Non Calculator **Indices** Year 8 Section Skills and Knowledge Assessed: Investigate index notation and represent whole numbers as products of powers of prime Name numbers (ACMNA149) Use index notation with numbers to establish the index laws with positive integral indices and the zero index (ACMNA182) Answer all questions in the spaces provided on this test paper by: Writing the answer in the box provided. Shading in the bubble for the correct answer from the four choices provided. Show any working out on the test paper. Calculators are **not** allowed.  $4^5 = ?$ 1.  $\square$  4 × 4 × 4 × 4  $\square$  4 × 4 × 4 × 4 × 4  $\bigcap$  5 × 5 × 5 × 5  $\bigcap$  5 × 5 × 5 × 5 × 5 Write 15<sup>4</sup> as a repeated multiplication. 2.  $x^7 \times x^8 = ?$ 3.  $\bigcap x^{56}$  $245^6 \times 245^{11} = ?$ 4.  $8^{18} \div 8^{6} = ?$ 5.  $\bigcap 1^3$  $\square$  8<sup>3</sup>

Write the answer to  $12^{39} \div 12^{15}$  in index notation. 6.

Simplify  $2m^3 \times 3m^4$ . 7.



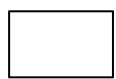
 $h^4 \times h^6 \times h^5 = ?$ 8.





 $\bigcap h^{120}$ 

 $6^9 \times 6^3 \times 6^7 = ?$ 9.



Simplify  $m^7 \div m^7 = ?$ 10.

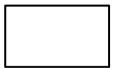
 $\Box$  0

□ 1

 $\square$  m

 $\square$   $m^{14}$ 

Evaluate 320<sup>0</sup>. 11.



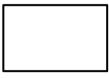
 $\frac{12x^8}{6x^2} = ?$ 12.

 $\square 2x^4 \qquad \square 2x^6$ 

 $\Box$   $6x^4$ 

 $\Box$   $6x^6$ 

Simplify  $6x^7 \times 4x^8$ . 13.



14.

$$(x^9)^2 = ?$$

- $\square x^7 \qquad \square x^{11}$

15. 
$$(2c^4)^3 = ?$$

- $\square 2c^7$   $\square 2c^{12}$ 
  - $\square$  8 $c^7$
- - $8c^{12}$

16.

$$3a^2b^3 \times 4ab^4 = ?$$

17.

$$\frac{y^5 \times y^7}{y^6} = ?$$

- $\square y^6 \qquad \square y^9$
- $\square$   $y^{18}$
- $\square$   $y^{29}$

18.

Simplify  $\frac{8x^8 \times 2x^9}{4x^7}$ .

19.

$$\frac{(2y^6)^4}{4y^2 \times 2y^4} = ?$$

- $\square 2y^3 \qquad \square 2y^6$
- $\square$  2 $y^{12}$
- $\square$   $2y^{18}$

20.

Simplify  $\frac{8a^7 \times 2a^9}{(4a^4)^2}$ .

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Answer all questions in the spaces provided on this test paper by:

Writing the answer in the box provided.

or

Shading in the bubble for the correct answer from the four choices provided. Show any working out on this test paper. Calculators are allowed.

1.  $5 \times 5 = ?$  $\square$  8<sup>5</sup>  $\Box$  5 × 8  $\square$  8 × 5 2.  $7^6 = ?$  $\square$  6 × 6 × 6 × 6 × 6 × 6 × 6  $\bigcirc$  6+6+6+6+6+6+6 7 + 7 + 7 + 7 + 7 + 73.  $z^{5} \times z^{4} = ?$  $\qquad \qquad m^{18}$ 5.  $6^5 \times 6^7 = ?$ 

6.

 $\frac{a^{35}}{a^{11}} = ?$ 

7.

 $\frac{33k^{16}}{3k^8} = ?$ 

 $\square$  11 $k^8$ 

 $\square$  11 $k^2$   $\square$  30 $k^8$ 

 $30k^2$ 

8.

 $\frac{30a^7}{6a^4} = ?$ 

9.

 $\frac{15p^{18}q^3}{5p^9q} = ?$ 

10.

 $a^{12} \times a^5 \times a^4 = ?$ 

11.

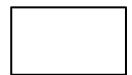
 $2a^3 \times 3a^5 \times 6a^{10} = ?$ 

 $\Box$  36 $a^{18}$ 

 $\square$  36 $a^{150}$ 

12.

 $5m^2n^3 \times 8m^4n^4 = ?$ 



13.

1 000 000 000 = ?

 $\square$  10<sup>3</sup>

 $\Box 10^{6}$   $\Box 10^{8}$ 

 $\square$  10<sup>9</sup>

14.

$$\frac{5a^6 \times 4a^8}{10a^3} = ?$$

15.

$$\frac{3m^5 \times 4m^7}{6m^{18}} = ?$$

 $\bigcap \frac{2}{m^6}$ 

 $\Box \frac{6}{m^6}$ 

 $\square \ 2m^6$ 

 $\Box$   $6m^6$ 

16.

$$(a^7)^5 = ?$$

 $\Box a^2$ 

 $\Box$   $a^{12}$ 

 $\Box$   $a^{35}$ 

17.

$$(2x^8)^5 = ?$$

18.

$$(2m^2 \times 4m^3)^3 = ?$$

 $\square \ 216m^{15} \qquad \square \ 216m^{18} \qquad \square \ 512 m^{15}$ 

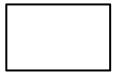
 $\Box$  512 $m^{18}$ 

19.

$$\left(\frac{5a^2 \times 12a^{12}}{10a^3}\right)^3 = ?$$

20.

