



Cambridge Assessment Admissions Testing

BioMedical Admissions Test (BMAT) Section 2:
Notes for test-takers

For universities in the Netherlands

2020

BMAT: Some important points to note

Section 2 general points

For this test you are only allowed a pen and a pencil. You are **not** allowed:

- calculator
- BINAS
- Periodic Table

You are expected to recall and use science and mathematics knowledge without any reference materials.

You have 40 minutes to complete the 27 questions in Section 2 (on average, less than 90 seconds per question), so note the following:

- Work quickly.
- If you find a question particularly difficult or time consuming, move on to a different question and come back to it later if you have time.
- Guess the answers you are not sure about.
- Estimation can be a useful approach to numerical calculations (though the questions will not ask you to estimate – you must decide whether to or not).
- Decimal points are used rather than commas - for example, 1.6 cm instead of 1,6 cm.
- In tables headings and axis labels, the units for a quantity will follow a “ / ” symbol rather than being in brackets – for example, “ speed / m s^{-1} ” is equivalent to “ speed (m s^{-1}) ”

In the following information, the guide referred to is the new, online BMAT Section 2 guide. This guide, the test specification and specimen papers can all be accessed at:

admissionstesting.org/for-test-takers/bmat/bmat-netherlands/preparing-for-bmat-netherlands/.

Please note that the specification has been updated from 2019, so some topics have been removed from the specification and some new topics have been added.

Please note that when you take the test, you may not yet have covered all of the topics on the BMAT specification, so you may need to study the BMAT guide in more detail on these topics.

Biology

The amount of subject matter covered by BMAT is less than you have covered in school. Topics like animal behaviour, the nitrogen cycle or the anatomy and physiology of plants are examples of some of the topics that are not assessed by the test. Some other topics are covered in less detail, for example genetics. This may make it seem like the biology questions will be easy – they are not necessarily. It may be helpful to be aware of these points:

- In anatomy you are expected to know all the English names for structures, as provided in the guide (B9).
- Notation for some topics is slightly different to what you are used to, such as with genetics, especially monohybrid crosses (B4.3).
- Be aware that respiration (B9.1) means dissimilatie, while respiratory (B9.2b) means ademhaling.
- Aspects of population dynamics, such as predator-prey and host-parasite interactions can be included in this test. These are not compulsory in Dutch schools and are taught in only some schools. These subjects may or may not require some basic additional study (B10.1).
- As the BINAS will not be available during the test, you should know the details of the carbon and water cycles (B10.2).
- New topics to the 2020 specification include cancer (B3.1c); structure of DNA (B5.2); benefits and risks of GE (B6.1c); benefits and risks of stem cells (B6.2d); impact of selective breeding (B6.3a); roles of hormones in human reproduction (B9.4c); communicable diseases for example measles and malaria; and non-communicable diseases for example coronary heart disease (B9.5a and b); the water cycle (B10.2).

Chemistry

Much of the chemistry you can be expected to know you have already covered at school, and the guide should serve as a reminder of this. There are some topics that you may **not** have covered in school and differences in approach to others; a list of some of these points to note is given below:

- You are expected to be able to relate the electronic structure to position in the Periodic Table (C2.3, C2.4).
- In this test, and in the guide, ionic salts in solution are **not** separated into their different ions. For example, aqueous copper sulfate solution would be written as $\text{CuSO}_4(\text{aq})$ (C3.2, C6.3).
- In this test, and in the guide, coefficients (balancing numbers) and formulae in equations are **not** separated by a space (C3.4).
- You are not given a Periodic Table or BINAS, but you are expected to know key concepts and facts such as reactivity (e.g. C7, C14.1, C14.2), solubility, gas tests (C16.1) and flame tests (C16.4), colours of precipitates (C16.2, C16.3), properties of metals (C14), the position of common elements in the Periodic Table (C2), the difference between complete and incomplete combustion of hydrocarbons (C13.1f), the reactions of the alkali metals (C7.1, C7.2) and the halogens (C7.3), and the formulae of ions (C6.3b-d).
- The molar volume of a gas at room temperature and pressure is $24.45 \text{ dm}^3 \text{ mol}^{-1}$; in the test and in the guide this is rounded to $24 \text{ dm}^3 \text{ mol}^{-1}$ (C4.8) for ease of calculation without a calculator.
- For redox reactions, the terminology in the guide and the test will be a bit different to what you know:
 - “Extraction” means producing the metal from the salt (the ore) by means of a reaction (not a “separation”) (C8.1, C14.4).
 - The oxidation state is the theoretical charge present on an atom. To calculate this, put all known charges in place and calculate the remainder (C5.3, C6.3d).
 - For the definition of *oxidising agent* or *reducing agent*, the focus is on the process: the oxidising agent oxidises another species by removing electrons from it (the oxidising agent is itself reduced as it gains electrons) (C5.2, C5.6).
- For electrolysis, the terminology in the guide and the test will be a bit different to what you know:
 - The positive (+ve) electrode is the *anode*, the negative (-ve) electrode is the *cathode* (C12.1).
 - The production of hydrogen or oxygen gas from an aqueous solution can be explained by the presence of $\text{H}^+ / \text{H}_3\text{O}^+$ in acidic solutions and OH^- ions in alkaline solutions, or the direct oxidation/reduction of H_2O . (C12.3, C12.4a).
 - There is no Dutch translation for the word *electroplating*. It means covering an object with a layer of any metal by means of electrolysis (C12.6).

