BioMedical Admissions Test (BMAT)

Section 1
Critical Thinking Guide

BMAT Section 1 - Critical Thinking Guide

Introduction

Overview

In one BMAT exam, there will be approximately **16 questions** that test your ability to understand arguments.

In these questions, an argument or explanation will be given and you will be required to do one of the following:
- Identify reasoning, assumptions and conclusions
- Detect flaws
- Draw conclusions

Common Questions

Identify reasoning, assumptions and conclusions:
- Which of the following matches the **reasoning** in the above argument?
- Which of the following is/are the underlying **assumption(s)** of the argument?
- Which of the following best expresses the main **conclusion** of the argument?

Detect flaws:
- Which of the following best expresses the **flaw** in the argument?
- Which of the following most **weakens** the argument?
- Which of the following most **strengthens** the argument?

Draw conclusions:
- Which of the following could be drawn as a **conclusion** from the passage?
- Which of the following is an **inference** that can be drawn from the passage?
- Which of the following most logically completes the last sentence in the passage?

How to approach questions

General Approach

1. **Skim read the passage**:
    a. Skim read the passage initially.
    b. Highlighting key information, keywords and any statistics.
    c. If you're given a graph, pay attention to the headings, descriptions, axes and units.

2. **Identify the question type**:
    a. Read the question and identify the question type from those outlined below.
    b. Understand what the question is asking you and think about how you can approach it.
    c. If the question asks you to identify statements that are true/false or correct/incorrect, pay careful attention to which you have to choose in your answer! A good way to do this is to write what the question asks you to identify, such as "true", and then listing all statements that fit this. This word will serve as a reminder whilst you read the statements.

3. **Reread the passage**:
    a. Go back to the passage and read the relevant information carefully, trying to think of the answer to the question.

4. **Work out the answer**:
    a. On rereading the relevant information, you may immediately have an idea of what the answer is. If you don't, you can use one of the methods outlined in this guide to help answer the question type you have identified. These methods require some practice to get used to, but they can be very helpful.

5. **Select the correct answer from the answer options**:
    a. Once you have an idea of what the answer should be, look through the options and try to find the answer that is most similar to the one you had in mind.
    b. If you are unsure of the correct answer, you can eliminate those that you know are incorrect. This will narrow down the options you have to choose from.

'Identifying reasoning' questions

<u>'Which of the following matches the **reasoning** in the above argument?'</u>

Reasoning questions can cause some confusion: some require many stages of thought, and some have answers that are very similar. Therefore the best way to approach reasoning questions is to use a systematic and logical method to decode the question information.

A very useful method for these questions is **rewriting reasoning in a simplified manner.** This will mean you can **see all reasoning in one glance**. Passages can be long and by simplifying it, you won't have to keep rereading the passage, and you're less likely to get the reasoning confused. There is no one correct method of doing this, it just needs to be in a way that is easy for you to understand.

Worked example

1. All platypuses lay eggs and all platypuses are mammals. Therefore, all mammals lay eggs.

    Which of the following matches the reasoning in the above argument?

    A   All platypuses are monotremes and all monotremes are mammals. Therefore, all platypuses are mammals.
    B   Platypuses lay eggs and are mammals. Therefore, all mammals lay eggs.
    C   Mammals give birth to live young. Therefore, non-mammals do not give birth to live young.
    D   Platypuses are mammals and monkeys are mammals. Therefore, platypuses are monkeys.
    E   Male platypuses are carnivorous and male platypuses are venomous mammals.Therefore, venomous mammals are carnivorous.

A very useful method for identifying reasoning is to decode it, as demonstrated below.

"All platypuses lay eggs and all platypuses are mammals. Therefore, all mammals lay eggs."

Assign each item in the statement with a letter. Then the statement can be rewritten:

All **A** do **B** and all **A** are **C**. So, all **C** do **B**.

Next, you need to rewrite all of the answers in a simplified manner and compare these to the original statement.

A   All platypuses are monotremes and all monotremes are mammals. Therefore, all platypuses are mammals.
Can be rewritten as:
All A are B and all B are C. So, all A are C.

