High School
Mathematics Test 2013
Index Laws

Year
9

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   Non Calculator Section

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

1. Simplify $6g^8 \times 8g^7$.

    ………………………………………………………………………………………………….

2. Simplify $\dfrac{36m^{11}}{9m^4}$.

    ………………………………………………………………………………………………….

3. Simplify $\left(d^5\right)^7$.

    ………………………………………………………………………………………………….

4. Simplify $\dfrac{6x^5y^8 \times 10x^3y^6}{4x^5y^3}$.

    ………………………………………………………………………………………………….

5. What is the value of $64^{\frac{1}{2}}$?

    ………………………………………………………………………………………………….

6. Evaluate 3^{-4} .

    ………………………………………………………………………………………………….

7. Evaluate $27^{\frac{2}{3}}$.

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8. Evaluate $25^{-\frac{3}{2}}$.

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9. Write 5.76×10^8 as a normal numeral.

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10. Write $8\,360\,000$ in standard notation.

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11. Write $0.000\,025\,7$ in standard notation.

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12. Zena is asked to estimate the number of grains of sand in a bucket. She counts the number of grains in a thimble and gets an answer of 1.2×10^3 . She then counts how many thimbles are needed to fill a cup and gets an answer of 100. She then counts how many cups are needed to fill the bucket and gets an answer of 1 000. What is her estimate of the number of grains in the bucket?

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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. $8a^4c^3 \times 5a^2c^4 =$

     A. $13a^6c^7$ B. $13a^8c^{12}$ C. $40a^6c^7$ D. $40a^8c^{12}$

2. $-6a^5m^2 \times -9am^7 =$

     A. $-15\,a^5m^9$ B. $-54\,a^5m^{14}$ C. $54\,a^5m^9$ D. $54\,a^6m^9$

3. $\left(6u^3r^6\right)^3 =$

     A. $24u^6r^9$ B. $216u^9r^{18}$ C. $216u^6r^{18}$ D. $216u^9r^9$

4. $\dfrac{9m^5p^7}{15m^3p^{10}}$ in simplest form is:

     A. $\dfrac{3m^2}{5p^3}$ B. $\dfrac{3p^3}{5m^2}$ C. $\dfrac{3m^2p^3}{5}$ D. $\dfrac{3}{5m^2p^3}$

5.   What is the value of $\left(2.9^3\right)^2$, rounded to the nearest integer?

     A.   205   B.   206   C.   594   D.   595

6. $16^{-\frac{3}{2}} =$

     A. $\dfrac{1}{64}$ B. $\dfrac{1}{32}$ C.   24   D.   48

7. $32b^{-7}e^6 \div 8b^8e^{-7} =$

   A. $\dfrac{4b}{e}$ B. $\dfrac{4e}{b}$ C. $\dfrac{4e^{13}}{b^{15}}$ D. $\dfrac{4b^{15}}{e^{13}}$

8. $a^{-\frac{3}{4}}$ can be written as:

   A. $\sqrt[4]{a}^{\;3}$ B. $\dfrac{1}{\sqrt[4]{a}^{\;3}}$ C. $\sqrt[3]{a}^{\;4}$ D. $\dfrac{1}{\sqrt[3]{a}^{\;4}}$

9. $\left(16x^4y^{10}\right)^{\frac{1}{2}} =$

   A. $4x^2y^5$ B. $8x^2y^5$ C. $4\,x^{\frac{9}{2}}y^{\frac{21}{2}}$ D. $8\,x^{\frac{9}{2}}y^{\frac{21}{2}}$

10. What is 0.0000258 when written in standard notation?

    A. 0.258×10^{-4} B. 2.58×10^{-5} C. 25.8×10^{-6} D. 258×10^{-7}

11. The distance to star A is quoted as being 5.7×10^{48} km and to Star B is 1.9×10^{40} km. Which is true?

    A. Star A is 300 times further away than Star B.
    B. Star A is 3×10^4 times further away than Star B.
    C. Star A is 3×10^6 times further away than Star B.
    D. Star A is 3×10^8 times further away than Star B.

12. $\dfrac{20w^6x}{9y^6} \times \dfrac{18y^{12}}{15w^7x^2} =$

    A. $\dfrac{8wx}{3y^6}$ B. $\dfrac{3x}{8y^6}$ C. $\dfrac{8y^6}{3wx}$ D. $\dfrac{24y^6}{wx}$

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Multiple Choice Answer Sheet

Name _____

Completely fill the response oval representing the most correct answer.

1. A ◯ B ◯ C ◯ D ◯
2. A ◯ B ◯ C ◯ D ◯
3. A ◯ B ◯ C ◯ D ◯
4. A ◯ B ◯ C ◯ D ◯
5. A ◯ B ◯ C ◯ D ◯
6. A ◯ B ◯ C ◯ D ◯
7. A ◯ B ◯ C ◯ D ◯
8. A ◯ B ◯ C ◯ D ◯
9. A ◯ B ◯ C ◯ D ◯
10. A ◯ B ◯ C ◯ D ◯

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ANSWERS

Section 1
1. $\quad 6g^8 \times 8g^7 = 48g^{15}$
2. $\quad \dfrac{36m^{11}}{9m^4} = 4m^7$
3. $\quad \left(d^5\right)^7 = d^{35}$
4. $\quad \dfrac{6x^5y^8 \times 10x^3y^6}{4x^5y^3} = \dfrac{60x^8y^{14}}{4x^5y^3}$ $\quad\quad\quad\quad\quad\quad\quad = 15x^3y^{11}$
5. $\quad 64^{\frac{1}{2}} = \sqrt{64} = 8$
6. $\quad 3^{-4} = \dfrac{1}{3^4}$ $\quad\quad\quad = \dfrac{1}{81}$
7. $\quad 27^{\frac{2}{3}} = \sqrt[3]{27^2} = 3^2 = 9$
8. $\quad 25^{-\frac{3}{2}} = \dfrac{1}{\left(\sqrt{25}\right)^3} = \dfrac{1}{5^3} = \dfrac{1}{125}$
9. $\quad 5.76 \times 10^8 = 576\,000\,000$
10. $\quad 8\,360\,000 = 8.36 \times 10^6$
11. $\quad 0.000\,025\,7 = 2.57 \times 10^{-5}$
12. $\quad$ Estimate of number of grains $= 1.2 \times 10^3 \times 10^2 \times 10^3$ $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad = 1.2 \times 10^8$

Section 2	
1.	C
2.	D
3.	B
4.	A
5.	D
6.	A
7.	C
8.	B
9.	A
10.	B
11.	D
12.	C

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Multiple Choice Answer Sheet

Name_____ <u>Marking Sheet</u>

Completely fill the response oval representing the most correct answer.

1. A ◯   B ◯   C ⬤   D ◯
2. A ◯   B ◯   C ◯   D ⬤
3. A ◯   B ⬤   C ◯   D ◯
4. A ⬤   B ◯   C ◯   D ◯
5. A ◯   B ◯   C ◯   D ⬤
6. A ⬤   B ◯   C ◯   D ◯
7. A ◯   B ◯   C ⬤   D ◯
8. A ◯   B ⬤   C ◯   D ◯
9. A ⬤   B ◯   C ◯   D ◯
10. A ◯   B ⬤   C ◯   D ◯
11. A ◯   B ◯   C ◯   D ⬤
12. A ◯   B ◯   C ⬤   D ◯