Physics

Much of the physics you can be expected to know you have already covered at school and the guide should serve as a reminder of this. There are some topics that you will **not** have covered in school; some of these are given below:

- Electric circuits: difference between alternating current and direct current (P1.2b); resistor combinations (P1.2j and k)
- Soft and hard magnetic materials (P2.1c).
- The dc motor (P2.3e).
- The ac generator (P2.4d).
- Transformers (P2.5).
- Kinematics: scalar and vector quantities e.g. distance and displacement, speed and velocity (P3.1a, b and c); interpreting graphs (P3.1e); equations of motion (P3.1h).
- Acceleration due to gravity, g , is also known as the gravitational field strength (the force per unit mass). The value of g on Earth is about 10 m s^{-2} , or 10 N kg^{-1} (P3.5b). Questions will use 10 N kg^{-1} .
- The concept of momentum and how it is related to force and used to solve problems (P3.6).
- Thermal radiation: absorption and emission of thermal radiation (P4.3).
- Matter: ideal gases, $PV = \text{constant}$ (P5.2); state changes, specific latent heat calculations (P5.3); hydrostatic pressure (P5.5b).
- Waves (P6): the terms compression and rarefaction (P6.1c), amplitude and pitch (P6.4c). That the frequency of a wave is defined at the source, and does **not** depend on the medium (P6.1e). Reflection and refraction (P6.2). The Doppler effect, a phenomenon that can be used to measure the speed with which an object is travelling, using waves (it is used in medicine to measure blood speed, and in law enforcement to measure the speed of vehicles, (P6.2e). Optics and ray diagrams (P6.3).

Some terminology is different, such as:

| <i>English</i> | <i>Dutch</i> |
|-----------------------------|-------------------------|
| Distance (P3.1b) | Afstand, afgelegde weg |
| Displacement (P3.1b) | Verplaatsing |
| Gradient of a graph (P3.1f) | Helling van een grafiek |
| Momentum (P3.6) | (Lineaire) Impuls |
| Thermistor (P1.2h) | NTC |

Mathematics

Much of the mathematics you are expected to know you will have already covered at school, and the guide should serve as a reminder of this. There are some topics that you will **not** have covered in school, and the details will depend on which mathematics course you have taken. It is important that you look carefully at the test specification and identify all the areas you might not have studied in school and then use the online guide to help you study these.

The approaches you will need to take when tackling mathematics questions are quite different to the approaches you will probably have taken in school exams. Working through past papers, under timed conditions, will help you get used to these approaches. Time is a factor in these papers so practising under timed conditions will help you get used to working both quickly and accurately.

If you have studied Mathematics B, you should take some time to learn topics such as data handling, probability and statistics (M6, M7). Also note that the part on quadratic graphs, harder graphs and transformations (e.g. M4.12) are covered in rather less depth than you are probably used to. Be advised that your normal approach to these subjects, as taught in school, will often be too time consuming. Usually an easier approach, such as those shown in the online guide, will suffice.

If you have studied Mathematics A, you should take some time to learn topics such as geometry (M5) and trigonometry from the online guide. The questions in the test will often combine geometry or probability with other topics, which the guide does not address. You may also need to refresh your algebra skills.

In both cases, there are some topics that you will not have studied in school, such as upper and lower bounds (M2.12), and topics that are not addressed very often like simultaneous equations (M4.15).

For students of either Mathematics A or B, there will be some unfamiliar topics covered in the BMAT specification, for example bearings (M5.13).

An approach to preparation

Read the test specification, then look through the online guide and note down the page numbers of any topics that you need to learn or that you need to revise.

If the explanation in the guide is not clear, then look for support from other places, such as the internet or textbooks. For topics that involve mathematical relationships and calculation, it is useful to look for practice material that may not resemble BMAT questions but will help you develop your understanding of the topic. You may find this practice material in textbook exercises and on the internet.

In addition to making sure you have studied all the topics that might be examined in the test, it is a very good idea to practise taking specimen papers under timed conditions.

Specimen papers and the test specification can be found at:

[admissionstesting.org/for-test-takers/bmat/bmat-netherlands/preparing-for-bmat-netherlands/](https://www.admissionstesting.org/for-test-takers/bmat/bmat-netherlands/preparing-for-bmat-netherlands/)

Review the guide again, and then try the specimen paper and work to the time given.

Further practice papers and a range of other resources at can be found at:

<https://www.admissionstesting.org/for-test-takers/bmat/preparing-for-bmat/>.

These can be useful to prepare with, but please be aware that some of the topics are no longer in the test, and some topics not on the past papers can now be asked in the test.

Please also note that for Section 2 you have an additional 10 minutes test time to use the Dutch glossary. So past BMAT papers are useful, but not as useful and representative as the specimen paper.

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Cambridge Assessment
Admissions Testing
The Triangle Building
Shaftesbury Road
Cambridge
CB2 8EA
United Kingdom

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