

Formulae and rearranging

Pearson Edexcel GCSE Mathematics 1MA1

L021 • Foundation and Higher

60 minute lesson | learner resources

The goal and the evidence

Connect & Check → Share → Present → Apply → Recall & Review

Substitute into formulae and change the subject by inverse operations. State necessary restrictions and check with values.

Explain, apply and check independently.

Starting-point diagnostic

R1–R3 • Attempt without notes

Solve $3x+4=19$.

Evaluate $2a+3$ for $a=4$.

Expand $2(x+5)$.

Worked example and your turn

D1 • Explain each step

Model: $y = x + 5$ becomes $x = y - 5$. Now make a the subject of $b = a - 7$.

Try the paired problem; check independently.

Worked example and your turn

D2 • Explain each step

Model: $y=3x+4$ becomes $x=(y-4)/3$. Now make n the subject of $C=5n+2$.

Try the paired problem; check independently.

Worked example and your turn

D3 • Explain each step

Model: $P=2l+2w$ becomes $l=(P-2w)/2$. Now make w the subject.

Try the paired problem; check independently.

Worked example and your turn

D4 • Explain each step

Model: $v = d/t$ becomes $d = vt$ by multiplying by t . Now make t the subject, for $v \neq 0$.

Try the paired problem; check independently.

A method you can explain

Name what changes at each step.

Check against the original question.

Diagnostic pause

Choose and explain before moving on.

Make x the subject of $y=3x+4$: A $y-4/3$, B $(y-4)/3$, C $(y+4)/3$.

Use your explanation to decide the next step.

Careful variation

A1 • Show your reasoning

Make x the subject: $y=2x+3$; $y=2(x+3)$; $y=x/2+3$.
Explain the different order of inverses.

Explain your decisions and check the result.

Independent application

A2 • Show your reasoning

Make h the subject of $A = bh/2$ for $b \neq 0$. Use $A = 30, b = 5$ to find h .

Explain your decisions and check the result.

Use the method in context

A3 • Show your reasoning

A taxi costs C pounds for d km, with $C=4+3d$.
Rearrange for d , then find d when $C=25$.

Explain your decisions and check the result.

Intentional practice feedback

Read after attempting A3

$$d = (C - 4) / 3; 7 \text{ km.}$$

Correct one step and explain the change.

A claim to test

C1 • Show your reasoning

Are $(P - 2w)/2$ and $P/2 - w$ equivalent? Justify without relying on one example.

Explain your decisions and check the result.

Deepen the reasoning

C2 • Show your reasoning

A learner rearranges $y=3x+4$ as $x=y/3-4$. Find a counterexample and repair it.

Explain your decisions and check the result.

Retrieval without notes

Q1–Q3 • Give numeric answers

x when $y=3x+4$ and $y=19$

h when $A=bh/2$, $A=30$, $b=5$

w when $P=2l+2w$, $P=30$, $l=9$

Retrieval without notes

Q4–Q6 • Give numeric answers

t when $d=120, v=40$ in $d=vt$

d when $C=4+3d$ and $C=25$

Solve $2x+5=13$

Independent exit evidence

P1 • Without notes • Teacher review

Make x the subject of $y=4x-3$. Show a balanced step. [2]

Show working and check your answer.

Independent exit evidence

P2 • Without notes • Teacher review

Make h the subject of $A = bh/2$ for $b \neq 0$. [2]

Show working and check your answer.

Feedback and next steps

P3 • Completion is not mastery

Explain one error you have corrected.

Set a fresh question and a delayed check.

Before the next lesson

L022: Inequalities and number lines

Complete F1 tomorrow without notes.

Attempt F2 and bring one question.

When the subject occurs twice

Higher alternative • Worked example • 3 min

$$y = ax + cx + d \rightarrow y - d = x(a + c)$$

$$\mathbf{x = (y - d)/(a + c), \text{ with } a + c \neq 0}$$

Factorise before dividing

Higher alternative • H1–H2 • 3 min

$$y = 4x + kx \rightarrow y = x(4 + k)$$

Make t the subject: $v = at + bt + 2$.

Independent Higher evidence

HX1 • 2 marks • 2 min

Make x the subject: $p = 5x + rx$.

State when your division is valid.

Independent Higher evidence

HX2 • 2 marks • 2 min

$y = 3x + kx$. A learner writes $x = y/3 + k$.

Explain the error; correct the formula.

Optional stretch

Rearrange $A = \pi r^2$ for positive r , then find r when $A = 49\pi \text{ cm}^2$.

Show a method. Explain a check or counterexample.

Optional deep challenge

Rearrange $v = u + at$ for t and identify when the rearrangement is invalid.

Show a method. Explain a check or counterexample.

L021 Recall & Review

Formulae and rearranging



Fresh evidence: prove the objective

Solve a new question without prompts. Explain one check, then correct one error in your working.

Objective: Substitute into formulae and change the subject by inverse operations. State necessary restrictions and check with values.

Write the next practice step before you leave. It must test the method again, not simply copy today's example.

Feedback language

Use the full phrases before the abbreviations.

What Went Well (WWW)

I represented the algebraic structure accurately, kept each transformation valid and checked the result by substitution, graph or equivalent reasoning.

Identify the mathematical method, representation, reasoning or check that improved.

Even Better If (EBI)

I will show the missing inverse operation or algebraic step, keep signs and brackets accurate and test the result in the original relationship.

Set one precise next-step action and test it on a fresh question.

Extension route

Choose this route only after the core evidence is secure.

Stretch

Rearrange $A = \pi r^2$ for positive r , then find r when $A = 49\pi \text{ cm}^2$.

Deep challenge

Rearrange $v = u + at$ for t and identify when the rearrangement is invalid.

Explain your reasoning clearly enough that another learner could check it.