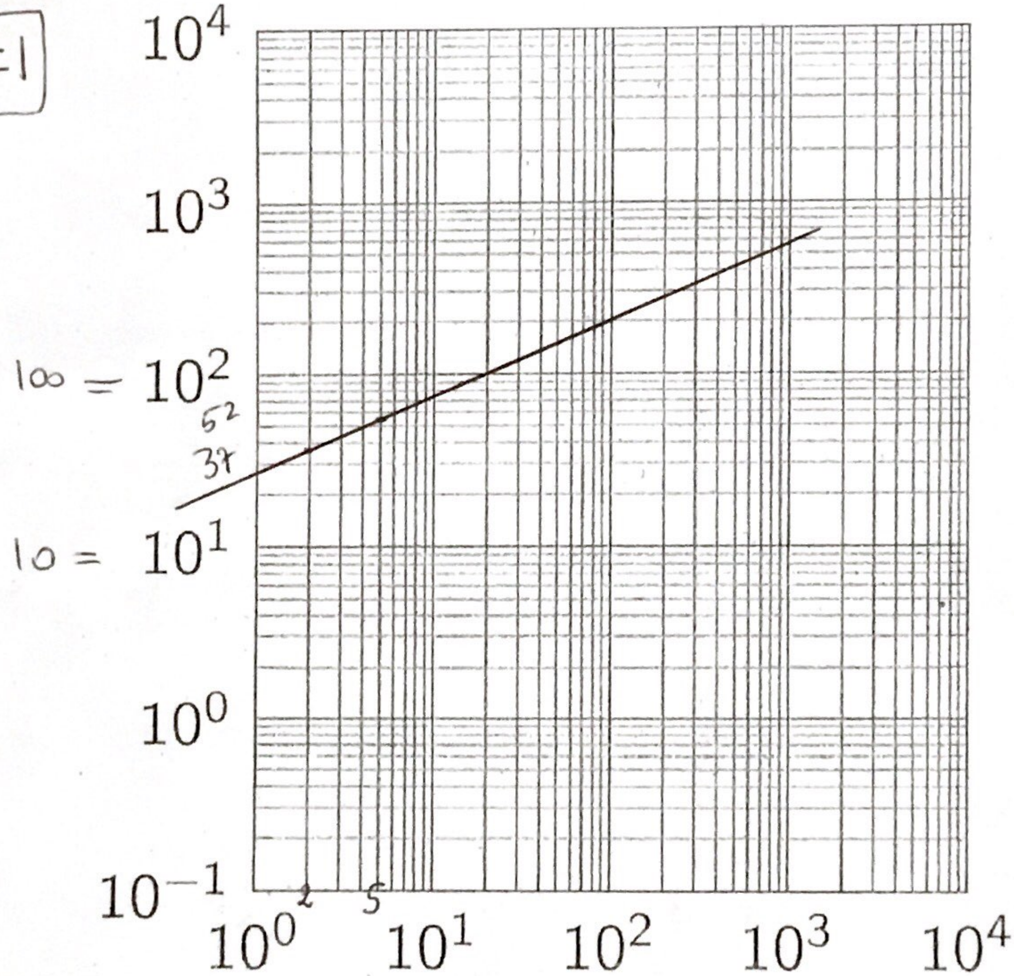
$\boxed{\#1}$



That is approximately the line in the doublelog plot corresponding to the actual observations (2,37) and (5,52)

The functional relationship between the actual quantities x and y is a power function relation:

$$y = C \cdot x^p$$

Substitute $(2,37)$ and $(5,52)$ in the expression to get

$$37 = C\cdot 2^p \quad \text{and} \quad 52 = C\cdot 5^p$$

Solve for C and equate: $\frac{37}{2^p} = C = \frac{52}{5^p}$

or $\frac{5^p}{2^p} = \frac{52}{37}$ or $\left(\frac{5}{2}\right)^p = 52/37$. Take log of both side to get: $\log\left[(5/2)^p\right] = \log\left(\frac{52}{37}\right)$

$$p\cdot \log(5/2) = \log(52/37) \qquad p = \frac{\log(52/37)}{\log(5/2)} = 0.37142$$

To get C substitute p in

$$C = \frac{37}{2^p} \approx \frac{37}{2^{0.37142}} \approx 28.60185$$

$$\therefore \quad \boxed{y = 28.60185\cdot x^{0.37142}}$$

Try to compute the equation of the line through $(\log 2, \log 37)$ and $(\log 5, \log 52)$. For example the slope of the line is

$$m = \frac{\log 52 - \log 37}{\log 5 - \log 2} = \frac{\log(52/37)}{\log(5/2)} \approx 0.37142$$

