

Exercise 4D

1 Solve these equations for x .

a $2^x = 32$ b $3^{1-2x} = 243$

$2^x = 2^5$
 $x = 5$

$3^{1-2x} = 3^5$
 $1-2x = 5$
 $-2x = 4$
 $x = -2$

c $3^{x^2-2x} = 27$ d $5^{2x-1} - 25 = 0$

$3^{x^2-2x} = 3^3$
 $x^2-2x = 3$
 $x^2-2x+1 = 3+1$
 $(x-1)(x-1) = 4$
 $(x-1)^2 = 4$
 $x-1 = \pm 2$
 $x = 1 \pm 2$
 $x = 3$
 $x = -1$

$5^{2x-1} = 25$
 $2x-1 = 2$
 $2x = 3$
 $x = \frac{3}{2}$

$7^{1-x} = 7^{-2}$
 $1-x = -2$
 $3-x = 0$
 $3 = x$

$7^{1-x} = 7^{-2}$
 $7^{1-x} = 49^{-1}$
 $7^{1-x} = (7^2)^{-1}$
 $7^{1-x} = 7^{-2}$
 $1-x = -2$
 $3-x = 0$
 $3 = x$

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EXAM-STYLE QUESTION

3 Solve $8(2^{x+1}) = 2\sqrt{2^x}$

$2^3 \cdot 2^{x+1} = 2^1 \cdot 2^{x \cdot \frac{1}{2}}$

$2^{x+4} = 2^{\frac{x}{2}+1}$

$2(x+4) = 2(\frac{x}{2}+1)$

$2x+8 = x+2$

$x+8 = 2$

$x = -6$


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Why don't we
multiply base

$$2^3 \cdot 2^2 = 2^5$$

$$2 \cdot 2 = 4$$


$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$$

$$2^5 = 4^5$$


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Solve $3x^{-\frac{3}{5}} = 24$

<p>Answer</p> $3x^{-\frac{3}{5}} = 24$ $x^{-\frac{3}{5}} = 8$ $\left(x^{-\frac{3}{5}}\right)^{-\frac{5}{3}} = 8^{-\frac{5}{3}} = 8^{\frac{1}{3} \cdot -1 \cdot 5}$ $x = (2^3)^{-\frac{5}{3}}$ $x = 2^{-5}$ $x = \frac{1}{32}$ <p style="text-align: center;"><i>← at 5</i></p>	<p><i>Divide both sides by 3.</i></p> <p><i>Multiply the exponent by its reciprocal since $-\frac{a}{b} \times -\frac{b}{a} = 1$</i></p> <p><i>Replace 8 with 2^3.</i></p>
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ex) $(x^{\frac{1}{3}})^3 = (5)^3$

$x = 125$


ex) $(x^{-\frac{2}{3}})^{-\frac{3}{2}} = (\frac{1}{4})^{-\frac{3}{2}}$

$x = 8$

$(\frac{1}{4})^{-1 \cdot \frac{1}{2} \cdot 3}$

$4^{\frac{1}{2} \cdot 3}$

2^2



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2 Solve these equations for x .


a) $(x^{\frac{1}{3}})^3 = (2)^3$

$x = 8$

b) $5x^{\frac{1}{2}} = 125$

$(x^{\frac{1}{2}})^2 = (25)^2$

$x = 625$



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c $3x^{\frac{2}{3}} = 192$

$$\left(x^{\frac{2}{3}}\right)^{\frac{3}{2}} = \left(\frac{192}{3}\right)^{\frac{3}{2}}$$

$$x = 8^3$$

$$x = 512$$

d $9x^{-\frac{2}{3}} = 16$

$$\left(x^{-\frac{2}{3}}\right)^{\frac{3}{2}} = \left(\frac{16}{9}\right)^{\frac{3}{2}}$$

$$x = \left(\frac{4}{3}\right)^{-3}$$

$$x = \left(\frac{3}{4}\right)^3$$

$$x = \frac{27}{64}$$

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