Maths and Further Maths

Task: Complete the questions below and mark the questions. Use any of the extra things below to help prepare for September's baseline assessment.

The baseline assessment in September will cover the content below and will be non-calculator.

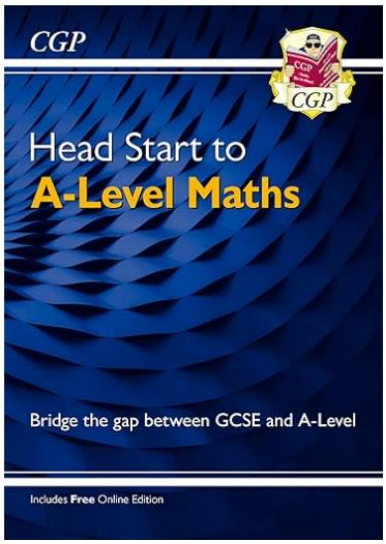
Extra:

TL Maths videos on essential Maths skills: TLMaths - GCSE to A-Level Maths Bridging the Gap **(**https://www.tlmaths.com/home/gcse-to-a-level-maths-bridging-the-gap**)**

Sign up for a free student account on Integral through the AMSP website: Transition to A level Mathematics course - AMSP **(**https://amsp.org.uk/transition-to-a-level-mathematics-course/**).** This course will support with your transition from GCSE to A-level Maths (and Further Maths), as it will cover the essential skills needed from GCSE:

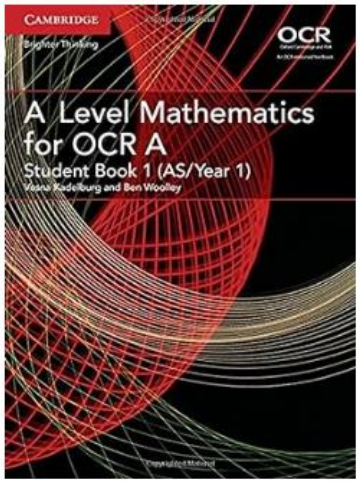
- Integers
- Geometry
- Surds and indices
- Coordinate geometry
- Algebraic manipulation
- Trigonometry
- Completing the square

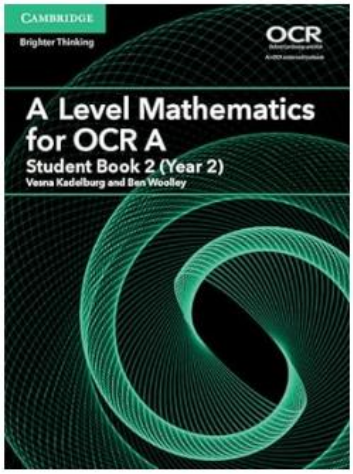
Head Start to A-level Maths book by CGP, picture for reference**.**
ISBN-13: 978-1782947929, "Head Start to A-Level Maths"



<u>Textbook(s) if you'd like to purchase your own</u>:

- Year 12: ISBN-13: 978-1316644287, "A-Level Mathematics for OCR Student Book (AS/Year 1)". Red cover
- Year 13: ISBN-13: 978-1316644300, "A-Level Mathematics for OCR Student Book (A2/Year 2)". Green cover





Essentials for the Course:

- Usual equipment such as pens, pencil, ruler, rubber, highlighter etc.
- Whiteboard pens, whiteboard work every lesson.
- A4 lined/file paper, refill pads to file into your folders.
- Arch-lever folder x2 (additional 2 if doing Further Maths), with dividers/plastic wallets.
- An A-level calculator - CASIO fx-991CW+ (new), CASIO fx-991EX (old), CASIO fx-CG100 (graphical)

You can email Mr Wan if you have any questions regarding the course or these transition tasks:
Email address: Wan.S@allsaints.notts.sch.uk
For the best chance of a quick reply, please do this before the summer break.
Emails during the summer break will get replies but may take longer.

Surds

Q1 Expand and fully simplify $\sqrt{5}(\sqrt{5}+\sqrt{7})$

Q2 Rationalise the denominator of $\frac{2\sqrt{5}}{\sqrt{6}}$

Give your answer in its simplest form.

Q3 Expand and fully simplify $(6+\sqrt{5})(1+\sqrt{5})$

Q4 Write $(5+\sqrt{12})(11+\sqrt{3})$ in the form $a+b\sqrt{3}$, where a and b are integers.

