Objectives

Objectives for today:

- Introducing specific vocabulary.
- Quick revision of quadratic function.
- Factorising Quadratics

Factorising

Factorising a quadratic
brackets, and is useful i
graph of a quadratic so
It's pretty easy if $a = 1$ (

- Factorising Quadratics.
- Proving Vieta's formulas.
- Carrying out gained knowledge by working out some word problems.

Quick Revision

Forms of Quadratic Function

- $f(x) = ax^2 + bx + c$ is called the **standard form**.
- $f(x) = a(x - x_1)(x - x_2)$ is called the **factored form**, where x_1 and x_2 are the roots of the quadratic function.
- $f(x) = a(x - h)^2 + k$ is called the **vertex form**.

Delta Δ

Δ determines tells us how many solutions quadratic equation have:

$$\begin{cases} 2 & \text{when } \Delta > 0 \end{cases}$$

can be a real pain otherw

In order to factorise follow steps outlined belo

1. Rearrange the equation $ax^2 + bx + c$ form.
2. Write down two bracket
3. Find two numbers that add or subtract to give
4. Put the numbers in bra signs.

It's commonly believed other previously establis even better than simply

$$\text{number of solutions} = \begin{cases} 1 & \text{when } \Delta = 0 \\ 0 & \text{when } \Delta < 0 \end{cases}$$

