

GCSE Maths: Algebra & equations

Exam-style practice for AQA, Edexcel and OCR Higher tier (grades 4–9). Includes linear equations, completing the square, the cosine rule and surds. A full mark scheme is on page 2.

England

Higher tier

AQA / Edexcel / OCR

A4 · 2 pages

HIGHER-TIER REMINDER

Higher tier covers grades 4–9. Questions involving surds, quadratics, the cosine rule and completing the square are assessed at Higher only. Show all working: method marks save you even if the final answer is wrong. A formula sheet is provided for 2025–2027 sittings.

QUESTIONS

Q1 ★ · Linear equations (3 marks)

Solve $5(x - 2) = 3x + 7$.

Q2 ★★ · Angle reasoning (4 marks)

ABC is a straight line. Angle DBC = $4x + 10^\circ$ and angle ABD = $2x + 50^\circ$. Work out x , giving a reason for each step.

Q3 ★★ · Surds (3 marks)

Rationalise the denominator and simplify: $12 / \sqrt{3}$. Give your answer in the form $a\sqrt{b}$.

Q4 ★★★ · Completing the square (4 marks)

(a) Write $x^2 + 6x + 1$ in the form $(x + a)^2 + b$. (2 marks) (b) Write the coordinates of the turning point of $y = x^2 + 6x + 1$. (2 marks)

Q5 ★★★ · Cosine rule (4 marks)

In triangle ABC, AB = 8 cm, AC = 11 cm and angle BAC = 47° . Find BC to 3 significant figures.

MARK SCHEME · PAGE 2

EXAMINER CONVENTIONS

M = method mark (correct approach). A = accuracy (correct value). B = independent mark. 3 s.f. = three significant figures. ECF = error carried forward.

Q1 · Linear equation $x = 8.5$

Expand: $5x - 10 = 3x + 7$ [M1]. Collect: $2x = 17$ [M1]. $x = 8.5$ (or $17/2$ or $8\frac{1}{2}$) [A1].

Q2 · Angle reasoning $x = 20$

Reason: angles on a straight line add up to 180° [M1: reason must be stated for this mark].

$(4x + 10) + (2x + 50) = 180$ [M1 equation]. $6x + 60 = 180 \rightarrow 6x = 120$ [M1]. $x = 20$ [A1].

Q3 · Surds $4\sqrt{3}$

Multiply by $\sqrt{3}/\sqrt{3}$: $12\sqrt{3} / 3$ [M1 rationalising]. Simplify: $4\sqrt{3}$ [A1 a=4, A1 b=3]. Accept $4\sqrt{3}$.

Q4 · Completing the square

(a) $(x + 3)^2 - 9 + 1 = (x + 3)^2 - 8$ [M1 for $(x+3)^2$; A1 for -8]. So $a = 3$, $b = -8$.

(b) Turning point at $(-3, -8)$ [B1 $x = -3$ follow-through; B1 $y = -8$ follow-through]. 'Hence' means you must use part (a).

Q5 · Cosine rule $BC = 8.06 \text{ cm}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ [M1 correct rule stated or used].

$BC^2 = 8^2 + 11^2 - 2(8)(11)\cos 47^\circ = 64 + 121 - 176\cos 47^\circ$ [M1 correct substitution].

$= 185 - 120.04 = 64.96$ [M1]. $BC = \sqrt{64.96} = 8.06 \text{ cm (3 s.f.)}$ [A1]. Accept 8.05–8.06.