B   Platypuses lay eggs and are mammals. Therefore, all mammals lay eggs.
Can be rewritten as:
A do B and are C. So, all C do B.

C   Mammals give birth to live young. Therefore, non-mammals do not give birth to live young.
Can be rewritten as:
A do B, so A do not do B.

D   Platypuses are mammals and monkeys are mammals. Therefore, platypuses are Monkeys.
Can be rewritten as:
A is C and B is C, so A is B.

E   Male platypuses are carnivorous and male platypuses are venomous mammals.Therefore, venomous mammals are carnivorous.
Can be rewritten as:
A is B and A is C. So, C is B.

E is the answer.

The simplified form of the argument given in the question is A (all platypuses) do B (lay eggs) and A (all platypuses) is C (mammals). So, C (mammals) do B (lay eggs).

The simplified form of **E** is A (male platypuses) is B (carnivorous) and A (male platypuses) is C (venomous mammals). So, C (venomous mammals) is B (carnivorous).

A   is incorrect because it has a different simplified form. (A are B and B are C, so A is C)
B   is incorrect because it has a different simplified form. (A do B and is C, so all C do B)
C   is incorrect because it has a different simplified form. (A do B, so A do not do B)
D   is incorrect because it has a different simplified form. (A is C and B is C, so A is B)

Approach to 'identifying assumption' questions

'Which of the following is/are the underlying **assumption(s)** of the argument?'

In everyday life, we often jump to conclusions and make assumptions. We do these things very automatically, without thinking about them. Therefore, finding an assumption can actually be quite challenging; we have to unravel an automatic process that we usually do not think about doing to find the underlying, implied assumption.

Since we are not used to thinking about assumptions, many answer options can seem viable. You may find the following method helpful for identifying the best answer.

First, you need to identify the **conclusion** and then any **reasons or evidence** that support the conclusion. Next, locate the **implied, underlying link** between the reasons and the conclusion which makes the conclusion make sense. When thinking about what the assumptive link is, remember that without it, the argument and the conclusion would not make sense.

Worked example

2   In a move to reduce usage of plastic, many food and beverage companies are beginning to use alternatives to plastic straws, such as paper or metal straws. However, bubble tea continues to use plastic straws and represents a booming market that is continuously expanding its presence globally. The use of plastic straws will continue if bubble tea continues to be so popular.

Which one of the following is an underlying assumption of the above argument?

A   Bubble tea will become the most popular drink worldwide.
B   There are no alternatives to plastic straws in the bubble tea market.
C   The government has not implemented a ban on plastic straws.
D   The use of plastic straws will harm the environment.
E   Many people love the taste of bubble tea.

Let's identify the conclusion and supporting reasons/evidence in this question.

Conclusion - if bubble tea continues to be popular, the **use of plastic straws** will continue.
Reason - other food and beverage companies have started using **alternatives** to plastic straws, but bubble tea **continues to use** plastic straws and is getting **more popular.**
Implied link - bubble tea will continue to use plastic straws as it becomes more popular.

B is the answer.

The phrase 'no alternatives' addresses why 'bubble tea will continue to use plastic straws as they become more popular'. This is the assumption of the argument.

A, C, D, E are incorrect because they do not make sense when placed into the argument above.

Approach to 'identifying conclusion' questions

'Which of the following best expresses the **main conclusion** of the argument?'

When trying to identify the conclusion of an argument, try not to overthink it; you don't need to infer or think about the logic behind the conclusion.

To identify the conclusion, try to think about the **overall message** that the passage is trying to convey. Look out for any **indicator words** in the passage such as 'thus', 'therefore' or clues such as 'we should …' or 'we can...'. as these can show the **point/purpose** of the argument and the message it is trying to convey.

Try to **summarise the argument in one statement** consisting of the **conclusion** and the **reason**.

> *Exam Tip* - When the conclusion of a passage is not very obvious, try and take a step back and think about what, overall, the passage is trying to tell you.

