

Biology data booklet

For use during the course and in the examinations
First assessment 2028

Version 1.0

Diploma Programme Biology data booklet

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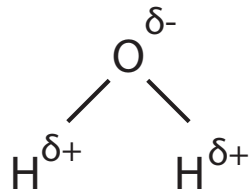
Introduction

This Diploma Programme (DP) *Biology data booklet* accompanies the DP *Biology guide* and DP *Biology teacher support material*. It contains physiology diagrams, physical equations and constants, and other data relevant to the course.

Students must have access to a copy of this booklet for the duration of the course, so that they can become familiar with its contents. Direct reference is made to relevant equations within syllabus content. This helps to maintain the emphasis on interpretation and application rather than memorization of symbols, constants and equations.

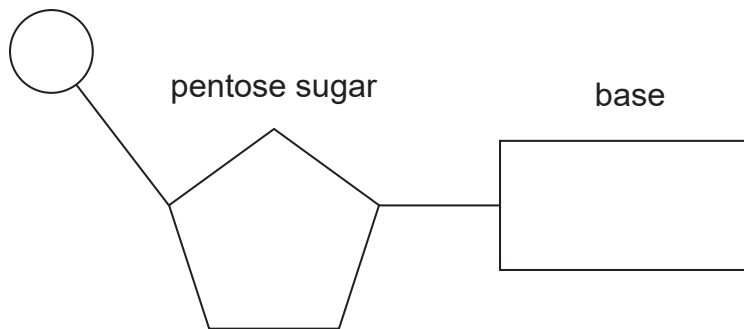
Each student must have access to a clean copy of the *Biology data booklet* during examinations. It is the responsibility of the school to download a copy of this booklet from IBIS or the Programme Resource Centre and to ensure that there are sufficient copies available for all students.

