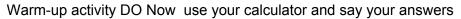
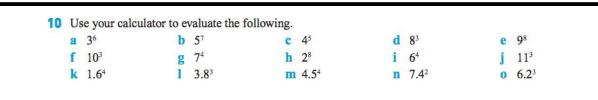
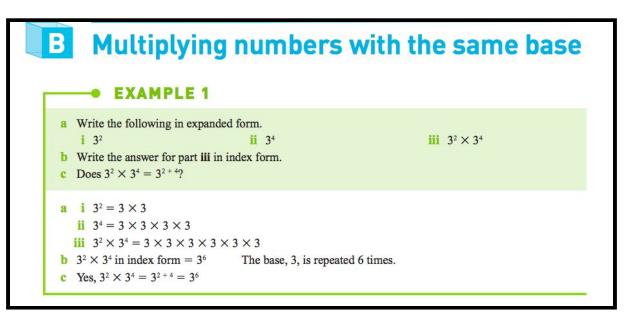
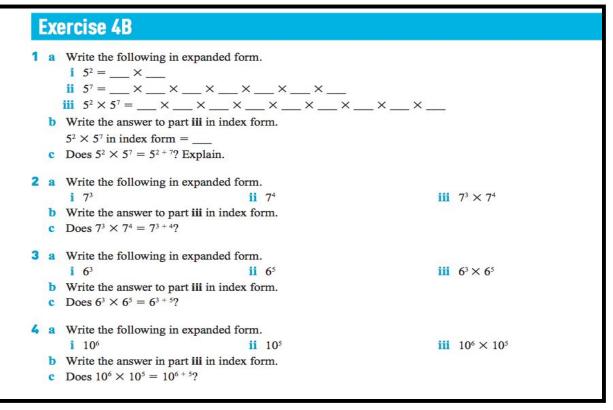
Multiplying numbers with exponents

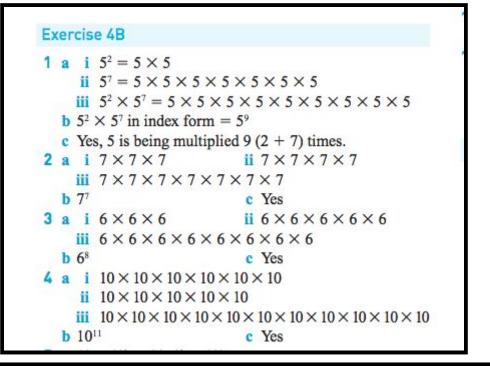






Discuss and then work in your books

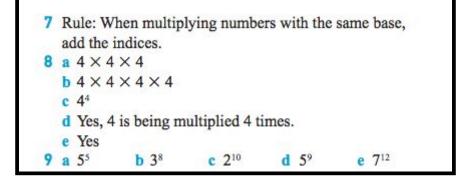




| Write the following in index form. | | |
|---|---------------------------|---------------------------|
| a $5^2 \times 5^4$ | b $2^3 \times 2^7$ | |
| a $5^2 \times 5^4$ | | |
| $5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 = 5^{2+4} = 5^6$ | | Count the number of 5s. 🌔 |
| b $2^3 \times 2^7$ | | |
| $2 \times 2 \times$ | $2 = 2^{3+7} = 2^{10}$ | Count the number of 2s. 🚺 |

