# GRE Algebra Practice Questions & Answers

**1. Expand the following equation: $(x^2 + 5)(x - 4)$**

(A) $x^3 + x^2 - 20$
(B) $x^3 - 4x^2 + 5x - 20$
(C) $x^3 - 20$
(D) $x^2 - 4x + 5$
(E) $x^2 - 4x + 5x - 20$

**Solution:**

To expand the equation $(x^2 + 5)(x - 4)$, we will use the distributive property (also known as the FOIL method for binomials).
$(x^2 + 5)(x - 4) = x^2(x) + x^2(-4) + 5(x) + 5(-4)$

Upon simplifying,
**$(x^2 + 5)(x - 4) = x^3 - 4x^2 + 5x - 20$**

Therefore, the correct answer is: (B) $x^3 - 4x^2 + 5x - 20$.

**2. $(x + 4y)(x - 4y) = 12$**

**Quantity A: $x^2 - 16y^2$ Quantity B: 20**

(A) The two quantities are equal.
(B Quantity B is greater.
(C) Quantity A is greater.
(D) The relationship cannot be determined from the information given.
(E) Quantity A is greater than or equal to Quantity B.

**Solution:**

To compare the given quantities, we first need to simplify the left-hand side of the equation using the difference of squares formula. The given equation is: **$(x + 4y)(x - 4y) = 12$**

Using the difference of squares formula, we get: $(x + 4y)(x - 4y) = x^2 - 16y^2$
Therefore, the equation simplifies to: **$x^2 - 16y^2 = 12$**

Now, for comparing the quantities;
**Quantity A: $x^2 - 16y^2$**

**Quantity B: 20**

From the simplified equation, we see that $x^2 - 16y^2 = 12$
Thus, Quantity A is equal to 12.

So, **Quantity A: 12 and Quantity B: 20**
Clearly, 20 is greater than 12 which means Quantity B is greater.

Therefore, the correct answer is: **(B) Quantity B is greater.**

**3. The speed of sound is approximately $3.40 \times 10^2$ meters per second. In scientific notation, how many kilometers per hour is the speed of sound? (h3)**

(A) $1.22 \times 10^3$
(B) $2.04 \times 10^6$
(C) $3.40 \times 10^5$
(D) $1.22 \times 10^6$
(E) $3.40 \times 10^6$

**Solution:**

To convert the speed of sound from meters per second to kilometers per hour, we need to follow these steps:

1. Convert meters to kilometers.
2. Convert seconds to hours.

The speed of sound is approximately **$3.40 \times 10^2$ meters per second**.

**Convert meters to kilometers**

1 kilometer = 1000 meters,
so, $3.40 \times 10^2$ meters = $(3.40 \times 10^2)/1000$ **$= 3.40 \times 10^{-1}$ kilometers.**

**Convert seconds to hours**

1 hour = 3600 seconds,
so, $3.40 \times 10^{-1}$ kilometers per second × 3600 seconds per hour

Now, we calculate,
**$3.40 \times 10^{-1} \times 3600 = 3.40 \times 10^{-1} \times 3.60 \times 10^3 = 12.24 \times 10^2 = 1.224 \times 10^3$**

Therefore, the speed of sound in kilometers per hour, in scientific notation, **is (A) $1.224 \times 10^3$**

**4. A three-year certificate of deposit (CD) is opened with $2000 in it and an interest rate of 3%, compounded annually. This account is allowed to compound for three years. Which of the following most closely approximates the total amount in the account after that period of time? (h3)**

(A) $2185
(B) $2187
(C) $2191
(D) $2200
(E) $2215

**Solution:**

Given:

- Initial principal (P): $2000
- Annual interest rate (r): 3% (or 0.03 in decimal form)
- Number of years (t): 3
- Compounded annually

**Year 1:**

Initial principal: **P = 2000**
Annual interest rate in decimal form: r = 0.03
Calculate the amount after the first year:
**$A_1$ = P × (1 + r)** = 2000 × (1 + 0.03) = 2000 × 1.03 = **2060**

**Year 2:**

Amount at the end of Year 1 becomes the new principal for Year 2: P = 2060
Calculate the amount after the second year:
**$A_2$ = P × (1 + r)** = 2060 × (1 + 0.03) = 2060 × 1.03 = **2121.80**

**Year 3:**

Amount at the end of Year 2 becomes the new principal for Year 3: P = 2121.80
Calculate the amount after the third year:
**$A_3$ = P × (1 + r)** = 2121.80 × (1 + 0.03) = 2121.80 × 1.03 **= 2185.454**

After 3 years of compounding annually with an initial principal of $2000 and an annual interest rate of 3%, the total amount in the account is approximately 2185.