that is the power of the power function

expression : $y = 28.60185\, x^{\boxed{0.37142}}$

The equation of the line is

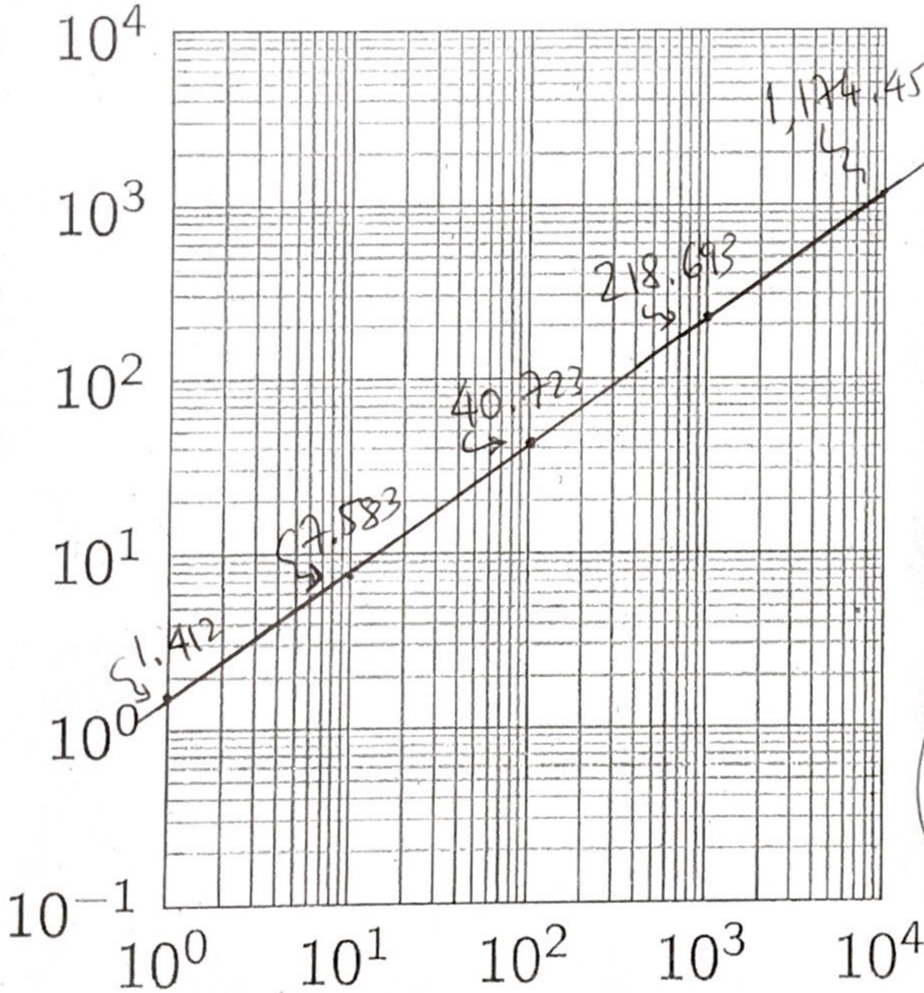
$$\log y - \log 5 = 0.37142(\log x - \log 5)$$

Solve for y to get $\boxed{y = 28.60185\, x^{0.37142}}$

$\boxed{\#2}$ Given $B = 1.412 \cdot A^{0.73}$, then we obtain that the log of that equation is

$$\log B = \log(1.412 \cdot A^{0.73})$$
$$= \log(1.412) + \log(A^{0.73})$$
$$= 0.73 \log A + \log(1.412)$$

That is: $y = 0.73 \cdot x + \log(1.412)$
with $y = \log B$ and $x = \log A$



A	$B = 1.412A^{0.7}$
1	1.412
10	7.583
100	40.723
1000	218.693
10,000	1174.45

We only needed 2 points

#3 $a_1 = \frac{4}{10}$ $a_2 = \frac{9}{17}$ $a_3 = \frac{16}{26}$ $a_4 = \frac{25}{37}$

$a_5 = \frac{36}{50}$ etc... the numerator is always a square. The denominator is a square + 1.

$a_1 = \frac{2^2}{3^2+1}$ $a_2 = \frac{3^2}{4^2+1}$ $a_3 = \frac{4^2}{5^2+1}$ $a_4 = \frac{5^2}{6^2+1}$

$a_5 = \frac{6^2}{7^2+1}$

$$\boxed{a_n = \frac{(n+1)^2}{(n+2)^2+1}}$$

$\boxed{\#4}$

$a_0 = 6 \qquad a_{n+1} = \frac{1}{3}a_n + \frac{5}{6}$

Write $a_1, a_2, a_3, a_4 \ldots$

$$a_1 = \frac{1}{3}a_0 + \frac{5}{6} = \frac{1}{3}\cdot 6 + \frac{5}{6} = 2 + \frac{5}{6} = \frac{17}{6}$$

$$a_2 = \frac{1}{3}a_1 + \frac{5}{6} = \frac{1}{3}\cdot\frac{17}{6} + \frac{5}{6} = \frac{17+15}{18} = \frac{32}{18}$$

$$a_3 = \frac{1}{3}a_2 + \frac{5}{6} = \frac{1}{3}\left(\frac{32}{18}\right) + \frac{5}{6} = \frac{32+45}{54} = \frac{77}{54}$$

$$a_4 = \frac{1}{3}a_3 + \frac{5}{6} = \frac{1}{3}\left(\frac{77}{54}\right) + \frac{5}{6} = \frac{77+135}{162} = \frac{106}{81}$$