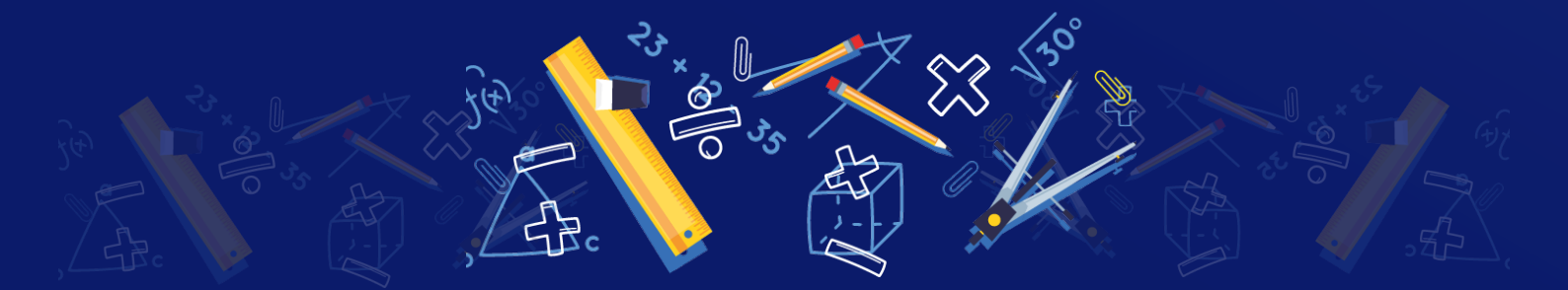
Quantitative Reasoning

LESSON 2

Using Estimation



Estimating vs. Working Precisely

In this section, we will look at the benefits of estimating as well as using exact values to work precisely, while evaluating when it is best to use both depending on the scenario.

What is the benefit of estimating?

In the UKCAT you will face a variety of questions, each requiring a different level of precision.

In an ideal world you would use your calculator to work out each answer to several decimal places, and then check your answer. However, this is just not possible due to the time constraints.

Estimating will **save you time** in several ways:

- You can use rounded figures that are easier to work with quickly
- It can make it easier to do mental maths
- You can sometimes answer by inspection, without having to do any calculations.

What is the benefit of working precisely?

Working precisely, bearing in mind time constraints, is the most ideal method:

- It will get you closer to the actual answer.
- You avoid missing the answer due to the inaccuracy of your estimated answer.

