

A Level Mathematics

Transition Activity

In addition to completing these questions, you may also find it useful reading through the 'Head Start to AS Maths' book for guidance ('Head Start to AS Maths' Published by CGP ISBN 9781782947929). The material included is all in the GCSE Maths Higher Syllabus. *Answers, with worked solutions, should be written by hand and brought to your first Maths lesson at the College.*

Additional resources that you may find interesting:

+plus magazine (<http://plus.maths.org/content/>) for interesting articles on application of mathematics e.g.

- The maths of infectious diseases:
- Constructing our lives: the mathematics of engineering
- Mathematics and the nature of reality

Enriching mathematics site (<http://nrich.maths.org/public/>) which has a wide range of puzzles and articles

There are many interesting popular maths books, here are just a few examples:

- 'Professor Stewart's Cabinet of Mathematical Curiosities' by Ian Stewart ISBN-10: 1846680646
- 'Fermat's Last Theorem: The story of a riddle that confounded the world's greatest minds for 358 years' by Simon Singh ISBN-10: 1841157910
- The Penguin Dictionary of Curious and Interesting Numbers (Penguin Press Science) ISBN-10: 0140261494

1. Indices:

a) What is the value of $1^6 - 2^5 + 3^4 - 4^3 + 5^2 - 6^1$?

Simplify the following expressions:

b) $\frac{4^5 \times 4^2}{4^4}$

c) $\frac{(2^5)^2}{2^3}$

d) $\frac{3^2 \times 3^4}{3^3 \times 3}$

e) $x^4 \times x^{-2}$

f) $\frac{(y^2)^4}{y^{-1} \times y^2}$

g) $\frac{6^7}{(6^2)^6}$

h) $5^0 \times 5^3 \times 5^4$

i) $\frac{x^2 \times x^5}{(x^3)^2}$

Evaluate:

f) $4^{\frac{3}{2}}$

g) $81^{\frac{3}{4}}$

h) -7^{-3}

i) $(\frac{8}{27})^{\frac{2}{3}}$

j) 10^0

2. Rearranging Formulae

Rearrange the following to make y the subject:

a) $x + y = 10$

b) $4x + 2y - 6 = 0$

c) $4x + y - 5 = 0$

d) $3x - y - 7 = 0$

e) $y - 6x + 9 = 0$

f) $x - 2y = 10$

3. Factorise

a) $x^2 - 36$

b) $x^2 + 5x + 6$

c) $x^2 - 2x - 24$

d) $x^3 - 6x^2 + 8x$

e) $3x^2 - 10x + 3$

f) $2y^2 + 7y + 6$

g) $6x^2 + 11x + 4$

h) $4x^2 + x - 3$

i) $3x^3 - 13x^2 + 4x$

4. Simultaneous equations

Solve the following pairs of simultaneous equations

a) $3x - y = 1$
 $x + y = 3$

b) $2x + y = 7$
 $x + y = 4$

c) $2x + 3y = 9$
 $x + 4y = 7$

d) $3x + 4y = 23$
 $2x + 5y = 20$

e) $x^2 + 2y = 12$
 $y = 3x - 2$

f) $x^2 + 3xy + y^2 = 11$
 $x + y = 3$

5. Equations

Solve the following equations

$$\begin{array}{lll} \text{a) } 5(x + 2) = 2x + 22 & \text{b) } 2(x - 4) = 3x + 1 & \text{c) } x^2 + 8x + 15 = 0 \\ \text{d) } d^2 - 9d + 20 = 0 & \text{e) } x^2 - 16 = 0 & \text{f) } x^2 + 3x - 5 = 0 \end{array}$$

6. More Rearranging Formulae

Rearrange the following to make x the subject:

$$\begin{array}{ll} \text{a) } y = \frac{x}{5} + 17 & \text{b) } a = b - cx \\ \text{c) } z = \sqrt{\frac{x}{x+y}} & \text{d) } d = \frac{2(S-xn)}{n(n-1)} \end{array}$$

7. More Equations

Solve the following equations

$$\begin{array}{lll} \text{a) } \frac{4}{7}y - \frac{3}{5}y = 2 & \text{b) } \frac{m}{2} + \frac{m}{3} + 3 = 2 + \frac{m}{6} & \text{c) } \frac{x+3}{4} - \frac{x-3}{5} = 2 \end{array}$$

8. Further Equations

Solve this using the quadratic formula

$$\text{a) } 4x^2 + 7x - 5 = 0$$

Solve this using completing the square method and keep your answer in exact form

$$\text{b) } x^2 - 5x + 2 = 0$$

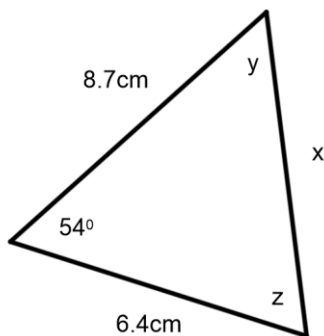
9. Surds

Evaluate the following:

a) $\sqrt{4} \times \sqrt{25}$ b) $\sqrt{7} \times \sqrt{7}$ c) $\sqrt{2} \times \sqrt{18}$ d) $\sqrt{6} \times \sqrt{10} \times \sqrt{15}$

10. Trigonometry

a) Calculate all missing angles and lengths in this triangle



b) Calculate the area of the triangle above

11. Miscellaneous

- a) How many 2-digit numbers can be formed using the digits 1, 3, 5, 7 and 8 which are divisible by 3?
- b) The number 114 is the sum of 4 consecutive positive integers. What are they?
- c) p and q are two positive integers. $p^2 + q^2 = 170$. What are the values of p and q?
- d) List the constant acceleration equations