tuberculosis. Below are the steps which they followed during their survey.
  - 1. They went to the clinic to get information on the number of people treated for tuberculosis monthly
  - 2. They made some conclusions based on their results
  - 3. They drew up sheets to record their results
  - 4. They analysed the results and represented the information in graphs
  - 5. They planned how they were going to carry out the survey

Which one of the following indicates the correct sequence/order of the steps involved in conducting the survey?

- A 1-2-3-4-5
- B 5-3-1-4-2
- C 4-5-2-3-1
- D 5-3-1-2-4
- 1.1.6 The diagram below shows the dominant plants in communities formed during succession from bare soil to pine forest.



Which plants are the pioneer species?

- A Crabgrass
- B Aster
- C Dogwood
- D Pine

1.1.7 An increase in the size of a population is due to ...

- A migration.
- B increased emigration.
- C increased immigration.
- D an increased death rate.
- 1.1.8 The increase in population size could be calculated by adding...
  - A births and deaths and subtracting emigration and immigration.
  - B births and immigration and subtracting deaths and emigration.
  - C deaths and emigration and subtracting immigration and mortality.
  - D emigration and immigration and subtracting births and deaths.
- 1.1.9 The information in the following table represents animal populations in four defined habitats.

1.	Springbuck only
2.	Springbuck and zebra
3.	Zebra and lions
4.	Lions only

Territoriality will occur most probably in...

- A 1 only
- B 1 and 2
- C 2 and 3
- D 1, 2, 3 and 4
- 1.1.10 Which of the following is a density-dependent factor?
  - A Drought
  - B Temperature
  - C Predation
  - D Fire

(10 X 2) (20)

- 1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question number (1.2.1 to 1.2.10) in your ANSWER BOOK.
  - 1.2.1 A protein found in the blood that is formed in response to a virus entering the body
  - 1.2.2 Structures that contain several sporangia and are located on the under surface of fern leaves
  - 1.2.3 Two sets of chromosomes, indicated as 2n
  - 1.2.4 An organism or factor that is used to transfer pollen from flower to flower
  - 1.2.5 An organism that hunts, catches and kills its prey
  - 1.2.6 The tough outer protective coat of a seed
  - 1.2.7 Disease causing organisms such as viruses and bacteria
  - 1.2.8 The permanent movement of organisms out of a specific area
  - 1.2.9 An asexual reproductive cell that can develop into an adult organism without fertilization
  - 1.2.10The initial stage in the growth phase of a population when<br/>numbers increase slowly<br/>(10x1)(10)

1.3 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 (1.3.1 to 1.3.3) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	Has true roots and leaves and	A: Bryophytes
	produces spores.	B: Pteridophytes
1.3.2	Formation of seeds and fruit.	A: Angiosperms
		B: Gymnosperms
1.3.3	The mark-recapture method is	A: suitable for estimating a
		population of animals that
		move around
		B: best used during the
		breeding season

(3 x 2) (6)

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1.4 The diagram below shows the relationships between animal phyla. The letters (**A** to **D**) indicate the characteristics shared by the different phyla of animals which are found after the letter. The point where various phyla differ from each other is indicated by the branching-off/split into new phyla.



1.4.1	What is this type of diagram called?	(1)
1.4.2	According to the diagram which characteristic is shared by all the organisms in the animal kingdom?	(1)
1.4.3	<ul> <li>Which LETTER (A – D) represents each of the following characteristics with respect to the body plan? (Write only the correct letter next to the corresponding question letter e.g. (a) D).</li> <li>(a) Cephalisation</li> <li>(b) Coelom</li> </ul>	(1) (1)
	(c) Bilateral symmetry	(1)
	(d) Segmentation	(1)
	(e) Vertebral column	(1)
1.4.4	Write down the names of the phyla that display the characteristic represented by <b>A</b> but not the characteristic	
	represented by C	(2)
		(9)

8

1.5 A person was injected with dead cholera bacteria. A second injection was given a few weeks later. The person's body reacted to these injections by producing antibodies against the cholera bacterium. The graph below shows the number of antibodies before and after the injections.



1.5.1	Mention TWO common ways of receiving vaccines.	(2)
1.5.2	When was the second injection given?	(1)
1.5.3	How long after the first injection did the person become immune to cholera?	(1)
1.5.4	During which weeks was there the greatest increase in antibody numbers?	(1) <b>(5)</b>

TOTAL SECTION A: 50

#### SECTION B

#### **QUESTION 2**

2.1 Read the extract below and answer the following questions.

#### Latest recycling stats for South Africa

South Africa's waste management industry is currently worth around ZAR 25 billion (EUR 1.4 billion), new market data suggests. The nation recycles over 70% of used steel beverage cans while the rates for glass and plastic packaging are 42% and 30% respectively.