**Answer: (A) $2185**

**5. Simplify the expression $(16^5 - 4^9) / 4$. (h3)**

(A) $3 \cdot 4^8$
(B) $4^7$
(C) $2 \cdot 4^9$
(D) $16^4$
(E) $3 \cdot 4^7$

**Solution:**

Calculate $16^5$
$16^5 = (4^2)^5 = 4^{10}$

Substitute and simplify: $\mathbf{(4^{10} - 4^9) / 4}$

Factor out $4^9$ from the numerator:
$4^9 (4 - 1) / 4$
$\mathbf{= 4^9 (3) / 4}$

Cancel out the 4 in the numerator and denominator:
$\mathbf{3 \cdot 4^8}$
Therefore, the simplified form of $(16^5 - 4^9) / 4$ **is (A)** $\mathbf{3 \cdot 4^8}$

**6. If $9^m = 27^n$ and both m and n are rational numbers, what is m/n? (h3)**

(A) 1/2
(B) 2/3
(C) 3/4
(D) 3/2
(E) 4/3

**Solution:**

Rewrite 9 and 27 using powers of 3:
$9 = 3^2$ and $27 = 3^3$
Substitute into the equation $9^m = 27^n$
$(3^2)^m = (3^3)^n$

Simplify the exponents, $3^{2m} = 3^{3n}$
Equate the exponents, $2m = 3n$
$m/n = 3/2$

Therefore, the correct answer is **(D) m/n = 3/2**

**7. Solve for x in the equation $2^x = 1/16$ (h3)**

(A) -4
(B) -3
(C) -2
(D) -1
(E) 0

**Solution:**

Rewrite 1/16 as a power of 2, $1/16 = 2^{-4}$

Therefore, the equation can be rewritten as: $\mathbf{2^x = 2^{-4}}$
Since the bases are the same, equate the exponents: **x = -4**
So, the solution to $\mathbf{2^x = 1/16}$ **is x = -4**.

Therefore the correct answer is **(A) -4**.

**8. Solve for x in the equation $3^{2x+3} = 243$. (h3)**

(A) -3
(B) -2
(C) -1
(D) 0
(E) 1

**Solution:**

Rewrite 243 as a power of 3, $\mathbf{3^{2x+3} = 3^5}$

Since the bases are the same, equate the exponents: **2x + 3 = 5**
Solving for x,

2x = 5 - 3
2x = 2
**x = 1.**

So, the solution to $3^{2x+3}$ **= 243 is x = 1.**

Therefore the correct answer is **(E) 1**.

**9. Solve for x in the equation 4(x + 2) = 2(x + 5). (h3)**

(A) 5
(B) 3
(C) -2
(D) -5
(E) 1

**Solution:**

Given, **4(x + 2) = 2(x + 5)**
Distribute on both sides of the equation: 4x + 8 = 2x + 10

On solving,
4x - 2x = 10 - 8
2x = 2
**x =1.**
So, the solution to **4(x + 2) = 2(x + 5) is x=1.**

Therefore the correct answer is **(E) 1**.

**10. Jane invested a total of $5,000. Part of the money was invested in a bond that paid 12% simple annual interest, and the remainder was invested in stocks that paid 9% simple annual interest. If Jane earned $480 in interest at the end of the first year, how much did she invest in each type of investment? (h3)**

(A) $2,000 at 12%, $3,000 at 9%
(B) $3,000 at 12%, $2,000 at 9%
(C) $1,000 at 12%, $4,000 at 9%
(D) $2,200 at 12%, $2,800 at 9%
(E) $2,800 at 12%, $4,200 at 9%

**Solution:**

Let x be the amount invested in the bond (12% interest), and y be the amount invested in stocks (9% interest).
From the given information,
**x + y = 5000** (Total amount invested is $5,000)
0.12x + 0.09y = 480 (Total interest earned is $480)

From x + y = 5000, solve for y:
y = 5000 − x

Substitute y into the interest equation:
$0.12x + 0.09(5000 - x) = 480$

Simplify and solve for x:
$0.12x + 450 - 0.09x = 480$
$0.03x = 30$
**$x = 30/0.03 = 1000$**.

On calculating y,
**y** $= 5000 - x = 5000 - 1000$ **$= 4000$**
So, **$x = 1000$ and $y = 4000$**.

Therefore, Jane invested **$1000 at 12% interest and $4000 at 9%** interest which is **option (C)**.