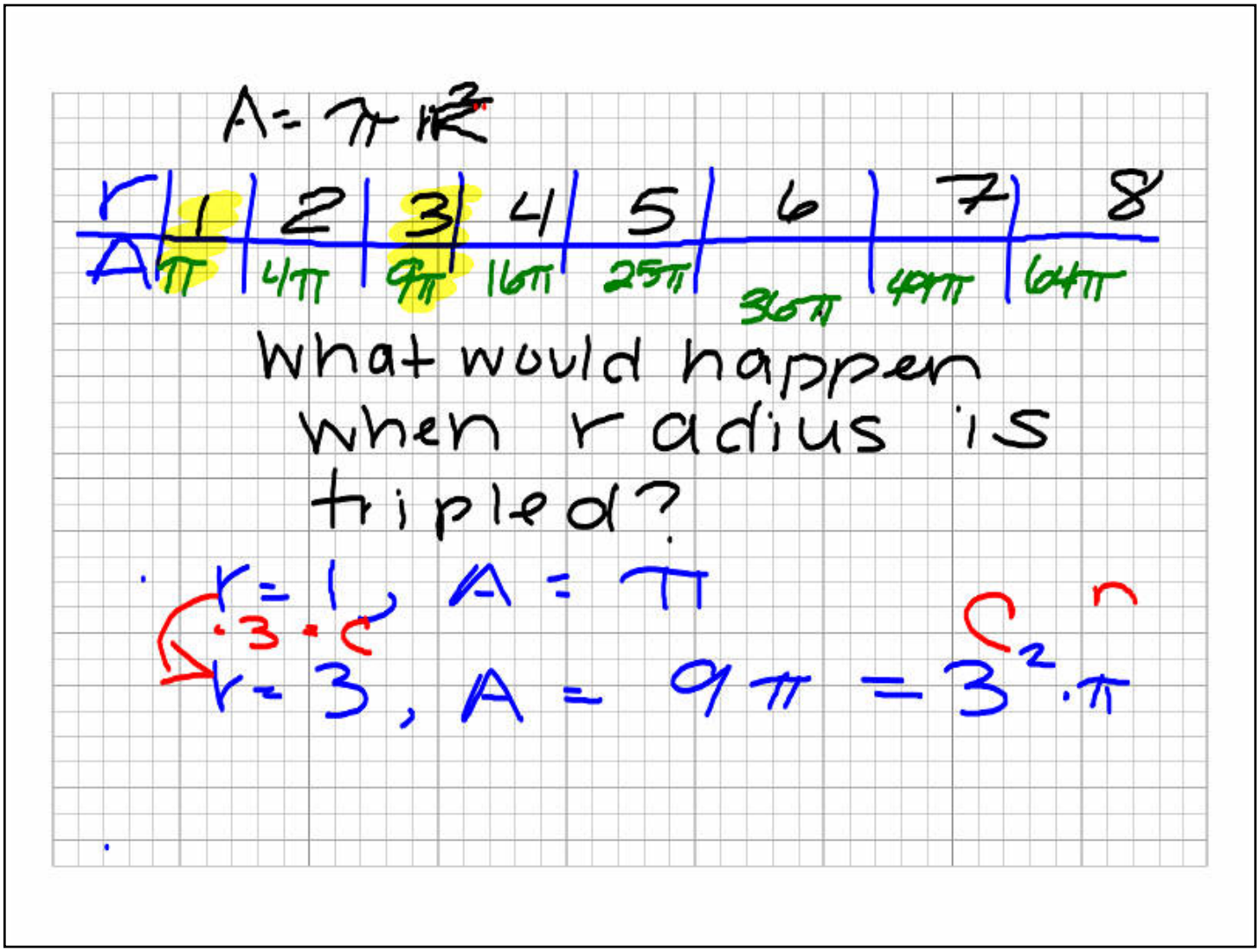
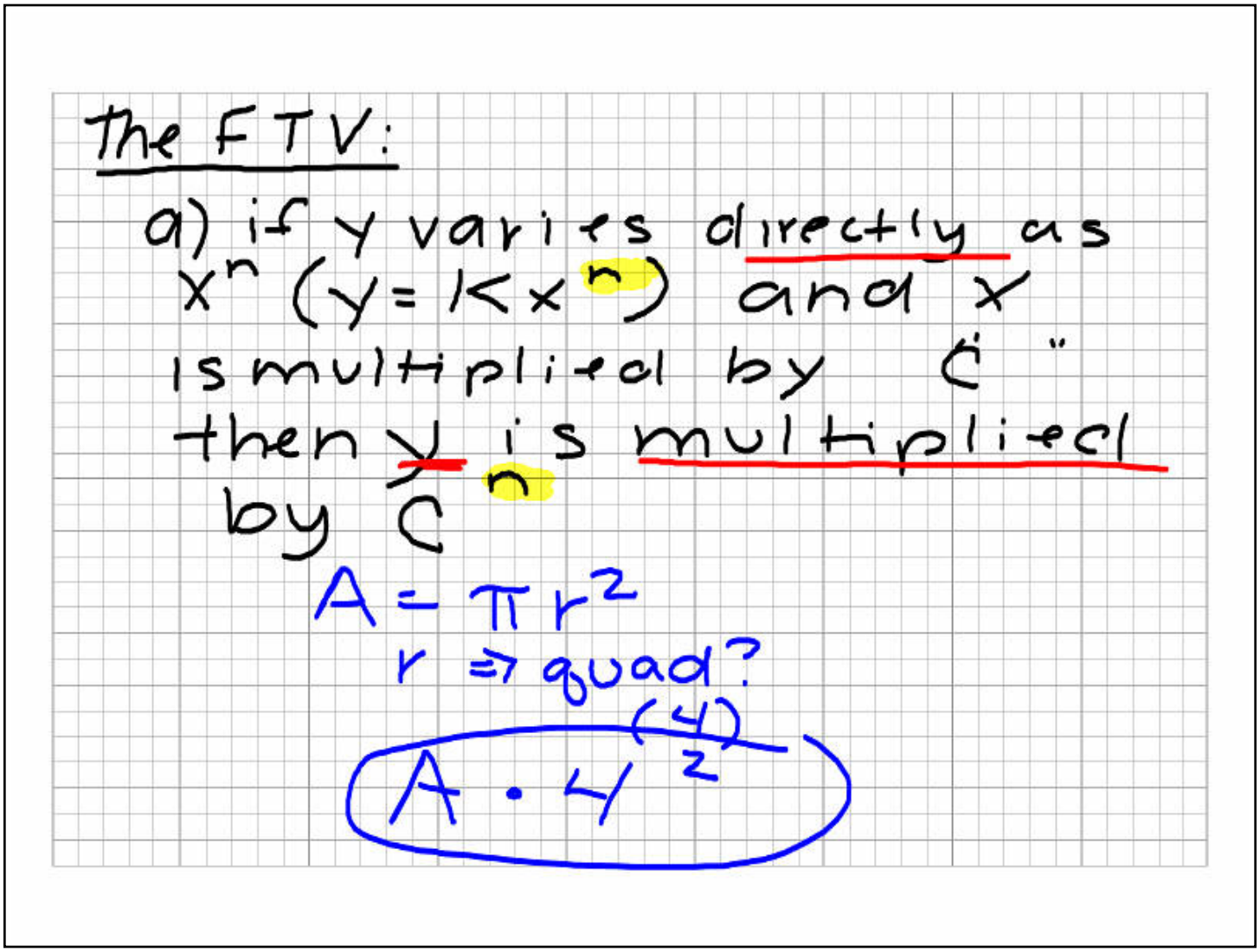
2.3 The Fundamental Theorem of Variation

