

INKMATHS FLASHCARDS

Algebra and functions

8 cards · fronts and backs

Print double-sided, flipping on the long edge, and each answer lands behind its question. Cut along the card borders.

Definitions in precise wording, the standard results the formulae booklet does not print, a check-yourself question per topic, and the slips that lose marks. The same cards run on the website with spaced-repetition scheduling, at inkphysics.co.uk/maths/flashcards.

STANDARD RESULT

Discriminant:

$$ax^2 + bx + c = 0: \text{discriminant} = ?$$

ALGEBRA AND FUNCTIONS

RECALL

State what completing the square hands you.

ALGEBRA AND FUNCTIONS

RECALL

State the factor theorem.

ALGEBRA AND FUNCTIONS

RECALL

State how to prove a line and a curve never meet.

ALGEBRA AND FUNCTIONS

RECALL

State which graph transformations go the way you do not expect.

ALGEBRA AND FUNCTIONS

RECALL

State what an inverse function does to the domain and the range.

ALGEBRA AND FUNCTIONS

RECALL

State the partial fraction form to write down.

ALGEBRA AND FUNCTIONS

SPOT THE ERROR

Say what is wrong with this claim:

$fg(x)$ means apply f first, then g .

ALGEBRA AND FUNCTIONS

RECALL

Write the quadratic as $a(x + p)^2 + q$. The turning point sits at $(-p, q)$, the minimum value of the expression is q when a is positive, and if q has the same sign as a there are no real roots. Three marks from one rewrite, so do it before you reach for the formula.

ALGEBRA AND FUNCTIONS

STANDARD RESULT

$b^2 - 4ac$. Positive gives two roots, zero gives one repeated root, negative gives none

ALGEBRA AND FUNCTIONS

RECALL

Substitute the line into the curve, gather everything on one side, and show the discriminant of the resulting quadratic is negative. Zero means the line is a tangent, and that is the same calculation with a different final sentence.

ALGEBRA AND FUNCTIONS

RECALL

$(x - p)$ is a factor of $f(x)$ exactly when $f(p) = 0$. For a factor $(ax - b)$ test $f(b/a)$ instead, which is where most of the lost marks are. Showing $f(p) = 0$ without the sentence naming the factor usually costs the conclusion mark.

ALGEBRA AND FUNCTIONS

RECALL

They swap. The domain of f inverse is the range of f , and its range is the domain of f . The inverse exists only if f is one-to-one. That is what a restricted domain in the question is there for. The two graphs are reflections of each other in the line $y = x$.

ALGEBRA AND FUNCTIONS

RECALL

Anything inside the bracket acts on x and acts backwards, so $y = f(x + a)$ moves left by a and, for $a > 0$, $y = f(ax)$ squashes by a factor $1/a$. Anything outside acts on y and behaves normally, so $y = f(x) + a$ moves up and, for $a > 0$, $y = af(x)$ stretches by a . A negative a scales by $|a|$ and reflects as well, in the y -axis inside the bracket and in the x -axis outside it. Check with one point you can compute.

ALGEBRA AND FUNCTIONS

SPOT THE ERROR

It means g first. The function nearest x acts first, because $fg(x)$ is shorthand for $f(g(x))$. Test it on $f(x) = x + 1$ and $g(x) = x^2$. $fg(3) = 10$ and $gf(3) = 16$, so the order is worth six marks of difference.

ALGEBRA AND FUNCTIONS

RECALL

Each distinct linear factor gets a constant over it. A repeated factor needs two terms, $A/(x - a)$ and $B/(x - a)^2$, and writing only the squared one leaves the identity unsolvable. If the numerator's degree reaches the denominator's, divide first and split the remainder.

ALGEBRA AND FUNCTIONS