

Mathematics

How can I prepare for A Level Mathematics?

By attempting the following questions, it will help you to find out how suitable you will be to study A Level Mathematics. It uses algebra-based questions which are of a GCSE standard as it will be taken for granted that you are able to use these skills at A Level. Over the next 6 pages you will find many questions which you can use to judge how well you could do. The answers may be found in the document which accompanies this one. You can, of course, use your revision guides and the appropriate lessons and questions of mymaths (login: ribstonhall, Password: triangle) to supplement your preparations.

During the first few days in September make an effort and talk to your Mathematics teachers if you have struggled with any of the questions. Within the first two weeks, you will undertake an algebra examination to ensure you have the necessary skills to undertake the course.

What topics does the Algebra examination test?

All questions contained in the examination are based on material in the algebra section of the GCSE syllabus. Specifically, you should know and understand:

Topic	Questions
Rules for working with negative numbers.	17
Expanding brackets in algebra and collecting like terms.	4, 5, 6, 14, 15
Forming and solving linear equations and inequalities.	5, 6
Rules of indices, including applying them to simplifying algebraic expressions.	1, 3, 4, 8
Changing the subject of a formula.	10, 11, 12, 13
Factorising by removing common factors of an expression.	23
The equation of a straight line in the form $y = mx + c$	20, 25
Solving linear simultaneous equations – both algebraic and graphical methods.	20, 21
Factorising quadratics.	7, 8, 9, 14, 19
Solving quadratic equations.	14, 18, 19, 24
Algebraic fractions.	4, 5, 6, 7, 8, 23
Solving simultaneous equations where one is linear and the other quadratic.	22
Constructing and using formulae and expressions.	16, 24
Fractions	2

Make sure you show complete methods and that you check your answers. For any questions you are unsure about be pro-active and go and find out how to answer them.

Your completed, marks solutions should be handed in to your mathematics teacher the first lesson of the first week of term.

1. Simplify $\frac{15a^3b^7}{3a^2b^3}$ (2)
2. A rectangle is $2\frac{4}{9}$ m wide and $5\frac{3}{5}$ m high. Find the perimeter and area of the rectangle. Show your working. (5)
3. (a) Simplify $p^8 \div p^2$ (1)
- (b) Simplify $(w^4)^3$ (1)
- (c) Simplify $5e^3f \times e^2f^2$ (2)
4. Simplify fully
- (a) $2(3x + 4) - 3(4x - 5)$ (2)
- (b) $(2xy^3)^5$ (2)
- (c) $\frac{n^2 - 1}{n + 1} \times \frac{2}{n - 2}$ (3)
5. Solve $7(x + 2) = \frac{5x + 1}{2}$ (4)
6. Solve $2x + 1 = \frac{5x}{3}$ (2)
7. Simplify fully $\frac{3(2x + 1)}{4x^2 - 1}$ (2)
8. Simplify fully
- (a) $(3xy^2)^4$ (2)
- (b) $\frac{x^2 - 3x}{x^2 - 8x + 15}$

9. (a) (i) Expand and simplify $(a - b)^2$ (3)
- (ii) Show that $\frac{(a + b)^2 + (a - b)^2}{2} = a^2 + b^2$
- (iii) Hence, or otherwise, find the value of $102.5^2 + 97.5^2$ (5)
10. Make a the subject of the formula $2(3a - c) = 5c + 1$ (3)
11. Make x the subject of $5(x - 3) = y(4 - 3x)$ (4)
12. Make a the subject of the formula $s = \frac{a}{4} + 8u$ (2)
13. $P = \frac{n^2 + a}{n + a}$ Rearrange the formula to make a the subject. (4)
14. (a) Solve $6x + 2 = 4(x - 7)$ (2)
- (b) Solve $\frac{15 - 2x}{3} = 4$ (3)
- (c) (i) Factorise $x^2 - 23x + 42$
- (ii) Hence solve $x^2 - 23x + 42 = 0$ (3)
15. (a) Expand and simplify $(x - 6)(x + 4)$ (2)
- (b) Factorise completely $12x^2 - 18xy$ (2)
16. Eggs are sold in boxes. A small box holds 6 eggs. A large box holds 12 eggs. Hina buys x small boxes of eggs. Hina also buys 4 less of the large boxes of eggs than the small boxes.
- (a) Find, in terms of x , the total number of eggs in the **large** boxes that Hina buys. (1)
- (b) Find, in terms of x , the total number of eggs that Hina buys. Give your answer in its simplest form. (2)

17.

$$D = ut + kt^2$$

$$\text{If } u = 20, t = 1.2, k = -5$$

(a) Work out the value of D .

(2)

$$\text{If } D = 50, t = 5, k = -5$$

(b) Work out the value of u .

(2)

(c) Make u the subject of the formula

$$D = ut + kt^2$$

(2)

18. Solve $x^2 - 3x - 18 = 0$

(3)

19. (a) (ii) Factorise $2x^2 - 35x + 98$

(ii) Solve the equation $2x^2 - 35x + 98 = 0$

(3)

20.

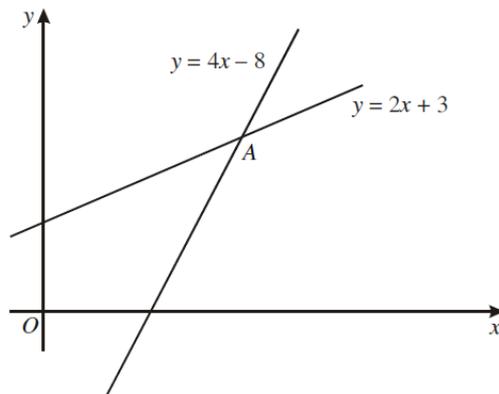


Diagram NOT accurately drawn

The diagram shows two straight lines intersecting at point A.

