

Are you ready for SK297?

This item contains selected online content. It is for use alongside, not as a replacement for the module website, which is the primary study format and contains activities and resources that cannot be replicated in the printed versions.

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Are you ready for SK297?

1 Introduction

If you are intending to study SK297, you should make sure that you have the necessary background knowledge and skills to be able to enjoy the module fully and to give yourself the best possible chance of completing it successfully.

Read through these notes carefully and work through the questions in Section 5.

The notes cover the knowledge and skills you should already possess, and the questions will provide a useful exercise for all prospective students of SK297.

If you find that you can answer most of the questions, it is likely that you are well prepared to take on SK297. However, if you are not confident in answering some of the questions you should consider doing some additional preparatory work before starting SK297, or studying one of the modules mentioned in Section 2.

2 Suggested prior study

SK297 *Infection, immunity and public health* is an OU Stage 2 science module that makes intellectual demands that are appropriate to the second year of a conventional degree.

The module is compulsory for the Q71 BSc in Health Sciences and an optional component of the Q64 BSc in Natural Sciences and R64 BSc in Public Health and Wellbeing. The module develops some of the subjects covered in the following OU Stage 1 modules:

- SDK100 Science and health: an evidence-based approach.
- SK190 Human biology: a body in balance.

It is assumed that you will have studied at least SK190 or SDK100 prior to studying SK297. If you have not studied one of these modules, it is assumed that you will have a similar level of biology and health science knowledge. If you do not have the assumed prior study or knowledge, you may find the content of SK297 more challenging and may have to do more background reading in addition to the module-guided study time each week.

If you are unsure about your current science knowledge and skills, you may find it useful to work through some of the Stage 1 content on the OU's OpenLearn platform, for example:

- [Basic science: understanding experiments](#)
- [Infection and immunity](#)
- [Understanding antibiotic resistance](#)
- [Mathematics for science and technology](#)
- [Essay and report writing skills](#)

3 Your available study time

SK297 *Infection, immunity and public health* runs for nine months, starting in October. It carries 30 credits towards your degree and you will need to find 8–10 hours study time per week. Think now about whether you will be able to find enough time.

Consider your other commitments – for example, paid or voluntary employment, caring or childcare responsibilities, hobbies and holidays. You should also take into consideration any other study you have committed to. For example, studying other OU modules at the same time as SK297 to a total of 120 credits (full time study) would require a total study time of 32–36 hours a week. If you cannot commit to this, we strongly recommend that you study SK297 alone or in conjunction with one other 30 credit module. We provide breaks in late December and in March or April, but otherwise you will need to keep up to date with your studies throughout the nine-month period, submitting assignments at regular intervals.

4 Computer and web access

SK297 is delivered entirely online via a module website (there are no printed module materials). You will therefore need access to a computer with reliable internet access for the required number of hours per week to be able to study the module materials and complete your assignments. You will also be offered online tutorials and you will be able to communicate with your tutor and fellow students in our online forums.

Computing requirements

A computing device with a browser and broadband internet access is required for this module. Any modern browser will be suitable for most computer activities. Functionality may be limited on mobile devices and with some older browsers.

To study this module, you will need a desktop or laptop computer with either:

- Windows 7 or higher
- Mac OS X 10.7 or higher

The screen of the device must have a resolution of at least 1024 × 768 pixels.

To complete the module assignments, you will also require:

- word-processing skills and a word processing program – for example, Microsoft Word or Apache OpenOffice (available as a free download)
- basic spreadsheet skills and a spreadsheet program – for example, Microsoft Excel or Apache OpenOffice equivalent; skills include data entry, basic manipulation and simple graph generation
- a means of inputting a digital image of hand-drawn graphs or diagrams into a word-processed file – for example, a scanner, a digital camera or a mobile phone with a camera
- a scientific calculator.

The OU offers students the opportunity to sign up for a free version of Microsoft 365, which contains the software that you will need during your studies.

It may be possible to join some tutorials via a mobile phone with the Adobe Connect app installed. To participate in online tutorials, you will also require:

- a basic headset (earphones and microphone).

5 Self-assessment questions

These questions are intended to help you find out whether you are ready for SK297, or if you need to brush up on your knowledge and skills in advance.

This exercise will be useful for all prospective students of SK297, even for those of you who have already studied other OU science modules and have completed the suggested prior study. Working through the information will serve as a reminder of some of the relevant facts, skills and concepts that you should be bringing with you from earlier study.