Worked example

3   Psychological and medical research has suggested that the human body has massive recovery potential, and that it is never too late to begin a healthy lifestyle. For example, regardless of duration of smoking or frequency of tobacco usage, after five years of abstinence, ex-smokers have about the same risk for heart disease as those who never smoked. The same is true for a variety of other risk factors, including obesity and a sedentary lifestyle.

> [Adapted from: *Age and Physical Functioning*, by Gail Williamson and David Shaffer. *Cambridge Handbook of Psychology, Health and Medicine*: 2007. pp10-14]

Which one of the following best expresses the main conclusion of the argument?

A   Regardless of past habits, it is not futile to start a healthy lifestyle.
B   The human body is able to recover from past bad habits.
C   Ex-smokers are able to regain their full health after 5 years of quitting.
D   We should lead healthy lifestyles.
E   Medical research has enabled people to live healthier lives.

Let us summarise the argument in one thesis statement consisting of the conclusion and the reason.

Thesis: It is never too late to begin a healthy lifestyle (conclusion) because the body has massive recovery potential (reason).

A is the answer.

It is important to remember that if a → b, b is the main conclusion, a is the reason.
The main conclusion of the argument is 'it is never too late to begin a healthy lifestyle' while the supporting evidence refers to the possibility of health recovery from bad lifestyle habits.

- **B** is incorrect because it is the reason and not the main conclusion.
- **C** is incorrect because it is inaccurate (the passage only speaks for the risk of cardiovascular disease and not the full health potential) and not the main conclusion.
- **D** is incorrect because the main conclusion has the time factor of 'never too late' in addition to leading a healthy lifestyle.
- **E** is incorrect because it is not mentioned in the passage.

Approach to 'detecting flaw' questions

'Which one of the following best expresses the **flaw** in the above argument?'

Flaws can be spotted by looking for **something that causes the argument not to make sense**. If the flaw can't be identified straight away, try to identify the assumption first, and the flaw should then become clearer to see.

One example of a flaw is a mistake in logical reasoning. A common mistake in logical reasoning is **confusing association with causation**. This means a simple association between two variables is assumed to mean that one causes the other. But this is not always the case!

For example, evidence may show that people who eat an apple a day, go to the doctors fewer times per year. This does **not** mean that people will go to the doctors less if they eat an apple a day; this would be based on the **assumption** that it was the apples that **caused** fewer visits to the doctors. However, it could be the case that people who eat an apple a day are generally more concerned about their health, and have a healthier diet overall and **this** caused fewer visits to the doctors.

Worked example

4 In addition to helping relieve stress, playing video games can help improve mental skills. However, there is a negative stigma associated with playing video games as many become addicted and spend large amounts of time using them. Childhood obesity is increasing at an alarming rate and anti-social behaviour is also on the rise. Hence, parents should control the amount of time their children spend on playing video games to protect their physical and mental health.

Which one of the following best expresses the flaw in the above argument?

A It does not highlight the importance of playing video games.
B The argument is only based on those with addiction to playing video games and not the entire video game playing population.
C The argument assumes that parental control will have a positive effect on the physical and mental health.
D It excludes other factors that lead to increased childhood obesity and anti-social behaviour.
E It assumes that addiction to playing video games has resulted in increased childhood obesity and anti-social behaviour.

You may notice that the argument mentions **2 separate trends**.
➔ The first is that many become addicted to playing video games, and the second is that childhood obesity and anti-social behaviour is increasing.
➔ There is then a **large jump to the conclusion** that controlling the amount of time spent playing video games will protect their physical and mental health.

The flaw is quite large here and is a classic example of **confusing association with causation**. The 'missing link' is the **assumption** that spending large amounts of time playing video games **results** in the increase in childhood obesity and anti-social behaviour.

If a jump in logic is not apparent to you at first glance, you can try to find the flaw through a methodical process.

Conclusion - control time children spend on playing video games to protect their physical & mental health.
Reason - (1) Many become addicted to playing video games (2) Childhood obesity and anti-social behaviour is increasing.
Implied - **(1) results in (2)**, and therefore stop (1).

