

# School Name

## Mathematics Test 2017

Year 8

### Indices

Non Calculator  
Section

#### Skills and Knowledge Assessed:

- Investigate index notation and represent whole numbers as products of powers of prime numbers (ACMNA149)
- Use index notation with numbers to establish the index laws with positive integral indices and the zero index (ACMNA182)

Name \_\_\_\_\_

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 the test paper. Calculators are **not** allowed.

1.

$$3^6 = ?$$

☐  $3 \times 6$

☐  $3 \times 3 \times 3 \times 3 \times 3 \times 3$

☐  $6 \times 6 \times 6$

☐  $3 \times 6 \times 3 \times 6$

2.

Write  $12^5$  as a repeated multiplication.

3.

$$a^5 \times a^9 = ?$$

☐  $a^2$

☐  $a^4$

☐  $a^{14}$

☐  $a^{45}$

4.

$$131^9 \times 131^{21} = ?$$

5.  $7^{22} \div 7^8 = ?$

☐  $1^{14}$

☐  $7^3$

☐  $7^9$

☐  $7^{14}$

6. Write the answer to  $115^{28} \div 115^{18}$  in index notation.

7. Simplify  $6b^4 \times 8b^9$ .

8.  $k^5 \times m^6 \times k^8 = ?$

☐  $k^{13}m^6$

☐  $k^{11}m^8$

☐  $k^{40}m^6$

☐  $km^{19}$

9. Simplify  $5^8 \times 6^2 \times 5^4 \times 6^3$ .

10. Simplify  $p^6 \times p^0 \times p^1 = ?$

☐ 0

☐ 1

☐  $p^6$

☐  $p^7$

11. Evaluate  $180^0$ .

12.  $\frac{24p^9}{6p^3} = ?$

☐  $4p^3$

☐  $4p^6$

☐  $18p^3$

☐  $18p^6$

13.

Simplify  $7w^5 \times 3w^2 \times w$ .

14.

$$(x^8)^3 = ?$$

☐  $x^{11}$

☐  $x^{24}$

☐  $x^{83}$

☐  $x^{512}$

15.

$$(3m^5)^2 = ?$$

☐  $6m^7$

☐  $6m^{10}$

☐  $9m^{10}$

☐  $9m^{25}$

16.

$$8a^5c^7 \times 5ac^3 = ?$$

17.

$$\frac{w^3 \times w^9}{w^4} = ?$$

☐  $w^8$

☐  $w^3$

☐  $w^{23}$

☐  $w^{31}$

18.

$$\text{Simplify } \frac{4p^{10} \times 5p^9}{2p^7 \times 2p^8}.$$

19.

$$\frac{(2a^8)^5}{(4a^3)^2} = ?$$

☐  $2a^7$

☐  $2a^{28}$

☐  $2a^{34}$

☐  $8a^{34}$

20.

$$\text{Simplify } \frac{9m^7n^3 \times 3mn^5}{(3mn^2)^2}.$$

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Short Answer Section

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

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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.  $7 \times 7 \times 7 \times 7 \times 7 \times 7 = ?$

