FROM THE EXAMINER REPORTS, 2018 TO 2025

Five Pure traps very few candidates get past

Ranked by how the Edexcel examiner reports describe them, strongest evidence first. Each one shows the line where the marks stop, and the line that keeps them.

1 TRIGONOMETRIC EQUATIONS

Get down to a quadratic in one ratio

The trap: stopping at a line that still holds two ratios. Replace one, put every term on one side, and a quadratic appears.

Solve, for $0° \leq \theta < 360°$:

$$2\cos^2\theta + 3\sin\theta = 3$$

STUCK: TWO RATIOS STILL IN IT

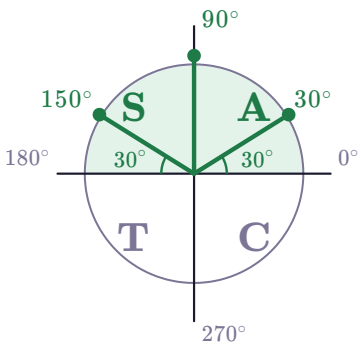
$2\cos^2\theta = 3 - 3\sin\theta$

WHAT EXAMINERS SAID

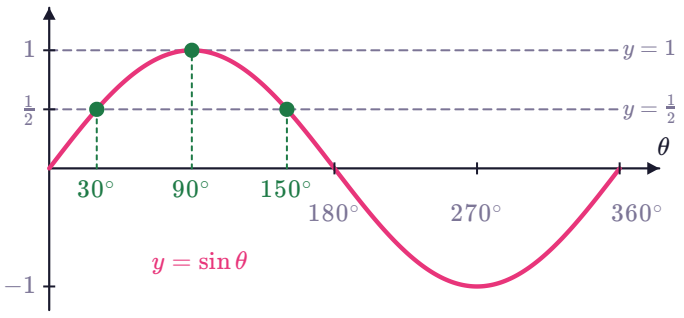
June 2024, AS Paper 1, Q13(a): very few gained all four marks. Many who started well never reached a quadratic in one ratio, so the given answer stayed out of reach. The same trap is evidenced at six AS sittings.

ONE RATIO, THEN A QUADRATIC

$2(1-\sin^2\theta) + 3\sin\theta = 3$	Replace $\cos^2\theta$ with $1-\sin^2\theta$
$2 - 2\sin^2\theta + 3\sin\theta = 3$	Expand the bracket
$2\sin^2\theta - 3\sin\theta + 1 = 0$	Every term on one side: a quadratic in $\sin\theta$
$(2\sin\theta - 1)(\sin\theta - 1) = 0$	Factorise
$\sin\theta = \frac{1}{2}$ or $\sin\theta = 1$	Set each bracket equal to zero
$\sin\theta = \frac{1}{2} \Rightarrow \theta = 30°$	The principal value
$\theta = 180° - 30° = 150°$	Sine is positive in S as well as A
$\sin\theta = 1 \Rightarrow \theta = 90°$	The top of the sine curve
$\theta = 30°,\ 90°,\ 150°$	Every solution in $0° \leq \theta < 360°$



Sine is positive in A and S, so $\sin\theta = \frac{1}{2}$ gives $30°$ and $180° - 30° = 150°$.



$y = \frac{1}{2}$ cuts the curve twice; $y = 1$ touches it once, at $90°$.

2

COMPOSITE FUNCTIONS

Composite range

The trap: finding one end of the range and stopping, or putting the ends of f's domain straight into gf. The range of f is what g actually receives.

Find the range of gf(x), given:

