

## Indices

$$\begin{aligned}y &= y^1 \\y \times y &= y^2 \\y \times y \times y &= y^3 \\y \times y \times y \times y &= y^4 \\y \times y \times y \times y \times y &= y^5\end{aligned}$$

## Rules of Indices

- 1)  $x^p \times x^q = x^{p+q}$
- 2)  $x^p \div x^q = x^{p-q}$
- 3)  $(x^p)^q = x^{p \times q}$
- 4)  $x^1 = x$
- 5)  $x^0 = 1$
- 6)  $x^{-p} = \frac{1}{x^p}$
- 7) LATER
- 8) LATER

## Examples

$$\begin{aligned} 1) \quad x^5 \times x^3 &= x^{5+3} = x^8 \\ 2) \quad y^{10} \div y^3 &= y^{10-3} = y^7 \\ 3) \quad (y^4)^5 &= y^{4 \times 5} = y^{20} \\ 4) \quad 7^1 &= 7 \\ 5) \quad 6^0 &= 1 \\ 6) \quad 4^{-2} &= \frac{1}{4^2} = \frac{1}{16} \end{aligned}$$

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## Exercise

$$\begin{aligned} 1) \quad y^5 \times y^5 &= y^{5+5} = y^{10} \\ 2) \quad y^{11} \div y^5 &= y^{11-5} = y^6 \\ 3) \quad (y^2)^3 &= y^{2 \times 3} = y^6 \\ 4) \quad 9^1 &= 9 \\ 5) \quad 9^0 &= 1 \\ 6) \quad 9^{-2} &= \frac{1}{9^2} = \frac{1}{81} \end{aligned}$$

$$7) \quad x^5 \times x = x^6$$

$$8) \quad x^7 \div x = x^6$$

$$9) \quad (x^3)^3 = x^{3 \times 3} = x^9$$

$$10) \quad 4^1 = 4$$

$$11) \quad 3^0 = 1$$

$$12) \quad 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

### Further Examples

$$\begin{aligned} 1) \quad 2x^3 \times 5x^4 &= 2 \times x^3 \times 5 \times x^4 \\ &= 2 \times 5 \times x^3 \times x^4 \\ &= 10x^7 \end{aligned}$$

2) Trick question in exams

$$3x^3 \times 5x^5 = 15x^8$$

$$3) \quad \frac{10x^7}{5x^3} = 2x^4$$

4) Trick question in exams

$$\frac{20x^{20}}{2x^2} = 10x^{18}$$

$$\begin{aligned} 5) (3x^2)^3 &= 3x^2 \times 3x^2 \times 3x^2 \\ &= 27x^6 \end{aligned}$$

6) Trick question in exams

$$(2x^2)^5 = 32x^{10}$$

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Exercise

$$1) 3x^4 \times 2x^5 = 6x^9$$

$$2) \frac{8x^7}{2x^2} = 4x^5$$

$$3) (2x^5)^3 = 8x^{15}$$

$$4) 4x^3 \times 3x^2 = 12x^5$$

$$5) 20x^8 \div 4x^2 = 5x^6$$

$$6) \quad 5^{-2} = \frac{1}{5^2} = \frac{1}{25}$$

$$7) \quad 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$$

$$8) \quad 5^1 = 5$$

$$9) \quad 5^0 = 1$$

$$10) \quad 4^{-1} = \frac{1}{4^1} = \frac{1}{4}$$

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