Solihull Sixth Form College

Welcome to College Day Homework

Most of the work covered in A-level Mathematics is focused on algebra. This document is designed to support you with many key skills at GCSE that will enable you cope with the initial demands of the A level Mathematics course.
This includes expanding brackets, factorising, algebraic fractions, indices, rearranging formulae, rearranging formulae, solving other equations such as quadratics, straight line graphs, surds and trigonometry.

Please watch the following 19 videos, making notes on each video on lined paper. Your notes should include at least one example from each video and be in a format you could show your teacher in September, including the title of each topic and your name. You may wish to pause the videos while making notes.
https://sites.google.com/view/tlmaths/home/gcse-to-a-level-maths-bridging-the-gap

2) Now please answer the following questions. If you have access to a printer than you may print this document. Alternatively, please answer on lined paper.

Section 1: Multiplying two brackets

Video Link: https://sites.google.com/view/tlmaths/home/gcse-to-a-level-maths-bridging-the-gap#h.q6gw21wg7wpp

Exercise 1
Multiply out these brackets

1. $(x-9)(x-3)$

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2. $(3p+2q)(3p-q)$

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Square these brackets

3. $(x-2)^2$

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4. $(3x+2y)^2$

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Section 2: Factorising with algebraic expressions

Video Link: https://sites.google.com/view/tlmaths/home/gcse-to-a-level-maths-bridging-the-gap#h.9ofdywmss6ot

Exercise 2

Fully factorise these expressions

1. $2ab-6ac$

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2. $3a^2b-6a^3b$

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Factorise the following expressions

3. $1-49t^2$

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4. $7a^2-63b^2$

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Factorise the following expressions

5. x^2-7x+6

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6. $x^2+4x-32$

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Factorise the following expressions;

7. $3x^2+7x+2$

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8. $12x^2 + x - 6$

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Section 3: Cancelling algebraic fractions

Video Link:https://sites.google.com/view/tlmaths/home/gcse-to-a-level-maths-bridging-the-gap#h.rgyss7x782p5

Exercise 3A

Simplify the following expressions

1. $\frac{3x^2yz}{6xy^2z^2}$

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2. $\frac{5x^2 - 20x}{10x^2}$

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Section 4: Laws of indices

Video Link: https://sites.google.com/view/tlmaths/home/gcse-to-a-level-maths-bridging-the-gap#h.hsgrele55n6a

Exercise 4

Work out these, giving your answers as fractions or whole numbers

1. $27^{\frac{4}{3}}$

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2. $5^{-2}\times10^{5}\times16^{\frac{-1}{2}}$

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Write these numbers as a power of the number in brackets

3. 32 (2)

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4. 0.25 (2)

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Section 5: Rearranging formulae

Video Link: https://sites.google.com/view/tlmaths/home/gcse-to-a-level-maths-bridging-the-gap#h.i2iqqk5pyulw

Exercise 5

Rearrange these formulae making the letter in the brackets the subject;

1. $s-2ax=b(x-s)$ (x)

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2. $\frac{a}{b} - 2a = b \qquad (a)$

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Section 6: Simultaneous equations

Video Link: https://sites.google.com/view/tlmaths/home/gcse-to-a-level-maths-bridging-the-gap#h.xgcv7mpz6kl5

Exercise 6: Solve these pairs of simultaneous equations

a) $9x + 8y = 1$

$2x + 3y = -1$

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b) 3s + 2t = 57

2s + 5t = 82

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Section 7: Solving Linear Equations

Video Link: https://sites.google.com/view/tlmaths/home/gcse-to-a-level-maths-bridging-the-gap#h.mar1qu9w7e6s

Exercise 7: Solve the following equations

1. $5x+7+2=12+3-3x$

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2. $2(4x+3)+3(2x+1)=23$

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Section 8: Straight line graphs

Video Link: https://sites.google.com/view/tlmaths/home/gcse-to-a-level-maths-bridging-the-gap#h.y6hld4tizsu1

Exercise 8A

What are the equations of the following lines;

1. gradient is 5, passing through the point $(0,0)$

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2. gradient is 4, passing though the point $(0,-1)$

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3. gradient is -2, passing through the point $(0,5)$

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What is the gradient of the line passing through the following pairs of points? What is the equation of each line?