1. Water as a medium for life

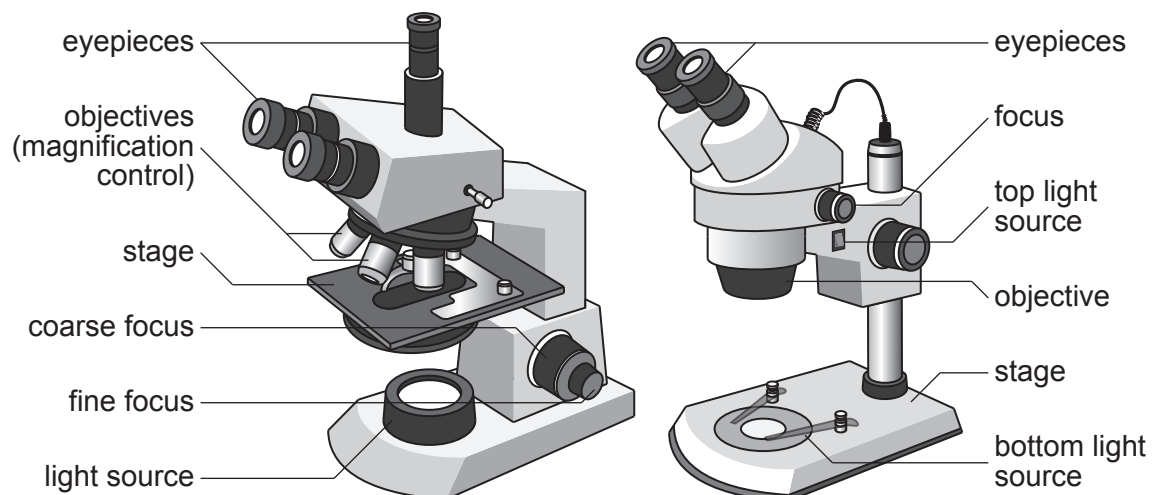


2. Nucleotide structure

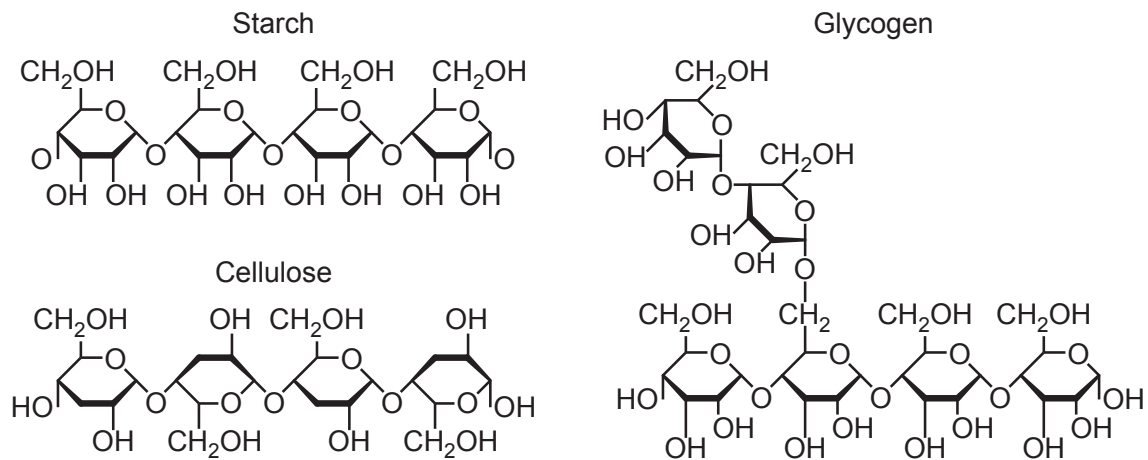
phosphate



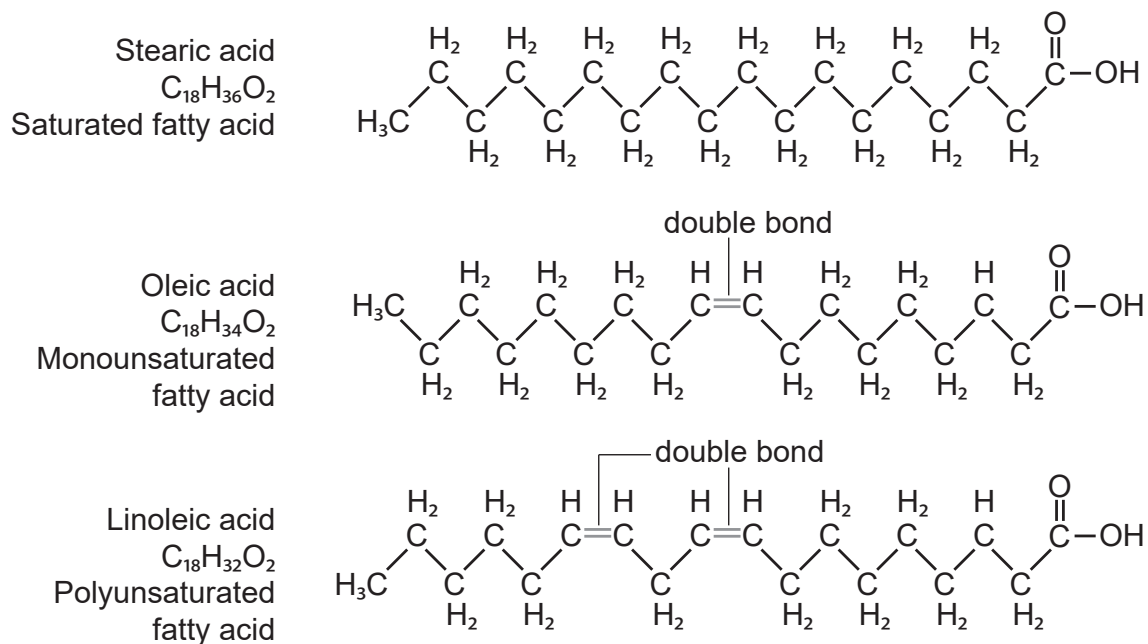
3. Parts of a microscope



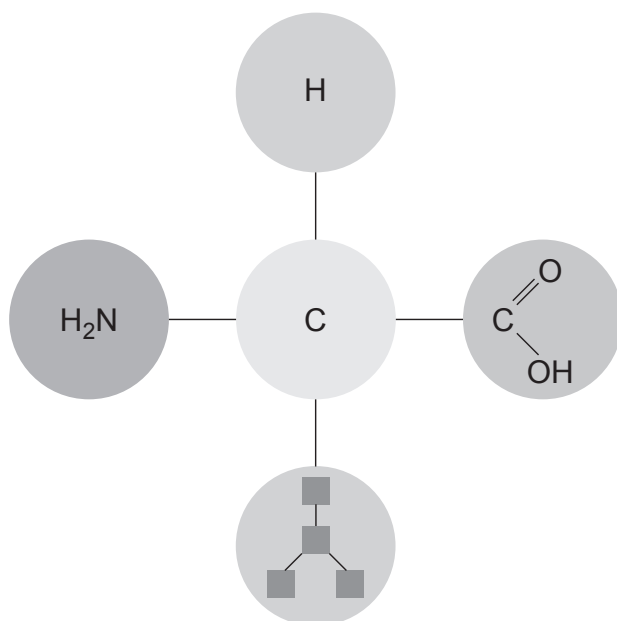
4. Structural polysaccharides



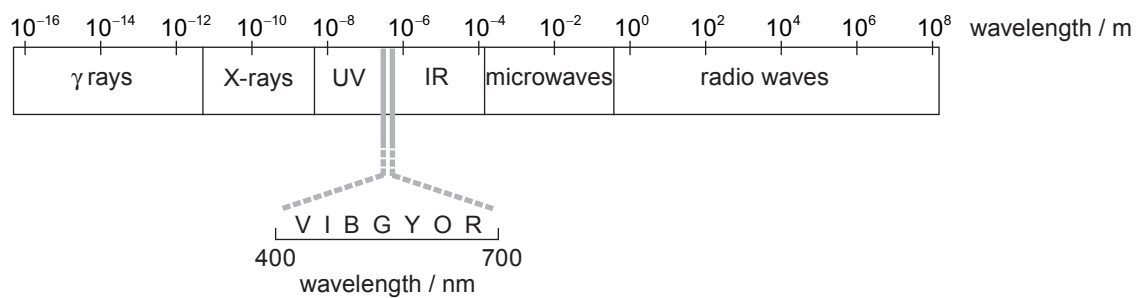
5. Fatty acids



6. General structure of an amino acid

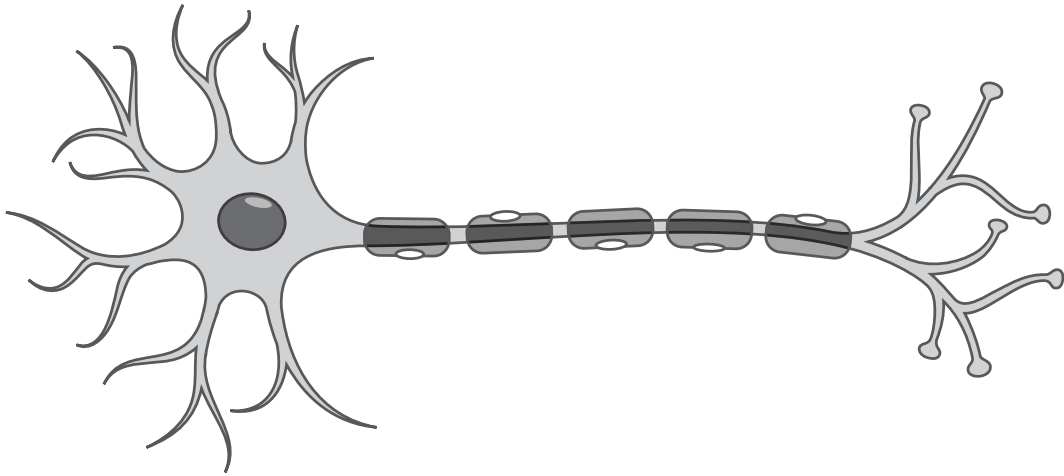


7. Electromagnetic spectrum and visible spectrum

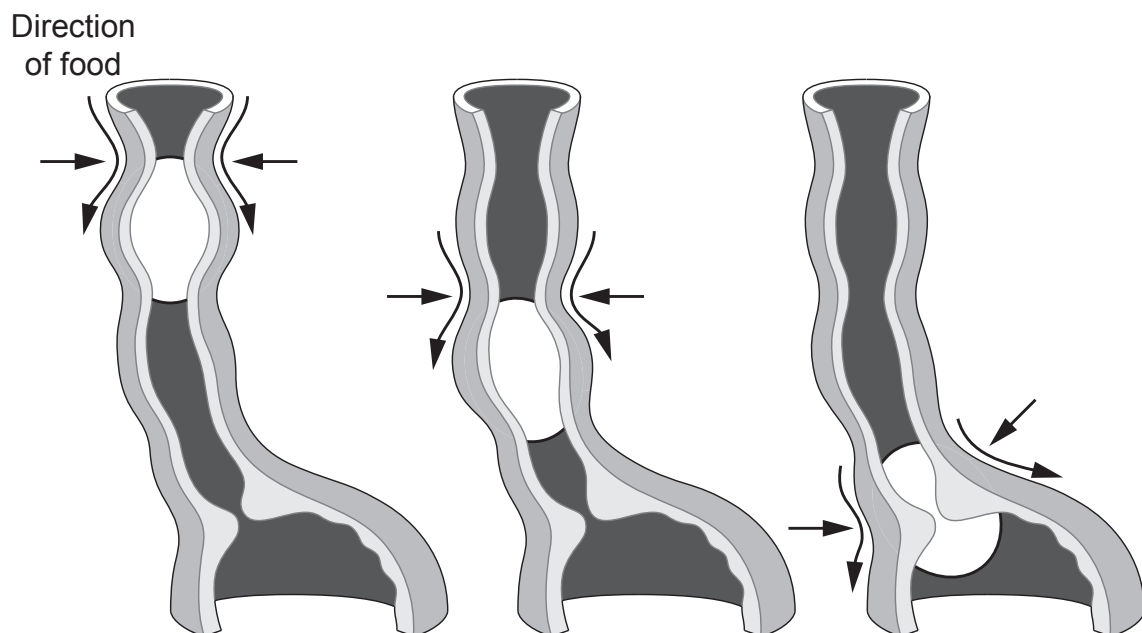


Abbreviation	Colour
V	violet