Please note that you shouldn't expect to be able to answer all the questions correctly now but attempting them should allow you to judge: (a) the areas where some reading beforehand would be useful; (b) whether you will be able to cope with the demands of the module.

If you struggle with any of the questions or are unfamiliar with the terminology, you are strongly advised to prepare for the module with some directed study in those areas. This preparation could be through revising the areas from your previously studied modules, or by using the SK297 Primer materials.

Question 1

You are in a research laboratory discussing how to assess the impact of eating vegan food on fetal growth. One colleague wants to use brain diameter and femur length as measured by ultrasound, while another wants to use the ratio of head circumference to abdominal circumference. Which stage of the scientific method are these colleagues discussing?

- Results
- Background and Question
- Methodology
- Hypothesis
- Discussion

.....
Answer

The colleagues are discussing the **methodology** for the study.

Question 2

Match the following scientific disciplines to their corresponding descriptions below:

genetics

physiology

anatomy

biochemistry

behaviour

Match each of the items above to an item below.

The study of inheritance and the role of DNA and genes in the cells of the body.

The study of the relationship between structure and function of body systems.

The study of the structures of the body.

The study of the chemical processes that occur within the cells and fluids of the body.

The study of activities and interactions between individuals and with their surroundings.

.....
Answer

- The study of inheritance and the role of DNA and genes in the cells of the body – **genetics**.
- The study of the relationship between structure and function of body systems – **physiology**.
- The study of the structures of the body – **anatomy**.
- The study of the chemical processes that occur within the cells and fluids of the body – **biochemistry**.
- The study of activities and interactions between individuals and with their surroundings – **behaviour**.

Question 3

From 1 (smallest) to 7 (largest), put the following terms in the correct order of the hierarchy structure within the human body:

atoms

chemicals

biomolecules

cells

tissues

organs

organ systems

Match each of the items above to an item below.

1 (smallest)

2

3

4

5

6

7 (largest)

Answer

From the smallest to the largest, the order is:

- 1 atoms
- 2 chemicals
- 3 biomolecules
- 4 cells
- 5 tissues
- 6 organs
- 7 organ systems

Name some of the organ systems of the human body.

Provide your answer...

Answer

The main organ systems are the: nervous system; musculoskeletal system; endocrine system; gastrointestinal system; immune system; cardiovascular system; respiratory system; urinary system; and the reproductive system.

SK297 is concerned with the biomolecules, cells, tissues and organs of the immune system.

Question 4

This question is concerned with the internal structure of a cell. Match the following cell organelles to their corresponding cellular functions below:

ribosome

nucleus

mitochondrion

vesicle

Match each of the items above to an item below.

Involved in production of proteins in the cell.

Stores DNA, which contains the 'recipes' for proteins.

Generates energy in the form of ATP for cells to use – also known as the powerhouse of the cell.

Stores important chemicals that need to be used by the cell or exported to the extracellular matrix.

Answer

- Involved in production of proteins in the cell – **ribosome**.
- Stores DNA, which contains the 'recipes' for proteins – **nucleus**.
- Generates energy in the form of ATP for cells to use – also known as the powerhouse of the cell – **mitochondrion**.
- Stores important chemicals that need to be used by the cell or exported to the extracellular matrix – **vesicle**.

Question 5

Which of the following statements are **true** and which are **false**?

The translation of genetic information in cells involves mRNA, tRNA and ribosomes.

- True
- False

.....

Answer

True. Translation is the process by which the information encoded in mRNA is converted into proteins. It occurs in the cytosol of the cell.

Genetic information is translated in the nucleus.

- True
- False

.....

Answer

False. Genetic information is **transcribed** in the nucleus. Transcription is the name for the process by which DNA sequences are converted into mRNA.

Ribosomes are found in the cytosol and are closely associated with rough endoplasmic reticulum.

- True
- False

.....

Answer

True.

Methylation is a chemical modification of DNA that does not change the nucleotide sequence of a gene but changes the likelihood of the gene being expressed.

- True
- False

.....

Answer

True.

Question 6

This question is concerned with different types of immune responses in humans. You may have come across this before in SK190, but if not here is a brief summary:

Innate immunity refers to the rapid but non-specific immune responses that are present in all humans. The innate immune system is composed of cells, anatomical structures, chemical barriers and immune molecules which respond to all pathogens in the same way and at the same speed each time.

By contrast, **adaptive immunity** refers to the more targeted but slower responses, particularly when a pathogen is encountered for the first time. Each pathogen species has its own unique antigens on their surface, and the cells of the adaptive immune system react to these unique antigens to provide a specific, more focused response.

