Mathematics Summer Work 2026

South Wilts Grammar School

Welcome to Mathematics at SWGS!

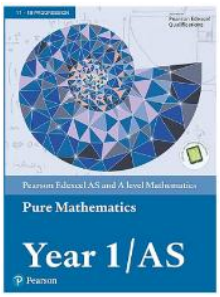
Over this summer we would like you to complete some consolidation work of GCSE topics so that we can hit the ground running in September. You will need to be fluent in working with algebra in order to be successful in the A-level Mathematics course.

Please complete all the attached questions on A4 paper and bring them to hand in to your teacher in your first lesson in September. You should write the questions and show all workings clearly – not just list your answers! Your teacher will review your work so please ensure that it is well presented.

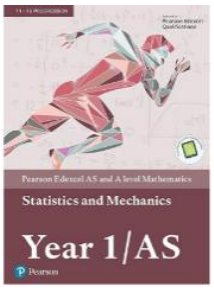
There are 4 sections to work through: expanding and factorising, indices, surds and algebraic fractions. We have included links to Corbett Maths videos for you to watch if you need a reminder for any of these topics.

In preparation for your Maths lessons at SWGS please remember to bring a set of white board pens with you to all lessons. We use A3 whiteboards in all our A-level Maths lessons. We will also provide graphical calculators to use in all lessons.

We will be using the following two textbooks in class and for homework. You may wish to get ahead and purchase these before the start of term. Each book comes with a digital book link that can be viewed online.



Pearson Edexcel AS and A level Mathematics Pure Mathematics Year 1/AS



Edexcel AS and A level Mathematics Statistics & Mechanics Year 1/AS

We look forward to meeting you in September.

Mrs J Argyle
Head of Maths

Section A: Expanding and Factorising

Expanding Two Brackets Video – Corbettmaths

Expanding Three Brackets Video – Corbettmaths

Factorising Quadratics 2 Video – Corbettmaths

1)

Expand and simplify if possible:

a $(x+4)(x+7)$	**b** $(x-3)(x+2)$	**c** $(x-2)^2$
d $(x-y)(2x+3)$	**e** $(x+3y)(4x-y)$	**f** $(2x-4y)(3x+y)$
g $(2x-3)(x-4)$	**h** $(3x+2y)^2$	**i** $(2x+8y)(2x+3)$
j $(x+5)(2x+3y-5)$	**k** $(x-1)(3x-4y-5)$	**l** $(x-4y)(2x+y+5)$
m $x(2x+3)(x+y-5)$	**n** $2x(3x-1)(4x-y-3)$	**o** $3x(x-2y)(2x+3y+5)$
p $(x+3)(x+2)(x+1)$	**q** $(x+2)(x-4)(x+3)$	**r** $(x+3)(x-1)(x-5)$

2)

Factorise:

a x^2+4x	**b** $2x^2+6x$	**c** $x^2+11x+24$
d $x^2+8x+12$	**e** $x^2+3x-40$	**f** $x^2-8x+12$
g x^2+5x+6	**h** $x^2-2x-24$	**i** $x^2-3x-10$
j x^2+x-20	**k** $2x^2+5x+2$	**l** $3x^2+10x-8$
m $5x^2-16x+3$	**n** $6x^2-8x-8$	
o $2x^2+7x-15$	**p** $2x^4+14x^2+24$	
q x^2-4	**r** x^2-49	
s $4x^2-25$	**t** $9x^2-25y^2$	**u** $36x^2-4$
v $2x^2-50$	**w** $6x^2-10x+4$	**x** $15x^2+42x-9$

Section B: Indices

Laws of Indices – Algebra Video – Corbettmaths

Negative indices Video – Corbettmaths

Fractional Indices Video – Corbettmaths

1)

