Name	Date started	Target end date

WJEC GCSE Mathematics and Numeracy (Double Award) — Question Pack

Rearranging formulae to change the subject — simple one-step formulae, formulae with two operations, and formulae where the new subject appears twice.

REVISE
.wales

2.10 — Rearranging formulae

Spec 2.1.16, 2.1.17 — Unit 2 (no calculator)

Rearranging formulae to change the subject — simple one-step formulae, formulae with two operations, and formulae where the new subject appears twice. Sourced from legacy WJEC GCSE Mathematics Higher non-calculator papers, organised for revision under the 2025 spec.

2025 SPECIFICATION

Estimated time for entire question pack: ~1 hours 58 minutes

*Derived from the GCSE Higher pace of **~1.5 min/mark** (79 marks across 22 questions).*

*You are advised to **not** attempt to complete all of this in one sitting.*

ABOUT THIS QUESTION PACK

This is a **focused single-topic practice pack**, not a single mock paper. Questions are organised against the 2025 specification. Questions are ordered chronologically by sitting, with custom-written and SAM questions at the end.

INSTRUCTIONS

Use black ink or black ball-point pen. Show all working — method marks are awarded for clear setup.

*A calculator is **not** permitted on any question in this pack (Unit 2 is the non-calculator paper).*

Rearranging formulae — what the new spec asks

WJEC GCSE Mathematics (first teaching 2025) · Unit 2: non-calculator.

Change the subject — once 2.1.16

- Undo operations one at a time using inverses.
- Reverse BIDMAS — last operation comes off first.
- Keep both sides balanced at every step.

Change the subject — twice 2.1.17

- Collect all terms with the new subject on one side.
- Move every other term to the other side.
- Factorise out the subject, then divide.

Brackets & fractions 2.1.16

- Multiply through to clear any fractions first.
- Expand brackets only if it helps isolate the subject.
- Simplify the final fraction where possible.

Powers, roots & sign care 2.1.16

- Square to undo a root; root to undo a square.
- $\sqrt{x^2} = |x|$ — consider $\pm$ where context allows.
- Check by substituting a sample value back in.

Crib sheet »

Rearranging formulae in one page

Quick-reference notes — revisit before each question. Don't use during the questions.

What "subject" means

The *subject* of a formula is the letter on its own on one side of $=$.

In $y = 3x + 4$, the subject is y. To make x the subject, isolate x on one side.

Inverse operations — one each side

Treat the formula like a balance: whatever you do to one side, do to the other.

$y = 3x + 4 \Rightarrow y - 4 = 3x \Rightarrow \dfrac{y-4}{3} = x.$

Unwind the order

Reverse BIDMAS: undo the *last* operation first, then the next.

$y = 2x - 5$: undo -5 first ($+5$ to both sides), then undo $\times 2$ ($\div 2$).

Subject appears once

Straightforward: just unwind operation by operation.

$v = u + at$ — make a the subject:

$v - u = at \Rightarrow a = \dfrac{v-u}{t}.$

Subject appears twice — collect & factorise

$$\text{collect} \rightarrow \text{factorise} \rightarrow \text{divide}$$

$ax + b = cx + d$: $ax - cx = d - b$, then

$x(a-c) = d - b$, so $x = \dfrac{d-b}{a-c}.$

Worked example — with brackets

$y = \dfrac{2x+3}{x-1}$, make x the subject.

$y(x-1) = 2x + 3 \Rightarrow yx - y = 2x + 3 \Rightarrow yx - 2x = y + 3.$

$x(y-2) = y + 3 \Rightarrow x = \dfrac{y+3}{y-2}.$

Powers & roots

To undo a square, take the (positive) square root: $A = \pi r^2 \Rightarrow r = \sqrt{\dfrac{A}{\pi}}.$

To undo a square root, square both sides.

Watch the $\pm$ when both signs are valid.

Common traps

- Forgetting to factorise when the new subject appears twice.
- Dividing one term but not the other: $y = 2x + 4 \Rightarrow x = \dfrac{y-4}{2}$, not $\dfrac{y}{2} - 4$.
- Sign errors when moving terms across.

Examiner only

4. *(a)* Make m the subject of the formula $y = 6m + 7$. [2]

(b) Factorise $6x^2 - 12x$. [2]

5. Find, in standard form, the value of each of the following.

(a) $\dfrac{7{\cdot}5 \times 10^6}{5000}$ [2]

(b) $(2{\cdot}3 \times 10^3) + (6{\cdot}4 \times 10^4)$ [2]

Examiner only

13. Make x the subject of the following formula. [4]

$$a(x - b) = x(c - d)$$

Examiner only

12. Make c the subject of the following formula.
Give your answer in its simplest form. [5]

$$c - 5 = \frac{3c - 7}{d}$$

Examiner only

6. *(a)* Rearrange the following formula to make x the subject.
Give your answer in its simplest form. [3]

$$2(x + y) = 7y - 3$$

(b) Write down the nth term of the following sequence. [2]

3, 6, 11, 18, 27, …

Examiner only

18. Make c the subject of the following formula. [4]

$$\sqrt{gc^2 - v} = c$$

Examiner only

1. *(a)* Expand $3x(x^2 - 2)$. [2]

(b) Make g the subject of the formula $f = 2 - 3g$. [2]

(c) (i) Solve $7x - 3 < 29$. [2]

(ii) What is the greatest integer value of x that satisfies the above inequality? [1]

Examiner only

13. Rearrange the following formula to make c the subject.

$$\frac{6c-3d}{c+2}=g$$ [4]

Examiner only

1. *(a)* Write down the nth term of the following sequence. [2]

8, 11, 14, 17, ...