South Africa sends around 95 million tonnes of waste to its 826 landfill sites and less than 40% of the materials are recycled, according to analysts at Research & Markets. Additionally, the nation produces upwards of 65 million tonnes of hazardous waste, of which only 6% is recycled.

2.1.1	Define the term <i>landfill site</i> .	(2)
2.1.2	How many tonnes of hazardous waste produced by South Africa remains unrecycled?	(1)
2.1.3	Explain how dumpsites and landfill sites contribute to the 'enhanced greenhouse effect'.	(2)
2.1.4	Name TWO benefits of recycling.	(2)
2.1.5	Draw a bar graph to represent the amount of used steel beverage cans, glass and plastic packaging that is recycled in South Africa.	(6) <b>(13)</b>
Describe quality c	e how the excessive use of fertilizers by farmers impacts on the of water.	(5)

2.2

2.3 The table below shows the population of impala in a 500-hectare game farm over a period of 10 years.

Year	Population
2010	25
2011	35
2012	75
2013	110
2014	130
2015	120
2016	86
2017	116
2018	110
2019	110

2.3.1	What type of growth curve do we see in this impala population?	(1)
2.3.2	Why did the numbers increase rapidly between 2011 and 2013?	(2)
2.3.3	Name <b>TWO</b> factors that would contribute to intra-specific competition.	(2)
2.3.4	Give <b>ONE</b> possible reason why the population numbers dropped drastically in 2016.	(1)
2.3.5	What would the carrying capacity of the game farm be?	(1)
2.3.6	Give a reason for you answer to QUESTION 2.3.5.	(2)
2.3.7	Describe what would happen to the numbers of the impala population over the next 10-year period if the farmer had to introduce a pride of lions to the game farm.	(4) <b>(13)</b>

2.4 The arrangement of body tissues becomes increasingly complex as animals become more evolved. This has allowed animals to develop different feeding strategies. The diagrams below show tissue layers in animals.



2.4.1	Which diagram shows: (a) the more evolved (complex) body plan? (b) a diploblastic organism? (c) an organism that has a through (complete) gut?	(1) (1) (1)
2.4.2	Name ONE phylum represented by each diagram.	(2)
2.4.3	Which of the two organisms, represented by <b>A</b> and <b>B</b> , is radially symmetrical?	(1)
2.4.4	Provide labels for <b>X</b> and <b>Y</b> .	(2)
2.4.5	Explain ONE advantage of a complete gut.	(2) (10)

2.5 **Moss** leaves are **sensitive to pollution** since they consist of a single layer of cells that easily absorb material from the environment. Botonists wanted to investigate the effect that pollution on the growth of moss plants. They looked at the numbers of moss plants found at various distances from the centre of town in two large industrial cities, namely Bloemfontein and Pietermaritzburg and a small rural town called Wartburg.

The results of their investigation are shown in the graph below.



- 2.5.1 In the graph, there are fewer numbers of mosses growing closer to Bloemfontein and Pietermaritzburg. Explain why this is.
- 2.5.2 Calculate the percentage increase in the number of moss plants growing at 13 km from Pietermaritzburg compared to the number growing at 3km. Show all your calculations. (3)
- 2.5.3What conclusion can be made from the results shown in the<br/>graph?(4)<br/>(9)

(2)

[50]

### **QUESTION 3**

3.1

Garlic is known to be effective against a wide range of bacteria and the ability to combat the common cold. The antimicrobial (agent that kills microorganisms) substance in garlic is called allicin. **Allicin** has been shown to exhibit broad-spectrum antimicrobial activity against Gram-positive and - negative bacteria, including multidrug-resistant bacteria, and in addition has been shown to possess antiviral, anti-fungal and anti-parasitic activity. <u>https://www.spandidos-publications.com/10.3892/etm.2019.8388</u>

Scientists wanted to investigate the effectiveness of garlic in killing bacteria. They conducted the experiment as follows:

- They prepared three petri dishes with blood agar and stored these in the refrigerator.
- Before thet start of the experiment, they removed the petri dishes from the refrigirator to allow them to reach room temperature.
- They prepared three specimens in test tubes and labelled them as test tube **A**, **B** and **C**.
- The contents of the test tubes were measured and mixed as shown in the table below:

	Contents of the test tubes			
Test tube	100 ml milk	5 ml <i>E.coli</i>	Garlic	<b>]</b> •
		bacterium	extract	The
А	✓	X	X	
В	✓	✓	X	peu
С	✓	✓	✓	

dishes were labelled A, B and C.