I	indigo
B	blue
G	green
Y	yellow
O	orange
R	red

8. Simple neuron



9. Peristalsis in digestive system



10. Unit conversion

$$1\text{dm}^3 = 1\text{litre} = 1 \times 10^{-3}\text{m}^3 = 1 \times 10^3\text{cm}^3$$

11. Formulas, equations and statistics

Hardy–Weinberg equation

$$p^2 + 2pq + q^2 = 1$$

$$p + q = 1$$

Simpson reciprocal index, 1/D

$$D = \sum \left(\frac{n}{N} \right)^2$$

$$D = \frac{\sum n(n-1)}{N(N-1)}$$

Both formulae are acceptable

N : total number of organisms in of all species

n : number of organisms of each species

Lincoln index

$$\text{Population size estimate} = M \times \frac{N}{R}$$

M : number of individuals caught and marked initially

N : total number of individuals recaptured

R : number of marked individuals recaptured

Chi-squared test

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

χ^2 : chi-squared value

O_i : observed value

E_i : expected value

Σ : summation of values for all i

Chi-squared table

Degrees of freedom								
p value	1	2	3	4	5	6	7	8
0.05	3.84	5.99	7.81	9.49	11.07	12.59	14.07	15.51
0.01	6.63	9.21	11.34	13.28	15.09	16.81	18.48	20.09