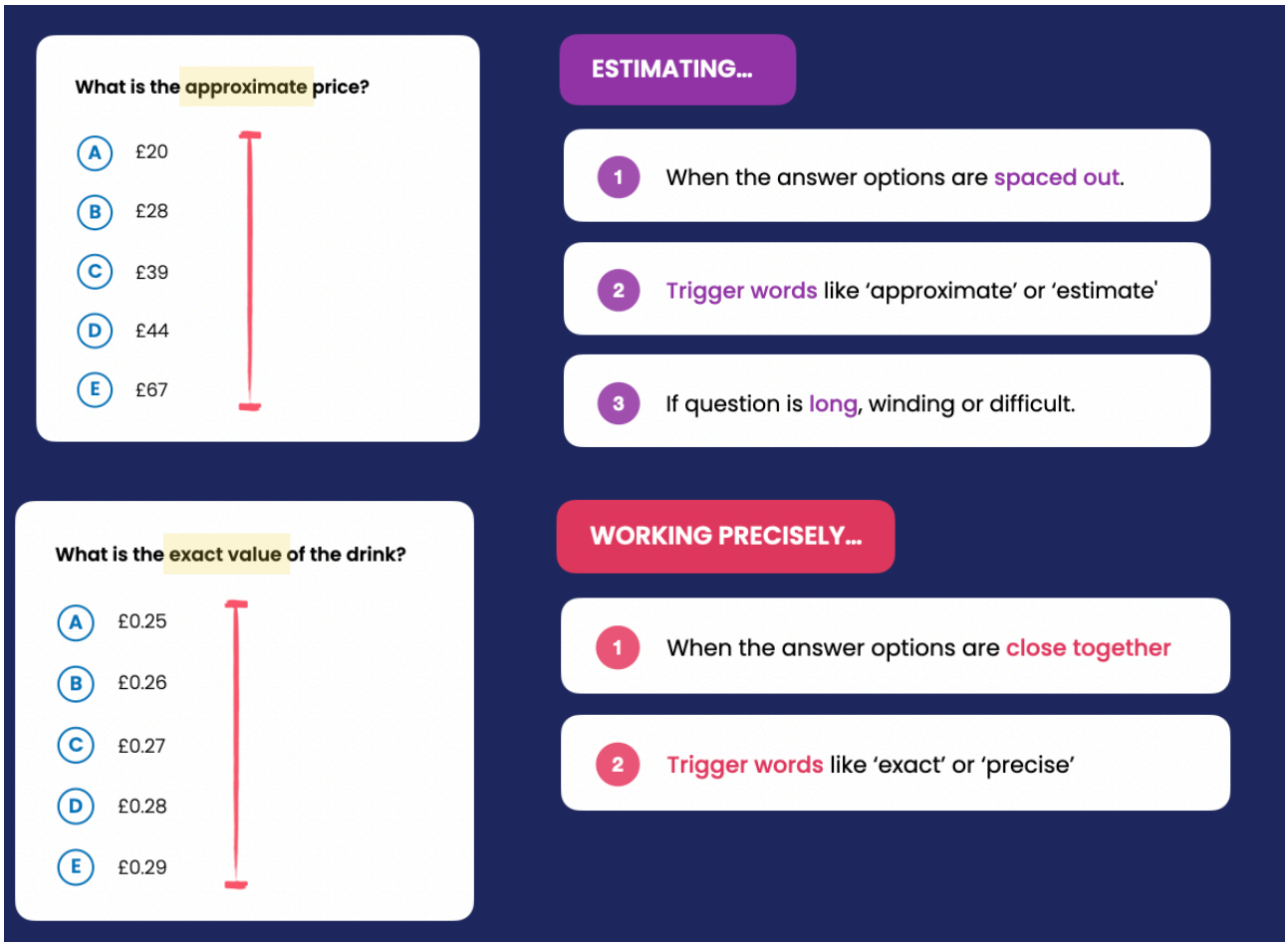
When should you estimate?

Estimate when:

- The answer options are spaced out. For example, if the answers are to the nearest thousand, and the data is given to the nearest ten, you can round the data to the nearest hundred.
- The question asks for the 'approximate answer', or it begins with 'estimate'. It might sound simple, but many students miss these subtle signs when they read the question.

Work precisely when:

- The answer options are close together. For example, if the answer options are 0.1, 0.2, 0.3, 0.4 and 0.5, you have to work precisely and at least to the nearest 1dp.
- The question asks for the 'exact answer'.