| | | mplify the follo | - | | den loll | | 77 24 72 | 77+0 70 | | | |
|---|-----------------------------------|---|--|--|----------|---------------------------|----------|---|------------------|---|--|
| | | $8^4 \times 8^{10} = 8^{\square}$ $9^7 \times 9^3 = 9^{\square + 3}$ | | | | ~ | | $7^{7+\square} = 7^\square$ $= 5^{\square+\square} = 5^\square$ | | | |
| 6 | Si | mplify the follo | wing b | y writing in ine | dex for | m. | | | | | |
| | a | $3^{5} \times 3^{4}$ | b | $2^{7} \times 2^{5}$ | С | $7^2 \times 7^8$ | d | $5^{7} \times 5^{2}$ | e | $4^{10} \times 4^{6}$ | |
| | f | $6^9 \times 6^4$ | g | $10^{5} \times 10^{4}$ | h | $2^{10} \times 2^{10}$ | i | $5^{20} \times 5^{10}$ | j | $3^{11} \times 3^{7}$ | |
| | k | $3^{4} \times 3^{6}$ | 1 | $7^{5} \times 7^{8}$ | m | $2^4 \times 2^4$ | n | $8^9 \times 8^{12}$ | 0 | $3^{14} \times 3^{3}$ | |
| | Ca | an you see a rul | e emer | ging? Complete | e the to | llowing sta | atement. | | | | |
| | Ch W | an you see a rul noose from thes 'hen nu onstruct your ov | e word | s: base, add, in with the same | dices, n | nultiplying the | <u>.</u> | | Look at deter | question 6 to 1 mine the rule. | |
| | Ch W. Co | hoose from thes | e word mbers wn exai | s: base, add, in with the same _ mple to explain | dices, n | nultiplying the | <u>.</u> | | Look at deter | question 6 to mine the rule. | |
| | Ch W. Co a | hoose from thes hen num onstruct your ov | e word mbers wn exar panded | s: base, add, in with the same _ mple to explain form. | dices, n | nultiplying the | <u>.</u> | | Look at deter | question 6 to D | |
| 8 | Ch W Co a b | hoose from thes hen nu: onstruct your ov Write 4 ³ in exp | e word mbers wn exar panded n expa | s: base, add, in with the same _ mple to explain form. nded form. | dices, n | nultiplying the le. | <u>.</u> | | Look at deter | question 6 to D | |
| 8 | Ch W. Cc a b c | moose from thes then number of the n | e word mbers wn exar panded n expa swer fo | s: base, add, in with the same mple to explain form. nded form. or part b in inde | dices, n | nultiplying the le. | <u>.</u> | | Look at deter | question 6 to U | |
| 8 | Ch W Cc a b c d | moose from thes then number onstruct your ov Write 4^3 in exp Write $4^3 \times 4$ in Write your and | where words mbers $\frac{1}{2}$ where $\frac{1}{2}$ panded in expanded swer for $\frac{1}{2} \times 4^{1}$? | s: base, add, in with the same _ mple to explain form. nded form. or part b in inde Explain. | dices, n | nultiplying the le. | <u>.</u> | | Look at deter | question 6 to D | |
| 8 | Ch W C c d e | moose from these then number of the second | e word mbers vn exan panded n expa swer for 1×4^{1} ? e same | s: base, add, in with the same _ mple to explain form. nded form. or part b in inde Explain. as 4 ¹ ? | dices, n | nultiplying the le. | <u>.</u> | | Look at deter | question 6 to mine the rule. | |

| 1 | a | $15^2 = 5$ | × 5 | | | | |
|---|-----|-----------------------|---------------------------------|-------------|---------------------|--------------------|--------------------------|
| | | ii $5^7 = 5$ | $\times 5 \times 5 \times 5$ | × 5 | $\times 5 \times$ | 5 | |
| | i | ii $5^2 \times 5^7$ | $= 5 \times 5 \times 5$ | 5 × : | $5 \times 5 \times$ | 5×5 | $\times 5 \times 5$ |
| | | | index form = | | | | |
| | c ' | Yes, 5 is be | ing multiplie | d 9 (| (2 + 7) | times. | |
| 2 | | | ×7 | | | | 7 |
| | i | ii 7×7> | ×7×7×7 | ×7 | × 7 | | |
| | b | 77 | | c | Yes | | |
| 3 | a | i 6×6> | < 6 | ii | 6×6 | × 6 × | 6 × 6 |
| | i | ii 6×6> | < 6 × 6 × 6 | × 6 | ×6× | 6 | |
| | b | 5 ⁸ | | c | Yes | | |
| 4 | a | i 10×10 | $\times 10 \times 10 \times$ | 10> | < 10 | | |
| | | ii 10×10 | $\times 10 \times 10 \times$ | 10 | | | |
| | i | ii 10×10 | $\times 10 \times 10 \times 10$ | $10 \times$ | 10×10 | $\times 10 \times$ | $10 \times 10 \times 10$ |
| | b | 1011 | | c | Yes | | |
| 5 | a | $8^4 \times 8^{10} =$ | $8^{4+10} = 8^{14}$ | | | | |
| | b | $7^7 \times 7^2 = 7$ | $7^{7+2} = 7^9$ | | | | |
| | | 24444 | $9^{7+3} = 9^{10}$ | | | | |
| | | | $5^{6+11} = 5^{17}$ | | | | |
| 6 | | 39 | | | 710 | d | CT / |
| | | | | | 10 ⁹ | h | 2 ²⁰ |
| | i : | | | k | 310 | 1 | 713 |
| | m | 28 | n 8 ²¹ | 0 | 317 | | |