E is the answer.

As always with these questions, try to identify the conclusion and evidence, then find the assumption that has been made between the two. There is a missing link between addiction to playing video games and the increasing childhood obesity/ anti-social behaviour.

While **A,B,C,D** are all valid points, they do not directly address the flaw in the given argument.

Approach to 'weaken the argument' questions

'Which one of the following, if true, **weakens** the above argument?'

If a statement **weakens** an argument, it makes the conclusion **invalid** or **less valid**. The correct answer may **directly oppose** or **not support the conclusion**, resulting in the conclusion being false or not making sense. You must **understand the conclusion well** before you can find the correct answer.

Once you have identified the conclusion of the argument, look through all the answer options and choose the option that opposes what the conclusion addresses. This is demonstrated in the worked example below.

Worked example

5   Cultured pearls are produced more efficiently and in greater numbers than naturally-produced pearls. This means that cultured pearls are much cheaper in price than naturally-produced ones. Therefore, owning and wearing pearls is no longer limited to the rich.

Which one of the following, if true, weakens the above argument?

A   Only the rich have access to the pearl market.
B   Owning and wearing pearls is a sign of socio-economic standing.
C   The most valuable pearls are natural pearls.
D   Cultured pearls can be distinguished from natural pearls.
E   Pearls are used not only in jewellery but also to adorn clothing.

First, identify the conclusion: cultured pearls are cheaper than naturally-produced ones, meaning not only the rich will be able to buy pearls. The conclusion concerns the ability of people to buy pearls and the answer that weakens the argument would then provide a reason on why only the rich are able to own and wear pearls, directly opposing the conclusion. Eliminate the options which do not directly oppose the argument.

A is the answer.

If the statement 'only the rich have access to the pearl market' is true, this would mean that only the rich are able to buy, own and wear pearls, directly opposing the conclusion that not only the rich will be able to buy pearls.

B, C, D and **E** are incorrect because they do not address why the ability of buying pearls is still only limited to the rich.

Approach to 'strengthen the argument' questions

'Which one of the following, if true, would most **strengthen** the above argument?'

If a statement **strengthens** an argument, it makes the conclusion **valid** or **more valid**. You must understand the conclusion before you can find the answer.

Try and **identify the conclusion** first. The correct answer will support the conclusion, resulting in the conclusion **making more sense**. There are many ways an answer can **support** a conclusion. For example, a statement may remove or address a possible assumption made for the conclusion to hold true, or provide a reason or purpose for the argument. Look through all the options and choose the option that **most validates** the conclusion.

Worked example

6 There is a need for school-based sex education programmes. Effective programmes successfully teach the young people safe sex practices. This will enable young people to make informed decisions about their sexual health.

Which one of the following, if true, would most strengthen the above argument?

A	Effective programmes have led to a reduction in sexual partners among young people.
B	Young people lack sexual reproductive health knowledge.
C	There is an increase in the use of contraception among young people as a result of sex education.
D	Young people are reaching puberty earlier.
E	Young people have access to sexual health knowledge via the internet.

Identify the **conclusion** - there is a need for school-based sex education programmes so that young people can make informed decisions about their sexual health.

The conclusion concerns the need for school-based sex education programmes. Therefore, the answer that strengthens the argument will provide a reason for why there is such a need, directly supporting the conclusion. Look through each option and eliminate if it does not help the conclusion make more sense.

The answer 'young people lack sexual reproductive health knowledge.' **provides a reason** as to why young people should be educated on this issue. It therefore **supports the conclusion** that there is a need for school-based sex education programmes so that young people can make informed decisions about their sexual health

- **A** is incorrect because while it supports the conclusion, it refers to a benefit of sex education programmes rather than why there should be a need for these programmes in the first place.
- **C** is incorrect because while it supports the conclusion, it refers to a benefit of sex education programmes rather than why there should be a need for these programmes in the first place.
- **D** is incorrect because it does not justify the conclusion.
- **E** is incorrect because it actually weakens the argument. If young people already have the knowledge, there is no need for these programmes.

