Answer Key

Laws of Exponents

1) Answer: A
Explanation: Since we are multiplying expressions with the same bases, we can apply the Product Rule:

$3a^2b^3 \cdot ab^2$
$3a^2b^3 \cdot ab^2 = 3a^{2+1}b^{3+2}$ *Product Rule*
$= 3a^3b^5$

Therefore, the answer is $3a^3b^5$.

2) Answer: A
Explanation: Let us apply the Laws of Exponents to simplify the given expression.

Given: $(\frac{a^3}{a^{-1}})^2$

Since we have expressions involved in a division process which are raised to an exponent, we can apply the Power of a Quotient Rule:

$(\frac{a^3}{a^{-1}})^2 = \frac{a^{3 \cdot 2}}{a^{-1 \cdot 2}}$ *Power of the Quotient Rule*
$= \frac{a^6}{a^{-2}}$

Now, we can remove the negative exponent by applying the Negative Exponent Rule:

$\frac{a^6}{a^{-2}}$
$= a^6 a^2$ *Negative-Exponent Rule*
$= a^{6+2} = a^8$ *Product Rule*

Therefore, the answer is a^8.

3) Answer: D

Explanation: To remove the negative exponents of the expression $a^{-1}b^{-3}c^2$, we apply the Negative Exponent Rule. This rule tells us that if we put a quantity with a negative exponent in the denominator, its negative exponent will then be positive.

$$a^{-1}b^{-3}c^2 = \frac{a^{-1}b^{-3}c^2}{1}$$

$$= \frac{c^2}{ab^3} \qquad \textit{Negative Exponent Rule}$$

Thus, the answer is $\frac{c^2}{ab^3}$

4) Answer: C

Explanation: The first thing we have to do to remove the negative exponent of $(k + m)^2(k + m)^{-1}$ is to apply the Negative Exponent Rule. This means that we transfer $(k + m)^{-1}$ to the denominator so that its exponent will be positive.

$(k + m)^2(k + m)^{-1}$

$\frac{(k+m)^2}{(k+m)}$ *Negative Exponent Rule*

Note that since we have same bases being divided, we can apply the Quotient Rule:

$\frac{(k+m)^2}{(k+m)} = (k + m)^{2-1} = k + m$ *Quotient Rule*

Thus, the answer is $k + m$

5) Answer: A
Explanation: We can apply the Product Rule to determine the value of $(3 \times 10^2) \bullet (3 \times 10^3)$. We multiply the same bases together:

$(3 \times 3) \bullet (10^2 \bullet 10^3)$
$9 \bullet 10^5$ *Product Rule*

Now to determine $9 \bullet 10^5$ in figures, we just add five zeroes to the right of 9:
$9 \bullet 10^5 = 900\,000$

Thus, the answer is 900 000.