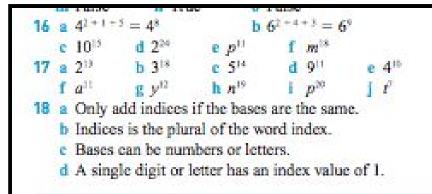


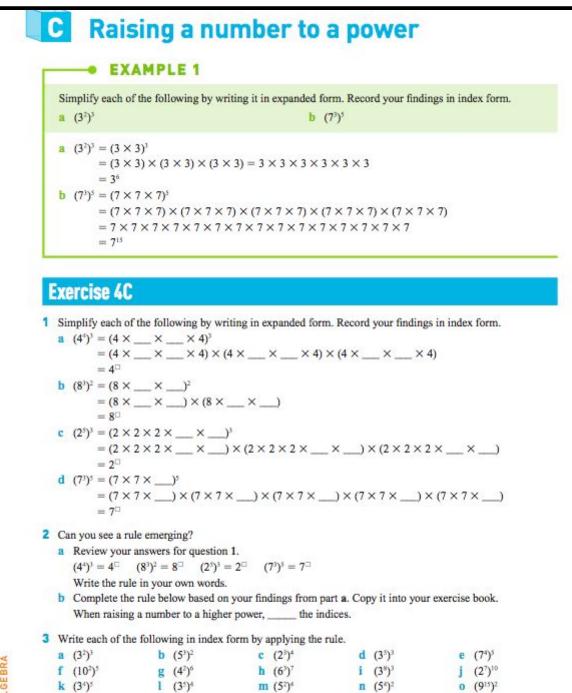
Now working with variables Day 2 21st April 2020

WALT: use indices rules for multiplication, division and raising powers **Success Criteria:** I know how to apply the rule when multiplying add the powers and when raising the powers then multiply powers inside the bracket.

Watch video on basics

| | Simplify the followin a $2^3 \times 2^5 \times 2^4$ | ng by writing in index for | m. b $3^5 \times 3^6 \times 3^3$ | Remember: You can add indices if the bases are the same. | | | | | |
|----|---|--|---|---|---|--|--|--|--|
| | a $2^3 \times 2^5 \times 2^4 = 2^3$ | $4+5+4 = 2^{12}$ | b $3^5 \times 3^6 \times 3^3 =$ | $3^{5+6+3} = 3^{14}$ | | | | | |
| 16 | | ng to write the answer in | | | | | | | |
| | | $\times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4$ | | | | | | | |
| | | ×6×6×6×6×6×6×6> | | | | | | | |
| | | d $2^7 \times 2^7$ | $2^{13} \times 2 \times 2^{3}$ | | | | | | |
| | $e p^3 \times p^6 \times p^2$ | f $m^7 \times$ | $m^4 \times m^2 \times m^5$ | Letters can also be a base. | 0 | | | | |
| 17 | Simplify the following | ng by writing in index for | m. | | | | | | |
| | a $2^4 \times 2^6 \times 2^3$ | b $3^8 \times 3^3 \times 3^7$ | c $5^3 \times 5^7 \times 5^4$ | d $9^2 \times 9^5 \times 9^4$ | | | | | |
| | $e 4^6 \times 4^3 \times 4$ | f $a^4 \times a^5 \times a^2$ | g $y^7 \times y^3 \times y^2$ | h $n^9 \times n^8 \times n^2$ | | | | | |
| | $\mathbf{i} p^6 \times p^3 \times p^{11}$ | $\mathbf{j} t^4 \times t^1 \times t^2$ | | | | | | | |
| 18 | Summary of findings | : Complete each statemer | nt and copy it into your exer | cise book. | | | | | |
| | Choose from these w | ords: 1, index, letters, bas | ses, add. | | | | | | |
| | a Only indi | ces if the are the | same. | | | | | | |
| | b Indices is the plural of the word | | | | | | | | |
| | c Bases can be numbers or | | | | | | | | |
| | d A single digit or l | etter has an index value o | f | | | | | | |





