

## Investigating Multiplying Algebraic Powers

1. Complete the table to simplify these algebraic expressions.

Question	Working	Answer
$a^3 \times a^2$	$a \times a \times a \times a \times a$	$a^5$
$a^4 \times a^2$	$a \times a \times a \times a \times a \times a$	
$a^2 \times a^6$		
$a^3 \times a^4$		
$a^5 \times a^2$		

2. Can you spot a rule which enables you to simplify the expressions without the need for working?

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3. Use your rule to simplify the following algebraic expressions.

- (a)  $a^6 \times a^3$                       (b)  $x^2 \times x^5$   
(c)  $d^3 \times d^6$                       (d)  $y^{11} \times y^4$   
(e)  $a^3 \times b^3$                       (f)  $a^4 \times a^1$   
(g)  $c^{0.5} \times c^{1.5}$                       (h)  $f^9 \times f^{-2}$   
(i)  $p^{-1} \times p^5$                       (j)  $a^2 \times a^3 \times a^5$   
(k)  $x^4 \times x^0$                       (l)  $b^6 \times b^5 \times b^{-3}$

4. Now simplify these harder algebraic expressions.

- (a)  $2a^3 \times a^4$                       (b)  $3d^2 \times 2d^3$   
(c)  $4x^3 \times 5x^3$                       (d)  $2b^9 \times 5b^4$   
(e)  $3y^4 \times 3y^4$                       (f)  $5p^7 \times 3p^{-1}$   
(g)  $7x^1 \times 3x^{15}$                       (h)  $8q^2 \times 5q^{-2}$   
(i)  $6p^{2.5} \times 3p^{1.5}$                       (j)  $5a^6 \times 2a^5 \times 3a^4$

## Investigating Dividing Algebraic Powers

1. Complete the table to simplify these algebraic expressions.

Question	Working	Answer
$a^5 \div a^2$	$\frac{a \times a \times a \times a \times a}{a \times a}$	$a^3$
$a^4 \div a^2$	$\frac{a \times a \times a \times a}{a \times a}$	
$a^7 \div a^4$		
$a^8 \div a^3$		

2. Can you spot a rule which enables you to simplify the expressions without the need for working?

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3. Use your rule to simplify the following algebraic expressions.

(a)  $a^7 \div a^3$

(b)  $x^5 \div x^2$

(c)  $\frac{d^9}{d^3}$

(d)  $\frac{y^{13}}{y^4}$

(e)  $b^3 \div b^3$

(f)  $a^4 \div b^2$

(g)  $c^5 \div c^4$

(h)  $f^{2.5} \div f^{0.5}$

(i)  $p^{-1} \div p^5$

(j)  $a^7 \div a^{-2}$

4. Now simplify these harder algebraic expressions.

(a)  $10a^7 \div 5a^4$

(b)  $9d^6 \div 3d^2$

(c)  $\frac{25d^8}{5d^5}$

(d)  $\frac{28y^{11}}{4y^5}$

(e)  $27y^{15} \div 3y^8$

(f)  $10p^{3.5} \div 2p^{0.5}$

(g)  $16x^5 \div 4x^{-1}$

(h)  $40q^2 \div 5q^1$

## Investigating Algebraic Powers Raised to a Power

1. Complete the table to simplify these algebraic expressions.

Question	Working	Answer
$(a^3)^2$	$a^3 \times a^3$	$a^6$
$(a^5)^2$	$a^5 \times a^5$	
$(a^4)^2$		
$(a^2)^3$	$a^2 \times a^2 \times a^2$	
$(a^4)^3$		

2. Can you spot a rule which enables you to simplify the expressions without the need for working?

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3. Use your rule to simplify the following algebraic expressions.

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|-------------------|---------------------|
| (a) $(a^5)^2$     | (b) $(x^2)^4$       |
| (c) $(b^3)^6$     | (d) $(f^7)^2$       |
| (e) $(a^4)^3$     | (f) $(y^{11})^0$    |
| (g) $(x^1)^4$     | (h) $(a^{-5})^4$    |
| (i) $(b^{1.5})^2$ | (j) $(a^{-3})^{-2}$ |

4. Now complete the table to simplify these harder algebraic expressions.

Question	Working	Answer
$(2a^5)^2$	$2a^5 \times 2a^5$	
$(2a^4)^3$	$2a^4 \times 2a^4 \times 2a^4$	
$(3a^5)^3$		
$(2a^3)^4$		