

Quadratics - Difference between Two Squares - PDF Copy

The presentation contains the slides below with the objective of showing how to: **Factorise cases like $4x^2 - 9 = 0$ using the difference between two squares relationship.** There are animated explanations and questions with answers..

Factorise a Quadratic that has the Differences Between Two Squares Form

Objective
Factorise in cases like $4x^2 - 9 = 0$ using the difference between two squares relationship

1 ☆

The difference between two squares
If we wanted to work out $5^2 - 3^2$, we could obviously do it like this:

$5^2 = 25$
 $3^2 = 9$
 $25 - 9 = 16$

But we could also find the answer this way

$5^2 - 3^2 = (5+3)(5-3) = 8 \times 2 = 16$

2 ☆

This is often a better method of dealing with more difficult numbers

$16^2 = 256$
 $14^2 = 196$
 $256 - 196 = 60$

But this is easier

$16^2 - 14^2 = (16+14)(16-14) = 30 \times 2 = 60$

3 ☆

Try these...

1. $7^2 - 3^2$
2. $12^2 - 8^2$
3. $9^2 - 6^2$
4. $14^2 - 4^2$
5. $16^2 - 6^2$
6. $15^2 - 12^2$
7. $18^2 - 8^2$
8. $17^2 - 13^2$

See if you can do these more quickly than your friend who is using a calculator to work out the squares and then subtract

$16^2 - 14^2 = (16+14)(16-14) = 30 \times 2 = 60$

4 ☆

Try these...

1. $7^2 - 3^2 \rightarrow (7+3)(7-3) \rightarrow 10 \times 4 = 40$
2. $12^2 - 8^2 \rightarrow (12+8)(12-8) \rightarrow 20 \times 4 = 80$
3. $9^2 - 6^2 \rightarrow (9+6)(9-6) \rightarrow 15 \times 3 = 45$
4. $14^2 - 4^2 \rightarrow (14+4)(14-4) \rightarrow 18 \times 10 = 180$
5. $16^2 - 6^2 \rightarrow (16+6)(16-6) \rightarrow 22 \times 10 = 220$
6. $15^2 - 12^2 \rightarrow (15+12)(15-12) \rightarrow 27 \times 3 = 81$
7. $18^2 - 8^2 \rightarrow (18+8)(18-8) \rightarrow 26 \times 10 = 260$
8. $17^2 - 13^2 \rightarrow (17+13)(17-13) \rightarrow 30 \times 4 = 120$

5 ☆

The difference between two squares and factorising quadratics

6 ☆

$x^2 - 9 = 0$

A quadratic like this one can be factorised using the difference between two squares. We do it like this...

7 ☆

Notice that $x^2 - 9$ could be written as $x^2 - 3^2 = 0$

This is difference between two squares

It factorises like this

$(x+3)(x-3) = 0$

Giving the solutions $x = -3$ and $+3$

8 ☆

Try these...

1. $x^2 - 25 = 0$
2. $x^2 - 100 = 0$
3. $x^2 - 36 = 0$
4. $x^2 - 49 = 0$
5. $x^2 - 81 = 0$
6. $x^2 - 64 = 0$
7. $x^2 - 121 = 0$
8. $x^2 - 225 = 0$

$x^2 - 9 = 0$
 $x^2 - 3^2 = 0$
 $(x+3)(x-3) = 0$
 $x = -3$ and $+3$

9 ☆

Try these...

1. $x^2 - 25 = 0 \rightarrow (x+5)(x-5) = 0 \rightarrow x = -5 \text{ \& } 5$
2. $x^2 - 100 = 0 \rightarrow (x+10)(x-10) = 0 \rightarrow x = -10 \text{ \& } 10$
3. $x^2 - 36 = 0 \rightarrow (x+6)(x-6) = 0 \rightarrow x = -6 \text{ \& } 6$
4. $x^2 - 49 = 0 \rightarrow (x+7)(x-7) = 0 \rightarrow x = -7 \text{ \& } 7$
5. $x^2 - 81 = 0 \rightarrow (x+9)(x-9) = 0 \rightarrow x = -9 \text{ \& } 9$
6. $x^2 - 64 = 0 \rightarrow (x+8)(x-8) = 0 \rightarrow x = -8 \text{ \& } 8$
7. $x^2 - 121 = 0 \rightarrow (x+11)(x-11) = 0 \rightarrow x = -11 \text{ \& } 11$
8. $x^2 - 225 = 0 \rightarrow (x+15)(x-15) = 0 \rightarrow x = -15 \text{ \& } 15$

10 ☆

Try these...

1. $x^2 - 7 = 0$
2. $x^2 - 3 = 0$
3. $x^2 - 17 = 0$
4. $x^2 - 13 = 0$
5. $x^2 - 12 = 0$
6. $x^2 - 18 = 0$
7. $x^2 - 27 = 0$
8. $x^2 - 50 = 0$

Give the answers to questions 5, 6, 7 and 8 in surd form

11 ☆

Try these...

1. $x^2 - 7 = 0 \rightarrow (x+\sqrt{7})(x-\sqrt{7}) = 0 \rightarrow x = \pm\sqrt{7}$
2. $x^2 - 3 = 0 \rightarrow (x+\sqrt{3})(x-\sqrt{3}) = 0 \rightarrow x = \pm\sqrt{3}$
3. $x^2 - 17 = 0 \rightarrow (x+\sqrt{17})(x-\sqrt{17}) = 0 \rightarrow x = \pm\sqrt{17}$
4. $x^2 - 13 = 0 \rightarrow (x+\sqrt{13})(x-\sqrt{13}) = 0 \rightarrow x = \pm\sqrt{13}$
5. $x^2 - 12 = 0 \rightarrow (x+\sqrt{12})(x-\sqrt{12}) = 0 \rightarrow x = \pm 2\sqrt{3}$
6. $x^2 - 18 = 0 \rightarrow (x+\sqrt{18})(x-\sqrt{18}) = 0 \rightarrow x = \pm 3\sqrt{2}$
7. $x^2 - 27 = 0 \rightarrow (x+\sqrt{27})(x-\sqrt{27}) = 0 \rightarrow x = \pm 3\sqrt{3}$
8. $x^2 - 50 = 0 \rightarrow (x+\sqrt{50})(x-\sqrt{50}) = 0 \rightarrow x = \pm 5\sqrt{2}$

12 ☆

Extension Work

13 ☆

$16x^2 - 9 = 0$ could be written as $(4x)^2 - 3^2 = 0$

And this could be written as $(2x+3)(2x-3) = 0$

This is difference between two squares

It factorises like this $x = -1\sqrt{2}$ and $+1\sqrt{2}$

14 ☆

Try these...

1. $4x^2 - 9 = 0$
2. $9x^2 - 25 = 0$
3. $25x^2 - 16 = 0$
4. $16x^2 - 49 = 0$

15 ☆

Try these...

1. $4x^2 - 9 = 0 \rightarrow (2x+3)(2x-3) = 0 \rightarrow x = \pm 1\frac{1}{2}$
2. $9x^2 - 25 = 0 \rightarrow (3x+5)(3x-5) = 0 \rightarrow x = \pm 1\frac{2}{3}$
3. $25x^2 - 16 = 0 \rightarrow (5x+4)(5x-4) = 0 \rightarrow x = \pm \frac{4}{5}$
4. $16x^2 - 49 = 0 \rightarrow (4x+7)(4x-7) = 0 \rightarrow x = \pm 1\frac{7}{4}$

16 ☆