Name: Key

Period: ____

Rate Laws

General form of a rate law is **rate = k[A]^x[B]^y** for a reaction with two reactants

1. Use the data table below to answer questions about the reaction **A_2 + B_2 → 2 AB**

Trial	[A_2]	[B_2]	Rate (M/s)
1	0.01	0.05	0.01
2	0.01	0.10	0.02
3	0.02	0.10	0.04

a. What trials do you use to determine the effect of [A_2] on the reaction rate?

2 + 3

b. What is the rate order (the exponent) with respect to [A_2]?

$\left(\frac{.02}{.01}\right)^x = \left(\frac{.04}{.02}\right)$ $2^x = 2$ $x = 1$ $[A_2]^1$

c. What trials do you use to determine the effect of [B_2] on the reaction rate?

1 + 2

d. What is the rate order (the exponent) with respect to [B_2]?

$\left(\frac{.10}{.05}\right)^x = \frac{.02}{.01}$ $2^x = 2$ $x = 1$ $[B_2]^1$

e. What is the rate law for this reaction?

rate = k[A_2][B_2]

2. Use the data table below to answer questions about the reaction **C + D → E**

Trial	[C]	[D]	Rate (M/s)
1	0.1	0.01	0.02
2	0.1	0.02	0.04
3	0.2	0.02	0.16

a. What trials do you use to determine the effect of [C] on the reaction rate?

2 + 3

b. What is the rate order (the exponent) with respect to [C]?

$\left(\frac{.2}{.1}\right)^x = \left(\frac{.16}{.04}\right)$ $2^x = 4$ $x = 2$ $[C]^2$

c. What trials do you use to determine the effect of [D] on the reaction rate?

1 + 2

d. What is the rate order (the exponent) with respect to [D]?

$\left(\frac{.02}{.01}\right)^x = \frac{.04}{.02}$ $2^x = 2$ $x = 1$ $[D]^1$

e. What is the rate law for this reaction?

rate = k[C]^2[D]

3. Use the data table below to answer questions about the reaction **C + D → E**

Trial	[C]	[D]	Rate (M/s)
1	0.1	0.01	0.02
2	0.1	0.02	0.08
3	0.1	0.03	0.18
4	0.1	0.04	0.32
5	0.2	0.04	1.28
6	0.3	0.04	2.88

a. What trials do you use to determine the effect of [C] on the reaction rate?

4 + 5

b. What is the rate order (the exponent) with respect to [C]?

$\left(\frac{.2}{.1}\right)^x = \frac{1.28}{.32}$ $2^x = 4$ $x = 2$ $[C]^2$

c. What trials do you use to determine the effect of [D] on the reaction rate?

1 + 2

d. What is the rate order (the exponent) with respect to [D]?

$\left(\frac{.02}{.01}\right)^x = \frac{.08}{.02}$ $2^x = 4$ $x = 2$ $[D]^2$

e. What is the rate law for this reaction?

$rate = K[C]^2[D]^2$

4. Use the data table below to answer questions about the reaction **F + G → H**

Trial	[F]	[G]	Rate (M/s)
1	0.01	0.4	0.02
2	0.02	0.4	0.16
3	0.03	0.4	0.54
4	0.1	0.2	5
5	0.1	0.4	20
6	0.1	0.6	45

a. What trials do you use to determine the effect of [F] on the reaction rate?

1 + 2

b. What is the rate order (the exponent) with respect to [F]?

$\left(\frac{.02}{.01}\right)^x = \left(\frac{.16}{.02}\right)$ $2^x = 8$ $x = 3$ $[F]^3$

c. What trials do you use to determine the effect of [G] on the reaction rate?

4 + 5

d. What is the rate order (the exponent) with respect to [G]?

$\frac{.4}{.2} = \frac{20}{5}$ $2^x = 4$ $x = 2$ $[G]^2$

e. What is the rate law for this reaction?

$rate = K[F]^3[G]^2$