ALGEBRA: SOLVING EXPONENTIAL EQUATIONS

Best Guess Mastery Worksheet (Target Grade 4/5)

I Do

Solve $16^{x} \times 8 = 32^{x-1}$

$x =$ .....

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We Do

Solve $8^x \times 2 = 16^{x-1}$

$x =$ .....

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You Do 1

Solve $4^x \times 32 = 8^{x+1}$

$x =$ .....

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You Do 2

Solve $27^{x} \times 9 = 81^{x-1}$

$x =$ .....

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Challenge 1

Solve $16^{x+1} \times 8^{x} = 32^{2x-1}$

$x =$ .....

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Challenge 2

Solve $25^{x} \times 125 = 5^{3x + 1}$

$x =$ .....

Answers & Worked Solutions

I Do:

Rewrite with base 2: $(2^4)^x \times 2^3 = (2^5)^{x-1}$
$2^{4x} \times 2^3 = 2^{5x-5} \rightarrow 2^{4x+3} = 2^{5x-5}$
Equate powers: $4x + 3 = 5x - 5 \rightarrow \boldsymbol{x = 8}$

We Do:

Rewrite with base 2: $(2^3)^x \times 2^1 = (2^4)^{x-1}$
$2^{3x} \times 2^1 = 2^{4x-4} \rightarrow 2^{3x+1} = 2^{4x-4}$
Equate powers: $3x + 1 = 4x - 4 \rightarrow \boldsymbol{x = 5}$

You Do 1:

Rewrite with base 2: $(2^2)^x \times 2^5 = (2^3)^{x+1}$
$2^{2x+5} = 2^{3x+3}$
Equate powers: $2x + 5 = 3x + 3 \rightarrow \boldsymbol{x = 2}$

You Do 2:

Rewrite with base 3: $(3^3)^x \times 3^2 = (3^4)^{x-1}$
$3^{3x+2} = 3^{4x-4}$
Equate powers: $3x + 2 = 4x - 4 \rightarrow \boldsymbol{x = 6}$

Challenge 1:

Rewrite with base 2: $(2^4)^{x+1} \times (2^3)^x = (2^5)^{2x-1}$
$2^{4x+4} \times 2^{3x} = 2^{10x-5} \rightarrow 2^{7x+4} = 2^{10x-5}$
Equate powers: $7x + 4 = 10x - 5 \rightarrow 3x = 9 \rightarrow \boldsymbol{x = 3}$

Challenge 2:

Rewrite with base 5: $(5^2)^x \times 5^3 = 5^{3x+1}$
$5^{2x+3} = 5^{3x+1}$
Equate powers: $2x + 3 = 3x + 1 \rightarrow \boldsymbol{x = 2}$