$$3 \leq f(x) \leq 12, \quad g(x) = 1 - 2x$$

STUCK: ONE END ONLY

$gf(x) \leq -5$

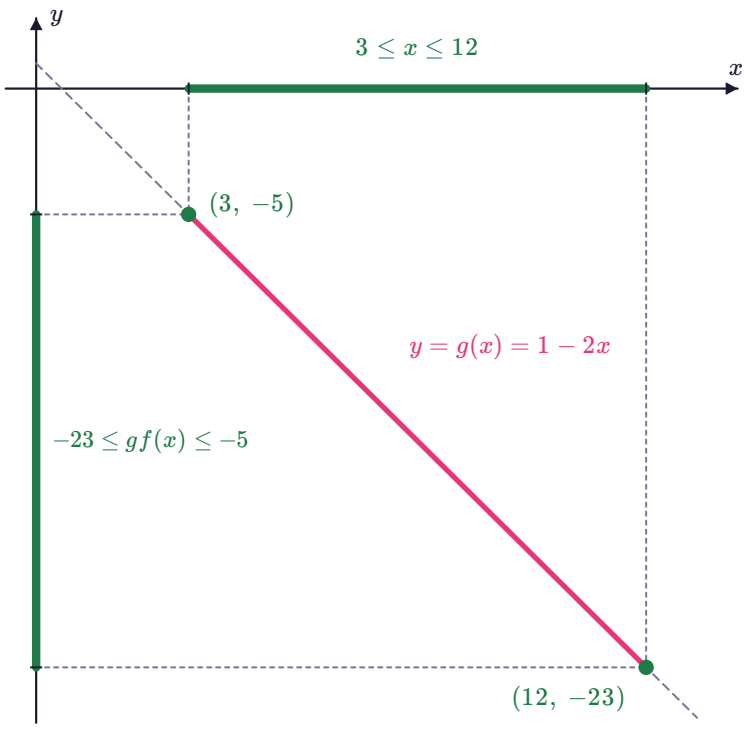
WHAT EXAMINERS SAID

June 2024, Paper 1, Q8(c)(ii): very few scored the mark. Many found only one end of the range, and some wrote it in x rather than gf(x). The same trap is evidenced at five sittings.

INNER RANGE, THEN OUTER RULE

$gf(x) = g(f(x))$	f acts first, then g
$3 \leq f(x) \leq 12$	The outputs of f …
inputs to g: $3 \leq x \leq 12$	… are the only inputs g receives
$g(3) = 1 - 2(3) = -5$	One end of that interval
$g(12) = 1 - 2(12) = -23$	The other end
$g(x) = 1 - 2x$ is a straight line	So its least and greatest values are at the ends
$-23 \leq gf(x) \leq -5$	Smaller value first, and name $gf(x)$, not x

$$x \xrightarrow{f} 3 \leq f(x) \leq 12 \xrightarrow{g} -23 \leq gf(x) \leq -5$$



g only ever receives 3 to 12, so its outputs run from -23 to -5.

3

AREAS BY INTEGRATION

Combining regions: add a piece, or subtract a line?

The trap: integrating the curve and stopping, or calling the shape under the line a triangle when the line does not reach the axis.

R is bounded by the curve, the line and the y-axis. Find the area of R:

