Topic: Power rule for exponents

Question: Simplify the expression.

$$(x^a)^b$$

Answer choices:

A x^{a+b}

B x^{2ab}

C x^{a-b}

D x^{ab}

Solution: D

When we raise an exponential expression to a power, we can apply the power rule for exponents, by multiplying the exponents and keeping the base the same. Given

$$(x^a)^b$$

the base x stays the same and the exponents a and b get multiplied. The result is

$$x^{ab}$$

Topic: Power rule for exponents

Question: Simplify the expression.

$$(x^a)^{a^2}$$

Answer choices:

A x^{a+a^2}

B x^{2a^2}

C x^{a^3}

D x^a

Solution: C

When we raise an exponent to another exponent, we apply the power rule for exponents, and we multiply the exponents together, keeping the base the same. Given

$$(x^a)^{a^2}$$

the base x stays the same and the exponents a and a^2 get multiplied together. The result is

$$x^{a \cdot a^2}$$

$$x^{a^{1+2}}$$

$$x^{a^3}$$

Topic: Power rule for exponents

Question: Simplify the expression.

$$\frac{x^{3-a}}{(x^3)^2}$$

Answer choices:

A x^{a+3}

B x^{-3-a}

C x^{3-a}

D x^{a-3}

Solution: B

The power rule for exponents tells us that

$$(x^a)^b = x^{ab}$$

We'll apply this rule to the expression in the denominator of the fraction,

$$\frac{x^{3-a}}{(x^3)^2}$$

$$\frac{x^{3-a}}{x^{3(2)}}$$

$$\frac{x^{3-a}}{x^6}$$

The quotient rule for exponents tells us that

$$\frac{x^a}{x^b} = x^{a-b}$$

Applying this to our fraction, we get

$$x^{3-a-6}$$

$$x^{-3-a}$$