



CLASS 8 MATHS · 2026-27

Algebraic identities

Algebraic expressions and identities

36

QUESTIONS

30

MINUTES

3

EXERCISES

This belongs to _____ Date _____

WHAT YOU'LL GET GOOD AT

- Expands using each of the three standard identities
- Uses an identity to do arithmetic mentally
- Recognises an identity inside a question that does not announce it
- Rearranges an identity to find an unknown expression

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.

Algebraic identities

Algebraic expressions and identities · 36 questions · tick each box as you finish

Exercise 1 of 3 · 12 questions Expand using an identity. Name the one you used.



WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

$(2x + 3)^2 = 4x^2 + 12x + 9$. The trap is writing $2x^2$ instead of $4x^2$ - the whole of $2x$ is being squared, not just the x . Whenever the first term has a number in front of it, square the number too. That single slip accounts for more lost marks in this chapter than any misremembered identity.

1) $(x + 5)^2$

2) $(a - 7)^2$

3) $(2x + 3)^2$

4) $(3m - 4)^2$

5) $(x + 6)(x - 6)$

6) $(2y + 5)(2y - 5)$

7) $(x + 9)^2$

8) $(a - 5)^2$

9) $(3x + 7)^2$

10) $(5m - 2)^2$

11) $(x + 8)(x - 8)$

12) $(3y + 4)(3y - 4)$

Exercise 2 of 3 · 12 questions Work these out using an identity. No long multiplication.

WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

$103 \times 97 = 9991$, because $103 = 100 + 3$ and $97 = 100 - 3$, so the answer is $100^2 - 3^2 = 10000 - 9$. This exercise exists for one reason: it turns three abstract formulas into something obviously useful. A child who can do 103×97 in their head stops treating identities as things to be memorised for a test.

1) 102^2

2) 98^2

3) 103×97

4) 51^2

5) 995×1005

6) 49×51

7) 101^2

8) 97^2

9) 104×96

10) 52^2

11) 998×1002

12) 48×52

Exercise 3 of 3 · 12 questions Expand or evaluate. Some need an identity, some need rearranging.

WRITE THE ANSWER

HERE'S ONE DONE FOR YOU

If $a + b = 7$ and $ab = 12$, then $a^2 + b^2 = 25$. You cannot find a and b separately from this - and you do not need to. Square the sum: $(a + b)^2 = a^2 + 2ab + b^2$, so $49 = a^2 + b^2 + 24$, giving 25. This is the question type that separates memorising the identity from understanding it, and it appears in some form in every paper from here to Class 10.

1) $(x + 3)(x + 5)$

2) $(x - 4)(x + 7)$

3) $(2a + 3)(a - 5)$

4) If $a + b = 7$ and $ab = 12$, find $a^2 + b^2$.

5) If $x + 1/x = 5$, find $x^2 + 1/x^2$.

6) Simplify $(x + y)^2 - (x - y)^2$.

7) $(x + 2)(x + 9)$

8) $(x - 3)(x + 8)$

9) $(3a + 2)(a - 4)$

10) If $a + b = 9$ and $ab = 20$, find $a^2 + b^2$.

11) If $x + 1/x = 6$, find $x^2 + 1/x^2$.

12) Simplify $(x + y)^2 + (x - y)^2$.

**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

Algebraic identities · keep this page back until your child has finished.

1. Expand using an identity. Name the one you used.

- 1) $x^2 + 10x + 25$, using $(a + b)^2 = a^2 + 2ab + b^2$.
- 2) $a^2 - 14a + 49$, using $(a - b)^2 = a^2 - 2ab + b^2$.
- 3) $4x^2 + 12x + 9$. Here $a = 2x$, so $a^2 = 4x^2$ and $2ab = 2 \times 2x \times 3 = 12x$.
- 4) $9m^2 - 24m + 16$. Here $a = 3m$, so $a^2 = 9m^2$ and $2ab = 2 \times 3m \times 4 = 24m$.
- 5) $x^2 - 36$, using $(a + b)(a - b) = a^2 - b^2$.
- 6) $4y^2 - 25$. Here $a = 2y$, so $a^2 = 4y^2$.
- 7) $x^2 + 18x + 81$. Identity $(a + b)^2 = a^2 + 2ab + b^2$.
- 8) $a^2 - 10a + 25$. Identity $(a - b)^2 = a^2 - 2ab + b^2$.
- 9) $9x^2 + 42x + 49$. Identity $(a + b)^2$, with $a = 3x$ and $b = 7$.
- 10) $25m^2 - 20m + 4$. Identity $(a - b)^2$, with $a = 5m$ and $b = 2$.
- 11) $x^2 - 64$. Identity $(a + b)(a - b) = a^2 - b^2$.
- 12) $9y^2 - 16$. Identity $(a + b)(a - b)$, with $a = 3y$ and $b = 4$.

2. Work these out using an identity. No long multiplication.

- 1) 10404. $(100 + 2)^2 = 10000 + 400 + 4$.
- 2) 9604. $(100 - 2)^2 = 10000 - 400 + 4$.
- 3) 9991. $(100 + 3)(100 - 3) = 10000 - 9$.
- 4) 2601. $(50 + 1)^2 = 2500 + 100 + 1$.
- 5) 999975. $(1000 - 5)(1000 + 5) = 1000000 - 25$.
- 6) 2499. $(50 - 1)(50 + 1) = 2500 - 1$.
- 7) 10,201. $(100 + 1)^2 = 10000 + 200 + 1$.
- 8) 9,409. $(100 - 3)^2 = 10000 - 600 + 9$.
- 9) 9,984. $(100 + 4)(100 - 4) = 10000 - 16$.
- 10) 2,704. $(50 + 2)^2 = 2500 + 200 + 4$.
- 11) 999,996. $(1000 - 2)(1000 + 2) = 1000000 - 4$.
- 12) 2,496. $(50 - 2)(50 + 2) = 2500 - 4$.

3. Expand or evaluate. Some need an identity, some need rearranging.

- 1) $x^2 + 8x + 15$.
- 2) $x^2 + 3x - 28$.
- 3) $2a^2 - 7a - 15$. Expanding gives $2a^2 - 10a + 3a - 15$.
- 4) 25. Since $(a + b)^2 = a^2 + 2ab + b^2$, we get $a^2 + b^2 = 49 - 2(12) = 25$.
- 5) 23. Squaring both sides gives $x^2 + 2 + 1/x^2 = 25$, so $x^2 + 1/x^2 = 23$.
- 6) $4xy$. The first expands to $x^2 + 2xy + y^2$ and the second to $x^2 - 2xy + y^2$; subtracting leaves $4xy$.
- 7) $x^2 + 11x + 18$.
- 8) $x^2 + 5x - 24$.
- 9) $3a^2 - 10a - 8$.
- 10) $a^2 + b^2 = (a + b)^2 - 2ab = 81 - 40 = 41$.
- 11) $x^2 + 1/x^2 = (x + 1/x)^2 - 2 = 36 - 2 = 34$.
- 12) $2x^2 + 2y^2$. The cross terms cancel because one is $+2xy$ and the other $-2xy$.

WHILE YOUR CHILD WORKS

- When the first term has a number in front - $(2x + 3)^2$ - check they squared the number too. That single slip is the commonest error in the chapter.
- The mental arithmetic exercise is the one that makes identities feel worth knowing. Do not skip it if time is short.
- The last two questions cannot be done by memorising. If those come out, the chapter is genuinely understood.

**Spotted a gap while marking?**

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