$$y = x^2 \quad \text{and} \quad y = 3x + 4$$

STUCK: A TRIANGLE, NOT A TRAPEZIUM

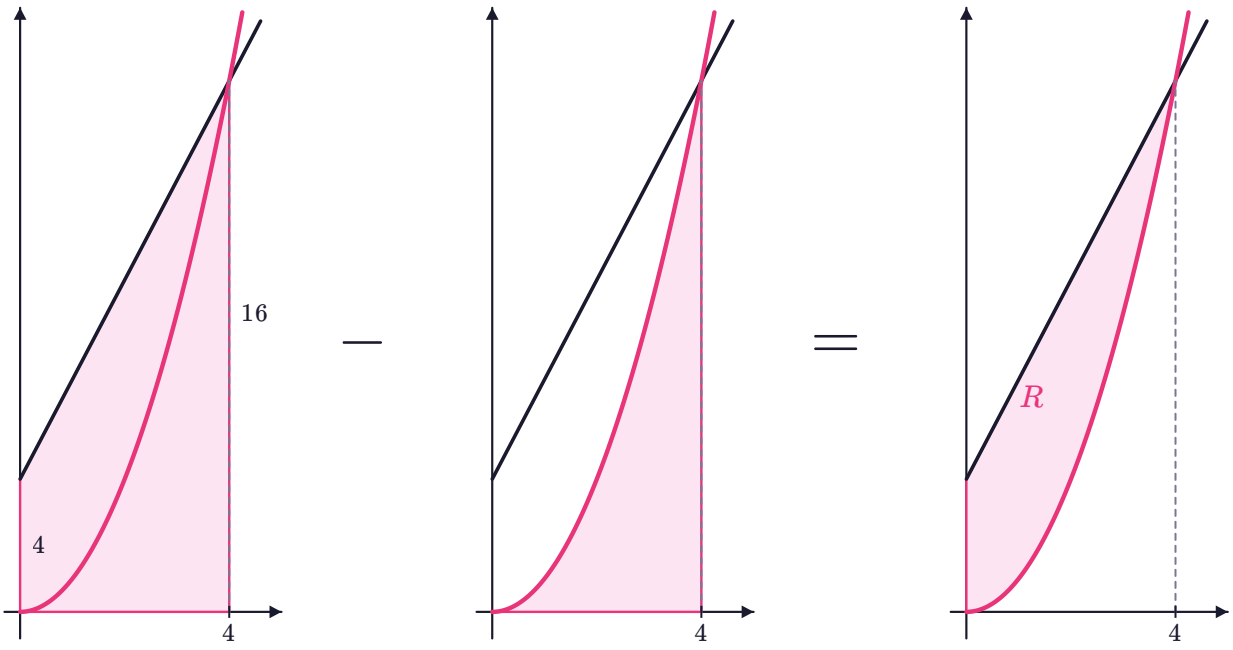
$\frac{1}{2}(4)(16) - \int_0^4 x^2\,dx$

WHAT EXAMINERS SAID

June 2024, AS Paper 1, Q8(c): some did not show a complete strategy for the area, and the trapezium under the line was often taken for a triangle. The same trap is evidenced at four sittings.

TRAPEZIUM MINUS THE CURVE

$x^2 = 3x + 4$	Where the curve meets the line
$x^2 - 3x - 4 = 0$	Every term on one side
$(x - 4)(x + 1) = 0$	Factorise
$x = 4$	$x = -1$ is left of the y-axis, outside R
$x = 0$: $y = 3(0) + 4 = 4$	The line where it meets the y-axis
$x = 4$: $y = 3(4) + 4 = 16$	The line at the far end
$\frac{1}{2}(4 + 16)(4) = 40$	Trapezium under the line: parallel sides 4 and 16
$\int_0^4 x^2\,dx = \left[\frac{1}{3}x^3\right]_0^4 = \frac{64}{3}$	Area under the curve
$\mathrm{R} = 40 - \frac{64}{3} = \frac{56}{3}$	Trapezium minus the curve



Trapezium under the line: 40 — Area under the curve: $\frac{64}{3}$ — R, the area asked for: $\frac{56}{3}$

From Integration 1 in Beat the Traps.

4

MODULUS EQUATIONS

The phantom root

The trap: solving both cases and keeping both roots. A modulus is never negative, so one root can fail the original equation.

Solve:

