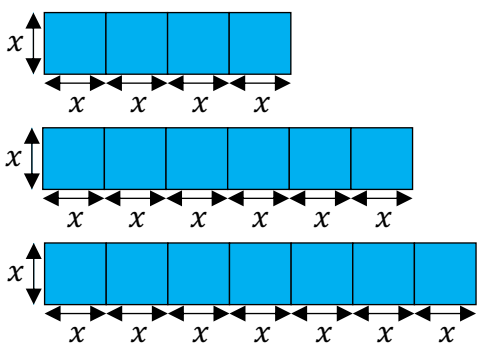
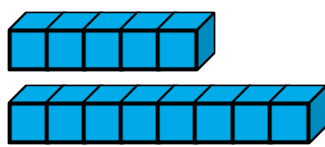


Question	Answer
1	a) $2x^2$ $3x^2$ b) 
2	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; background-color: #fff9c4;"><math>3 \times x^2</math> ✓</div> <div style="border: 1px solid black; padding: 5px; background-color: #fff9c4;"><math>3 + x^2</math></div> <div style="border: 1px solid black; padding: 5px; background-color: #fff9c4;"><math>3x^2</math> ✓</div> <div style="border: 1px solid black; padding: 5px; background-color: #fff9c4;"><math>x^2 \times x^2 \times x^2</math></div> </div>
3	a) $5x^2$ b) $14m^2$ c) $5t^2$ d) $6v^2$
4	a) $2x^3$ $4x^3$ b) 
5	a) $3x^3$ b) $4x^3$ c) $15x^3$ d) $x^3$
6	a) $x^3 + x^2$ b) $2x^3 + 3x^2$ c) $3x^3 + 4x^2$ d) $6x^3 + 6x^2$
7	a) $2x^3 + 2x^2$ b) $3x^3 + 4x^2$ c) $3x^3 + 7x^2$
8	a) $2b^2 + 3p^2$ b) $5c^3 + 4p^3$
9	a) $4x^2$ b) $9x^2$ c) $8x^3$

Question	Answer						
1							
2	<p>a) <math>y \times y \times y \times y \times y</math>                      b) <math>k \times k \times k \times k \times k \times k</math>                      c) <math>t \times t \times t \times t \times t \times t \times t</math>                      d) <math>n \times n \times n \times n</math></p>						
3	<p>a) <math>r^4</math>                      b) <math>z^6</math>                      c) <math>q^4</math>                      d) <math>y^5</math></p>						
4	<p>a) 100                      b) 100                      c) 100                      The answer is the same, but the order of calculations is different.</p>						
5	<p>a) <math>2x \times 3x \equiv 2 \times x \times 3 \times x</math>  <math>\equiv 2 \times 3 \times x \times x</math>  <math>\equiv 6 \times x^2</math>  <math>\equiv 6x^2</math>                      b) <math>5y \times 3x^2 \equiv 5 \times y \times 3 \times y \times y</math>  <math>\equiv 15 \times y^3</math>  <math>\equiv 15y^3</math>                      c) <math>4k^2 \times 3k^3 \equiv 4 \times k \times k \times 3 \times k \times k \times k</math>  <math>\equiv 12 \times k^5</math>  <math>\equiv 12k^5</math></p>						
6	<p>a) He has multiplied the indices. He should have added them.                      b) <math>12v^7</math></p>						
7	<table border="0" style="width: 100%; text-align: center;"> <tr> <td style="border: 1px solid black; padding: 5px;"><math>4ba</math></td> <td style="border: 1px solid black; padding: 5px;"><math>4ab</math></td> <td style="border: 1px solid black; padding: 5px;"><math>4b \times a</math></td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;"><math>2a \times 2b</math></td> <td style="border: 1px solid black; padding: 5px;"><math>4a \times b</math></td> <td style="border: 1px solid black; padding: 5px;"><math>2a + 2b</math> ✓</td> </tr> </table> <p>All the expressions are equivalent to <math>4ab</math> except for <math>2a + 2b</math>, which cannot be simplified any further.</p>	$4ba$	$4ab$	$4b \times a$	$2a \times 2b$	$4a \times b$	$2a + 2b$ ✓
$4ba$	$4ab$	$4b \times a$					
$2a \times 2b$	$4a \times b$	$2a + 2b$ ✓					

Y8 – Spring – Block 3 – Step 2 – Simplifying algebraic expressions by multiplying indices Answers  
(continued)