Q5 Rationalise the denominator of $\frac{1+\sqrt{2}}{\sqrt{2}}$

Give your answer as a fraction in its simplest form.

Expanding brackets

Q1 Expand and fully simplify $(m + 9)(m + 2)$

Q2 Expand and fully simplify $(2a + 3)(4a + 5)$

Q3 Expand and fully simplify $(x - 3)(4x + 9)$

Q4 Expand and fully simplify $(6n - 5)^2$

Factorising quadratics

Q1 Fully factorise $y^2 + 9y + 20$

Q2 Fully factorise $x^2 - x - 20$

Q3 Fully factorise $w^2 - 15w + 54$

Simplifying expressions

Q1 Fully simplify the expression $4y^5 \times 3y^2$

Q2 Simplify $(h^{-5})^3$

Give your answer without any negative indices.

Q3 Write $\frac{2t^6u}{8t^3}$ as a fraction in its simplest form.

Q4 Fully simplify $\left(\frac{t^3}{u^5}\right)^2$

Q5 Write $\frac{33xy + 9x}{18x}$ as a fraction in its simplest form.

Q6 Fully simplify $\frac{6a + 42}{a^2 + 11a + 28}$

Operations with algebraic fractions

Q1 Fully simplify $\frac{14a}{b} \times \frac{b}{2}$

Q2 Fully simplify $\frac{6a}{v} \div \frac{2a}{5}$

Give your answer as a fraction.

Q3 Fully simplify the expression below to give a single fraction.

$\frac{n+2}{5} + \frac{6n}{7}$

Solving quadratic equations

Q1 Find the two solutions to the equation

$(x - 9)(x + 5) = 0$

Q2 Solve this equation by factorising:

$y^2 + 3y - 10 = 0$

Q3 Solve this equation by factorising:

$12 - 8w + w^2 = 0$

Q4 Using the quadratic formula, solve

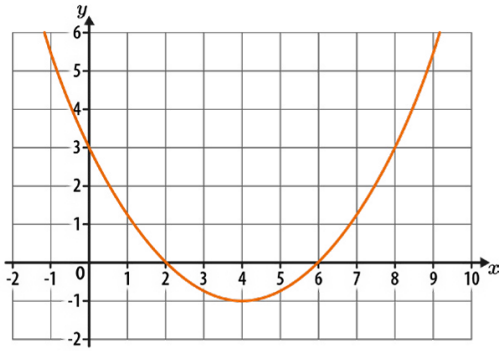
$4x^2 + 16x + 15 = 0$

Q5 Solve this equation by factorising:

$2m^2 - 11m + 5 = 0$

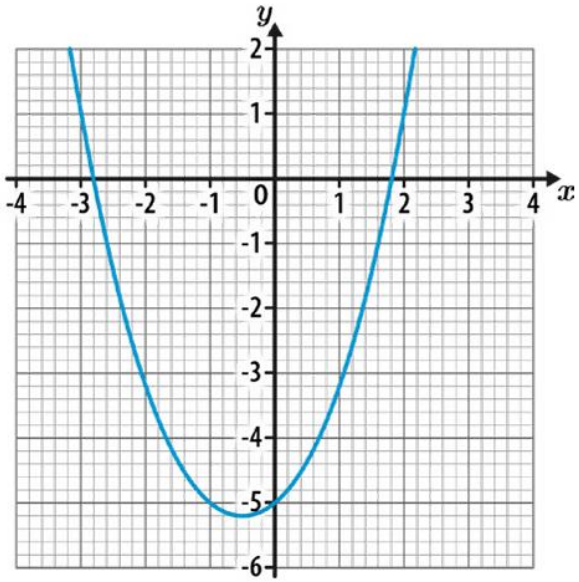
Quadratic graphs

Q1 Write down the coordinates of the roots of the quadratic curve shown below.



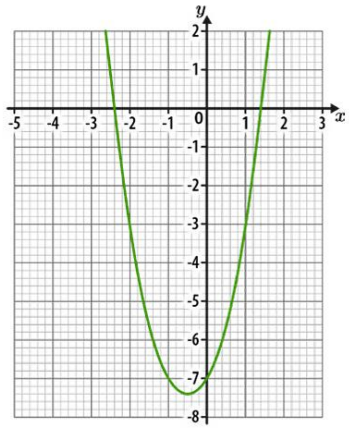
Q2 Here is the graph of the function $y = x^2 + x - 5$

Estimate the solutions to $x^2 + x - 5 = 0$
Give your answers to 1 d.p.



