CREST Olympiads

#CRESTInnovator

CREST Mathematics Olympiad (CMO)

Worksheet *for*

Class 8

Topic

Exponents and Powers

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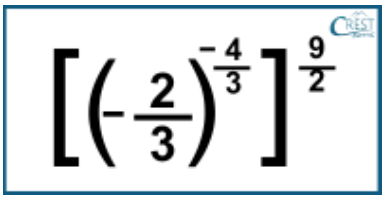
Worksheet on Exponents and Powers

1. **What is the multiplicative inverse of the following expression?**



   a. $64/729$
   b. $128/729$
   c. $729/64$
   d. $729/128$

2. **Which of the following exponents in expanded form represents the number 5629.354?**

   a. $5 \times 10^4 + 6 \times 10^3 + 2 \times 10^2 + 9 \times 10^1 + 3 \times 10^{-1} + 5 \times 10^{-2} + 4 \times 10^{-3}$
   b. $5 \times 10^4 + 6 \times 10^3 + 2 \times 10^2 + 9 \times 10^{-1} + 3 \times 10^{-2} + 5 \times 10^{-3} + 4 \times 10^{-4}$
   c. $5 \times 10^3 + 6 \times 10^2 + 2 \times 10^1 + 9 \times 10^0 + 3 \times 10^{-1} + 5 \times 10^{-2} + 4 \times 10^{-3}$
   d. $5 \times 10^3 + 6 \times 10^2 + 2 \times 10^1 + 9 \times 10^{-1} + 3 \times 10^{-2} + 5 \times 10^{-3} + 4 \times 10^{-4}$

3. **Simplify the following expression: $(-7/3)^{-2} \times (7/9)^2 \div (2/7)^{-2} \times 42$**

   a. $4/21$
   b. $21/4$
   c. $8/21$
   d. $21/8$

4. **What is the value of 'p' if $11^{2p+11} = 1/1331$?**

   a. 7
   b. -7
   c. 11
   d. -11

5. **What is the area of a rectangle in standard form whose length is 17×10^5 m and breadth is 1.7×10^4 m?**

   a. 2.89×10^{-9} m^2
   b. 2.89×10^9 m^2
   c. 2.89×10^{-10} m^2
   d. 2.89×10^{10} m^2

Answer Key

1. a - $^{64}/_{729}$

Explanation:

$$= \left[\left(-\frac{2}{3}\right)^{-\frac{4}{3}}\right]^{\frac{9}{2}}$$

$$= \left(-\frac{2}{3}\right)^{-\frac{4}{3} \times \frac{9}{2}}$$

$$= \left(-\frac{2}{3}\right)^{-6}$$

$$= \left(-\frac{3}{2}\right)^{6}$$

$$= \frac{(-3)^6}{2^6}$$

$$= \frac{(-3) \times (-3) \times (-3) \times (-3) \times (-3) \times (-3)}{2 \times 2 \times 2 \times 2 \times 2 \times 2}$$

$$= \frac{729}{64}$$

Thus, the multiplicative inverse of $\frac{729}{64}$ is $\frac{64}{729}$

Thus, the multiplicative inverse of 729/64 is 64/729.

2. c - $5 \times 10^3 + 6 \times 10^2 + 2 \times 10^1 + 9 \times 10^0 + 3 \times 10^{-1} + 5 \times 10^{-2} + 4 \times 10^{-3}$

Explanation: The expanded form of 5629.354

$= 5 \times 10^3 + 6 \times 10^2 + 2 \times 10^1 + 9 \times 10^0 + 3 \times 10^{-1} + 5 \times 10^{-2} + 4 \times 10^{-3}$

3. c - $^{8}/_{21}$

Explanation:

$$= \left(-\frac{7}{3}\right)^{-2} \times \left(\frac{7}{9}\right)^{2} \div \left(\frac{2}{7}\right)^{-2} \times 42$$

$$= \left(-\frac{3}{7}\right)^{2} \times \left(\frac{7}{9}\right)^{2} \div \left(\frac{7}{2}\right)^{2} \times 2 \times 3 \times 7$$

$$= \left(\frac{-3}{7}\right)^{2} \times \left(\frac{7}{9}\right)^{2} \div \left(\frac{2}{7}\right)^{2} \times 2 \times 3 \times 7$$

$$= \frac{(-3)^2 \times 7^2 \times 2^2}{7^2 \times (3^2)^2 \times 7^2} \times 2 \times 3 \times 7$$

$$= \frac{3^2 \times 7^2 \times 2^2 \times 2 \times 3 \times 7}{7^2 \times (3)^4 \times 7^2}$$

$$= 3^{2+1-4} \times 7^{2+1-2-2} \times 2^{2+1}$$

$$= 3^{-1} \times 7^{-1} \times 2^{3}$$

$$= \frac{2^3}{3 \times 7}$$

$$= \frac{8}{21}$$

4. b - (-7)