Read each of the following statements and decide whether they refer to the innate or adaptive immune system:

Fast acting, usually within hours.

- Innate
- Adaptive

Slow acting, usually days.

- Innate
- Adaptive

Composed of T and B cells (lymphocytes).

- Innate
- Adaptive

Non-specific.

- Innate
- Adaptive

Has physical and chemical barriers, and myeloid cells.

- Innate
- Adaptive

Antigen specific.

- Innate
- Adaptive

No immunological memory.

- Innate
- Adaptive

Forms an immunological memory.

- Innate
- Adaptive

.....

Answer

Innate immunity:

- Fast acting, usually within hours.
- Non-specific.
- Has physical and chemical barriers, and myeloid cells.
- No immunological memory.

Adaptive immunity:

- Slow acting, usually days.
- Composed of T and B cells (lymphocytes).
- Antigen specific.

- Forms an immunological memory.

Question 7

This question relates to the different cells of the immune system. Match the **immune cells** to their corresponding functions described below:

macrophages

eosinophils

neutrophils

natural killer cells

helper T cells

B cells

Match each of the items above to an item below.

Phagocyte- and antigen-presenting cells involved in controlling inflammation.

A type of granulocyte capable of attacking multicellular parasites and controlling inflammation.

Usually the first immune cells that respond to an infection. They are phagocytes and release antimicrobial chemicals.

Can attack virus-infected cells and cancer cells.

Activate and recruit all other immune cells.

Produce circulating antibodies.

Do not worry if you are not familiar with these types of immune cell. You will be introduced to them and their functions in the module. However, if these terms are new to you, you may benefit from some background reading of the basics of the human immune system before starting the module.

Question 8

There are six groups of pathogens studied in SK297: **prions**, **viruses**, **bacteria**, **fungi**, **protists** and **parasitic worms**. Match each pathogen to its corresponding description below:

bacteria

viruses

prions

fungi

parasites

protists

Match each of the items above to an item below.

A type of prokaryote.

Reproduce inside host cells.

Not an organism, but a protein that is misfolded.

Yeasts and moulds are included in this group of pathogen.

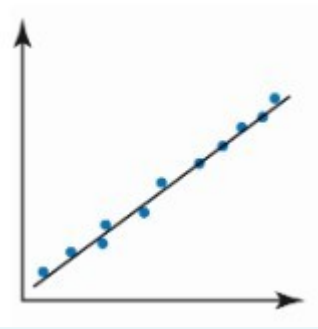
This group of pathogens is composed of worms that live in and feed off living hosts.

Malaria is a disease caused by this type of pathogen.

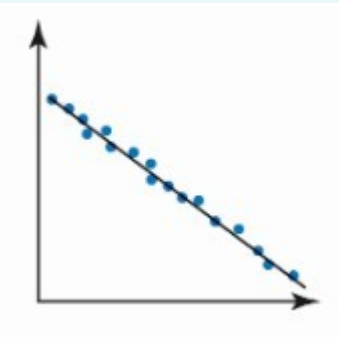
The remaining questions show the level of numeracy and data handling skills that you would be expected to have from your prior study.

Question 9

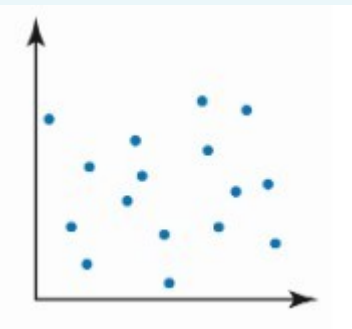
Match the terms **no correlation**, **positive correlation**, **negative correlation** to the charts below:



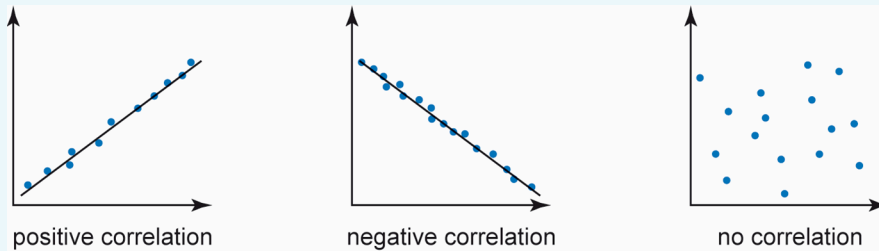
- no correlation
- positive correlation
- negative correlation



- no correlation
- positive correlation
- negative correlation



- no correlation
- positive correlation
- negative correlation

Answer

The graph on the left is a positive correlation, the middle graph is a negative correlation and the graph on the right shows no correlation.