The equations of the lines are

$$y = 4x - 8$$

$$y = 2x + 3$$

Work out the coordinates of A.

(3)

21. Solve the simultaneous equations

$$2x + 3y = 6$$

$$3x - 2y = 22$$

(4)

22. By eliminating y , find the solutions to the simultaneous equations

$$y - 2x = 3$$

$$x^2 + y^2 = 18$$

$$x = \dots\dots\dots y = \dots\dots\dots$$

$$\text{OR } x = \dots\dots\dots y = \dots\dots\dots$$

(7)

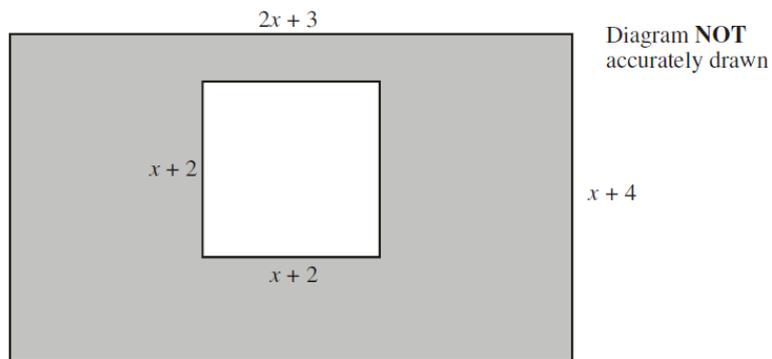
23. (a) Factorise completely $2(x - 5)^2 + 3(x - 5)$

(2)

- (b) Simplify $\frac{3(y - 4)}{(y - 4)^2}$

(1)

24. Peter cuts a square out of a rectangular piece of metal.



The length of the rectangle is $2x + 3$. The width of the rectangle is $x + 4$. The length of the side of the square is $x + 2$. All measurements are in centimetres. The shaded shape in the diagram shows the metal remaining.

The area of the shaded shape is 20 cm^2 .

- (a) Show that $x^2 + 7x - 12 = 0$

(4)

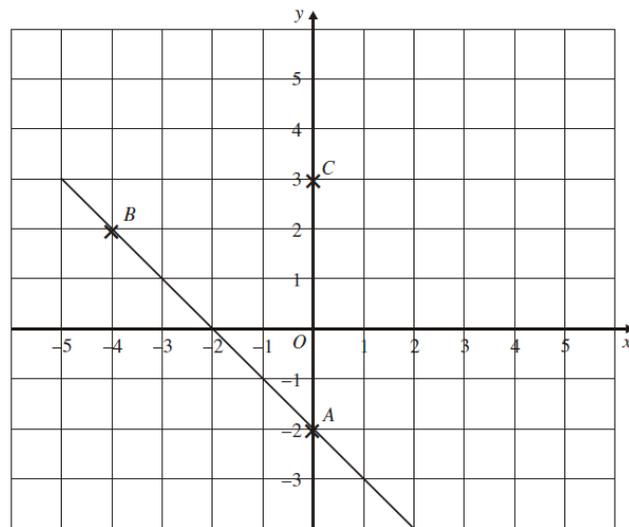
- (b) (i) Solve the equation $x^2 + 7x - 12 = 0$ (Give your answers correct to 4 significant figures).

(3)

- (ii) Hence, find the perimeter of the square. (Give your answer correct to 3 significant figures).

(1)

25.



In the diagram

- A is the point $(0, -2)$,
- B is the point $(-4, 2)$,
- C is the point $(0, 3)$.

Find an equation of the line that passes through C and is parallel to AB .

(4)

Y12 Holiday Homework Answers

Make sure you show full solutions on separate lined paper and hand in at the start of the term.

1. $5ab^4$
2. $16\frac{4}{45}$ $13\frac{31}{45}$
3. (a) a^6 (b) w^{12} (c) $5e^{5f^3}$
4. (a) $23 - 6x$ (b) $32x^5y^{15}$ (c) $\frac{2(n-1)}{n-2}$
5. -3
6. -3
7. $\frac{3}{2x-1}$
8. (a) $81x^4y^8$ (b) $\frac{x}{x-5}$
9. (a) (i) $a^2-2ab+b^2$ (iii) 20012.5
10. $a = \frac{7c+1}{6}$
11. $x = \frac{4y+15}{5+3y}$
12. $a = 4(s - 8u)$
13. $a = \frac{n^2-nP}{P-1}$
14. (a) -15 (b) 1.5 (c)(i) $(x - 21)(x - 2)$ (ii) 2 and 21
15. (a) $x^2 - 2x - 24$ (b) $6x(2x - 3y)$
16. (a) $12(x - 4)$ (b) $18x - 48$
17. (a) 16.8 (b) 35 (c) $u = \frac{D-kt^2}{T}$
18. $6, -3$
19. (a) (i) $(2x - 7)(x - 14)$ (ii) $\frac{7}{2}, 14$
20. $(5.5, 14)$
21. $x = 6, y = -2$
22. $x = -3$ $y = -3$, $x = \frac{3}{5}$ $y = 4\frac{1}{5}$
23. (a) $(x - 5)(2x - 7)$ (b) $\frac{3}{y-4}$
24. (b) (i) $1.424, -8.424$ (ii) 13.7
25. $y = 3 - x$