Magnification formula

$$\text{Magnification} = \frac{\text{image size}}{\text{actual size}}$$

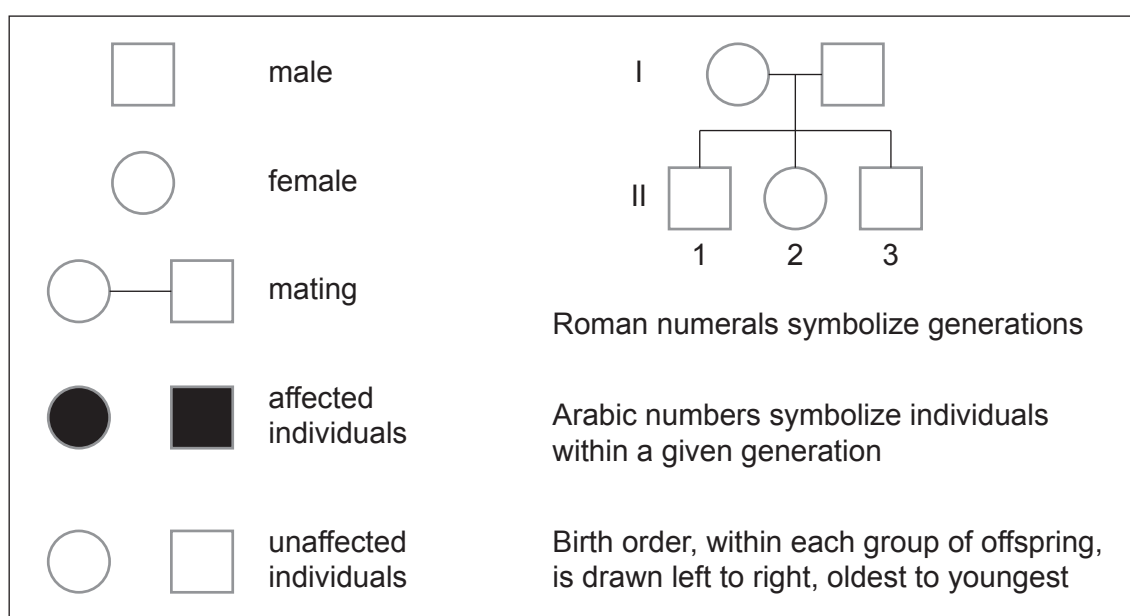
12. Abbreviations for hormones in the guide

Hormone	Abbreviation
antidiuretic hormone	ADH
follicle-stimulating hormone	FSH
gonadotropin-releasing hormone	GnRH
human chorionic gonadotropin	hCG
luteinizing hormone	LH

13. Symbols

Symbols	Description
B, b	alleles: upper case is dominant, lower case is recessive
I^A, I^B, i	alleles, human blood type (ABO)
P	parent generation
F_1	first filial generation
F_2	second filial generation
p	frequency of dominant allele
q	frequency of recessive allele

Pedigree symbols



Messenger RNA codons and their corresponding amino acids

First base	Second base				Third base
	U	C	A	G	
U	UUU phenylalanine	UCU serine	UAU tyrosine	UGU cysteine	U
	UUC phenylalanine	UCC serine	UAC tyrosine	UGC cysteine	C
	UUA leucine	UCA serine	UAA stop **	UGA stop **	A
	UUG leucine	UCG serine	UAG stop **	UGG tryptophan	G
C	CUU leucine	CCU proline	CAU histidine	CGU arginine	U
	CUC leucine	CCC proline	CAC histidine	CGC arginine	C
	CUA leucine	CCA proline	CAA glutamine	CGA arginine	A
	CUG leucine	CCG proline	CAG glutamine	CGG arginine	G
A	AUU isoleucine	ACU threonine	AAU asparagine	AGU serine	U
	AUC isoleucine	ACC threonine	AAC asparagine	AGC serine	C
	AUA isoleucine	ACA threonine	AAA lysine	AGA arginine	A
	AUG methionine*	ACG threonine	AAG lysine	AGG arginine	G
G	GUU valine	GCU alanine	GAU aspartate	GGU glycine	U
	GUC valine	GCC alanine	GAC aspartate	GGC glycine	C
	GUA valine	GCA alanine	GAA glutamate	GGA glycine	A
	GUG valine	GCG alanine	GAG glutamate	GGG glycine	G

*Note: AUG is an initiator codon and also codes for the amino acid methionine.