d (d 5)11

i (i*)5

 $(n^9)^3$

e (e4)10

j (j²)²

0 (0⁹)⁷

4 Write each of the following in index form by applying the rule.

c (c⁷)⁶

h (h11)3

m (m⁶)⁶

b (b⁶)⁹

g (g⁹)⁴

1 (1⁵)8

NUMBER & ALGEBRA

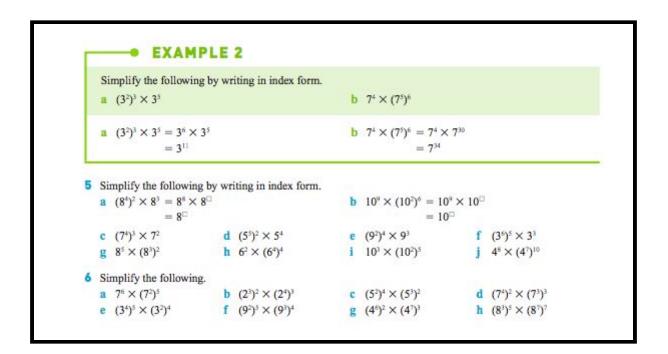
a (a3)2

f (f2)7

 $k (k^{7})^{8}$

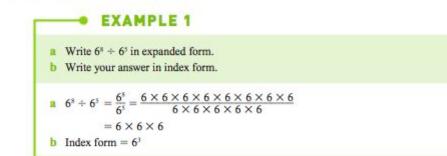
Check your answers

| E | ercise 40 | ; | | | | | | | | |
|---|---|----------------------------|---|---|--|--|--|--|--|--|
| 1 | a (4 × 4 | $\times 4 \times 4)^3 = ($ | $4 \times 4 \times 4 \times 4$ | $\times (4 \times 4 \times 4 \times 4)$ | | | | | | |
| | 10 | | $\times (4 \times 4 \times 4 \times 4)$ | | | | | | | |
| | | | = 412 | | | | | | | |
| | b $(8 \times 8 \times 8)^2 = (8 \times 8 \times 8) \times (8 \times 8 \times 8) = 8^6$ | | | | | | | | | |
| | | ×2×2×2 | | 0104100400000 | | | | | | |
| | $= (2 \times 2 \times 2 \times 2 \times 2) \times (2 \times 2 \times 2 \times 2 \times 2) \times$ | | | | | | | | | |
| | $(2 \times 2 \times 2 \times 2 \times 2) = 2^{15}$ | | | | | | | | | |
| | $d(7 \times 7 \times 7)^5$ | | | | | | | | | |
| | $=(7 \times 7 \times 7) \times (7 \times 7 \times 7) \times (7 \times 7 \times 7) \times$ | | | | | | | | | |
| | 1.72. 1.7. | | $\times 7 \times 7 = 7^{1}$ | | | | | | | |
| 2 | a (44)3 = | 412 (83)2 = | = 8 ⁶ (2 ⁵) ³ = | 2^{15} $(7^3)^5 = 7^{15}$ | | | | | | |
| | | | | power, multiply | | | | | | |
| | the indi | | | | | | | | | |
| 3 | a 3 ⁶ | b 5% | c 212 | d 315 | | | | | | |
| | e 720 | f 10 ¹⁰ | g 412 | h 6 ²¹ | | | | | | |
| | 1 324 | 1 270 | k 3 ²⁰ | 1 320 | | | | | | |
| | m 5" | n 5* | 0 930 | 2010-2010 | | | | | | |



| | III M | ш /л | 0.0 | |
|---|------------------------------------|-------------------------------|---------------------|-------------------|
| 5 | a (8 ⁴) ² × | $8_3 = 8_8 \times 8_2 \times$ | = 811 | |
| | b $10^{\circ} \times$ | $(10^2)^6 = 10^9 \times$ | $10^{12} = 10^{21}$ | |
| | c 7 ¹⁴ | d 514 | e 911 | f 3 ³³ |
| | g 811 | h 6 ¹⁸ | i 10 ¹³ | 428 |
| 6 | a 718 | b 2 ¹⁸ | c 514 | d 717 |
| | e 3 ²⁸ | f 922 | g 4 ³³ | h 854 |

D Dividing numbers with the same base



Exercise 4D

1 Complete the following to write each in expanded form. Express your answer in index form.

a
$$4^7 \div 4^3 = \frac{4 \times 4 \times 4 \times \Box \times \Box \times \Box \times \Box}{4 \times 4 \times 4}$$

 $= 4^{\Box}$
b $9^6 \div 9^2 = \frac{9 \times 9 \times \Box \times \Box \times \Box}{9 \times 9}$
 $= 9^{\Box}$
c $5^8 \div 5^5 = \frac{5 \times 5 \times 5 \times 5 \times 5 \times \Box \times \Box \times \Box}{5 \times 5 \times 5 \times 5 \times 5 \times 5}$
 $= __^{\Box}$
d $2^{10} \div 2^6 = \frac{2 \times 2 \times 2 \times 2 \times 2 \times \Box \times \Box \times \Box}{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}$



Basic rules explained