INTRODUCTION TO ORDERS

1) Consider this reaction: $A + B + C \rightarrow D$

The rate equation is: $rate = k [B] [C]^2$

Complete the table to show how changing the concentrations affects the rate.

Initial rate (mol dm^{-3} s^{-1})	Change in concentration of reagents	Effect on rate	New initial rate (mol dm^{-3} s^{-1})
2.5	[A] x 3	None	2.5
0.75	[B] x 4		
12	[C] x 10		
0.50	[D] x 5		
0.25	[A] ÷ 4		
2.8	[B] ÷ 10		
3.5	[C] ÷ 3		
0.80	[D] ÷ 2		
10.3	[A] x 2, [B] x 2		
6.5	[B] x 2, [C] x 3		
12.5	[A] x 2, [B] ÷ 3		
4.8	[B] x 3, [C] ÷ 2		
12.5	[A] x 6, [B] ÷ 4, [C] x 2		
2.9	[A] x 2, [B] x 10, [C] ÷ 1.5		
15.5	[B] x 3, [C] x 10, [D] ÷ 10		

2) Consider this reaction: $P + Q \rightarrow R$ T acts as catalyst

The rate equation is: $rate = k [P]^2 [T]$

Complete the table to show how changing the concentrations affects the rate.

Initial rate (mol dm^{-3} s^{-1})	Change in concentration of reagents	Effect on rate	New initial rate (mol dm^{-3} s^{-1})
6.0	[P] x 2		
5.0	[Q] x 5		
10.0	[R] x 3		
0.80	[T] x 4		
8.0	[P] ÷ 3		
12.5	[Q] ÷ 2		
60	[R] ÷ 5		
50	[T] ÷ 10		
12	[P] x 2, [Q] x 2		
10	[P] x 2, [T] x 3		
40	[Q] x 2, [T] ÷ 3		
25	[R] x 3, [T] ÷ 2		
10	[P] x 4, [Q] ÷ 2, [T] x 2		
20	[P] x 2, [Q] x 10, [T] ÷ 1.5		
30	[P] x 3, [Q] x 10, [T] ÷ 10		
5	[P] ÷ 2, [Q] ÷ 2, [T] ÷ 3		
12	[P] x 2, [Q] ÷ 10, [T] x 5		
16	[P] ÷ 3, [Q] ÷ 2.5, [T] x 3		
8	[P] x 2.5, [Q] ÷ 4, [T] ÷ 2		