Question	Answer
8	No. $2^2 \times 3^2 = 4 \times 9 = 36$ $6^4 = 1,296$
9	<p>The diagram illustrates the multiplication of two algebraic expressions. At the top, two purple boxes contain <math>x \times y \times y \times y</math> and <math>y^3 \times x</math>. Blue lines connect these to two yellow boxes in the middle: <math>xy^3</math> and <math>x^2y^2</math>. A red bracket connects the two top boxes to the two middle boxes. From the yellow boxes, red lines connect to four purple boxes at the bottom: <math>x^2 \times y^2</math> (from <math>xy^3</math>), <math>x \times y^2 \times x</math> (from <math>x^2y^2</math>), <math>x^2 \times y^2</math> (from <math>x^2y^2</math>), and <math>x \times y \times x \times y</math> (from <math>x^2y^2</math>). A blue line also connects the <math>xy^3</math> box to the <math>y \times x \times y \times y</math> box.</p>
10	a) $s^2t^3$ $h^3p^4$ $30k^2l^3$ b) multiple possible answers, e.g.: $12 \times x^2 \times y^2 \times x$ $3x \times 2x \times 2y^2 \times x$ $6x^2 \times 2xy^2$
11	a) $x \times x \times x \times y \times y \equiv x^3y^2$ b) $x \times x \times y \times y \times y \equiv x^2y^3$ c) $2 \times x \times y \times 6 \times x \times x \times x \equiv 12x^4y$

Question	Answer																					
12	a)	<table border="1"> <thead> <tr> <th data-bbox="265 229 389 292">Weight</th> <th data-bbox="401 229 972 292">Multiplications</th> <th data-bbox="976 229 1110 292">Total</th> </tr> </thead> <tbody> <tr> <td data-bbox="265 298 389 360">1</td> <td data-bbox="401 298 972 360"><math>x, y</math></td> <td data-bbox="976 298 1110 360">2</td> </tr> <tr> <td data-bbox="265 366 389 428">2</td> <td data-bbox="401 366 972 428"><math>x^2, y^2, xy</math></td> <td data-bbox="976 366 1110 428">3</td> </tr> <tr> <td data-bbox="265 435 389 497">3</td> <td data-bbox="401 435 972 497"><math>x^3, x^2y, xy^2, y^3</math></td> <td data-bbox="976 435 1110 497">4</td> </tr> <tr> <td data-bbox="265 503 389 565">4</td> <td data-bbox="401 503 972 565"><math>x^4, x^3y, x^2y^2, xy^3, y^4</math></td> <td data-bbox="976 503 1110 565">5</td> </tr> <tr> <td data-bbox="265 571 389 634">5</td> <td data-bbox="401 571 972 634"><math>x^5, x^4y, x^3y^2, x^2y^3, xy^4, y^5</math></td> <td data-bbox="976 571 1110 634">6</td> </tr> </tbody> </table>	Weight	Multiplications	Total	1	$x, y$	2	2	$x^2, y^2, xy$	3	3	$x^3, x^2y, xy^2, y^3$	4	4	$x^4, x^3y, x^2y^2, xy^3, y^4$	5	5	$x^5, x^4y, x^3y^2, x^2y^3, xy^4, y^5$	6		
	Weight	Multiplications	Total																			
	1	$x, y$	2																			
	2	$x^2, y^2, xy$	3																			
	3	$x^3, x^2y, xy^2, y^3$	4																			
	4	$x^4, x^3y, x^2y^2, xy^3, y^4$	5																			
	5	$x^5, x^4y, x^3y^2, x^2y^3, xy^4, y^5$	6																			
b)	11																					
c)	The number of multiplications is one more than the weight.																					
d)	The number of multiplications forms the triangular numbers.																					
	weight 1: 3 multiplications																					
	weight 2: 6 multiplications																					
	weight 3: 10 multiplications																					
	weight 4: 15 multiplications																					
	weight 5: 21 multiplications																					

Y8 – Spring – Block 3 – Step 3 – Simplifying algebraic expressions by dividing indices Answers

Question	Answer
1	To simplify a fraction you divide the <b>numerator</b> and the <b>denominator</b> by a common <b>factor</b> .
2	a) $\frac{2}{5}$ b) $\frac{3}{7}$ c) $\frac{3}{5}$
3	$\frac{2}{4} = \frac{3}{6}$ $\frac{2}{3} = \frac{4}{6}$ $\frac{4}{2} = \frac{6}{3}$ $\frac{3}{2} = \frac{6}{4}$
4	a) $\frac{2}{7}$ b) $\frac{3}{5}$ c) 7 d) $\frac{2}{5}$ e) $\frac{1}{3}$ f) 14
5	a) 5 b) 5 c) 5 d) 5 e) 5 f) 5 They are all equal to 5 In each case the dividend is 5 lots of the divisor.
6	a) $\frac{2x}{5}$ b) $\frac{x}{y}$ c) $ab$ d) $5a$ e) $5b$ f) $\frac{5a}{2}$

Question	Answer
7	a) 15 b) $5x$ c) $5y$ d) $3xy$ e) $3x$ f) $5y^2$
8	a) $4ab$ $4b$ $2a$ b) $6xy$ $7x$ $3$
9	The two expressions are equivalent, but it is often better to avoid decimals within algebra.
10	a) $3abc$ b) $4c^3$ c) $6y^2$ d) $\frac{15abc}{4}$ e) $\frac{9a}{2}$ f) $\frac{8x}{3}$
11	multiple possible answers, e.g.: $\frac{2a^2 \times 3b}{a}$ $\frac{8a^2b \times 3a}{4a^2}$ $\frac{4ab \times 3b^2}{2b^2}$
12	$7xy^2$

