Multiplying and dividing indices - Worksheet

Skill

Group A - Multiplying indices

Simplify:

1) $a^2 \times a^5$

2) $a^5 \times a^2$

3) $a^5 \times a^{-2}$

4) $a^{-5} \times a^2$

5) $a^{-5} \times a^{-2}$

6) $a^2 \times a^5 \times a$

7) $3a^2 \times a^5$

8) $3a^2 \times 6a^5$

9) $a^2 \times 6a^5$

10) $6a^5 \times 3a^{-2}$

11) $3a^2 \times a^5 \times 6a$

12) $3a^2b \times 6a^5b \times a$

Group B - Dividing indices

Simplify:

1) $a^5 \div a^2$

2) $a^2 \div a^5$

3) $a^5 \div a^{-2}$

4) $a^{-5} \div a^2$

5) $a^{-5} \div a^{-2}$

6) $\frac{a^5}{a}$

7) $3a^5 \div a^2$

8) $\frac{6a^5}{3a^2}$

9) $\frac{a^2}{6a^5}$

10) $\frac{6a^5}{6a^{-2}}$

11) $\frac{3a^2b^3}{6ab}$

12) $\frac{a^5}{a^2b}$

Group C - Complex multiplying and dividing indices

Simplify:

1) $\frac{x^9 \times x^7}{x^8}$

2) $\frac{x^9 \times x^{-7}}{x^8}$

3) $\frac{x^{-9} \times x^{-7}}{x^{-8}}$

4) $\frac{48x^5}{8x^9}$

5) $\frac{64x^{-5}}{8x^9}$

6) $\frac{63x^{-5}}{7x^{-9}}$

7) $\left(x^9 \times x^3\right) \div x^5$

8) $\left(x^9 \times x^{-3}\right) \div x^5$

9) $\left(x^9 \times x^{-3}\right) \div x^{-5}$

10) $\left(x^{-9} \times x^{-3}\right) \div x^{-5}$

11) $\left(x^9 \times x^3\right) \div \left(x^5 \times x^{13}\right)$

12) $\left(x^9 \times x^{-3}\right) \div \left(x^{-5} \times x^{13}\right)$

Multiplying and dividing indices - Worksheet

Applied

1) **(a)** Here is an expression: $2b^5 \times 3b^2$

Jan thinks the solution is $6b^{10}$

Jan is wrong.
What is the mistake that she made?

(b) Write down the correct solution

2) **(a)** Does $4d^0$ and $(4d)^0$ have the same result?
Explain your reason.

(b) Simplify $2e^4 \times 3e^{-4}$

3) **(a)** Syra says that these two expressions are equal.

$f^9 \times f^2 \div f^3$ and $\frac{f^9 \times f^2}{f^3}$

Is she correct? Explain your reason.

(b) Simplify these expressions.

Multiplying and dividing indices - Exam Questions

1) **(a)** Simplify $\frac{4y^4}{y^{-5}}$

.....

(1)

(b) Simplify $5uw^3 \times 3u^4w$

.....

(2)

(3 marks)

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2) **(a)** Simplify $6y \times 4y$

.....

(1)

(b) Simplify $\frac{d^7}{d^2}$

.....

(1)

(2 marks)

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3) **(a)** Simplify $\frac{x^4 \times x^{-2}}{x^6}$

.....

(2)

(b) Simplify $\frac{63x^5y^2}{7x^9y}$

.....

(2)

(4 marks)

Multiplying and dividing indices - Exam Questions

4) Donte is asked to work out the value of this calculation.
$10^3 \times 10^2$. He writes down 1 000 000 as his answer.
He is wrong.

Identify his mistake.

.....

(1 mark)

Multiplying and dividing indices - Answers

	Question	Answer
	Skill Questions	
Group A	Simplify: **1)** $a^2 \times a^5$ **2)** $a^5 \times a^2$ **3)** $a^5 \times a^{-2}$ **4)** $a^{-5} \times a^2$ **5)** $a^{-5} \times a^{-2}$ **6)** $a^2 \times a^5 \times a$ **7)** $3a^2 \times a^5$ **8)** $3a^2 \times 6a^5$ **9)** $a^2 \times 6a^5$ **10)** $6a^5 \times 3a^{-2}$ **11)** $3a^2 \times a^5 \times 6a$ **12)** $3a^2b \times 6a^5b \times a$	**1)** a^7 **2)** a^7 **3)** a^3 **4)** a^{-3} **5)** a^{-7} **6)** a^8 **7)** $3a^7$ **8)** $18a^7$ **9)** $6a^7$ **10)** $18a^3$ **11)** $18a^8$ **12)** $18a^8b^2$

