

High School Mathematics Test 2015

Year 9

Indices

Non Calculator

Skills and Knowledge Assessed:

- Apply index laws to numerical expressions with integer indices (ACMNA209)
- Express numbers in scientific notation (ACMNA210)
- Define rational and irrational numbers and perform operations with surds and fractional indices (ACMNA264)

Name _____

Section 1 Short Answer Section

Write all working and answers in the spaces provided on this test paper.

1. Write $5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5$ in index notation.

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2. Write 3^4 without using indices.

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3. Simplify $67^4 \times 67^5$, leaving your answer in index notation.

.....

4. Simplify $18^9 \div 18^5$, leaving your answer in index notation.

.....

5. Simplify $\left(s^4\right)^3$.

.....

6. Write 8×10^7 as a single numeral.

.....

7. Simplify $7w^6 \times 8w^6$.

.....

8.	Simplify $\frac{36r^{11}}{4r^5}$
9.	Simplify $(4g^9)^3$
10.	Simplify $\frac{8x^6 \times 6x^4}{(2x^4)^2}$
11.	Write 9^{-3} as a single numeral without using indices.
12.	Write 78 500 000 in scientific notation.
13.	What is the value of $49^{\frac{1}{2}}$?
14.	What is the value of $8^{\frac{4}{3}}$?

15. Simplify $(64x^8)^{-\frac{1}{2}}$.

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16. Write 0.000 006 78 in scientific notation.

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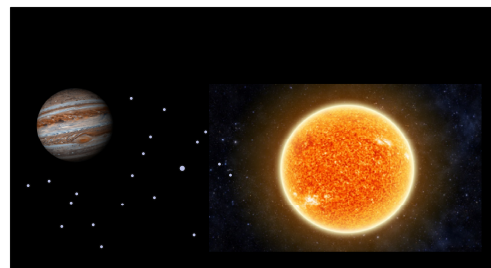
17. Simplify $(6 \times 10^8) \times (5 \times 10^{-6})$ writing your answer in scientific notation.

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18. The mass of the Sun is 2×10^{30} kg. The mass of Jupiter is 2×10^{27} .

How many times the mass of Jupiter is the mass of the Sun?

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.....
.....



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Calculator Allowed

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Section 2 Multiple Choice Section

Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

1. $9 \times 9 \times 9 \times 9 \times 9 \times 9 = ?$

- A. 6×9 B. 6^9 C. 9^6 D. 999 999

2. $5^2 \times 6^3 = ?$

- A. $5 \times 2 \times 6 \times 3$ B. $5 \times 5 \times 6 \times 6 \times 6$
C. $5 \times 5 \times 5 \times 6 \times 6$ D. $5 \times 6 \times 5 \times 6 \times 5 \times 6$

3. $7^3 \times 7^5 = ?$

- A. 7^8 B. 49^8 C. 7^{15} D. 49^{15}

4. $2^{20} \div 2^5 = ?$

- A. 1^4 B. 1^{15} C. 2^4 D. 2^{15}

5. $(5^2)^5 = ?$

- A. 5^7 B. 5^{10} C. 5^{25} D. 5^{32}

6. $2.4 \times 10^5 = ?$

- A. 2400 B. 24 000 C. 240 000 D. 2 400 000

7.	$3^3 \times 3^4 \times 3^5 = ?$	A.	3^{12}	B.	3^{60}	C.	9^{35}	D.	27^{12}
8.	$4a^2 \times 3a^6 = ?$	A.	$7a^8$	B.	$12a^8$	C.	$7a^{12}$	D.	$12a^{12}$
9.	$\frac{18m^9}{3m^3} = ?$	A.	$3m^3$	B.	$3m^6$	C.	$6m^3$	D.	$6m^6$
10.	$\left(3d^6\right)^4 = ?$	A.	$12 d^{10}$	B.	$12 d^{24}$	C.	$81 d^{24}$	D.	$81d^{1296}$
11.	$3c^3g^5 \times 8c^4g^5 = ?$	A.	$24c^7g^{10}$	B.	$24c^{12}g^{10}$	C.	$24c^7g^{25}$	D.	$24c^{12}g^{25}$
12.	$\frac{120k^7r^9}{6k^6r^9} = ?$	A.	$20r$	B.	$20kr$	C.	$\frac{20k}{r}$	D.	$20k$
13.	$8^{-2} = ?$	A.	$\frac{1}{8^2}$	B.	-8^2	C.	$(-8)^2$	D.	$\frac{1}{2^8}$

