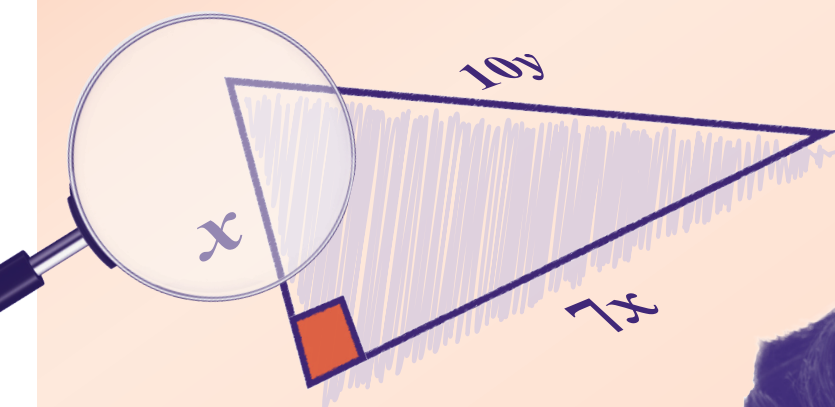


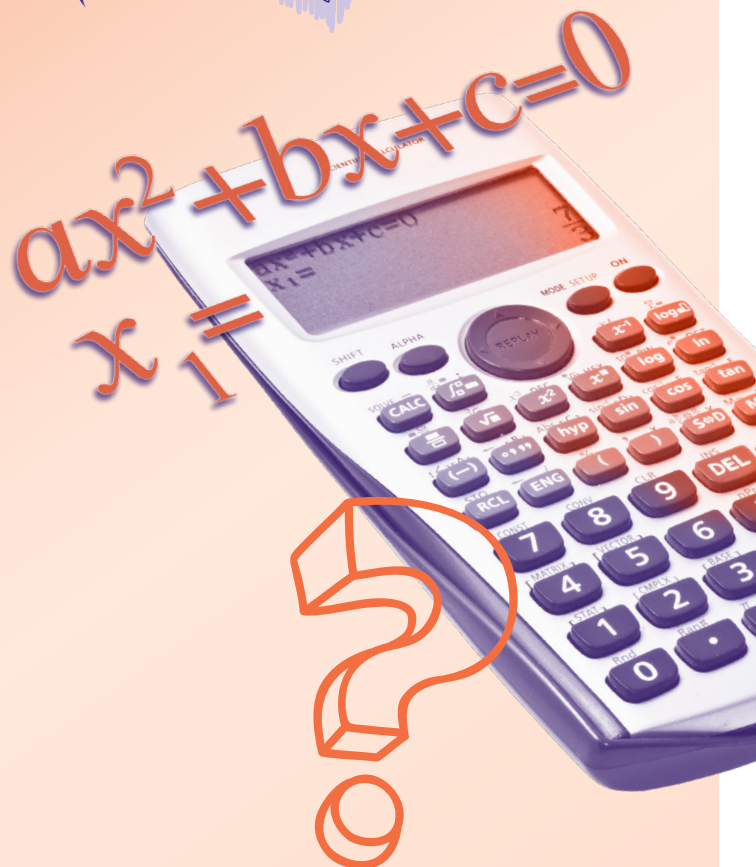
# GCSE Maths Focus on:

## Quadratics

Build on your students' assessment performance using our self-guided, modular training pack



Handouts  
booklet





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# Introduction to the ‘intelligent practice’ approaches

## Intelligent Variation (Reflect, Expect, Check)

This is an approach to writing sequences of questions with care, so that each question is related to the one that precedes it, as opposed to being a random collection of questions on a topic.

Because of this relationship, students are able to form expectations of a result before carrying out the procedure, leading them to engage more actively when working through an exercise. It also allows them to think more deeply about the processes involved. To find out more about creating sequences of questions with variation and how to use them in the classroom, visit

[variationtheory.com](http://variationtheory.com)

## Same Surface, Different Deep (‘ssdd’) problems

Students are often presented with a series of problems based on the same topic, but set in different contexts. Same Surface, Different Deep (‘ssdd’) problems take a different approach by presenting problems that appear similar at first glance (same surface) but have a different underlying structure (different deep). Students are challenged to engage in the problems and recognise how they are different and what mathematics needs to be applied to solve each one. To find out more about creating and using ‘ssdd’ problems, visit [ssddproblems.com/about-the-site](http://ssddproblems.com/about-the-site)

## Fill in the gaps

As the name suggests, these are tables of interconnected knowledge and students use what they know and what they are given – together – to complete the table. They are particularly useful in helping students see connections between different representations and different facts, and can be very effective as revision exercises. Examples can be found here: [variationtheory.com](http://variationtheory.com)

## ‘Goal-free’ problems

This approach removes the goal or specific question from a problem and replaces it with a much more open question such as ‘find out everything you can’. This stops students fixating on the end-point and frees them to explore all the maths within the situation. Longer, previous GCSE Maths exam questions provide excellent source material for Goal-free problems and some teachers use mock exam papers derived entirely of Goal-free questions with their students. For more explanation and examples, visit [goalfreeproblems.blogspot.com](http://goalfreeproblems.blogspot.com)

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# Activity 1c: 'ssdd' examples

## Same Surface, Different Deep ('ssdd') problems

Students are often presented with a series of problems based on the same topic, but set in different contexts. Same Surface, Different Deep ('ssdd') problems take a different approach by presenting problems that appear similar at first glance (same surface) but have a different underlying structure (different deep). Students are challenged to engage in the problems and recognise how they are different and what mathematics needs to be applied to solve each one.

Examples and definitions have been provided by Craig Barton. The examples below have been extracted from [ssddproblems.com](https://ssddproblems.com)

### Example 1

Expand and simplify  $(3x + 4)^2$

Simplify  $(3^4)^2$

Find the midpoint between  $(3, 4)$   
and the origin

Find the length of the vector  $\begin{pmatrix} 3 \\ 4 \end{pmatrix}$

## Example 2

Multiply out and simplify the expression

Draw the graph of  $y = (x - 8)^2$

$$(x - 8)^2$$

Does the equation (below) have two, one or no (real) solutions?

$$(x - 8)^2 = 0$$

$$(x - 8)^2 = a$$

Find a value of  $a$  so that the equation has

- (a) two different solutions
- (b) No (real) solutions

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# Notes

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