(b) Make t the subject of the formula $r = 3t - 8$. [2]

(c) A rectangle has a length of $(x + 5)$ cm and a width of $(2x - 3)$ cm.
Its perimeter is 46 cm.

Calculate the value of x. [4]

Examiner only

11. Rearrange the following formula to make x the subject. [3]

$$cx - 3 = 4x + d$$

Examiner only

15. Make a the subject of the following formula. [5]

$$\frac{2a^2 - b}{a^2 b} = 1$$

Examiner only

16. Make y the subject of the following formula. [4]

$$2y = \sqrt{3 + my^2}$$

Examiner only

5. *(a)* Rearrange the following formula to make k the subject.

$$p = 3k + 2$$ [2]

(b) Does the midpoint of the straight line joining points (3, 15) and (7, 19) lie on the line $y = 3x + 2$?
You must show all your working. [3]

6. *(a)* Express 0·0058 in standard form. [1]

(b) Calculate the value of $\dfrac{1{\cdot}4 \times 10^9}{2 \times 10^3}$.
Give your answer in standard form. [2]

Examiner only

12. Rearrange the following formula to make w the subject.

$$xw + 4 = 3y - 8w$$ [3]

Examiner only

2. (a) Make m the subject of the formula $w = 8m - 3$. [2]

(b) Expand and simplify $(y + 5)(y - 4)$. [2]

3. The height of a cylinder is 24·8 cm.
The ratio of the **diameter** of the cylinder to the height of the cylinder is 3 : 2.

Find the volume of the cylinder.
Give your answer correct to 2 significant figures.
You must show all your working. [5]

Examiner only

10. Rearrange the following formula to make x the subject.

$$5x + 4 = t - yx$$

You must show all your working. [3]

Examiner only

19. Make c the subject of the following formula. [5]

$$a\left(b+c^2\right)+d\left(e-c^2\right)=f$$

20. The diagram shows a triangle *ABC* and a circle with centre *C*.
The points *B* and *D* lie on the circumference of the circle.

The length of the line *AB* is 19 cm.
The length of the line *AC* is 29 cm.
The radius of the circle is x cm.

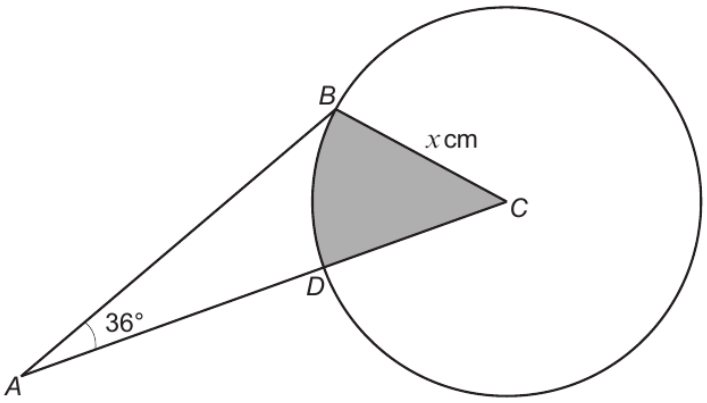

Diagram not drawn to scale

Examiner only

Calculate the area of the shaded sector *BCD*. [8]

END OF PAPER

Examiner only

1. (a) Solve the equation $7+5(x-2)=3x+8$. [3]

(b) Make f the subject of the formula $h=13-2f$. [2]

(c) Factorise $15x-35y$. [1]

Examiner only

(b) In a shape **similar** to the one shown on the previous page, the regular pentagon has sides of length 671 cm.

Complete the following statement.

Total area of new shape = ... × total area of original shape

You must show all your working. [2]

11. Make x the subject of the formula $ax^2 + x^2 = b$. [3]

Examiner only

17. If n is an integer, prove that $(2n-1)^2+7$ is always a multiple of 4.
You must use an algebraic method. [3]

18. Make t the subject of the following formula. [4]

$$\sqrt[3]{ct^3-9}=t$$

Examiner only

16. (a) Simplify $\dfrac{4y^2+8xy}{y^2-4x^2}$. [4]

(b) Make f the subject of the following formula. [5]

$$\sqrt{hf^2-m}=3f$$

Examiner only

7. Isaac and his sister Mari are both going to open savings accounts.

(a) Isaac decides to invest some of his savings in the Hereford Saver account.
Details of the account are shown below.

Hereford Saver account

Monthly interest rate 0·26%

Calculate the AER that the Hereford Saver account offers.
Give your answer as a percentage. [2]

Examiner only

(b) Mari invests £3000 in the Silver Plus savings account.
Details of the account are shown below.

Account name	Nominal annual rate	Interest paid
Silver Plus	2·48%	Quarterly

Mari does not withdraw any money or make any further payments into the account.
Mari closes the account after 10 years.

Calculate the percentage increase in the value of her investment.
You must show all your working. [5]

Examiner only

19. Make d the subject of the following formula. [5]

$$\sqrt{\frac{3d}{d+g}} = h$$