☐  $6 \times 7$

☐  $7 \times 6$

☐  $6^7$

☐  $7^6$

2.  $x^3 y^2 = ?$

☐  $3x \times 2y$

☐  $x^3 + y^2$

☐  $x \times x \times x \times y \times y$

☐  $x \times x \times x \times y \times y \times y$

3.  $p^{17} \times p^{12} = ?$

4.  $\frac{a^{32}}{a^8} = ?$

☐  $a^4$

☐  $a^{24}$

☐  $a^{30}$

☐  $a^{40}$

5.  $8^8 \times 8^8 = ?$

☐  $(8^8)^2$

☐  $2 \times 8^8$

☐  $8^{64}$

☐  $8^{8+2}$

6.	$\frac{a^{56}}{a^{28}} = ?$	<input type="text"/>
7.	$\frac{30p^{42}}{5p^6} = ?$ <input type="checkbox"/> $6p^7$ <input type="checkbox"/> $6p^{36}$ <input type="checkbox"/> $25p^7$ <input type="checkbox"/> $25p^{36}$	
8.	$14a^7 \times 2a^9 = ?$	<input type="text"/>
9.	$\frac{33a^{22}m^{15}}{11a^2m^3} = ?$ <input type="checkbox"/> $3a^{11}m^5$ <input type="checkbox"/> $3a^{20}m^{12}$ <input type="checkbox"/> $22a^{11}m^5$ <input type="checkbox"/> $22a^{20}m^{12}$	
10.	$3a^6 \times a^4 \times 5a^2 = ?$	<input type="text"/>
11.	$(a^5)^6 = ?$ <input type="checkbox"/> $a$ <input type="checkbox"/> $a^{11}$ <input type="checkbox"/> $a^{30}$ <input type="checkbox"/> $a^{56}$	
12.	$7s^3u^3 \times 9su^4t = ?$	<input type="text"/>
13.	$100^5 = ?$ <input type="checkbox"/> 100 000 <input type="checkbox"/> 100 000 000 <input type="checkbox"/> 10 000 000 000 <input type="checkbox"/> 100 000 000 000	
14.	$\frac{6a^2b^6 \times 10ab^5}{15a^3b^4} = ?$	<input type="text"/>

15.

$$\frac{2w^3 \times 3w^4}{5w \times 6w^7} = ?$$

☐  $\frac{1}{5w}$

☐  $\frac{2}{5w}$

☐  $\frac{1}{5w^2}$

☐  $5w$

16.

$$(6a^3b^4)^3 = ?$$

☐  $18a^6b^7$

☐  $18a^9b^{12}$

☐  $216a^6b^7$

☐  $216a^9b^{12}$

17.

$$(2x^4)^0 = ?$$

18.

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

☐  $\frac{1}{64m^9}$

☐  $\frac{m}{64}$

☐  $\frac{m^9}{64}$

☐  $\frac{9}{4m^9}$

19.

$$\frac{3xy \times 6x^2y^3}{30x^6y^2} = ?$$

20.

$$\left(\frac{3ap \times a^3p^5}{6a^2p^8}\right)^2$$

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Non Calculator Section

## ANSWERS

Question	Working and Answer
1.	$3^6 = 3 \times 3 \times 3 \times 3 \times 3 \times 3$ <b>2<sup>nd</sup> Answer</b>
2.	$12^5 = 12 \times 12 \times 12 \times 12 \times 12$
3.	$a^5 \times a^9 = a^{5+9} = a^{14}$ <b>3<sup>rd</sup> Answer</b>
4.	$131^9 \times 131^{21} = 131^{9+21} = \mathbf{131^{30}}$
5.	$7^{22} \div 7^8 = 7^{22-8} = 7^{14}$ <b>4<sup>th</sup> Answer</b>
6.	$115^{28} \div 115^{18} = 115^{28-18} = \mathbf{115^{10}}$
7.	$6b^4 \times 8b^9 = 6 \times 8 \times b^{4+9} = \mathbf{48b^{13}}$
8.	$k^5 \times m^6 \times k^8 = k^5 \times k^8 \times m^6$ $= k^{13}m^6$ <b>1<sup>st</sup> Answer</b>
9.	$5^8 \times 6^2 \times 5^4 \times 6^3 = 5^{8+4} \times 6^{2+3} = \mathbf{5^{12} \times 6^5}$
10.	$p^6 \times p^0 \times p^1 = p^{6+0+1} = p^7$ <b>4<sup>th</sup> Answer</b>

