



CLASS 10 MATHS · 2026-27

Quadratic equations

Quadratic equations

30

QUESTIONS

35

MINUTES

3

EXERCISES

This belongs to _____

Date _____

WHAT YOU'LL GET GOOD AT

- Solves a quadratic by splitting the middle term
- Applies the quadratic formula correctly, including the sign of b
- Uses the discriminant to state the nature of the roots
- Finds an unknown coefficient given a condition on the roots
- Forms a quadratic equation from a described situation

Take your time, and have a go at every one. If you get stuck, look at the orange box — Ollie has already done one for you.

Quadratic equations

Quadratic equations · 30 questions · tick each box as you finish

Exercise 1 of 3 · 10 questions Solve by factorisation.



WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

The last one looks alarming and works exactly like the others. The product to aim for is (first coefficient) $\times$ (last term) = $2 \times 52 = 10$, and the sum is 7, giving 5 and 2. Split the middle term as $5x + 2x$ and group. Surds in the coefficients change nothing about the method - only about how the arithmetic looks, and children who realise that stop being frightened by these.

1) $x^2 - 5x + 6 = 0$

2) $2x^2 + x - 6 = 0$

3) $x^2 - 3x - 10 = 0$

4) $6x^2 - x - 2 = 0$

5) $2x^2 + 7x + 52 = 0$

6) $x^2 - 7x + 12 = 0$

7) $3x^2 - 10x + 8 = 0$

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

9) $2x^2 - 5x - 3 = 0$

10) $x^2 - 16 = 0$

Exercise 2 of 3 · 10 questions Solve using the quadratic formula, then state the nature of the roots. ☐

WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

For $2x^2 - 7x + 3$, note that $b = -7$ and not 7, so $-b$ is $+7$. That sign is the commonest error in the whole chapter, and it survives because the answer still looks like a number. Write a , b and c on their own line before substituting - three seconds, and it removes the error entirely.

1) $2x^2 - 7x + 3 = 0$

2) $3x^2 - 5x + 2 = 0$

3) $x^2 + 4x - 5 = 0$

4) $2x^2 - 4x + 3 = 0$

5) $x^2 - 6x + 9 = 0$

6) $5x^2 - 6x + 1 = 0$

7) $4x^2 - 4x + 1 = 0$

8) $x^2 - 4x + 4 = 0$

9) $3x^2 + 2x + 5 = 0$

10) $2x^2 + 5x - 3 = 0$

Exercise 3 of 3 · 10 questions Form the equation and solve it. Check the answer against the question. ☐

WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

The train question is the one worth studying, because the algebra is easy and the first line is not. Time equals distance over speed, so the two journey times are $360/x$ and $360/(x + 5)$, and the faster one takes an hour less - which gives $360/x - 360/(x + 5) = 1$. Once that line is written the rest is routine. In every word problem here, the marks are decided by whether the child can write that first line, so it is worth practising the setting-up separately from the solving.

1) Find k so that $kx^2 - 2kx + 6 = 0$ has two equal roots.

2) The sum of a number and its reciprocal is $10/3$. Find the number.

3) The product of two consecutive positive integers is 306. Find them.

4) A rectangular plot has an area of 528 m^2 , and its length is one metre more than twice its breadth. Find both.

5) A train covers 360 km at a uniform speed. Had the speed been 5 km/h more, it would have taken one hour less. Find the speed.

6) Find the value of k for which $x^2 + kx + 9 = 0$ has equal roots.

7) The sum of the squares of two consecutive positive integers is 313. Find them.

8) The perimeter of a rectangle is 28 m and its area is 48 m^2 . Find its sides.

9) A two-digit number is such that the product of its digits is 18, and when 27 is subtracted the digits interchange. Find the number.

10) The difference of two numbers is 3 and their product is 88. Find them.

**All done? How did that feel?**

Colour in a star. Three stars means you could teach it to someone else.



Tricky · Getting there · Easy now



Answer key

For grown-ups

Quadratic equations · keep this page back until your child has finished.