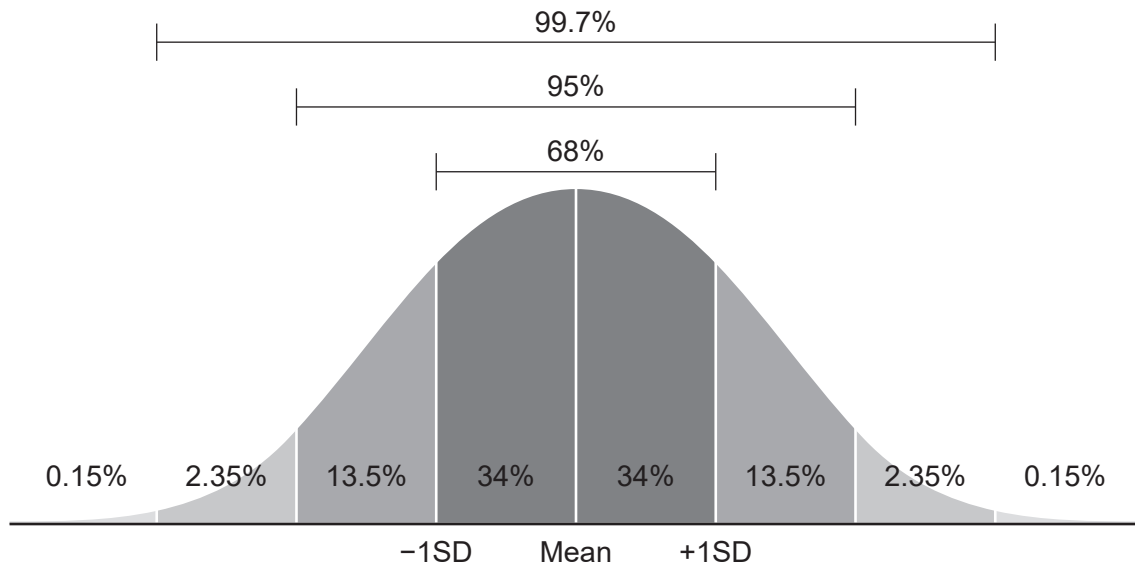
** Note: UAA, UAG and UGA are terminator codons.

Information about nitrogen bases

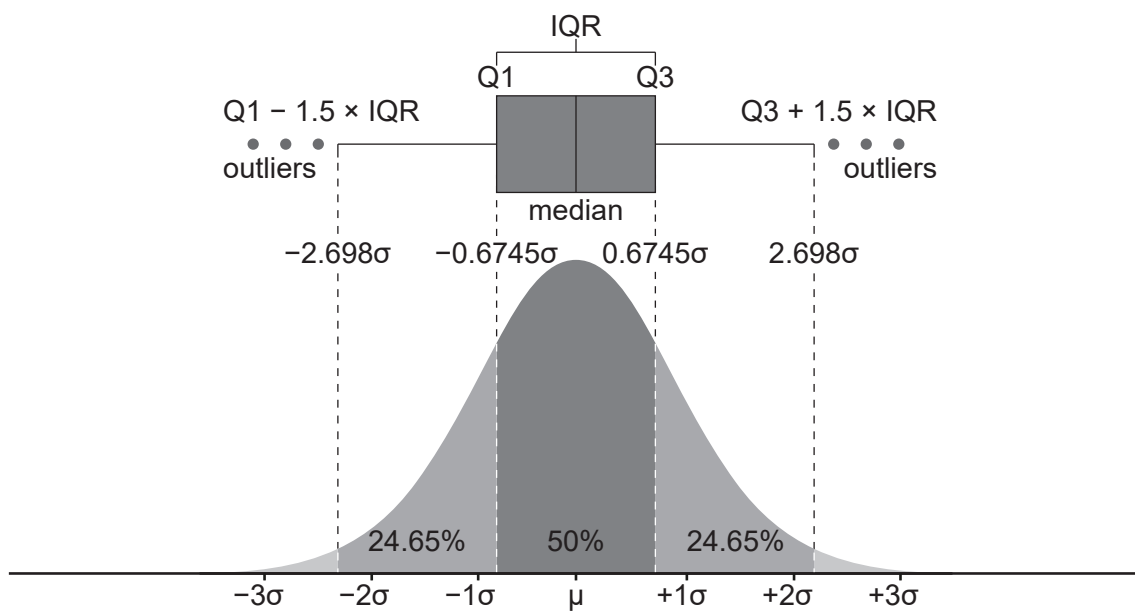
Nitrogen base	Classification	Abbreviation
adenine	purine	A
guanine	purine	G
cytosine	pyrimidine	C
thymine	pyrimidine	T
uracil	pyrimidine	U