Simplify these expressions:

a $x^3 \times x^4$ **b** $2x^3 \times 3x^2$ **c** $\frac{k^3}{k^2}$

d $\frac{4p^3}{2p}$ **e** $\frac{3x^3}{3x^2}$ **f** $(y^2)^5$

g $10x^5 \div 2x^3$ **h** $(p^3)^2 \div p^4$ **i** $(2a^3)^2 \div 2a^3$

j $8p^4 \div 4p^3$ **k** $2a^4 \times 3a^5$ **l** $\frac{21a^3b^7}{7ab^4}$

m $9x^2 \times 3(x^2)^3$ **n** $3x^3 \times 2x^2 \times 4x^6$ **o** $7a^4 \times (3a^4)^2$

2)

Simplify:

a $x^3 \div x^{-2}$ **b** $x^5 \div x^7$ **c** $x^{\frac{3}{2}} \times x^{\frac{5}{2}}$

d $(x^2)^{\frac{3}{2}}$ **e** $(x^3)^{\frac{5}{3}}$ **f** $3x^{0.5} \times 4x^{-0.5}$

g $9x^{\frac{2}{3}} \div 3x^{\frac{1}{6}}$ **h** $5x^{\frac{7}{5}} \div x^{\frac{2}{5}}$ **i** $3x^4 \times 2x^{-5}$

j $\sqrt{x} \times \sqrt[3]{x}$ **k** $(\sqrt{x})^3 \times (\sqrt[3]{x})^4$ **l** $\frac{(\sqrt[3]{x})^2}{\sqrt{x}}$

3)

Simplify:

a $(64x^{10})^{\frac{1}{2}}$ **b** $\frac{5x^3 - 2x^2}{x^5}$ **c** $(125x^{12})^{\frac{1}{3}}$ **d** $\frac{x + 4x^3}{x^3}$

e $\frac{2x + x^2}{x^4}$ **f** $\left(\frac{4}{9}x^4\right)^{\frac{3}{2}}$ **g** $\frac{9x^2 - 15x^5}{3x^3}$ **h** $\frac{5x + 3x^2}{15x^3}$

Section C: Surds – Do not use a calculator on this section!

Surds Video – Corbettmaths

Rationalising Denominators Video – Corbettmaths

1)

Do not use your calculator for this exercise. Simplify:

a $\sqrt{28}$ **b** $\sqrt{72}$ **c** $\sqrt{50}$

d $\sqrt{32}$ **e** $\sqrt{90}$ **f** $\frac{\sqrt{12}}{2}$

g $\frac{\sqrt{27}}{3}$ **h** $\sqrt{20}+\sqrt{80}$ **i** $\sqrt{200}+\sqrt{18}-\sqrt{72}$

2)

Expand and simplify if possible:

a $\sqrt{3}(2+\sqrt{3})$ **b** $\sqrt{5}(3-\sqrt{3})$ **c** $\sqrt{2}(4-\sqrt{5})$

d $(2-\sqrt{2})(3+\sqrt{5})$ **e** $(2-\sqrt{3})(3-\sqrt{7})$ **f** $(4+\sqrt{5})(2+\sqrt{5})$

g $(5-\sqrt{3})(1-\sqrt{3})$ **h** $(4+\sqrt{3})(2-\sqrt{3})$ **i** $(7-\sqrt{11})(2+\sqrt{11})$

3)

Simplify:

a $\frac{1}{\sqrt{5}}$ **b** $\frac{1}{\sqrt{11}}$ **c** $\frac{1}{\sqrt{2}}$ **d** $\frac{\sqrt{3}}{\sqrt{15}}$

e $\frac{\sqrt{12}}{\sqrt{48}}$ **f** $\frac{\sqrt{5}}{\sqrt{80}}$ **g** $\frac{\sqrt{12}}{\sqrt{156}}$ **h** $\frac{\sqrt{7}}{\sqrt{63}}$

4)

Rationalise the denominators and simplify:

a $\frac{1}{1+\sqrt{3}}$ **b** $\frac{1}{2+\sqrt{5}}$ **c** $\frac{1}{3-\sqrt{7}}$ **d** $\frac{4}{3-\sqrt{5}}$ **e** $\frac{1}{\sqrt{5}-\sqrt{3}}$

f $\frac{3-\sqrt{2}}{4-\sqrt{5}}$ **g** $\frac{5}{2+\sqrt{5}}$ **h** $\frac{5\sqrt{2}}{\sqrt{8}-\sqrt{7}}$ **i** $\frac{11}{3+\sqrt{11}}$ **j** $\frac{\sqrt{3}-\sqrt{7}}{\sqrt{3}+\sqrt{7}}$

Additional help for Q3 & 4:

If a fraction has a surd in the denominator, it is sometimes useful to **rearrange** it so that the denominator is a **rational** number. This is called rationalising the denominator.

