

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic

Algebra

Simplifying expressions using index laws

v1.0

Name _____

Materials

For this paper you must have:

- Mathematical instruments

Information

- The marks for questions are shown in brackets

Advice

- In all calculations, show clearly how you work out your answer

For questions 1 to 6 you must **NOT** use a calculator.



Q1. Simplify $\frac{1}{2}c \times 6d$ fully

(Total 2 marks)

Q2. Lucy wants to simplify $3p^2 \times 5p^7$
She says,
“Add 3 and 5, then add 2 and 7”
Her answer is $8p^9$
Copy a box for each part of her method.

	Correct	Not correct
Add 3 and 5	☐	☐
Add 2 and 7	☐	☐

(Total 1 mark)

Questions 3 to 7 are **higher** tier only

Q3. Simplify $(a^5)^3$

Which of these is the answer?

$8a$

$15a$

a^8

a^{15}

(Total 1 mark)

Q4. Which expression is equivalent to $(2x)^4$

$2x^4$

$6x^4$

$8x^4$

$16x^4$

(Total 1 mark)

Q5. Which expression is equivalent to $(4a^5)^2$

$16a^{10}$

$16a^7$

$8a^{10}$

$8a^7$

(Total 1 mark)

Q6. Simplify $16a^2 \div a + 3a \times 2$

Which of these is the answer?

$22a$

$8a$

$38a$

$2a$

(Total 1 mark)

Q7.

$$7^n = x$$

Match each expression on the left to the correct expression on the right.
One has been done for you.

$$7^n$$

$$7^{2n}$$

$$7^{n+1}$$

$$7^{\frac{1}{2}n}$$

$$7x$$

$$\frac{1}{x}$$

$$\frac{1}{2}x$$

$$\sqrt{x}$$

$$x^2$$

(Total 3 marks)

For the rest of the questions, you **may** use a calculator.



Q8.

Simplify fully $5 \times 2w$

(Total 1 mark)

Q9.

Simplify fully $\frac{20w}{4w}$

(Total 2 marks)

Q10.

Simplify fully $2m \div m$

(Total 1 mark)

Q11.

Simplify fully $y \times y \times y$

(Total 1 mark)

Q12.

Simplify fully $p^2 \times p$

(Total 1 mark)

Q13.

Here are three terms.

xy

x^2

$5y^2$

Alec multiplies two of these terms.

Work out the **three** possible fully simplified answers.

(Total 3 marks)

Q14.

Simplify fully $\frac{1}{3} \times 6t$

(Total 1 mark)

Q15.

Match each expression in Column P with the equivalent expression in Column Q.
One has been done for you.

Column P

Column Q

$a^2 \times a$

$2a \times 3$

$12a^2 \div 2$

$10 \times \frac{1}{2}a^2$

$6a$

$5a$

a^3

$5a^2$

$6a^2$

(Total 3 marks)

Q16.

Simplify $4 \times 2c$

Which of these is the answer?

$42c$

$16c$

$8c$

$6c$

(Total 1 mark)

Q17.

Match each expression on the left with one on the right.
One has been done for you.

		$4ab$
$12ab \div 4$		$4 + a$
$a + a + a + a$		$3ab$
$4 \times a \times b$		$4a$
$a \times a \times a \times a$		a^4
$a + a + b + b$		$2ab$
		$2a + 2b$

(Total 4 marks)

Questions 18 to 21 are **higher** tier only

Q18.

Simplify $w^1 \times w^0$

Which of these is the answer?

1

0

w

w^2

(Total 1 mark)

Q19.

Simplify fully $\frac{a^3b^2}{cd} \times \frac{c}{ab^5}$

(Total 3 marks)

Q20.

$$w = \frac{3}{5\sqrt{x}}$$

Which of these is the expression for w^2 ?

$$\frac{6}{10x^2}$$

$$\frac{9}{25x^2}$$

$$\frac{6}{10x}$$

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

(Total 1 mark)

Q21.

$$(a^r b^s)^4 = 16r^{20} \text{ where } a \text{ and } b \text{ are positive integers.}$$

Work out a and b

(Total 2 marks)