Q3 The diagram below shows the graph of the function $y = 2x^2 + 2x - 7$

Work out the solutions to $2x^2 + 2x - 7 = -3$



Answer: .....

Q4 a) Write $x^2 + 6x + 11$ in the form $(x + c)^2 + d$, where c and d are numbers.

b) Hence, write down the coordinates of the turning point on the curve $y = x^2 + 6x + 11$

Linear simultaneous equations

Q1 Solve the following simultaneous equations:

$6x + y = 22$

$2x + y = 10$

Q2 Solve the following simultaneous equations:

$7x - 4y = 20$

$2x + 4y = 16$

Q3 Solve the following simultaneous equations:

$15a - 4b = 25$

$5a + 2b = 25$

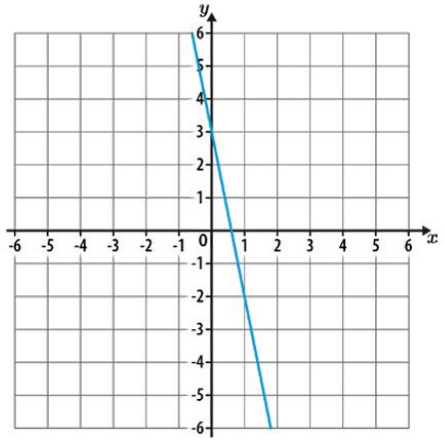
Q4 Solve the following simultaneous equations:

$2x + 3y = 8$

$3x + 4y = 11$

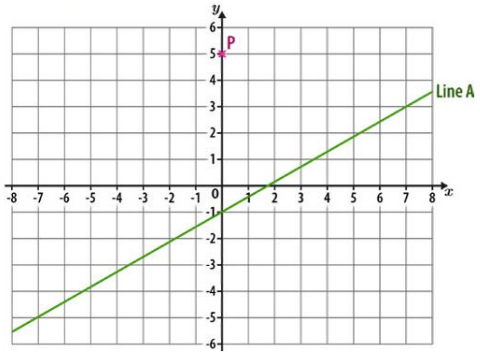
Straight line graphs

Q1 Work out the equation of the straight line shown below.



Answer: .....

Q2 Work out the equation of the straight line that is parallel to line A and pas through point P.



Q3 Line A has the equation $2y - 10 = 16x$
Line B is perpendicular to Line A.

What is the gradient of Line B?

Q4 A straight line has a gradient of 3 and passes through the point (2, 10)

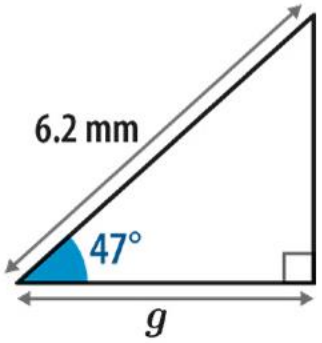
Work out the equation of the line.

Q5 Work out the equation of the straight line that passes through (2, 3) and (5, 18)

Trigonometry

Q1

Work out the length g.
Give your answer to 1 d.p.



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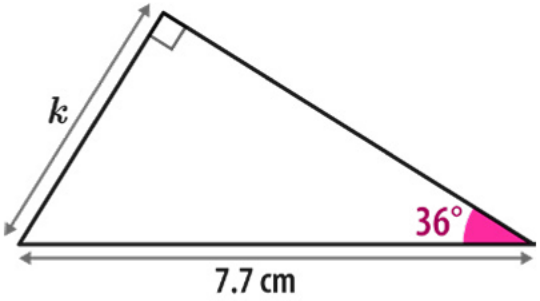
Q2

Work out the length k.
Give your answer to 1 d.p.



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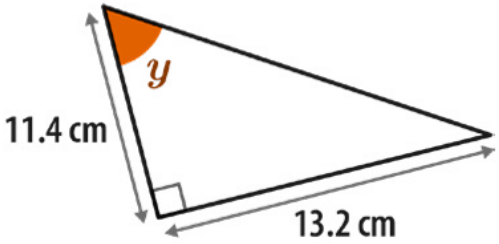
Q3

Calculate the size of angle y.
Give your answer to the nearest integer.



