

## Simplifying Multiplications

### Section 1 – Simplifying Products

Write each of these repeated multiplications using index notation.

- |                                             |                                                         |                                                                        |
|---------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------|
| a. $4 \times 4 \times 4$                    | g. $7 \cdot 8 \cdot 7 \cdot 7 \cdot 7$                  | l. $q \cdot r \cdot q \cdot r \cdot q \cdot r \cdot r$                 |
| b. $6 \times 6 \times 6 \times 6$           | h. $9 \cdot 10 \cdot 9 \cdot 8 \cdot 9 \cdot 9 \cdot 8$ | m. $mtmtmtmtmt$                                                        |
| c. $8 \cdot 8$                              | i. $p \cdot p \cdot p$                                  | n. $3 \cdot g \cdot g \cdot g \cdot g$                                 |
| d. $11 \cdot 11 \cdot 11 \cdot 11 \cdot 11$ | j. $r \times r \times r \times r \times r \times r$     | o. $4 \times y \times 4 \times 4 \times y \times 4 \times 4$           |
| e. $2 \cdot 2 \cdot 3 \cdot 3$              | k. $x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x$  | p. $x \cdot x \cdot x \cdot 7 \cdot 7 \cdot 7 \cdot x \cdot x \cdot x$ |
| f. $4 \cdot 5 \cdot 4 \cdot 5 \cdot 4$      |                                                         |                                                                        |

### Section 2 - Products of products

Fill in the blanks for this table

Product 1	Product 2	Full Multiplication	Simplified
$x^2$	$x^3$	$x \times x \times x \times x \times x$	
$y^3$	$y^4$		
$a^2b$	$b^2a$		
$2x$	$4x$		
$5x^2$			$10x^5$
$3t^2w$	$7t^2w^2$		
$4y^2x^3$			$20y^4x^4$
$(3x)^2$	$4x$		
$(3k)^2$	$(2k)^3$		

### Section 3 – Multiplication Grid

Fill in the blanks in this multiplication grid

$\times$		$2k$		$4w$
$6k$				
	$3w^2k^2$	$2k^3$		
			$15w^2k$	$12w^2$
		$18w^2k^3$		

### Section 4 – Comparing Simplifying Additions and Multiplications

Match up the expressions on the left with their equivalents on the right.

- |                                         |                  |
|-----------------------------------------|------------------|
| <b>a</b> $x + x + x$                    | <b>i</b> $4x$    |
| <b>b</b> $x \times x \times x$          | <b>ii</b> $x^2$  |
| <b>c</b> $x + x$                        | <b>iii</b> $x^3$ |
| <b>d</b> $x \times x$                   | <b>iv</b> $2x$   |
| <b>e</b> $x + x + x + x$                | <b>v</b> $x^4$   |
| <b>f</b> $x \times x \times x \times x$ | <b>vi</b> $3x$   |

Match up the expressions on the left with those that are equivalent on the right.

- |        |                       |
|--------|-----------------------|
| $9y^3$ | $y + y + y$           |
| $y^3$  | $3y \times 3y^2$      |
| $9y$   | $y \times y \times y$ |
| $3y$   | $3 \times 3y$         |
|        | $3y + 3y + 3y$        |

## Section 5 – Simplifying Additions and Multiplications

Simplify these expressions.

<b>a</b> $m \times 2m$	<b>b</b> $m + 2m$	<b>c</b> $a \times 2b$
<b>d</b> $a + 3a - 2a$	<b>e</b> $a \times 2a$	<b>f</b> $k \times 2k$
<b>g</b> $a + 2b + a$	<b>h</b> $8 \times 2x$	<b>i</b> $x^2 + x^2$
<b>j</b> $2x \times x \times x$	<b>k</b> $5m + 3m + 2m$	<b>l</b> $5m \times 3m \times 2m$
<b>m</b> $3ab + 2ab - ab$	<b>n</b> $ab \times ab$	<b>o</b> $a^2 \times b$
<b>p</b> $5x^2 \times 3y$	<b>q</b> $2y \times 2y \times 2y$	<b>r</b> $k + 3k + 4k + 2k$
<b>s</b> $k \times 3k \times 4k \times 2k$		

## Section 6 – Using the Order of Operations

1.	$5b + 3b \times 2$	2.	$5b + 2 \times 3b$
3.	$3b \times 2 + 5b$	4.	$3b \times 2 + 5$
5.	$5 + 3b \times 2$	6.	$5 + 2 \times 3b$
7.	$5 + 2b \times 3b$	8.	$5b + 2b \times 3b$
9.	$5b^2 + 2b \times 3b$	10.	$2b \times 3b - b^2$
11.	$5b^2 + 2b \times 3b - b^2$	12.	$2b \times 3b - b^2 + 5b^2$
13.	$2b \times 3b - b \times 5b$	14.	$2b \times 3b + b \times 5b$
15.	$5b^2 + 2 \times 3b - b^2$	16.	$5b^2 + 2 \times 3b - b$
17.	$5b^2 + 3b \times b - 2b^2$	18.	$2b \times 5b + 3b \times b$

## Section 7 – Sum Products

Fill in the missing expressions in the boxes.