What does the graph on the left indicate about the relationship between the two variables?

Provide your answer...

Answer

The graph on the left shows that an increase in the value of one of the variables is associated with an increase in the value of the other variable. Importantly, it doesn't show that an increase in one variable **causes** an increase in the other, as there may be other variables involved.

Question 10

This question is concerned with different ways of working out average values from a data set. Match the following terms to their corresponding descriptions below:

median

mode

mean

Match each of the items above to an item below.

The middle value in a set of data.

The most frequently occurring value in a set of data.

The value calculated from adding all values together and dividing them by the total number of values in the set of data.

Question 11

550 children attend school A and 250 attend school B. Over a given year, 35 children from school A and 15 from school B had throat infections. Calculate the overall proportion of children from schools A and B who had throat infections and express this as a percentage.

Provide your answer...

Answer

The total number of children is $550 + 250 = 800$, of whom $35 + 15 = 50$ had throat infections. So the proportion was $50/800 = 0.0625$ or 6.25%.

How would you present the data from school A as a ratio of those with and without a throat infection, rounding your numbers to the nearest whole number?

Provide your answer...

Answer

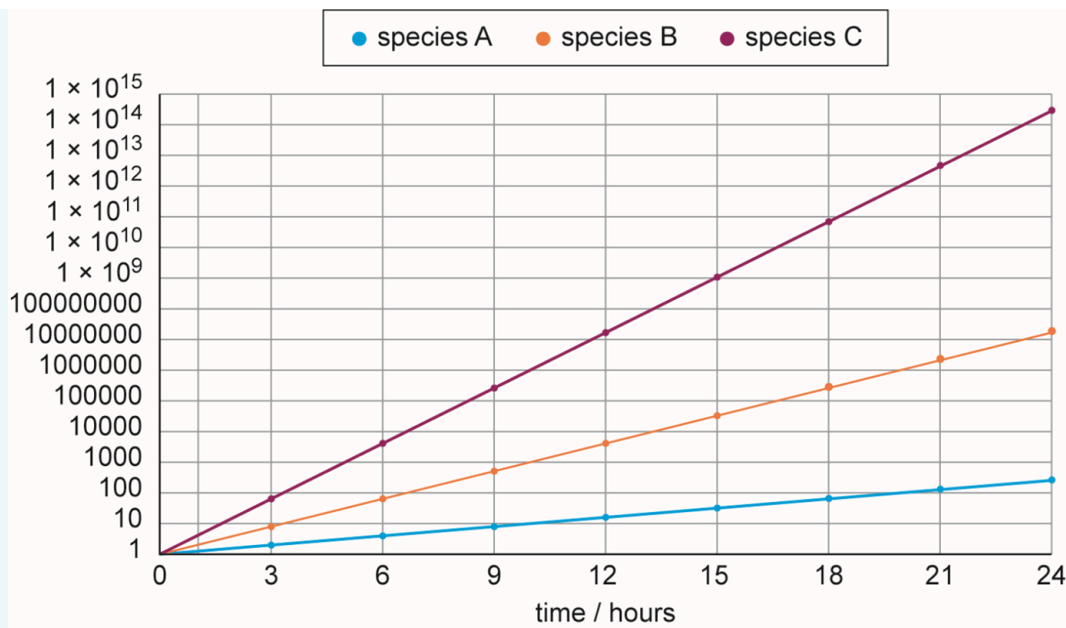
To express the data from school A as a ratio, you would first work out the number of children without a throat infection, which is $550 - 35 = 515$.

You would then divide 515 by 35, which is 15 to the nearest whole number.

The ratio of children with a throat infection to those without is 1 : 15.

Question 12

This is a line graph showing the growth of the three strains of bacteria during a 24-hour period.



What type of scale is illustrated on the y-axis?

Answer

The y-axis is a logarithmic scale.

What type of growth is illustrated here?

Answer

The type of growth shown here is exponential growth.

Species A replicates every 3 hours. Calculate the number of bacteria of species A after 24 hours, assuming a starting number of 1 bacterium, using the formula:

$$\text{Number of bacteria at a given time} = \text{starting number of bacteria} \times 2^n$$

(where n = number of replications)

Answer

The first step of the calculation is to work out the number of replications in the time period specified. Species A replicates every 3 hours, so there will be 8 replications in 24 hours. Applying the formula gives the number of bacteria after 24 hours as:

$$1 \times 2^8 = 256$$

Note that 2^8 is '2 to the power of 8', which means that 2 is multiplied by itself 8 times.

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