14.	$\frac{5^{12} \times 5^8}{5^{20}} = ?$	A. 0	B. $\frac{1}{5}$	C. 1	D. 5
15.	$6a^{-8} \times 3a^4 = ?$	A. $\frac{18}{a^{12}}$	B. $\frac{18}{a^4}$	C. $18a^4$	D. $18a^{12}$
16.	$\frac{15m^{-8}}{3m^5} = ?$	A. $\frac{5}{m^{13}}$	B. $\frac{5}{m^3}$	C. $\frac{45}{m^{13}}$	D. $5m^3$
17.	$\frac{16m^2 n^{-2} \times 5m^4 n}{12m^{-3} n^6} =$	A. $\frac{20n^7}{3m^9}$	B. $\frac{20m^9}{3n^7}$	C. $\frac{20m^9 n^7}{3}$	D. $\frac{20}{3m^9 n^7}$
18.	$3^{\frac{5}{2}} = ?$	A. $\frac{1}{3^5}$	B. $\frac{1}{\sqrt{3}^5}$	C. $\sqrt[5]{3}^2$	D. $\sqrt{3}^5$
19.	$\frac{5^{\frac{1}{2}} \times 5^{-1}}{\frac{3}{5^2}} = ?$	A. $\frac{1}{125}$	B. $\frac{1}{25}$	C. $\frac{1}{5}$	D. 1

20.	What is the value of $6^{-\frac{2}{3}} \times 6^{\frac{1}{2}}$?
A.	$\frac{1}{\sqrt[6]{6}}$
B.	$\frac{1}{\sqrt[3]{6}}$
C.	$\frac{1}{\sqrt{6}}$
D.	$6\sqrt{6}$
21.	Write 4.25×10^{-5} as a normal numeral.
A.	0.000 000 0425
B.	0.000 000 425
C.	0.000 004 25
D.	0.000 042 5
22.	Write 0.000 86 in standard notation.
A.	8.6×10^{-6}
B.	8.6×10^{-5}
C.	8.6×10^{-4}
D.	8.6×10^{-3}

High School Mathematics Test 2015

Multiple Choice Answer Sheet

Indices

Name _____

Completely fill the response oval representing the most correct answer.

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|-----|---|-----------------------|---|-----------------------|---|-----------------------|---|-----------------------|
| 1. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 2. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
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| 20. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 21. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |
| 22. | A | <input type="radio"/> | B | <input type="radio"/> | C | <input type="radio"/> | D | <input type="radio"/> |

High School Mathematics Test 2015

Year 9

Indices

Non Calculator

Section 1 Short Answer Section

ANSWERS

No.	WORKING	ANSWER
1.	$5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 = 5^7$	5^7
2.	$3^4 = 3 \times 3 \times 3 \times 3 = 81$	Either $3 \times 3 \times 3 \times 3$ or 81
3.	$67^4 \times 67^5 = 67^9$	67^9
4.	$18^9 \div 18^5 = 18^4$	18^4
5.	$(s^4)^3 = s^{12}$	s^{12}
6.	$8 \times 10^7 = 80\,000\,000$	80 000 000
7.	$7w^6 \times 8w^6 = 56w^{12}$	$56w^{12}$
8.	$\frac{36r^{11}}{4r^5} = 9r^6$	$9r^6$
9.	$(4g^9)^3 = 4^3 \times g^{9 \times 3} = 64g^{27}$	$64g^{27}$
10.	$\frac{8x^6 \times 6x^4}{(2x^4)^2} = \frac{48x^{10}}{4x^8} = 12x^2$	$12x^2$
11.	$9^{-3} = \frac{1}{9^3} = \frac{1}{81 \times 9} = \frac{1}{729}$	$\frac{1}{729}$
12.	$78\,500\,000 = 7.85 \times 10^7$	7.85×10^7
13.	$49^{\frac{1}{2}} = \sqrt{49} = 7$	7