- **The rules to rationalise denominators are:**
  - **For fractions in the form $\frac{1}{\sqrt{a}}$, multiply the numerator and denominator by $\sqrt{a}$.**
  - **For fractions in the form $\frac{1}{a+\sqrt{b}}$, multiply the numerator and denominator by $a-\sqrt{b}$.**
  - **For fractions in the form $\frac{1}{a-\sqrt{b}}$, multiply the numerator and denominator by $a+\sqrt{b}$.**

Section D: Algebraic Fractions

Simplifying algebraic fractions Video – Corbettmaths

Adding algebraic fractions Video – Corbettmaths

Multiplying algebraic fractions Video – Corbettmaths

Dividing algebraic fractions Video – Corbettmaths

1)

Simplify these fractions as far as possible:

a $\frac{(x+3)(x-2)}{(x-2)}$ **b** $\frac{(x+4)(3x-1)}{(3x-1)}$ **c** $\frac{(x+3)^2}{(x+3)}$

d $\frac{x^2+10x+21}{(x+3)}$ **e** $\frac{x^2+9x+20}{(x+4)}$ **f** $\frac{x^2+x-12}{(x-3)}$

g $\frac{x^2+x-20}{x^2+2x-15}$ **h** $\frac{x^2+3x+2}{x^2+5x+4}$ **i** $\frac{x^2+x-12}{x^2-9x+18}$

j $\frac{2x^2+7x+6}{(x-5)(x+2)}$ **k** $\frac{2x^2+9x-18}{(x+6)(x+1)}$ **l** $\frac{3x^2-7x+2}{(3x-1)(x+2)}$

2)

Simplify:

a $(x+2)\times\frac{1}{x^2-4}$ **b** $\frac{1}{a^2+6a+9}\times\frac{a^2-9}{2}$ **c** $\frac{x^2-3x}{y^2+y}\times\frac{y+1}{x}$

d $\frac{y}{y+3}\div\frac{y^2}{y^2+4y+3}$ **e** $\frac{x^2}{3}\div\frac{2x^3-6x^2}{x^2-3x}$ **f** $\frac{4x^2-25}{4x-10}\div\frac{2x+5}{8}$

g $\frac{x+3}{x^2+10x+25}\times\frac{x^2+5x}{x^2+3x}$ **h** $\frac{3y^2+4y-4}{10}\div\frac{3y+6}{15}$ **i** $\frac{x^2+2xy+y^2}{2}\times\frac{4}{(x-y)^2}$

3)

Write as a single fraction:

a $\frac{3}{x}-\frac{2}{x+1}$ **b** $\frac{2}{x-1}-\frac{3}{x+2}$ **c** $\frac{4}{2x+1}+\frac{2}{x-1}$

d $\frac{1}{3}(x+2)-\frac{1}{2}(x+3)$ **e** $\frac{3x}{(x+4)^2}-\frac{1}{x+4}$ **f** $\frac{5}{2(x+3)}+\frac{4}{3(x-1)}$

4)

Write as a single fraction:

a $\frac{2}{x^2+2x+1}+\frac{1}{x+1}$ **b** $\frac{7}{x^2-4}+\frac{3}{x+2}$ **c** $\frac{2}{x^2+6x+9}-\frac{3}{x^2+4x+3}$

d $\frac{2}{y^2-x^2}+\frac{3}{y-x}$ **e** $\frac{3}{x^2+3x+2}-\frac{1}{x^2+4x+4}$ **f** $\frac{x+2}{x^2-x-12}-\frac{x+1}{x^2+5x+6}$

Hint for Q4 – factorise the denominators before you start adding or subtracting!