Water Flow Teacher Notes

Which Free-Standing Unit does this support?
Advanced Level – Working with algebraic and graphical techniques

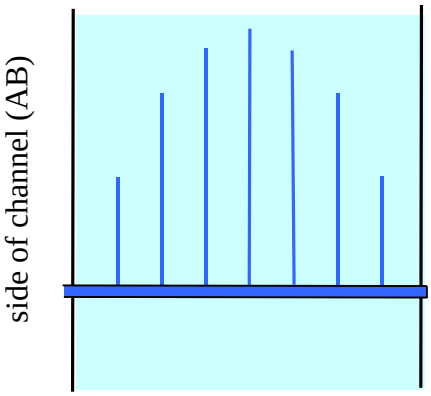
General Notes and Suggestions

The Water Flow package includes a data sheet (page 1) and a sample examination question (pages 2 and 3).

Before attempting the practice examination question, students need to know how to
- ***fit linear and quadratic models to a data set***
- ***describe geometric transformations***
- ***find the equation of a curve after a geometric transformation.***

The data sheet can also be used in other ways. Ideally students should provide their own data for portfolio work, but the Water Flow data can be used to demonstrate the methods needed or to give students extra practice.

The sketch shows the progress of the dye along the channel a short time after it is released. A sketch of this type could be discussed with students before they are asked to draw accurate graphs using the data provided.



Fitting different types of functions to the whole curve, or parts of it, could give valuable practice for requirements 1a, b(i), (iv) and c of the portfolio. Students can try other polynomials and trigonometric functions as well as the linear and quadratic functions used in the practice question.

Answers to Sample Examination Question

a **Intercepts with *x* axis** The velocity is zero at each side of the channel.
Turning Point The maximum velocity of 0.28 ms^{-1} occurs in the middle of the channel at a distance of 0.4 metres from each side.

b **(i)** $u = 1.05x$ **(ii)** 0.015 ms^{-1} **(iii)** 12.5%

c **(i)** $a = 1.75$, $b = 0.8$ **(ii)** 0.0025 ms^{-1} **(iii)** 2.08%

d **(i)** 25% **(ii)** 0.16, 0.20, 0.20, 0.16 respectively

e **(i)** One way stretch in the u direction with scale factor $\frac{8}{7}$.

(ii) $u = 2x(0.8 - x)$ **(iii)** 0.24 ms^{-1}