Using the addition law for indices

1 **a)** Fill in the gaps in the calculation.

$2^4 \times 2^3 = 2 \times 2 \times 2 \times 2 \times \square \times \square \times \square = 2^{\square}$

b) What happens to the base value when 2^4 and 2^3 are multiplied?

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c) What happens to the indices when 2^4 and 2^3 are multiplied?

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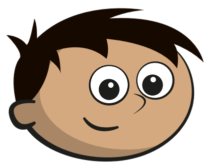
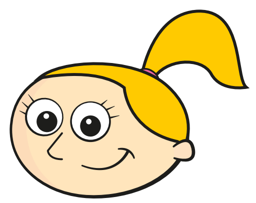
2 Amir and Eva are both trying a problem.

Simplify $3^{10} \times 3^{20}$



It is going to take a long time to answer this question because I have to write out the whole multiplication.

I can do it without writing out the multiplication.



What has Eva noticed?

3 Complete the statements.

a) $3^4 \times 3^5 = 3^{\square}$

b) $4^2 \times 4^6 = \square$

c) $7^8 \times 7^{10} = \square$

d) $a^4 \times a^3 \equiv$ ______

e) $y^{11} \times y^6 \equiv$ ______

f) $p^4 \times p^7 \equiv$ ______

4 The addition rule for indices can be described using algebra.

Complete the statement.

The addition rule for indices is $x^a \times x^b \equiv$ ______

Describe the rule in your own words.

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5 Simplify the expressions.

a) $x^3 \times x^4 \times x^5 \equiv$ ______

b) $v^7 \times v^7 \times v^7 \equiv$ ______

c) $h^3 \times h^8 \times h^{10} \equiv$ ______

d) $w^{50} \times w^{100} \times w^{250} \equiv$ ______

6 Identify and explain the mistake that has been made in each statement.

a) $3^2 \times 3^4 = 3^8$

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b) $5^2 \times 5^3 = 25^5$

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c) $10^4 + 10^5 = 10^9$

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d) $5^3 \times 2^6 = 7^9$

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7 Simplify the expressions.

a) $a^3 \times b^2 \times a^4 \times b^5 \equiv a^{\square} \times b^{\square} \equiv$ ______________

b) $m^4n^3 \times m^2n^3 \equiv$ ______________

c) $p^2q^2 \times p^3r^3 \times q^4r^4 \equiv$ ______________

8 Match the equivalent expressions.

$4y^3 \times 3x^3$	$2 \times 2x^3 \times 2y^3$
$2y^2 \times 6x^2$	$6y^3 \times 2x^3$
$8x^3 \times y^3$	$2 \times 2x^2 \times 3y^2$

9 Fill in the missing powers and coefficients.

a) $2k^3 \times 4k^{\square} \equiv \square k^6$

b) $2m^2 \times 3m^{\square} \times \square m^4 \equiv 30m^{16}$

c) $3d^{\square} \times \square D^2 \times 2d^4 \times 3D^{\square} \equiv 36d^7D^5$

10 Find the value of x.

a) $2^7 \times 2^x = 2^{12}$

$x = \square$

b) $3^x \times 3^x \times 3^4 = 3^{20}$

$x = \square$

c) $d^x \times d^{x+1} = d^{11}$

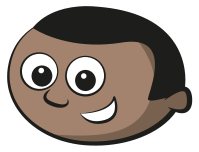
$x = \square$

d) $5^{2x} \times 5^x \times 5^2 = 5^{23}$

$x = \square$

11

$3^4 \times 3 \equiv 3^4$, because there is no power on the 3



a) Write out the full multiplication to show why Mo is incorrect.

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b) Simplify the expressions.

$4^6 \times 4$	5×5^7	$a^3 \times a^2 \times a$	$3b^4 \times 4b$
$\square$	$\square$	________	________