

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic – Mark Scheme

Algebra

Simplifying expressions using index laws

v1.0

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. e.g. accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
3.14...	Allow answers which begin 3.14 e.g. 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Q1.

$3cd$ or $3dc$

B1 3 or cd or dc

B2

Additional Guidance

cd^3

B1

Use of multiplication signs is max B1

eg $3 \times cd$

B1

eg $c \times d$

B0

$6\frac{1}{2}cd$

B1

$\frac{1}{2}c6d$

B0

$\frac{1}{2}c3d$

B0

[2]

Q2.

Not correct for Add 3 and 5

and

Correct for Add 2 and 7 B1

B1

Additional Guidance

Accept any clear indication of their answer

[1]

Q3.

a^{15}

B1

[1]

Q4.

$16x^4$

B1

[1]

Q5.

$16a^{10}$

B1

[1]

Q6.

$22a$

B1

[1]

Q7.

$$7^{2n} \rightarrow x^2$$

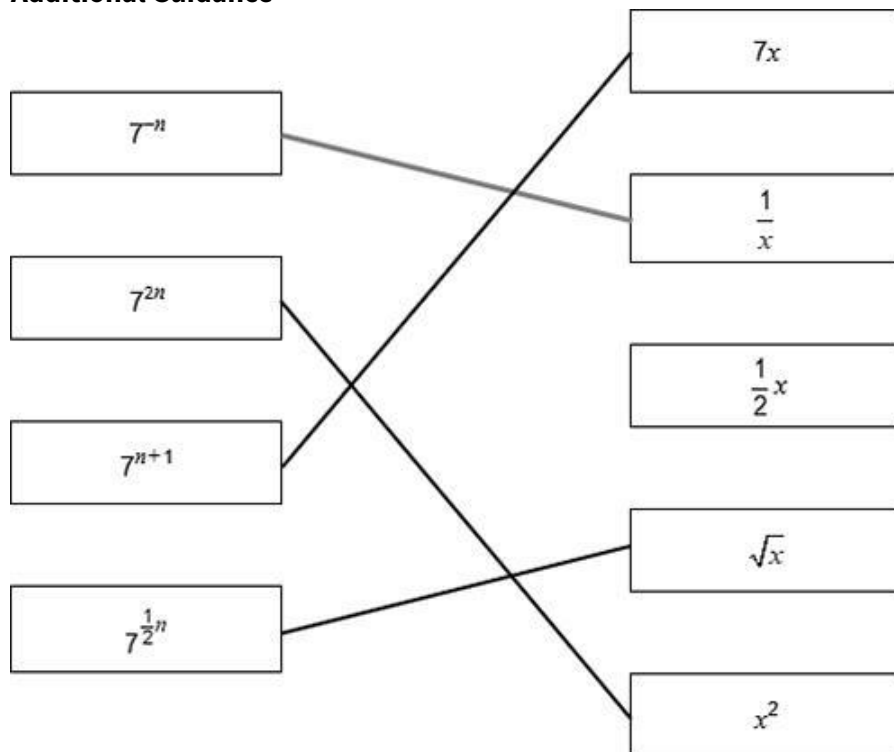
$$7^{n+1} \rightarrow 7x$$

$$7^{\frac{1}{2}n} \rightarrow \sqrt{x}$$

B1 each correct match

B3

Additional Guidance



B3

Two lines from a box on the left is incorrect for that box

[3]

Q8.

$$10w$$

B1

Additional Guidance

$$10 \times w \text{ or } w \times 10 \text{ or } w10$$

B0

[1]

Q9.

$$5$$

B1 correct partial simplification eg $\frac{20}{4}$ or $\frac{5}{1}$ or $\frac{10w}{2w}$ or $\frac{5w}{w}$

SC1 5w

B2

Additional Guidance

Correct partial simplification followed by incorrect further work

eg $\frac{10w}{2w}$, Answer 8w

B1

Correct answer followed by further work

B1

[2]

Q10.

$$2$$

B1

Additional Guidance

$$\frac{2}{1} \text{ or } 2 \div 1$$

B0

[1]

Q11.

$$y^3$$

B1

Additional Guidance

$$y^2 \times y \text{ or } y \times y^2$$

B0

[1]

Q12.

$$p^3$$

B1

Additional Guidance

$$\text{Accept } 1p^3$$

[1]

Q13.

$$x^3y \text{ or } yx^3$$

B1

$$5xy^3 \text{ or } 5y^3x$$

B1

$$5x^2y^2 \text{ or } 5y^2x^2$$

B1

Additional Guidance

Mark the answer lines unless blank

Do not allow transcription errors

[3]

Q14.

$$2t$$

B1

Additional Guidance

Allow 2T

B1

$$2 \times t = 2t$$

B1

$$2 \times t$$

B0

$$2^t$$

B0

$$\frac{2t}{1} \text{ or } \frac{2}{1}t$$

B0

[1]

Q15.