Y8 – Spring – Block 3 – Step 4 – Using the addition law for indices Answers

Question	Answer
1	a) $2^4 \times 2^3 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^7$ b) It stays the same. c) They are added together.
2	The base is the same, so she can add the indices. $3^{10} \times 3^{20} = 3^{30}$
3	a) $3^9$ b) $4^8$ c) $7^{18}$ d) $a^7$ e) $y^{17}$ f) $p^{11}$
4	The addition rule for indices is $x^a \times x^b \equiv x^{a+b}$ When multiplying, if the base is the same we can add the powers.
5	a) $x^{12}$ b) $v^{21}$ c) $h^{21}$ d) $w^{400}$
6	a) The indices have been multiplied instead of added. correct answer: $3^6$ b) The bases have been multiplied. correct answer: $5^5$ c) The two expressions have been multiplied instead of added. The expression cannot be simplified. d) Both the bases and the indices have been added, but the bases are different so the expression cannot be simplified
7	a) $a^3 \times b^2 \times a^4 \times b^5 \equiv a^7 \times b^7 \equiv a^7 b^7$ b) $m^6 n^6$ c) $p^5 q^6 r^7$
8	
9	a) $2k^3 \times 4k^3 \equiv 8k^6$ b) $2m^2 \times 3m^{10} \times 5m^4 \equiv 30m^{16}$ c) $3d^3 \times 2D^2 \times 2d^4 \times 3D^3 \equiv 36d^7 D^5$

Y8 - Spring - Block 3 - Step 4 - Using the addition law for indices Answers (continued)

Question	Answer
10	a) $x = 5$ b) $x = 8$ c) $x = 5$ d) $x = 7$
11	a) $3 \times 3 \times 3 \times 3 \times 3 = 3^5$ b) $4^7$ $5^8$ $a^6$ $12b^5$





Y8 - Spring - Block 3 - Step 5 - Using the addition and subtraction law for indices Answers (continued)

Question	Answer
10	four possible answers: $3^9 \times 3^3 \div 3^5 = 3^7$ $3^9 \times 3^3 \div 3^7 = 3^5$ $3^9 \div 3^5 \times 3^3 = 3^7$ $3^9 \div 3^7 \times 3^3 = 3^5$
11	Teddy                  Rosie <b>both</b> neither Any number to the power 0 = 1

Question	Answer
1	$5^6 = 5 \times 5 \times 5 \times 5 \times 5 \times 5$ $(7^2)^5 = 7^2 \times 7^2 \times 7^2 \times 7^2 \times 7^2 = 7^{10}$ $(a^6)^2 \equiv a^6 \times a^6 \equiv a^{12}$ $(k^3)^4 \equiv k^3 \times k^3 \times k^3 \times k^3 \equiv k^{12}$ $(t^{10})^3 \equiv t^{10} \times t^{10} \times t^{10} \equiv t^{30}$
2	a) The multiplication rule of indices is $(x^p)^q \equiv x^{pq}$ b) When finding powers of powers, multiply the powers.
3	a) The 3 also needs to be cubed. b) $8p^3$ c) $9q^2$ $\frac{m^3}{8}$ $64t^3$ $25p^8$
4	Aisha has raised 3 to the power 2 instead of multiplying the indices. $2^6$
5	a) $(3 \times 2)^4 = (3 \times 2) \times (3 \times 2) \times (3 \times 2) \times (3 \times 2)$ $= 3^4 \times 2^4$ b) $(a \times b \times c)^3$ $\equiv (a \times b \times c) \times (a \times b \times c) \times (a \times b \times c)$ $\equiv a^3 \times b^3 \times c^3$ $\equiv a^3 b^3 c^3$ c) $(x^2 y)^5$ $\equiv x^2 y \times x^2 y \times x^2 y \times x^2 y \times x^2 y$ $\equiv x^{10} y^5$ d) $(3p^2 q)^3$ $\equiv 3p^2 q \times 3p^2 q \times 3p^2 q$ $\equiv 27p^6 q^3$ e) $(2k^3 m^2)^4$ $\equiv 2k^3 m^2 \times 2k^3 m^2 \times 2k^3 m^2 \times 2k^3 m^2$ $\equiv 16k^{12} m^8$
6	
7	a) $y^{10}$ b) $d^{18}$ c) $t^{10}$ d) $p^{30}$

Y8 – Spring – Block 3 – Step 6 – Exploring powers of powers Answers (continued)

Question	Answer
8	a) $72x^7$ b) $18x^8$
9	a) $2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5 \times 5$ $= 2 \times 5 \times 2 \times 5 \times 2 \times 5 \times 2 \times 5 \times 2 \times 5$ $= (2 \times 5) \times (2 \times 5) \times (2 \times 5) \times (2 \times 5) \times (2 \times 5)$ $= (2 \times 5)^5$ b) 100,000
10	a) $(a^2)^5 \equiv a^{10}$ b) $(2b^2)^3 \equiv 8b^6$ c) $(c^3)^4 \times c^2 \equiv c^{14}$ d) $(d^3)^6 \div d^2 \equiv d^{16}$ e) $(3e^3)^3 \times e^2 \equiv 27e^{11}$ f) $(5f^4)^2 \times (2f^5)^2 \equiv 100f^{18}$