Explanation:

$$\Rightarrow 11^{2p+11} = \frac{1}{1331}$$

$$\Rightarrow 11^{2p+11} = \left(\frac{1}{11}\right)^{3}$$

$$\Rightarrow 11^{2p+11} = 11^{-3}$$

$$\Rightarrow 2p + 11 = -3$$

$$\Rightarrow 2p = -3 - 11$$

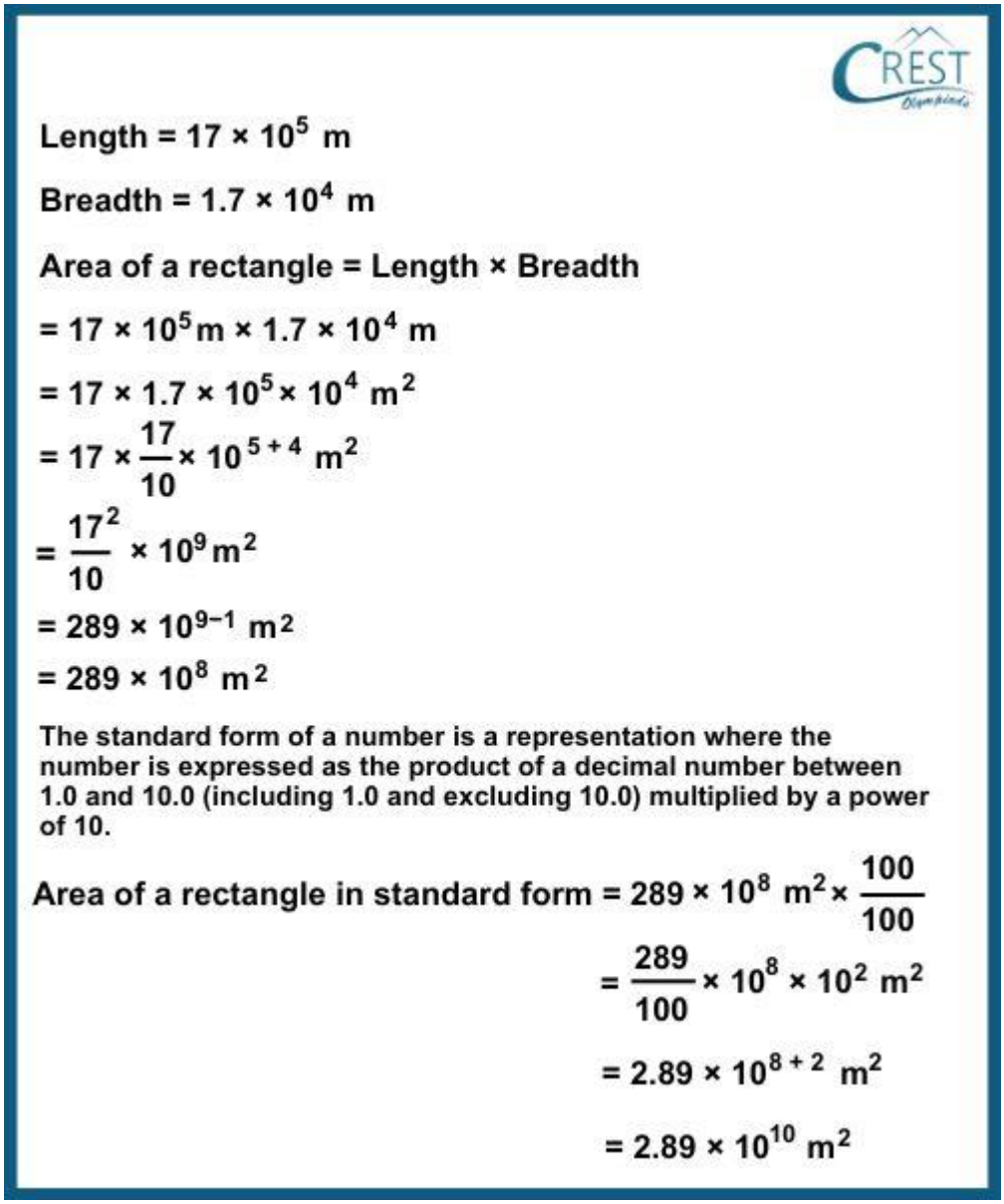
$$\Rightarrow 2p = -14$$

$$\Rightarrow p = \frac{-14}{2}$$

$$\Rightarrow p = -7$$

5. d - $2.89 \times 10^{10}\ m^2$

Explanation:



Length = 17×10^5 m

Breadth = 1.7×10^4 m

Area of a rectangle = Length × Breadth

$= 17 \times 10^5 m \times 1.7 \times 10^4\ m$

$= 17 \times 1.7 \times 10^5 \times 10^4\ m^2$

$= 17 \times \frac{17}{10} \times 10^{5+4}\ m^2$

$= \frac{17^2}{10} \times 10^9 m^2$

$= 289 \times 10^{9-1}\ m^2$

$= 289 \times 10^8\ m^2$

The standard form of a number is a representation where the number is expressed as the product of a decimal number between 1.0 and 10.0 (including 1.0 and excluding 10.0) multiplied by a power of 10.

Area of a rectangle in standard form $= 289 \times 10^8\ m^2 \times \frac{100}{100}$

$= \frac{289}{100} \times 10^8 \times 10^2\ m^2$

$= 2.89 \times 10^{8+2}\ m^2$

$= 2.89 \times 10^{10}\ m^2$

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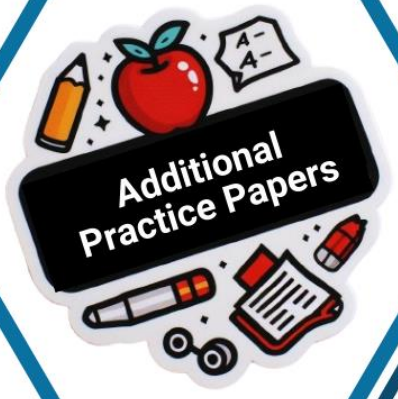

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