STEP I 2002 Comments

Question 1

This is a nice gentle introduction to the paper. Solving the simultaneous equations is easy (and eliminating the $x = 48$ solution; and then it just remains to find the general equation of the circle which passes through these two points.

Question 2

Another fairly reasonable question. Finding the second derivative and then factorising it can be a little fiddly. The final part is a nice extension of sketching polynomial functions in A Level.

Question 3

Quite fiddly with the differentiation, and some thought is needed to establish the maxima and minima.

Question 4

I think things start to get a little trickier here, with a few different ways to approach the first part of the question, some of which work better than others. The second part is just integration, although having to choose sensible limits for the second integral – the $\ln 2$ in the required answer should suggest using $y = \frac{1}{2}$.

Question 5

A little too reliant on arithmetic for my taste, but a decent (if short) question nonetheless.

Question 6

Some nice geometry here. I think this is actually quite tricky, as visualising the 3D shape can be difficult, particularly the cross section used to find the vertical height. Once you have a good labelled diagram the rest is just applications of trigonometry.

Question 7

This is classic STEP! This sort of method comes up fairly regularly and I like the progression here through the different parts of the question.

Question 8

A decent question, although I think part of the difficulty is actually understanding what is going on! The algebra itself isn't too tricky, although the final approximation takes a little thought that the $\frac{1}{50}$ term in the numerator means you need to expand to an extra term in the denominator.

Question 9

A little on the harder side for STEP I, I think but nothing completely unreasonable. The first part is of course straightforward; after that the algebra gets a little tricky along with some careful justifications for why various things are positive when you divide inequalities by them.

Question 10

A question where a lot of the difficulty is interpreting the question and the notation! The mechanical principles involved are simple, and the algebra largely is too; with some work required for the telescoping series.

Question 11

The equations to write down here are hopefully fairly clear – conservation of energy and momentum are pretty standard. After that, this algebra is actually quite tricky, and it will be rather easy to lose somethings along the way. Once you get it out, the final part of the question is easier!

Question 12

This really feels like a geometry problem – the difficult bit is drawing the correct regions on the diagram. After that, finding the relevant probabilities is trivial!

Question 13

Another question which feels a little light on the probability – once you know the probability of the six different outcomes the rest of the question just involves finding the relevant outcomes for each part and doing the maths that is required.

Question 14

Some thought is required to get up the two sums correctly. The rest is working through the algebra and using the standard results for the sums of geometric series.