14.	$8^{\frac{4}{3}} = \sqrt[3]{8^4}$ $= 2^4 = 16$	16
15.	$(64x^8)^{-\frac{1}{2}} = \frac{1}{(64x^8)^{\frac{1}{2}}}$ $= \frac{1}{(\sqrt{64} x^4)}$ $= \frac{1}{8x^4}$	$\frac{1}{8x^4}$
16.	$0.000\,006\,78 = 6.78 \times 10^{-6}$	6.78×10^{-6}
17.	$(6 \times 10^8) \times (5 \times 10^{-6}) = 6 \times 5 \times 10^{8-6}$ $= 30 \times 10^2$ $= 3 \times 10^3$	3×10^3
18.	<p>Number of times = $(2 \times 10^{30}) \div (2 \times 10^{27})$</p> $= \frac{2}{2} \times 10^3$ $= 1 \times 10^3$ $= 1000 \text{ times}$	1000 times

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Calculator Allowed

Section 2 Multiple Choice Section

ANSWERS

No.	WORKING	ANSWER
1.	$9 \times 9 \times 9 \times 9 \times 9 \times 9 = 9^6$	C
2.	$5^2 \times 6^3 = 5 \times 5 \times 6 \times 6 \times 6$	B
3.	$7^3 \times 7^5 = 7^{3+5} = 7^8$	A
4.	$2^{20} \div 2^5 = 2^{20-5} = 2^{15}$	D
5.	$(5^2)^5 = 5^{2 \times 5} = 5^{10}$	B
6.	$2.4 \times 10^5 = 240\,000$	C
7.	$3^3 \times 3^4 \times 3^5 = 3^{3+4+5} = 3^{12}$	A
8.	$4a^2 \times 3a^6 = 4 \times 3 \times a^{2+6} = 12a^8$	B
9.	$\frac{18m^9}{3m^3} = \left(\frac{18m^{9-3}}{3} \right) = 6m^6$	D
10.	$(3d^6)^4 = 3^4 \times d^{6 \times 4} = 81d^{24}$	C
11.	$3c^3g^5 \times 8c^4g^5 = 3 \times 8 \times c^{3+4} \times g^{5+5} = 24c^7g^{10}$	A
12.	$\frac{120k^7r^9}{6k^6r^9} = \left(\frac{120}{6} \right) \times k^{7-6} \times r^{9-9} = 20k^1r^0 = 20k$	D
13.	$8^{-2} = \frac{1}{8^2}$	A
14.	$\frac{5^{12} \times 5^8}{5^{20}} = \frac{5^{20}}{5^{20}} = 5^0 = 1$	C

15.	$6a^{-8} \times 3a^4 = 18a^{-4} = \frac{18}{a^4}$	B
16.	$\frac{15m^{-8}}{3m^5} = 5m^{-13} = \frac{5}{m^{13}}$	A
17.	$\frac{16m^2 n^{-2} \times 5m^4 n}{12m^{-3} n^6} = \frac{80m^6 n^{-1}}{12m^{-3} n^6}$ $= \frac{20m^9 n^{-7}}{3}$ $= \frac{20m^9}{3n^7}$	B
18.	$3^{\frac{5}{2}} = (\sqrt{3})^5$	D
19.	$\frac{5^{\frac{1}{2}} \times 5^{-1}}{5^{\frac{3}{2}}} = \frac{5^{\frac{1}{2}-1}}{5^{\frac{3}{2}}}$ $= \frac{5^{-\frac{1}{2}}}{5^{\frac{3}{2}}}$ $= 5^{-\frac{1}{2}-\frac{3}{2}}$ $= 5^{-2}$ $= \frac{1}{5^2}$ $= \frac{1}{25}$	B
20.	$6^{-\frac{2}{3}} \times 6^{\frac{1}{2}} = 6^{-\frac{2}{3}+\frac{1}{2}} = 6^{-\frac{4}{6}+\frac{3}{6}} = 6^{-\frac{1}{6}} = \frac{1}{6^{\frac{1}{6}}} = \frac{1}{\sqrt[6]{6}}$	A
21.	$4.25 \times 10^{-5} = 0.000\,042\,5$	D
22.	$0.000\,86 = 8.6 \times 10^{-4}$	C

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Multiple Choice Answer Sheet

Indices

Name ANSWERS

Completely fill the response oval representing the most correct answer.

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|-----|---|----------------------------------|---|----------------------------------|---|----------------------------------|---|----------------------------------|
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