4. origin and (3,12)

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5. $(0,1)$ and $(-2,4)$

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For each line below, give an equation of a line parallel and an equation for a line that is perpendicular.

6. $y = \frac{-1}{3}x + 6$

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7. $y = 0.5x + 1$

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Find the coordinates of the mid-point of the line connecting each of the following pairs of coordinates:

8. $C(1,5)$ and $D(7,3)$

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9. $G(3,7)$ and $H(8,2)$

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Section 9: Surds

Video Link: https://sites.google.com/view/tlmaths/home/gcse-to-a-level-maths-bridging-the-gap#h.58zwoeobeh4f

Exercise 9

Simplify each of these surds

1. $\sqrt{20} \times \sqrt{18}$

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2. $\sqrt{20} \div \sqrt{5}$

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For $x = 4 + \sqrt{3}$, $y = 4 - \sqrt{3}$ and $z = 3\sqrt{3}$, simplify

3. x^2

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4. $y \times z$

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5. $x + y + z$

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Rationalise the denominators of the following fractions

6. $\frac{5}{\sqrt{7}}$

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7. $\frac{6}{\sqrt{8}}$

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8. $\frac{4}{3\sqrt{10}}$

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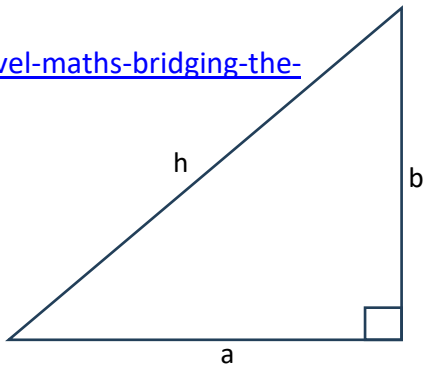
Section 10: Trigonometry

Video Link:https://sites.google.com/view/tlmaths/home/gcse-to-a-level-maths-bridging-the-gap#h.4fugqvtc6bz9



Exercise 10

What is the length of the hypotenuse to 2dp when the shorter sides of a right angled triangle are as follows:

1. $a = 2$ cm and $b = 5$ cm

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2. $a = 12$ cm and $b = 5$ cm

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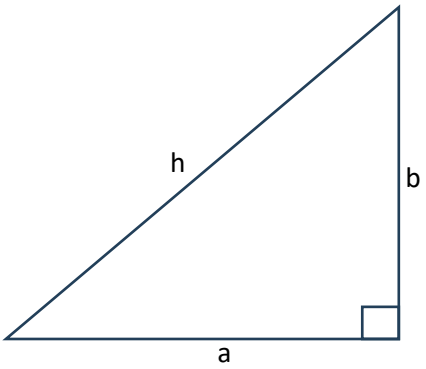

What is the missing length to 2 dp of a right angled triangle with the following sides?

3. $a = 12$ cm and $h = 20$ cm

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4. $b = 8$ cm and $h = 30$ cm

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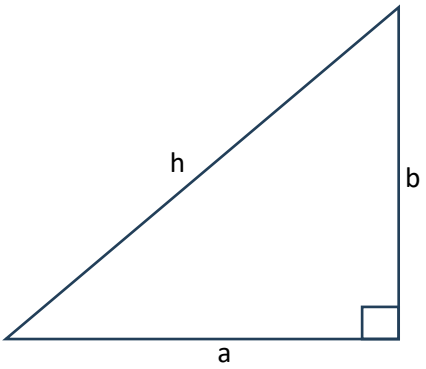

What is the missing length to 2 dp of a right angled triangle with the following sides?