Approach to 'drawing conclusion/inference' questions

'Which one of the following is an/a **inference/conclusion** that can be drawn from the passage above?'

Questions that ask you to draw a conclusion from something can sometimes be complex or unclear.

Therefore, you may find it useful to cover up the answer options whilst reading the question to try to avoid looking at the answers first. This is a very useful method because the answer options can complicate a question further.

This type of question requires you to identify the conclusion that logically follows the passage. After reading the passage, try and **summarise the whole argument in one sentence** so you can easily keep the whole text in mind when reading the answer options.

Then, choose the answer that is most similar to your summary sentence, or includes all of the important points within it.

Worked example

7   Across the globe, nationalist political parties are gaining momentum and power.
Some find it difficult to accept that these nationalistic views are appealing to a
growing proportion of voters. Nationalists highlight the importance of the
nation-state, an important building block of national identity. National identity is an
issue many grapple with in today's increasingly borderless world. However, national
identity is intrinsically linked to culture and race such that nationalistic policies on
immigration can quickly spiral to be of terrifying proportions, likened to legalised
persecution of a particular population.

Which one of the following is an/a inference/conclusion that can be drawn from the
passage above?

A   Most voters support nationalist political parties.
B   All nationalist political parties support the persecution of the immigrant
population.
C   Nationalists have some political insights that voters agree with.
D   Building a national identity is an agenda most voters place emphasis on.
E   Racist voters usually support nationalist political parties.

First, try to summarise the argument in **one statement** - nationalist political parties are
gaining more voters because people agree with some of their political agenda - mainly the
issue of national identity/importance of the nation-state.

Exam Tip - When looking through the options, **keep the entire text in mind** as
sometimes the options may try to mislead you, especially when there is a
contradiction hidden elsewhere in the text.

For example, in this question, the contradiction is that nationalistic policies on
immigration can sometimes be liked to legalised persecution of a particular
population. If not viewed in context, it is possible to mistake this as the main
message and hence conclusion of the passage.

C is the answer.

It is the answer most similar to the summarised statement.

A is incorrect because 'growing proportion of voters' does not mean a majority.
B is incorrect because it is a blanket statement ('all') and is alluded to as only a possibility.
D is incorrect because 'many' does not mean 'most' - a majority.
E is incorrect because it is not mentioned in the passage.

Exam Tip 1 - For questions that ask you to draw a conclusion, it is important **not** to use your own knowledge; you must **only use information included in the passage**.

Exam Tip 2 - Pay attention to the **terms used** in the passage and **compare them** to those used in the answer options. They may convey similar, but different, meanings.

For example, the passage mentions '**growing proportion** of voters' while option A uses the phrase '**most** voters'. While they both convey size and numbers, 'growing proportion' refers to an increasing number which may or may not be the majority, while 'most' refers to the majority.

Summary of Approaches

Question Type	Approach
'Identify reasoning'	**Write the argument in simplified form** and compare the forms between the given options
'Identify assumption'	Look out for **the implied link** between the evidence and the conclusion.
'Identify conclusion'	Look out for the author's opinion and **try to summarise the argument in one summary statement**. Look out for any indicator words in the passage such as 'Thus', 'therefore' or clues such as 'we should …' or 'we can...'.
'Detect flaw'	First, look for **mistakes in reasoning** that cause the argument to not make sense. If the flaw is not immediately obvious, conclude the argument and then look for **assumptions** that are made.
'Weaken the argument'	Identify the conclusion, and then find the answer that **makes the conclusion less valid**.
'Strengthen the argument'	The first step is to **identify the conclusion**. The second step is to **find the answer that makes the conclusion more valid** by supporting it. An answer may by providing a reason/purpose for the argument or by negating the assumption behind the argument, which helps to make the conclusion make more sense.
'Drawing conclusion/inference'	**Cover the answers and summarise the argument into a single statement**. Then choose the answer that addresses all the important points of the argument or is most similar to what you have summarised.