$$\frac{5 s^4 t^3 \times 4 s^7 t^6}{16 t^3 s^{15}} = ?$$



Ye	ar 8 Indices	Non Calculator Section			
	ANSWERS				
No.	WORKING	ANSWER			
1.	$4^5 = 4 \times 4 \times 4 \times 4 \times 4$	2 <sup>nd</sup> answer			
2.	$15^4 = 15 \times 15 \times 15 \times 15$	15 × 15 × 15 × 15			
3.	$x^7 \times x^8 = x^{7+8} = x^{15}$	2 <sup>nd</sup> answer			
4.	$245^6 \times 245^{11} = 245^{6+11} = 245^{17}$	245 17			
5.	$8^{18} \div 8^6 = 8^{18-6} = 8^{12}$	3 <sup>rd</sup> answer			
6.	$12^{39} \div 12^{15} = 12^{39-15} = 12^{24}$	12 24			
7.	$2m^3 \times 3m^4 = 6m^7$	$6m^7$			
8.	$h^4 \times h^6 \times h^5 = h^{4+6+5} = h^{15}$	1 <sup>st</sup> answer			
9.	$6^9 \times 6^3 \times 6^7 = 6^{9+3+7} = 6^{19}$	6 19			
10.	$m^7 \div m^7 = m^{7-7} = m^0 = 1$	2 <sup>nd</sup> answer			
11.	$320^0 = 1$	1			

12.	$\frac{12x^8}{6x^2} = 2x^6$	2 <sup>nd</sup> answer
13.	Simplify $6x^7 \times 4x^8 = 24x^{15}$	24x <sup>15</sup>
14.	$\left(x^{9}\right)^{2} = x^{9 \times 2} = x^{18}$	3 <sup>rd</sup> answer
15.	$(2c^4)^3 = 2^3 \times c^{4 \times 3} = 8c^{12}$	4 <sup>th</sup> answer
16.	$3a^2b^3 \times 4ab^4 = 12a^3b^7$	$12a^3b^7$
17.	$\frac{y^5 \times y^7}{y^6} = \frac{y^{12}}{y^6}$ $= y^6$	1 <sup>st</sup> answer
18.	$\frac{8x^8 \times 2x^9}{4x^7} = \frac{16x^{17}}{4x^7} = 4x^{10}$	$4x^{10}$
19.	$\frac{(2y^6)^4}{4y^2 \times 2y^4} = \frac{16y^{24}}{8y^6}$ $= 2y^{18}$	4 <sup>th</sup> answer
20.	$\frac{8a^7 \times 2a^9}{(4a^4)^2} = \frac{16a^{16}}{16a^8} = a^8$	$a^8$

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#### **ANSWERS**

No.	WORKING	ANSWER
1.	$5 \times 5 = 5^{8}$	3 <sup>rd</sup> answer
2.	$7^6 = 7 \times 7 \times 7 \times 7 \times 7 \times 7$	2 <sup>nd</sup> answer
3.	$z^5 \times z^4 = z^9$	9 Z
4.	$\frac{m^{24}}{m^6} = m^{18}$	4 <sup>th</sup> answer
5.	$6^5 \times 6^7 = 6^{12}$	6 12
6.	$\frac{a^{35}}{a^{11}} = a^{24}$	$a^{24}$
7.	$\frac{33k^{16}}{3k^8} = 11k^8$	1 <sup>st</sup> answer
8.	$\frac{30a^7}{6a^4} = 5a^3$	$5a^3$
9.	$\frac{15p^{18}q^3}{5p^9q} = 3p^9q^2$	2 <sup>nd</sup> answer
10.	$a^{12} \times a^5 \times a^4 = a^{21}$	$a^{21}$

11.	$2a^{3} \times 3a^{5} \times 6a^{10} = 36a^{18}$	3 <sup>rd</sup> answer
12.	$5m^2n^3 \times 8m^4n^4 = 40m^6n^7$	$40m^6n^7$
13.	$1\ 000\ 000\ 000 = 1000 \times 1000 \times 1000$ $= 10^{3} \times 10^{3} \times 10^{3}$ $= 10^{9}$	4 <sup>th</sup> answer
14.	$\frac{5a^6 \times 4a^8}{10a^3} = \frac{20a^{14}}{10a^3} = 2a^{11}$	$2a^{11}$
15.	$\frac{3m^5 \times 4m^7}{6m^{18}} = \frac{12m^{12}}{6m^{18}} = \frac{2}{m^6}$	1 <sup>st</sup> answer
16.	$(a^7)^5 = a^{35}$	3 <sup>rd</sup> answer
17.	$(2x^8)^5 = 2^5 \times x^{40} = 32x^{40}$	$32x^{40}$
18.	$(2m^{2} \times 4m^{3})^{3} = (8m^{5})^{3}$ $= 8^{3} \times m^{15}$ $= 512 m^{15}$	3 <sup>rd</sup> answer
19.	$\left(\frac{5a^2 \times 12a^{12}}{10a^3}\right)^3 = \left(\frac{60a^{14}}{10a^3}\right)^3$ $= \left(6a^{11}\right)^3$	$216 a^{33}$
	$= (6a^{11})^3$ $= 6^3 \times a^{33}$ $= 216 a^{33}$	
20.	$\frac{5 s^4 t^3 \times 4s^7 t^6}{16 t^3 s^{15}} = \frac{20 s^{11} t^9}{16 t^3 s^{15}}$ $= \frac{5 t^6}{4 s^4}$	$\frac{5t^6}{4s^4}$