$$|2x - 3| = 3x - 7$$

STUCK: BOTH ROOTS KEPT

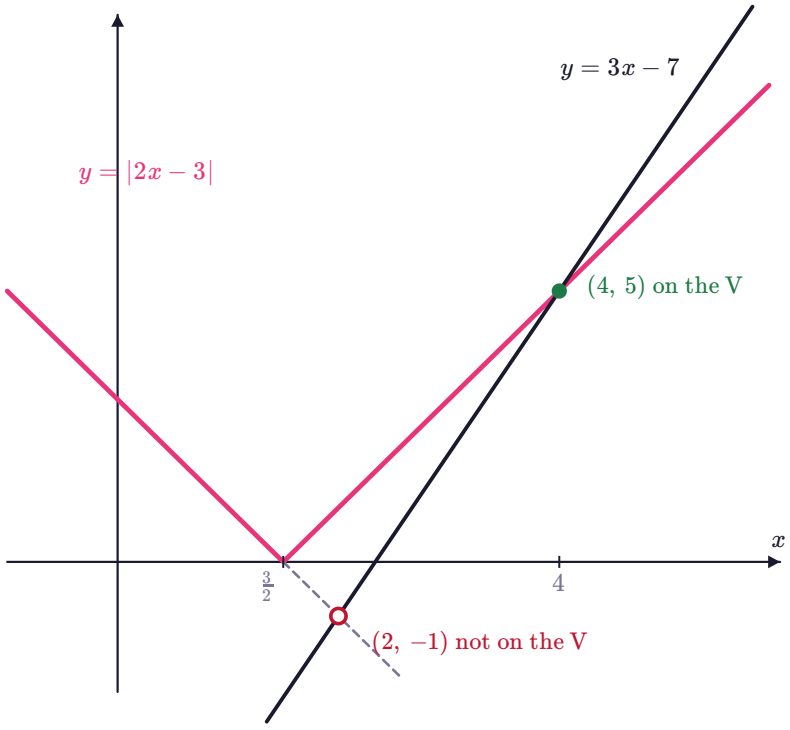
$x = 2$ and $x = 4$

WHAT EXAMINERS SAID

June 2024, Paper 1, Q6(b): the most common reason for losing the accuracy mark was not rejecting the extra root. Candidates who used the sketch were more successful at rejecting it. The same trap is evidenced at four sittings.

CHECK EACH ROOT IN THE ORIGINAL

$2x - 3 = 3x - 7$	Positive case
$x = 4$	Collect the terms
$-(2x - 3) = 3x - 7$	Negative case
$3 - 2x = 3x - 7$	Remove the bracket
$10 = 5x \Rightarrow x = 2$	Collect the terms
$x = 4$: $\lvert 2(4) - 3\rvert = 5$, $3(4) - 7 = 5$	Both sides agree: keep it
$x = 2$: $\lvert 2(2) - 3\rvert = 1$, $3(2) - 7 = -1$	A modulus is never negative: reject it
$x = 4$ only	The complete solution



The negative case, carried past the vertex, meets the line below the axis. That point is not on the V.

5

MODULUS GRAPHS

Line meets V

The trap: reaching for algebra when the answer is in the sketch. The two boundaries are the line through the vertex and the line parallel to a branch.

Find the values of k for which the line meets the curve at exactly two points:

$$y = kx + 2 \quad \text{and} \quad y = |3x - 12|$$

STUCK: BOTH ENDS INCLUDED

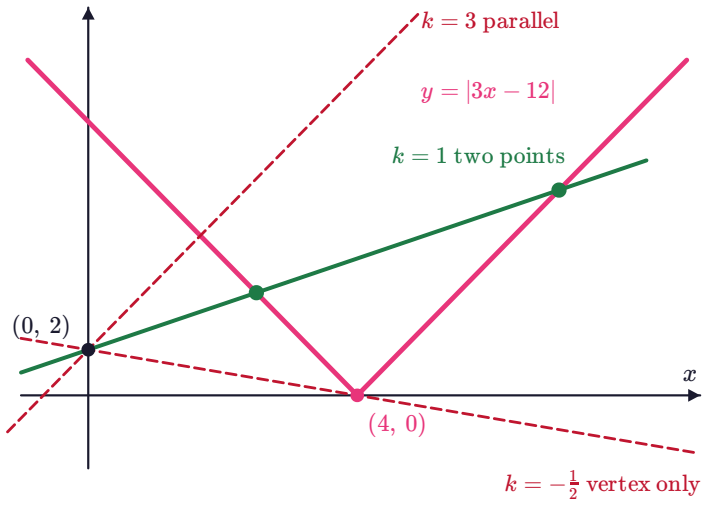
$-\frac{1}{2} \leq k \leq 3$

WHAT EXAMINERS SAID

June 2024, Paper 1, Q6(c): few scored full marks. Most turned to complicated algebra instead of the sketch, and many never realised there was an upper limit for k. The same trap is evidenced at three sittings.

BOUNDARIES FROM THE SKETCH

$3x - 12 = 0 \Rightarrow x = 4$	The vertex of the V is at $(4, 0)$
branch gradients: -3 and 3	The left branch falls, the right branch rises
$y = kx + 2$ passes through $(0,\ 2)$	Every line in the question pivots about this point
$0 = 4k + 2 \Rightarrow k = -\frac{1}{2}$	Through the vertex: the lower boundary
$k = 3$	Parallel to the right branch: the upper boundary
$k = -\frac{1}{2}$: one point; $k = 3$: one point	Neither end gives two points
$-\frac{1}{2} < k < 3$	Strict at both ends



Every line pivots about $(0, 2)$. Between the two red lines, it cuts both branches.

From The Modulus Function in Beat the Traps.

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