Question	Working and Answer
11.	$180^0 = 1$ ( Any real number raised to the power of 0 is equal to 1)
12.	$\frac{24p^9}{6p^3} = \left(\frac{24}{6}\right)p^{9-3} = 4p^6$ <b>2<sup>nd</sup> Answer</b>
13.	$7w^5 \times 3w^2 \times w = 21w^8$
14.	$(x^8)^3 = x^{8 \times 3} = x^{24}$ <b>2<sup>nd</sup> Answer</b>
15.	$(3m^5)^2 = 3^2 \times m^{5 \times 2} = 9m^{10}$ <b>3<sup>rd</sup> Answer</b>
16.	$8a^5c^7 \times 5ac^3 = 8 \times 5 \times a^{5+1} \times c^{7+3} = 40a^6c^{10}$
17.	$\frac{w^3 \times w^9}{w^4} = \frac{w^{12}}{w^4} = w^8$ <b>1<sup>st</sup> Answer</b>
18.	$\frac{4p^{10} \times 5p^9}{2p^7 \times 2p^8} = \frac{20p^{19}}{4p^{15}} = 5p^4$
19.	$\frac{(2a^8)^5}{(4a^3)^2} = \frac{32a^{40}}{16a^6} = 2a^{34}$ <b>3<sup>rd</sup> Answer</b>
20.	$\frac{9m^7n^3 \times 3mn^5}{(3mn^2)^2} = \frac{27m^8n^8}{9m^2n^4} = 3m^6n^4$



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## ANSWERS

Question	Working and Answer
1.	$7 \times 7 \times 7 \times 7 \times 7 \times 7 = 7^6$ <b>4<sup>th</sup> Answer</b>
2.	$x^3 y^2 = x \times x \times x \times y \times y$ <b>3<sup>rd</sup> Answer</b>
3.	$p^{17} \times p^{12} = p^{17+12} = p^{29}$
4.	$\frac{a^{32}}{a^8} = a^{32-8} = a^{24}$ <b>2<sup>nd</sup> Answer</b>
5.	$(8^8)^2 = 8^8 \times 8^8$ None of the others are correct. <b>1<sup>st</sup> Answer</b>
6.	$\frac{a^{56}}{a^{28}} = a^{56-28} = a^{28}$
7.	$\frac{30p^{42}}{5p^6} = 6p^{36}$ <b>2<sup>nd</sup> Answer</b>

8.	$14a^7 \times 2a^9 = \mathbf{28a^{16} ?}$
9.	$\frac{33a^{22}m^{15}}{11a^2m^3} = 3a^{20}m^{12}$ <b>2<sup>nd</sup> Answer</b>
10.	$3a^6 \times a^4 \times 5a^2 = \mathbf{15a^{12}}$
11.	$(a^5)^6 = a^{5 \times 6} = a^{30}$ <b>3<sup>rd</sup> Answer</b>
12.	$7s^3u^3 \times 9su^4t = \mathbf{63s^4u^7t}$
13.	$100^5 = 10^{10} = 10\,000\,000\,000$ <b>3<sup>rd</sup> Answer</b>
14.	$\frac{6a^2b^6 \times 10ab^5}{15a^3b^4} = \frac{60a^3b^{11}}{15a^3b^4}$ $= \mathbf{4b^7}$
15.	$\frac{2w^3 \times 3w^4}{5w \times 6w^7} = \frac{6w^7}{30w^8}$ $= \frac{1}{5w}$ <b>1<sup>st</sup> Answer</b>
16.	$(6a^3b^4)^3 = 216a^9b^{12}$ <b>4<sup>th</sup> Answer</b>
17.	$(2x^4)^0 = \mathbf{1}$
18.	$\left(\frac{3m^2}{12m^5}\right)^3 = \left(\frac{1}{4m^3}\right)^3$ $= \frac{1}{64m^9}$ <b>1<sup>st</sup> Answer</b>

19.	$\frac{3xy \times 6x^2y^3}{30x^6y^2} = \frac{18x^3y^4}{30x^6y^2}$ $= \frac{3y^2}{5x^3}$
20.	$\left( \frac{3ap \times a^3p^5}{6a^2p^8} \right)^2 = \left( \frac{3a^4p^6}{6a^2p^8} \right)^2$ $= \left( \frac{a^2}{2p^2} \right)^2$ $= \frac{a^4}{4p^4}$