

gridlocks – can you unlock the grid?

pH values 2

pH values can be calculated from $[H^+]$ and conversely $[H^+]$ can be calculated from pH values using the equations below. But before you dive for your calculator it is worth knowing how reasonably convenient numbers convert so you get a 'feel' for the type of answer you are expecting. Before you answer the gridlocks below fill in the table of pH values – see how many you can do without using the calculator. All pHs here to 1 d.p. ($\log 2 \approx 0.3$ and $\log 5 \approx 0.7$).

$[H^+]$	pH = $-\log_{10}[H^+]$	$[H^+] = 10^{-pH}$	pH
2	-0.3	2×10^{-7}	
0.5			7.3
0.2			11.7
5×10^{-5}		5×10^{-15}	14.3

Gridlock 1

Each row, column and 2 x 2 box contains information about the first four $[H^+]$ listed above. Use your problem solving skills and the answers in the table above to fill in the blank boxes.

$[H^+]$		pH	
2			4.3
	5×10^{-5}	-0.3	
	0.7		
		0.5	
	pH		$[H^+]$

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Gridlock 2

Each row, column and 2 x 2 box contains the last four [H⁺] listed above.

[H ⁺]		pH	
5×10^{-8}			6.7
			5×10^{-15}
11.7			
	pH		[H ⁺]

Gridlock 3

Work out the pH values this gridlock contains and then solve it.

[H ⁺]		pH	
5×10^{-4}			
		1.3	
		2×10^{-10}	
	12.7		
	pH		[H ⁺]

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pH values 2 – answers

pH values can be calculated from $[H^+]$ and conversely $[H^+]$ can be calculated from pH values using the equations below. But before you dive for your calculator it is worth knowing how reasonably convenient numbers convert so you get a 'feel' for the type of answer you are expecting. Before you answer the gridlocks below fill in the table of pH values – see how many you can do without using the calculator. All pHs here to 1 d.p. ($\log 2 \approx 0.3$ and $\log 5 \approx 0.7$).

$[H^+]$	$pH = -\log_{10}[H^+]$	$[H^+] = 10^{-pH}$	pH
2	-0.3	2×10^{-7}	6.7
0.5	0.3	5×10^{-8}	7.3
0.2	0.7	2×10^{-12}	11.7
5×10^{-5}	4.3	5×10^{-15}	14.3

Gridlock 1 – answers

Each row, column and 2 x 2 box contains information about the first four $[H^+]$ listed above. Use your problem solving skills and the answers in the table above to fill in the blank boxes.

$[H^+]$		pH	
2	0.5	0.7	4.3
0.2	5×10^{-5}	-0.3	0.3
0.3	0.7	5×10^{-5}	2
4.3	-0.3	0.5	0.2
pH		$[H^+]$	

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Gridlock 2 – answers

[H ⁺]		pH	
5×10^{-8}	2×10^{-12}	14.3	6.7
5×10^{-15}	2×10^{-7}	7.3	11.7
6.7	7.3	2×10^{-12}	5×10^{-15}
11.7	14.3	2×10^{-7}	5×10^{-8}
pH		[H ⁺]	

Gridlock 3 – answers

[H ⁺]		pH	
5×10^{-4}	0.05	12.7	9.7
2×10^{-13}	2×10^{-10}	1.3	3.3
1.3	3.3	2×10^{-10}	2×10^{-13}
9.7	12.7	5×10^{-4}	0.05
pH		[H ⁺]	