1. Solve by factorisation.

- 1) $(x - 2)(x - 3) = 0$, so $x = 2$ or $x = 3$.
- 2) $(2x - 3)(x + 2) = 0$, so $x = 3/2$ or $x = -2$. Split as $2x^2 + 4x - 3x - 6$.
- 3) $(x - 5)(x + 2) = 0$, so $x = 5$ or $x = -2$.
- 4) $(3x - 2)(2x + 1) = 0$, so $x = 2/3$ or $x = -1/2$. Split as $6x^2 - 4x + 3x - 2$.
- 5) $(2x + 5)(x + 2) = 0$, so $x = -5/2$ or $x = -2$. The product is $2 \times 5 = 10$ and the sum is 7, so split as $5x + 2x$.
- 6) $(x - 3)(x - 4) = 0$, so $x = 3$ or $x = 4$.
- 7) $(3x - 4)(x - 2) = 0$, so $x = 4/3$ or $x = 2$.
- 8) $(x + 4)(x - 2) = 0$, so $x = -4$ or $x = 2$.
- 9) $(2x + 1)(x - 3) = 0$, so $x = -1/2$ or $x = 3$.
- 10) $(x + 4)(x - 4) = 0$, so $x = 4$ or $x = -4$.

2. Solve using the quadratic formula, then state the nature of the roots.

- 1) $D = 49 - 24 = 25$, so $x = (7 \pm 5)/4$, giving $x = 3$ or $x = 1/2$. Two distinct real roots.
- 2) $D = 25 - 24 = 1$, so $x = (5 \pm 1)/6$, giving $x = 1$ or $x = 2/3$. Two distinct real roots.
- 3) $D = 16 + 20 = 36$, so $x = (-4 \pm 6)/2$, giving $x = 1$ or $x = -5$. Two distinct real roots.
- 4) $D = 16 - 24 = -8$, which is negative. No real roots.
- 5) $D = 36 - 36 = 0$, so $x = 3$ is a repeated root. Two equal real roots.
- 6) $D = 36 - 20 = 16$, so $x = (6 \pm 4)/10$, giving $x = 1$ or $x = 1/5$. Two distinct real roots.
- 7) $D = 16 - 16 = 0$, so $x = 4/8 = 1/2$ twice. Two equal real roots.
- 8) $D = 16 - 16 = 0$, so $x = 2$ twice. Two equal real roots.
- 9) $D = 4 - 60 = -56$, which is negative, so there are no real roots.
- 10) $D = 25 + 24 = 49$, so $x = (-5 \pm 7)/4$, giving $x = 1/2$ or $x = -3$. Two distinct real roots.

3. Form the equation and solve it. Check the answer against the question.

- 1) Equal roots require $D = 0$, so $4k^2 - 24k = 0$, giving $4k(k - 6) = 0$ and $k = 0$ or 6 . $k = 0$ makes it non-quadratic, so $k = 6$.
- 2) $x + 1/x = 10/3$ gives $3x^2 - 10x + 3 = 0$. $D = 64$, so $x = (10 \pm 8)/6$, giving $x = 3$ or $x = 1/3$.
- 3) $n(n + 1) = 306$ gives $n^2 + n - 306 = 0$. $D = 1225 = 35^2$, so $n = 17$ (rejecting the negative root). The integers are 17 and 18.
- 4) $b(2b + 1) = 528$ gives $2b^2 + b - 528 = 0$. $D = 4225 = 65^2$, so $b = 16$ and the length is 33 m.
- 5) $360/x - 360/(x + 5) = 1$ gives $x^2 + 5x - 1800 = 0$. $D = 7225 = 85^2$, so $x = 40$. The speed is 40 km/h.
- 6) Equal roots need $D = 0$, so $k^2 - 36 = 0$ and $k = \pm 6$.
- 7) $n^2 + (n + 1)^2 = 313$ gives $2n^2 + 2n - 312 = 0$, so $n^2 + n - 156 = 0$ and $(n + 13)(n - 12) = 0$. Taking the positive value, the integers are 12 and 13.
- 8) Let the sides be l and $14 - l$. Then $l(14 - l) = 48$, so $l^2 - 14l + 48 = 0$ and $(l - 6)(l - 8) = 0$. The sides are 6 m and 8 m.
- 9) Let the digits be x and y with $xy = 18$ and $10x + y - 27 = 10y + x$, so $x - y = 3$. Then $x = 6$ and $y = 3$, giving 63. Check: $63 - 27 = 36$.
- 10) Let them be n and $n + 3$. Then $n(n + 3) = 88$, so $n^2 + 3n - 88 = 0$ and $(n + 11)(n - 8) = 0$. The numbers are 8 and 11 (or -11 and -8).

WHILE YOUR CHILD WORKS

- Write a , b and c on their own line before using the formula. The sign of b is the commonest error in the chapter.
- Reject impossible roots explicitly - a negative length or a negative speed. Saying why earns the mark.
- In word problems, practise writing the first line without solving. That is where the marks actually are.

**Spotted a gap while marking?**

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