14. Variation in data sets

Standard deviation (SD)

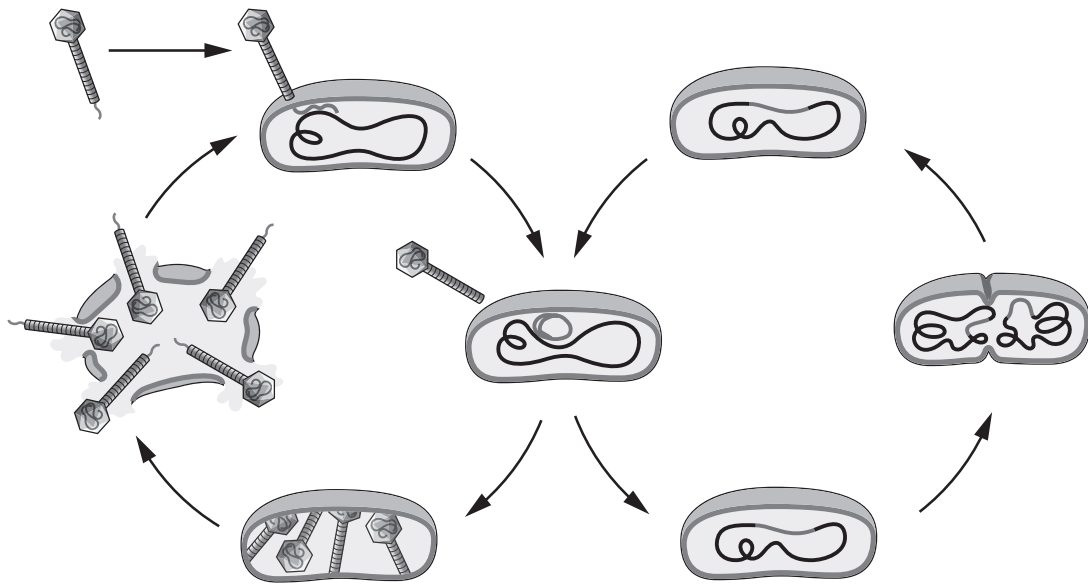


Box and whisker plot for normal distribution

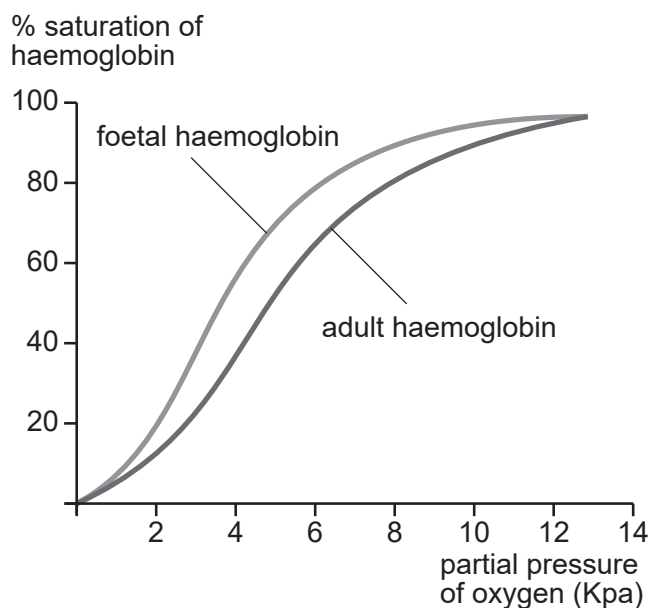


HL only

15. Lytic cycle and lysogenic cycle



16. Affinity of haemoglobin for oxygen



17. Sarcomere in a relaxed myofibril

