with university examination results.[1]

- It acts as preparation for the university course, because the style of mathematics found in STEP questions is similar to that of undergraduate mathematics.
- It tests motivation. It is important to prepare for STEP (by working through old papers, for example), which can require considerable dedication. Those who are not willing to make the effort are unlikely to thrive on a difficult university mathematics course.

STEP *vs* A-level

A-level[2] tests mathematical knowledge and technique by asking you to tackle fairly stereotyped problems. STEP asks you to apply the same knowledge and technique to problems that are, ideally, unfamiliar.

Here is an A-level question, in which you follow the instructions in the question:

> By using the substitution $u = 2x - 1$, or otherwise, find
>
> $$\int \frac{2x}{(2x-1)^2}\,\mathrm{d}x.$$

And here, for comparison, is a STEP question, which requires both competence in basic mathematical techniques and mathematical intuition. Note that help is given for the first integral, so that everyone starts at the same level. Then, for the second integral, candidates have to show that they understand why the substitution used in the first part worked, and how it can be adapted.

> Use the substitution $x = 2 - \cos\theta$ to evaluate the integral
>
> $$\int_{3/2}^{2} \left(\frac{x-1}{3-x}\right)^{\frac{1}{2}} \mathrm{d}x.$$
>
> Show that, for $a < b$,
>
> $$\int_{p}^{q} \left(\frac{x-a}{b-x}\right)^{\frac{1}{2}} \mathrm{d}x = \frac{(b-a)(\pi + 3\sqrt{3} - 6)}{12},$$
>
> where $p = (3a+b)/4$ and $q = (a+b)/2$.

The differences between STEP and A-level are:

1. STEP questions are much longer. Candidates completing four questions in three hours will almost certainly get a grade 1.
2. STEP questions are much less routine.
3. STEP questions may require considerable dexterity in performing mathematical manipulations.
4. Individual STEP questions may require knowledge of several different areas of mathematics (especially the mechanics and statistics questions, which will often require advanced pure mathematical techniques).

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[1] Recent studies comparing rank in STEP with rank in first-year Cambridge mathematics examinations reveal a Spearman correlation coefficient of 0.63, which is very high in comparison with other predictors of university examination results.

[2] I use the term 'A-level' here as a shorthand for a typical school mathematics examination. The particular examinations you take may well be very different in style and format but, even if that is the case, I am sure some of what follows will strike a chord with you.