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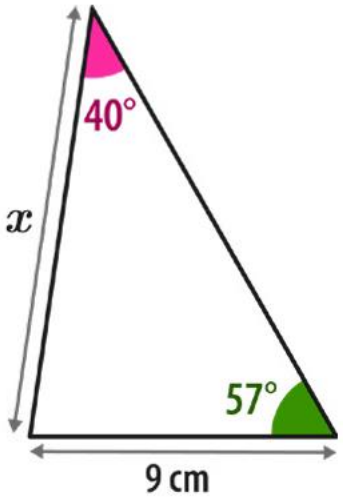
Further trigonometry

Q1 Using the sine rule, calculate the length x.
Give your answer to 1 d.p.



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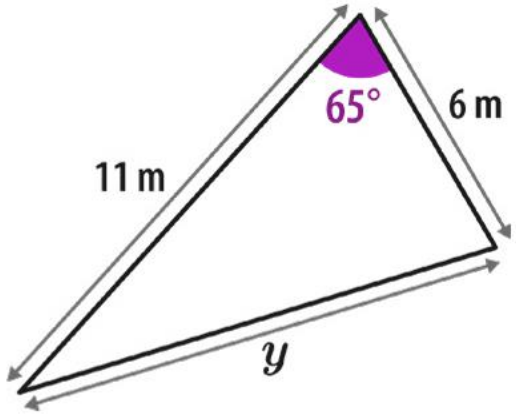
Q2 Using the cosine rule, work out the length y.
Give your answer to 1 d.p.



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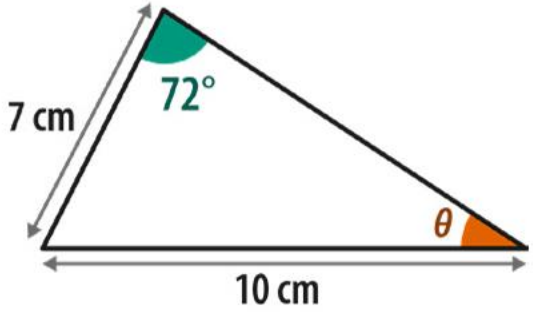
Q3 Use the sine rule to calculate angle θ.
Give your answer to 1 d.p.



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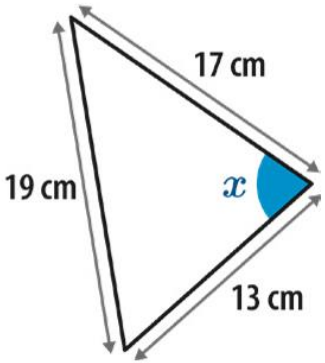
Q4 Use the cosine rule to calculate the size of angle x.
Give your answer to the nearest degree.



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Answers:

Surds

Q1 $5 + \sqrt{35}$

Q2 $\frac{\sqrt{30}}{3}$

Q3 $11 + 7\sqrt{5}$

Q4 $61 + 27\sqrt{3}$

Q5 $\frac{\sqrt{2} + 2}{2}$

Expanding brackets

Q1 $m^2 + 11m + 18$

Q2 $8a^2 + 22a + 15$

Q3 $4x^2 - 3x - 27$

Q4 $36n^2 - 60n + 25$

Factorising quadratics

Q1 $(y + 4)(y + 5)$

Q2 $(x + 4)(x - 5)$

Q3 $(w - 6)(w - 9)$

Operations with algebraic fractions

Q1 $7a$

Q2 $\frac{15}{v}$

Q3 $\frac{37n + 14}{35}$

Solving quadratic equations

Q1 $x = 9$ and $x = -5$

Q2 $y = 2$ and $y = -5$

Q3 $w = 2$ and $w = 6$

Q4 $x = \frac{-5}{2}$ and $x = \frac{-3}{2}$

Q5 $m = \frac{1}{2}$ and $m = 5$

Quadratic graphs

Q1 (2, 0) and (6, 0)

Q2 $x = -2.8$ and $x = 1.8$

Q3 $x = -2$ and $x = 1$

Q4 a) $(x + 3)^2 + 2$

b) (-3, 2)

Linear simultaneous equations

Q1 $x = 3, y = 4$

Q2 $x = 4, y = 2$

Q3 $a = 3, b = 5$

Q4 $x = 1, y = 2$

Straight line graphs

Q1 $y = -5x + 3$

Q2 $y = \frac{4}{7}x + 5$

Q3 $\frac{-1}{8}$

Q4 $y = 3x + 4$

Q5 $y = 5x - 7$

Trigonometry

Q1 4.2 mm

Q2 4.5 cm

Q3 49°

Further trigonometry

Q1 11.7 cm

Q2 10.1 m

Q3 41.7°

Q4 77°