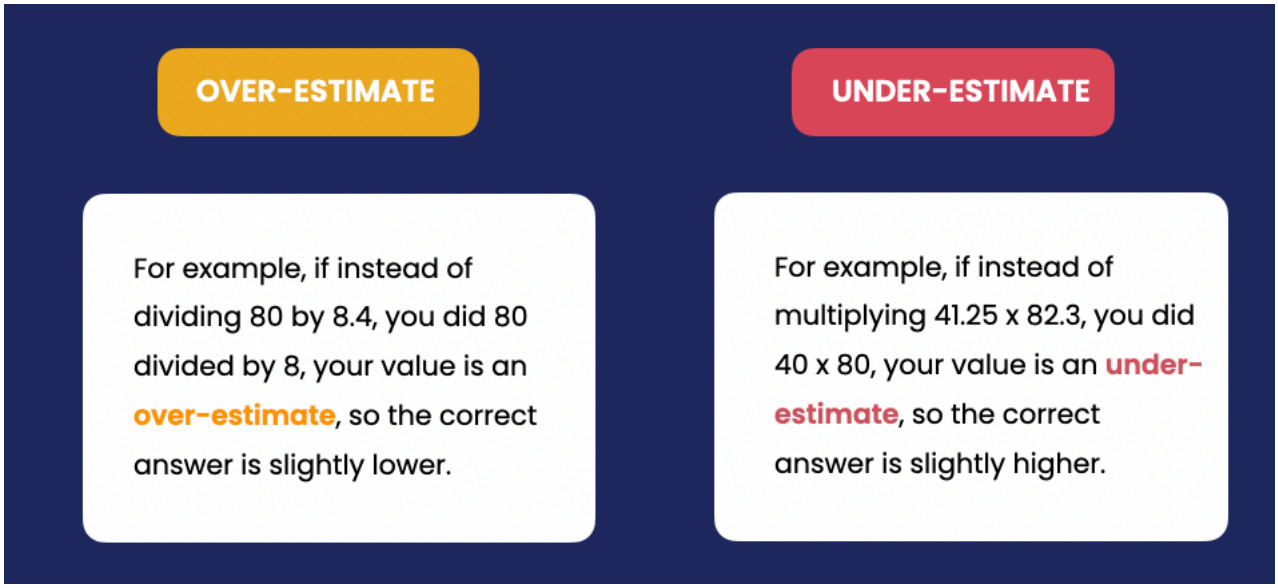


Estimating with graphs and pie charts

With graphs and pie charts you can often estimate depending on the question. If a graph only has axis labels to the nearest 10, don't worry too much about reading the plot to the nearest single unit.

Overestimate vs. Underestimate

If you are estimating, you should check whether the final answer is an underestimate or overestimate.



Estimating to check your answer

If you are unsure about an answer, you can do a quick estimate to check if you followed the correct general direction. Use approximate figures to get an estimate, and check whether your actual answer should be an overestimate or underestimate.

e.g. If the interest paid on a loan is paid in terms of compound interest at 3% each year, what is the amount owed on a £1560 loan after 3 years?

The method involves doing $1560 \times (1.03)^3 = £1794.65$

Do a quick estimate using simple interest to make sure you are going along the right lines. 1560 x 1.09 = £1700, and you know this has to be an underestimate. This is a good check for certain questions (not every one!) to make sure you haven't gone completely off track.

COMMON TRAP

Don't estimate blindly. In the previous example, if the options were closer together, be wary. Its a technique to save time, but it won't work for EVERY question!

TIMING TIP

If the UCAT asks you to calculate over 20 sums, then there's likely to be a shortcut, so be more confident in estimating

AVERAGES

When you calculate averages and extrapolate them to totals, estimates become larger and there's a bigger margin for error.

TIMING TIP

When working out rough claculations, write in short hand - e.g. in the previous question we wrote '7' instead if '7000'.

SENSE CHECK

If you are unsure about your answer, do a quick estimate and sense-check to make sure it sounds right...

The table contains information from a sample of Russian and English readers about how far they managed to get through classic works of Russian literature, either in the original Russian or in English translation. You may assume that Russian and English readers averaged the same % completion for each book.

Book	Total words (Russian)	Total words (English)	Average % completion across all readers
A Hero of Our Time	75,617	68,688	11.9
Crime and Punishment	246,621	209,741	29.1
Fathers and Sons	70,097	66,048	21.9
Life of Avvakum	81,410	73,961	27.1
Lolita	98,987	92,413	32.6
The Gulag Archipelago	216,001	188,302	31.1
The Master and Margarita	170,718	160,119	28.2
War and Peace	380,806	352,351	15.5

Difference (000s)

7 880

4 860

8

10

28

Checking Your Answer

When looking back, you may be worried about the low % completion of 'War and Peace' - is this possibly the answer? Do a quick sense check. The difference is 30,000 and 15% completion rate. 10% of 30,000 is 3,000, which is already above our 880 (Hero of Our Time).

Answer Choices

If your answer **matches an option**, it doesn't necessarily mean its correct.

e.g. Every wrong step can lead to one of the other answer choices

TIMING TIP

In a table with many categories or items, remember to focus just on the ones which are actually in the answer options, and eliminate any not present.

Summary

Estimating

Estimate when answer values are spread out or you see triggers like 'approximate'

Working Precisely

Work precisely when answer values are close together or you see triggers like 'exact'

Eyeball Graphs

For **graphs**, you can often estimate and round to the nearest level on the y-axis

Over or Underestimate

Check whether you did an under or **over-estimate** before choosing your answer

Eliminating Options

You can sometimes estimate to **eliminate** options, then work precisely with the options left

Checking Answers

If you're not confident, you can roughly estimate to **check** your answer sounds right