5. $a = 5$ cm and $b = 12$ cm

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6. $a = 6.8$ cm and $h = 9.3$ cm

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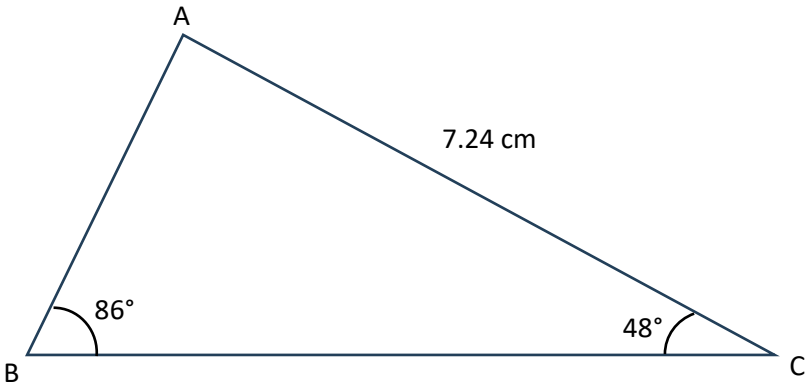
Use the sine rule to find the missing side or angle for the following triangles to 2dp



7.Find the length of side c if $B = 86^\circ$, $C = 48^\circ$ and $b = 7.24$ cm

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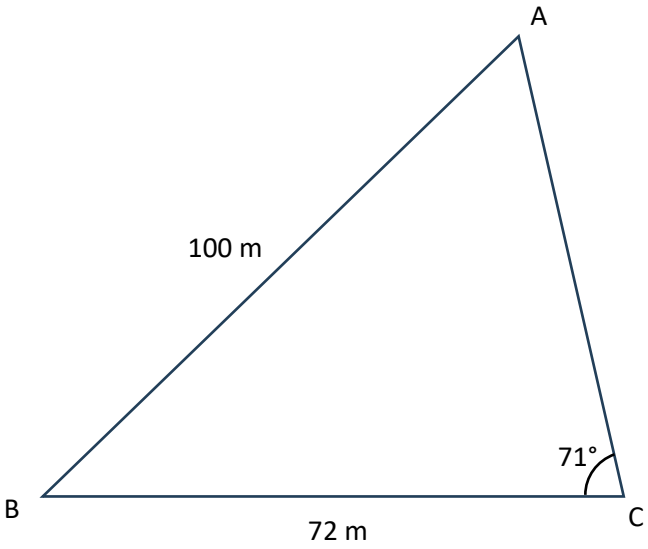

8.Find the size of angle A if $C = 71^\circ$, $a = 72$ m and $c = 100$ m

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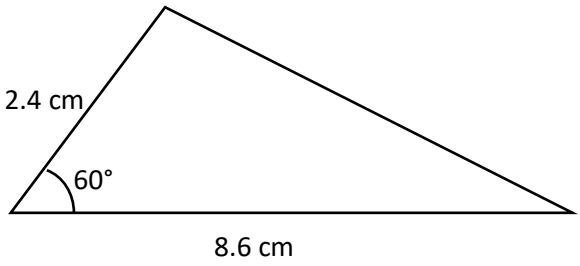
What is the area of these triangles to 2 dp. Use Area = $\frac{1}{2}ab\sin C$



9. Sides are 2.4 cm and 8.6 cm; included angle is 60°

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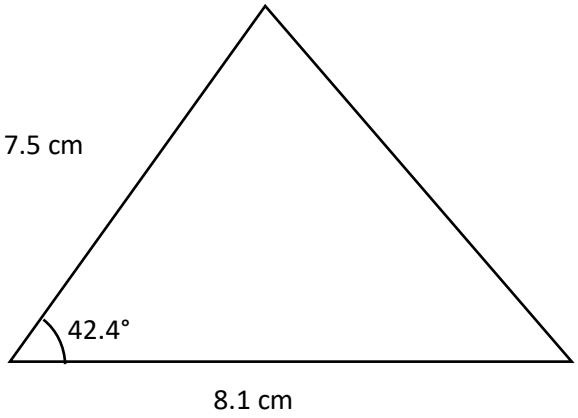

10. Sides are 7.5 cm and 8.1 cm; included angle is 42.4°

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