Multiplying and dividing indices - Answers

Group B	Simplify:	
	1) $a^5 \div a^2$	1) a^3
	2) $a^2 \div a^5$	2) a^{-3}
	3) $a^5 \div a^{-2}$	3) a^7
	4) $a^{-5} \div a^2$	4) a^{-7}
	5) $a^{-5} \div a^{-2}$	5) a^{-3}
	6) $\frac{a^5}{a}$	6) a^4
	7) $3a^5 \div a^2$	7) $3a^3$
	8) $\frac{6a^5}{3a^2}$	8) $2a^3$
	9) $\frac{a^2}{6a^5}$	9) $\frac{1}{6a^3}$
	10) $\frac{6a^5}{6a^{-2}}$	10) a^7
	11) $\frac{3a^2b^3}{6ab}$	11) $\frac{ab^2}{2}$
	12) $\frac{a^5}{a^2b}$	12) $\frac{a^3}{b}$

Multiplying and dividing indices - Answers

Group C	Simplify	
	1) $\frac{x^9 \times x^7}{x^8}$	**1)** x^8
	2) $\frac{x^9 \times x^{-7}}{x^8}$	**2)** x^{-6}
	3) $\frac{x^{-9} \times x^{-7}}{x^{-8}}$	**3)** x^{-8}
	4) $\frac{48x^5}{8x^9}$	**4)** $6x^{-4}$
	5) $\frac{64x^{-5}}{8x^9}$	**5)** $8x^{-14}$
	6) $\frac{63x^{-5}}{7x^{-9}}$	**6)** $9x^4$
	7) $\left(x^9 \times x^3\right) \div x^5$	**7)** x^7
	8) $\left(x^9 \times x^{-3}\right) \div x^5$	**8)** x^1 or x
	9) $\left(x^9 \times x^{-3}\right) \div x^{-5}$	**9)** x^{11}
	10) $\left(x^{-9} \times x^{-3}\right) \div x^{-5}$	**10)** x^{-7}
	11) $\left(x^9 \times x^3\right) \div \left(x^5 \times x^{13}\right)$	**11)** x^{-6}
	12) $\left(x^9 \times x^{-3}\right) \div \left(x^{-5} \times x^{13}\right)$	**12)** x^{-2}

Multiplying and dividing indices - Answers

	Question	Answer
	Applied Questions	
1)	**a)** Here is an expression: $2b^5 \times 3b^2$. Jan thinks the solution is $6b^{10}$. Jan is wrong. What is the mistake that she made? **b)** Write down the correct solution.	**a)** Jan has multiplied the indices instead of adding them. **b)** $6b^7$
2)	**a)** Does $4d^0$ and $(4d)^0$ have the same result? Explain your reason. **b)** Simplify $2e^4 \times 3e^{-4}$	**a)** No because $4d^0 = 4 \times d^0$ which is equal to $4 \times 1 = 4$. $(4d)^0 = 1$ **b)** 6 because $6e^0 = 6 \times 1$
3)	**a)** Syra says that these two expressions are equal. $f^9 \times f^2 \div f^3$ and $\frac{f^9 \times f^2}{f^3}$ Is she correct? Explain your reason. **b)** Simplify these expressions.	**a)** When applying the order of operations, multiplication and division are of equal priority so you will carry out the calculation in the order that it is written. In the second fraction, you need to simplify the numerator first then divide by the denominator, which is the same process. **b)** f^8

Multiplying and dividing indices - Mark Scheme

	Question	Answer	
	Exam Questions		
1) (a)	Simplify $\frac{4y^4}{y^{-5}}$	(a) $4y^9$	(1)
(b)	Simplify $5uw^3 \times 3u^4w$	(b) $15u^5$ **or** $15w^4$ **seen** $15u^5w^4$	(1) (1)
2) (a)	Simplify $6y \times 4y$	(a) $24y^2$	(1)
(b)	Simplify $\frac{d^7}{d^2}$	(b) d^5	(1)
3) (a)	Simplify $\frac{x^4 \times x^{-2}}{x^6}$	(a) $x^2 \div x^6$ **oe** x^{-4}	(1) (1)
(b)	Simplify $\frac{63x^5y^2}{7x^9y}$	(b) $9x^{-4}$ **or** $9y$ **seen** $9x^{-4}y$	(1) (1)
4)	Donte is asked to work out the value of this calculation: $10^3 \times 10^2$. He writes down 1 000 000 as his answer. He is wrong. Identify his mistake.	$1000 \times 100 = 100\,000$ $10^3 \times 10^2 = 10^5$ Donte has an extra zero in his number because he multiplied the indices **oe**	(1)