Extension Tasks for Further Maths

Task 1

Group the quadratic equations on the next slide.

You may wish to ask a friend to do this too and compare your groupings.

Some hints are provided after the activity

Once you have sorted the equations into groups, write a further equation for each group. (There are blank cards provided for this purpose.)

How else could you have sorted the equations?

(For a suggestion as to one possible way of grouping the equations, you could use the possible grouping cards.)

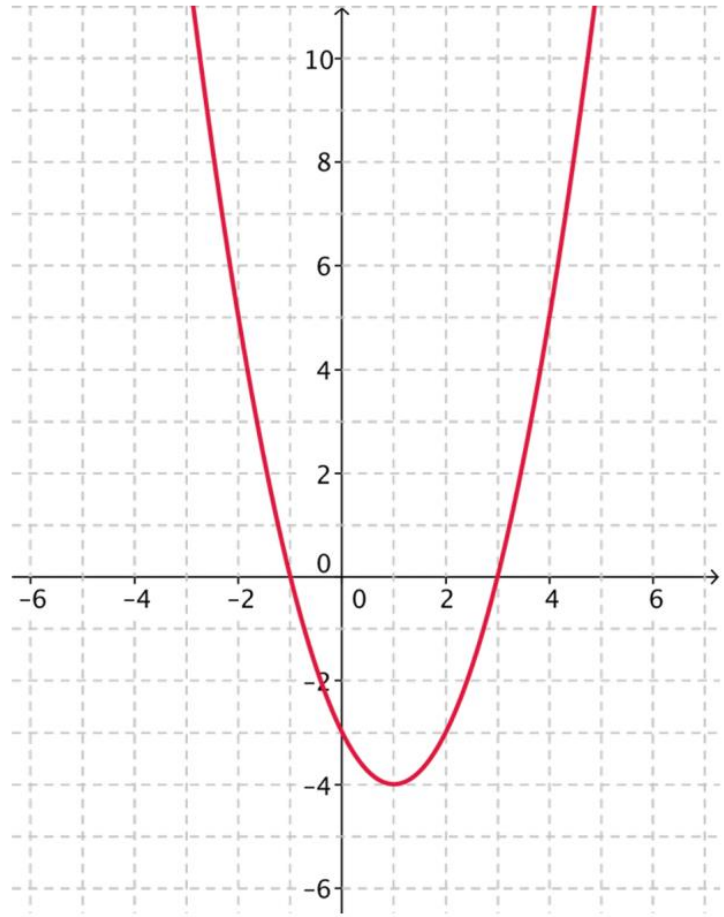
$3x^2 - 17 = 0$	$x^2 - 6x - 10 = 0$	$4x^2 - 7x = 0$
$3x^2 - 5x - 11 = 0$	$x^2 - 3x + 2 = 0$	$x^2 + 3x = 0$
$(2x - 5)^2 - 9 = 0$	$(2x - 1)(x + 3) = 0$	$(x - 3)^2 - 4 = 0$
$x^2 - 9 = 0$	$2x^2 + 5x + 2 = 0$	$2x^2 + 7x + 4 = 0$
$x^2 + 6x - 72 = 0$	$(x + 1)^2 = 0$	$x^2 - 16x = 0$
$2x^2 + 6x + 4 = 0$	$7x^2 + 14x - 21 = 0$	$3(x + 4)^2 - 8 = 0$

Hints for task 1

- Different approaches could be:
  - Factorising
  - Make x the subject
  - Solve
  - Complete the square
  - Use of DOTS

Task 2

- Find the equation of the parabola on the next slide
- What steps did you follow to get your answer?



Can you find an equation for this parabola?

✱

- In how many ways can you choose to show this equation?
- Which format did you initially choose and why?

Task 3 (Challenging)

Solve the inequality

$$\sqrt{x+2} - \sqrt{x-1} > \sqrt{2x-3}$$

for real values of x and of the square roots.

(The positive values of the square roots are to be taken.)

Task 3 – Tips and Suggestions

Beware! Multiplying an inequality through by a negative number will change the direction of the inequality sign.

How can we get rid of the square root signs?

What values of x are permissible in this question?

Task 4

* Find the last term of the sequence that starts with 3, has a common difference of $\frac{1}{2}$ and has 25 terms.

  - In what ways can this problem be solved?

* Change only one aspect of the sequence in order to make the last term 100.

  - What aspects can be changed?
  - What would they change to?

Task 5

For the sequences on the next slide:

Sort these infinite sequences into groups.

- How will you choose to define the groups?
- Are there some sequences which belong to more than one group?

Once you have sorted the sequences into groups, write a further sequence for each group.

How else could you have sorted the sequences?

Ⓐ $\frac{1}{2}, -\frac{1}{4}, \frac{1}{8}, -\frac{1}{16}, \ldots$	Ⓑ $3\sqrt{2}, 4\sqrt{2}, 5\sqrt{2}, 6\sqrt{2}, \ldots$
Ⓒ $2, 0, -2, -4, \ldots$	Ⓓ $\ln 1, \ln 2, \ln 3, \ln 4, \ldots$
Ⓔ $-1, -\sqrt{2}, -2, -2\sqrt{2}, \ldots$	Ⓕ $1, 1, 1, 1, \ldots$
Ⓖ $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots$	Ⓗ $-1, 1, -1, 1, \ldots$
Ⓘ $0.1, 0.01, 0.001, 0.0001, \ldots$	Ⓙ $3, 2\frac{1}{3}, 1\frac{2}{3}, 1, \ldots$
Ⓚ $4, 8, 16, 32, \ldots$	Ⓛ $\cos\left(\frac{\pi}{4}\right), \cos\left(\frac{2\pi}{4}\right), \cos\left(\frac{3\pi}{4}\right), \cos\left(\frac{4\pi}{4}\right), \ldots$
Ⓜ $1, 1\frac{1}{2}, 1\frac{2}{3}, 1\frac{3}{4}, \ldots$	Ⓝ $100, 105, 110, 115, \ldots$
Ⓞ $3.75, 5.625, 8.4375, 12.65625, \ldots$	

Task 5 - Hints

When looking for ways to group the sequences you might ask yourself the following questions.

- Is each term bigger or smaller than the previous one?
- How does the difference between adjacent terms change as you go along the sequence?
- Thinking about a pair of sequences, what is the same and what is different?
- Can you find a rule for generating the n^{th} term?

You might find it helpful to plot a graph of a sequence to get a feel for how it is behaving.