All 3 correct

B1 for each box in Column P correctly matched

B3

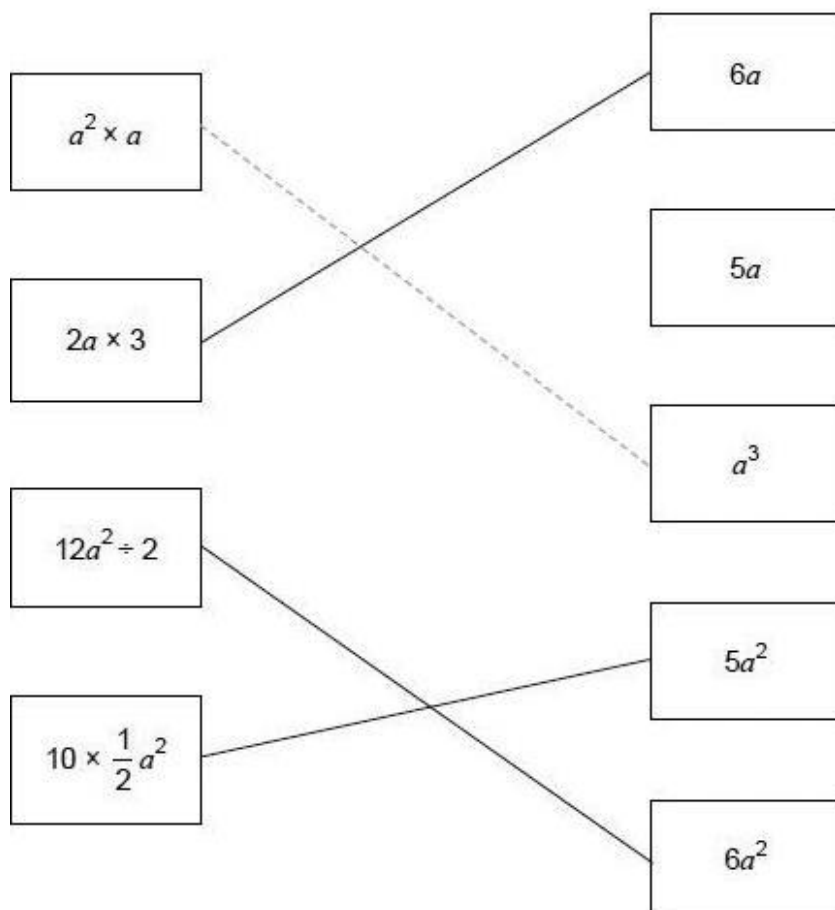
Additional Guidance

Connections do not have to be straight lines

Two or more lines from a box in Column P is choice so is incorrect for that box

Column P

Column Q



B3

[3]

Q16.

8c

B1

[1]