- They removed the lid in petri dish **A** and used a syringe to extract 10 ml of the sample form test tube **A** and placed it in the centre of petri dish **A**.
- In the same way, using a new syringe, a 10 ml sample was extacted from test tube B and placed in petri dish B and the procedure repeated for petri dish C.
- The petri dish lids were replaced and the petri dishes stored in a cool place.
- The diameter of the *E.coli* colony was measured every day for 5 days and recorded in the table below:

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	Petri		Diameter o	f bacteria c	olony (mm)	)	
	dish	Day 1	Day 2	Day 3	Day 4	Day 5	
	Α	0	1,7	3,0	4,6	7,1	
	В	0	4,2	8,4	15,1	36,5	
	С	0	0	0	0	0	
3.1.1	Iden	tify the inde	pendent var	iable in this	investigatior	۱.	(1)
3.1.2	Iden	tify TWO fa	ctors that sh	ould be kep	t constant d	uring the	

investigation.

3.1.3	Explain why the petri dishes were kept in the fridge before the start of the investigation.	(2)
3.1.4	State TWO ways in which the scientists could increase the reliability of the investigation.	(2)

3.1.5 Describe and explain the results obtained in petri dish **C**. (3)

(2)

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## 3.2 The following diagram represents a flower of an angiosperm.



3.2.1	What type of pollination would take place in this flower?	(1)
3.2.2	Write down the letter of the part in which the female gamete is produced.	(1)
3.2.3	Which structure is represented by the letters <b>A</b> , <b>B</b> and <b>D</b> ?	(1)
3.2.4	Using the LETTER only identify the following:	
	<ul><li>(a) Part where pollination takes place.</li><li>(b) Structure where a seed is formed.</li></ul>	(1) (1)
3.2.5	Is this flower likely to be self-pollinated or cross-pollinated?	(1)
3.2.6	Tabulate TWO differences between an insect pollinated flower and a wind pollinated flower.	(5) <b>(11)</b>

- 3.3 Four pots of the same size (**A**, **B**, **C**, **D**) were filled with the same amount of soil. Seeds were planted in each pot as follows:
  - Pot A 2 pea seeds and 2 bean seeds
    Pot B 4 pea seeds and 6 bean seeds
    Pot C 8 pea seeds and 8 bean seeds
    Pot D 20 bean seeds

The pots were well watered and left on a windowsill. After two weeks, the number of plants in each pot was counted. The average height of the plants above the ground (aerial part) was also determined. The results are shown below.

	Number of plants	Average height of plants (cm)
Pot A	4	6
Pot B	8	5
Pot C	8	3
Pot D	8	2

3.3.1 In which pot (**A**, **B**, **C** or **D**):

	<ul> <li>(a) is a single population found?</li> <li>(b) will least competition occur?</li> <li>(c) will intraspecific competition occur?</li> <li>(d) will the greatest interspecific competition occur?</li> </ul>	(1) (1) (1) (1)
	(e) was the least growth recorded?	(1)
3.3.2	What do we call the method used to determine the number of plants in each pot?	(1)
3.3.3	Describe THREE significances of seeds.	(3) <b>(9)</b>

3.4 The graph below shows species diversity in the Northern Cape. An environmental impact study was done before and after the land was used for agriculture.



- 3.4.1 Describe the difference in the number of species before and after agriculture. (2)
  3.4.2 Explain why the number of species decreased in areas of agriculture. (4)
  3.4.3 Which group of organisms was affected most by the change? (1)
  3.4.4 What is an environmental impact study and why is it necessary that
- 3.4.4 What is an environmental impact study and why is it necessary that environmental studies are done? (3)

(10)

## 3.5 The diagram below is that of a bacterial cell



	TOTAL SECTION B: GRAND TOTAL:	100 150
	Describe how the bacterium <i>E. coli</i> is used to produce insulin for the treatment of diabetes.	(5) <b>(10)</b> [ <b>50]</b>
3.5.4	Microorganisms can be used in the production of medicines such as insulin and antibiotics.	
3.5.3	State the function of the part labelled G.	(1)
3.5.2	Identify the parts labelled <b>A</b> and <b>D</b> .	(2)
3.5.1	Define the term <i>prokaryotic</i> .	(2)