The Quadratic Formula

$$x = \frac{-b \pm \sqrt{\Delta}}{2a}$$

Graph of Quadratic Function

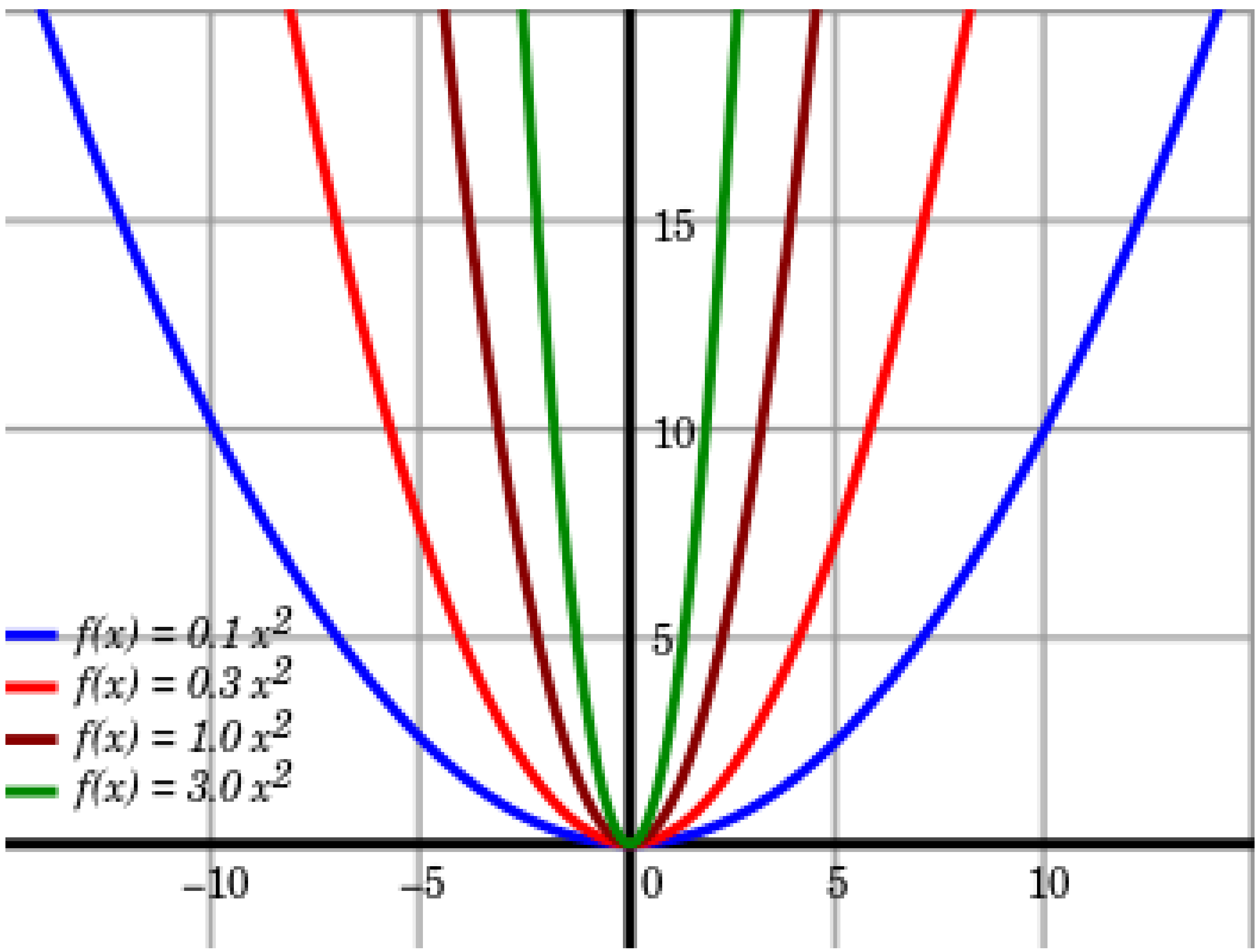

Figure 1:Graph of $f(x) = ax^2|_{\{0.1,0.3,1.0,3.0\}}$

Example of

Solve $x^2 + 4x - 21 = 0$ b

$$x^2 + 4x - 21 =$$

1 and 21 multiply to give
to give 22 and 20.
3 and 7 multiply to give
give 10 and 4.

$$x^2 + 4x + 21 =$$

And solving the equation

$$(x + 7)($$

we get

$$x = -7$$

Quadratic Function

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a Quadratic

means putting it into two f you're trying to draw a lve a quadratic equation. in $ax^2 + bx + c$ form), but

Factorising- Tasks

1. Factorise $x^2 - x - 12$.

vise.

a quadratic you should
ow:

into the standard

ts: $(x \quad)(x \quad)$
multiply to give 'c' and
'b' (ignoring signs).
ckets and choose their

2. Solve $x^2 - 8 = 2x$ by factorising.

Myth of Delta Δ

that in order to work out roots of a quadratic function you must count Δ and use
shed formulas. However this is untrue since factorising in many cases is as good or
counting Δ.

Factorisation

by factorising.

$= (x \quad)(x \quad)$

e 21 - and add or subtract

21 - and add or subtract to

$= (x+7)(x-3)$

:

$x-3) = 0$

, $\quad x = 3$

Proof of Vieta's Formulas

Let's prove that:

$$x_1 + x_2 = \frac{-b}{a}$$

When Δ is positive we have two roots:

$$x_1 = \frac{-b-\sqrt{\Delta}}{2a}, \quad x_2 = \frac{-b+\sqrt{\Delta}}{2a}$$

Substituting for x_1 and x_2 respectively, we receive:

$$x_1 + x_2 = \frac{-b-\sqrt{\Delta}}{2a} + \frac{-b+\sqrt{\Delta}}{2a} =$$

$$= \frac{(-b-\sqrt{\Delta}) + (-b+\sqrt{\Delta})}{2a} = \frac{-2b}{2a} = \frac{-b}{a}$$

The same we could do with another pattern, which state that $x_1 x_2 = \frac{c}{a}$, but proving this is going to be your task in next section.

Vieta's Formulas- Task

1. Prove that

$$x_1x_2 = \frac{c}{a}$$

Glossary

verb	**noun**	**meaning**
add	addition	$+$
subtract	subtraction	$-$
multiply	multiplication	$\cdot$
divide	division	$\div$
solve	solution	getting answer
substitute	substitution	$t = x^2$

Table 1:Word Formation

Some Necessary and Useful Vocabulary

- (n.) sign $\rightarrow$ $+$ or $-$
- (n.) equation $\rightarrow$ $something = 0$
- (n.) factor $\rightarrow$ two multiplied factors give result
- (v.) factorise $\rightarrow$ putting into brackets
- (n.) coefficient $\rightarrow$ a constant number i.e. a, b, c in a pattern $ax^2 + bx + c$
- (n.) quadratic function $\rightarrow$ $f(x) = ax^2 + bx + c$
- (n.) root $\rightarrow$ $\sqrt{sth}$ or solution of quadratic equation
- (n.) formula $=$ pattern