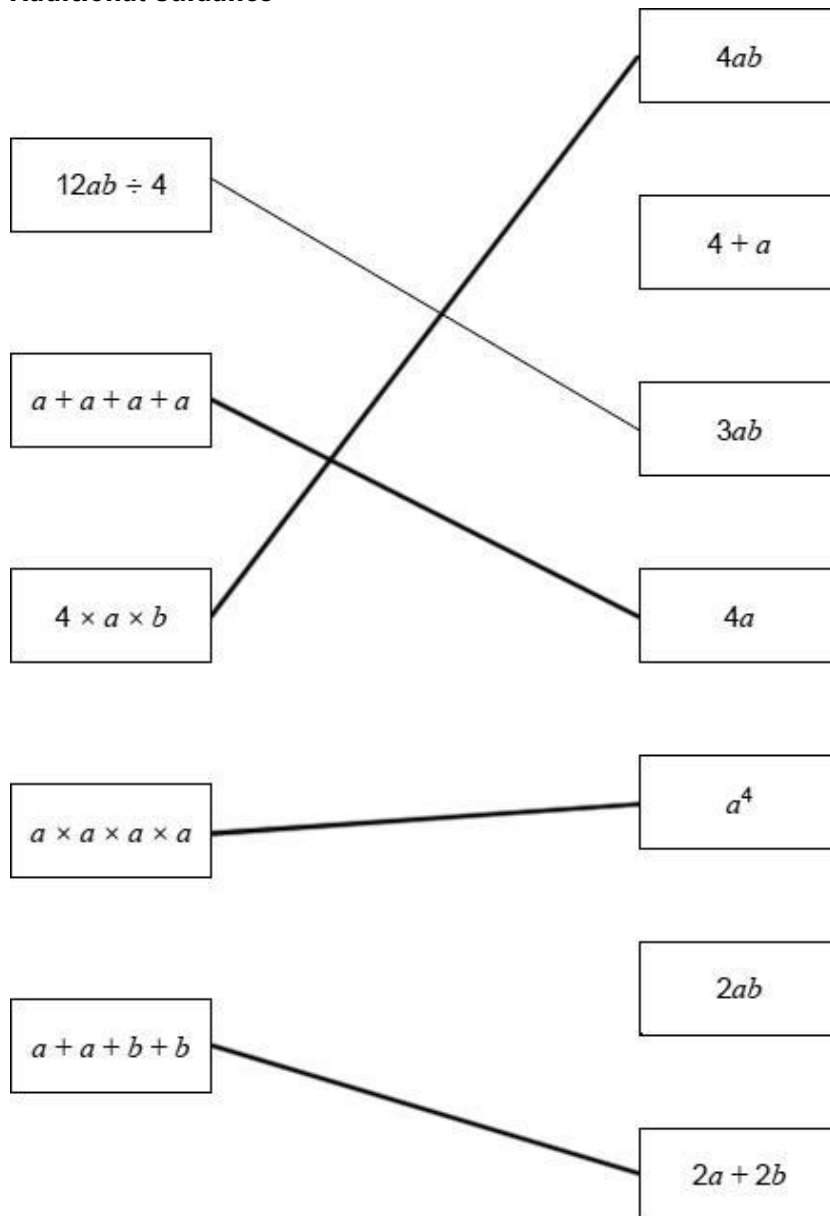
Q17.

All 4 correct matches

B1 for each correct match

B4

Additional Guidance



B4

Two different matches from left hand column is choice for that box
Accept any unambiguous indication

[4]

Q18.

W

B1

[1]

Q19.

Alternative method 1 – answer written as a fraction

a^2 on numerator

B1

a correctly simplified

b^3 on denominator

or b^{-3} on numerator

b correctly simplified

B1

c cancelled

and

d on denominator or d^{-1} on numerator

d correctly simplified

B1

Alternative method 2 – answer written only as a product

a^2

a correctly simplified

B1

b^{-3}

b correctly simplified

B1

d^{-1} and c cancelled

d correctly simplified

B1

Additional Guidance

If answer line is blank, marks can be awarded in the working

Do not award any marks if addition or subtraction is seen in their best attempt

Condone use of capital letters

Penalise use of $\times$ sign by one mark only if full marks would have been awarded e.g.

$a^2 \times b^{-3} \times d^{-1}$

B1B1

$$\frac{a^2}{db^3} \text{ or } \frac{a^2 d^{-1}}{b^3} \text{ or } \frac{a^2 b^{-3}}{d} \text{ or } a^2 b^{-3} d^{-1}$$

B1B1B1

$$\frac{a^2 b^2}{db^5} \text{ or } \frac{a^2 b^2 d^{-1}}{b^5} \text{ or } a^2 b^2 d^{-1} b^{-5}$$

B1B0B1

$$\frac{a^3}{dab^3}$$

B0B1B1

$$\frac{a^2 c}{cdb^3}$$

B1B1B0

$$\frac{a}{d} \times b^3$$

use of $\times$ sign not penalised as full marks would not be awarded

B0B0B1

$$a^2 + b^{-3} - d^{-1}$$

B0B0B0

[3]

Q20.

$$\frac{9}{25x}$$

B1

[1]

Q21.

$$a = 2$$

May be embedded

B1

$$b = 5$$

May be embedded

B1

Additional Guidance

$$(2r^5)^4$$

B1B1

$$(r^5)^4$$

B1

$2^4 = 16$ on its own is not enough

B0

$$a = 5 \text{ and } b = 2$$

B0B0

[2]