# Teaching rates of reaction post-16: next steps

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[rsc.li/3jV0WVq](https://rsc.li/3jV0WVq)

**These steps follow those from the graphical representations in the Teacher checklist, which accompanied the first Teaching rates of reaction post-16 article (**[**rsc.li/3yLp1nU**](https://rsc.li/3yLp1nU)**).**

## Introducing the rate equation

Students should be familiar with transforming a relationship that shows a proportional relationship into an equation by including a constant of proportionality.

***Rate ∝ [x]n* becomes *Rate = k[x]n***

Where *k* is the rate constant. This is only a constant when the temperature remains the same or when a catalyst doesn’t affect the rate.

### Calculating the rate constant

Now take Log10

***Log rate = logk + nlog[x]***

This equation form can be compared to *y = mx + c*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Log rate*** | **=** | ***logk*** | **+** | ***nlog[x]*** |
| *y* | *=* | *c* | *+* | *mx* |

So, plotting *log[x]* against *log rate* allows the gradient *n* (order) to be calculated. The intercept is *logk* which is important for calculating the *Ea*.

### Diagram  Description automatically generatedCalculating the activation energy (*Ea*)

Applying the Arrhenius equation

***k = Ae-Ea/RT***

Take natural logarithms and plot *lnk* versus *1/T*