Area of a circle varies directly as the square of its radius r.

$$A = \underbrace{\pi}_{k} r^2$$


A = πr²
r | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8
A | π | 4π | 9π | 16π | 25π | 36π | 49π | 64π
what would happen when radius is tripled?
r = 1, A = π
·3 · C
r = 3, A = 9π = 3² · π
C
n


The FTV:
a) if y varies directly as x^n ($y = kx^n$) and x is multiplied by c "
then y is multiplied by c^n
$A = \pi r^2$
r ⇒ quad?
$A \cdot 4^2$ (4)

b) if y varies inversely as x^n $\left(y = \frac{k}{x^n}\right)$ and x is multiplied by c, then y is divided by c^n.

ex Suppose m varies directly as the 5th power of q.

How does m change when:

$$m = k \cdot q^5$$

a) q is doubled?

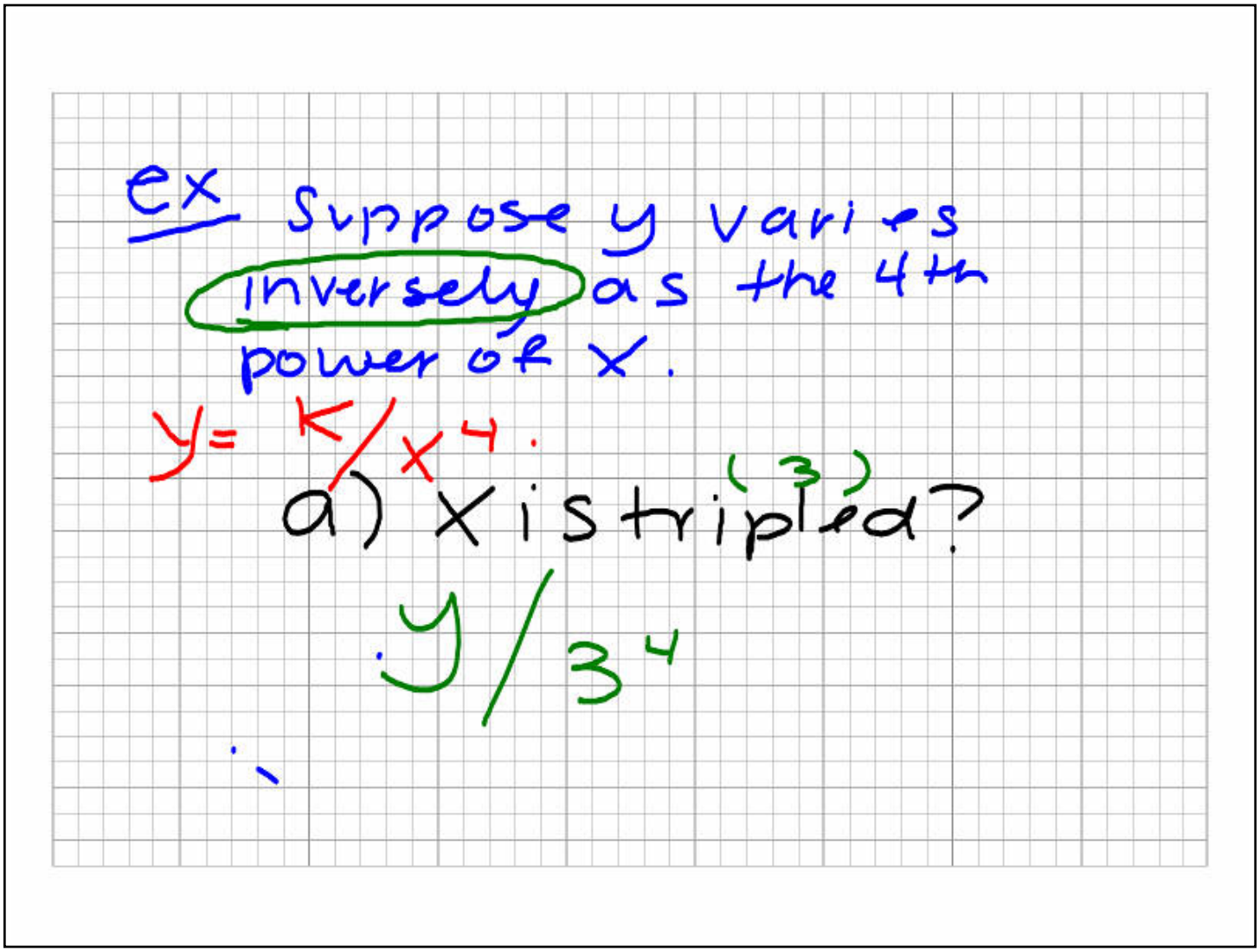
$$m \cdot 2^5 \quad (2)$$

b) q is quadrupled?

$$m \cdot 4^5 \quad (4)$$

c) q is mult. by $1/3$

$$m \cdot (1/3)^5$$


ex Suppose y varies inversely as the 4th power of x.
y = k/x^4.
a) x is tripled?
y/3^4

2.4 The graph of $y = kx$

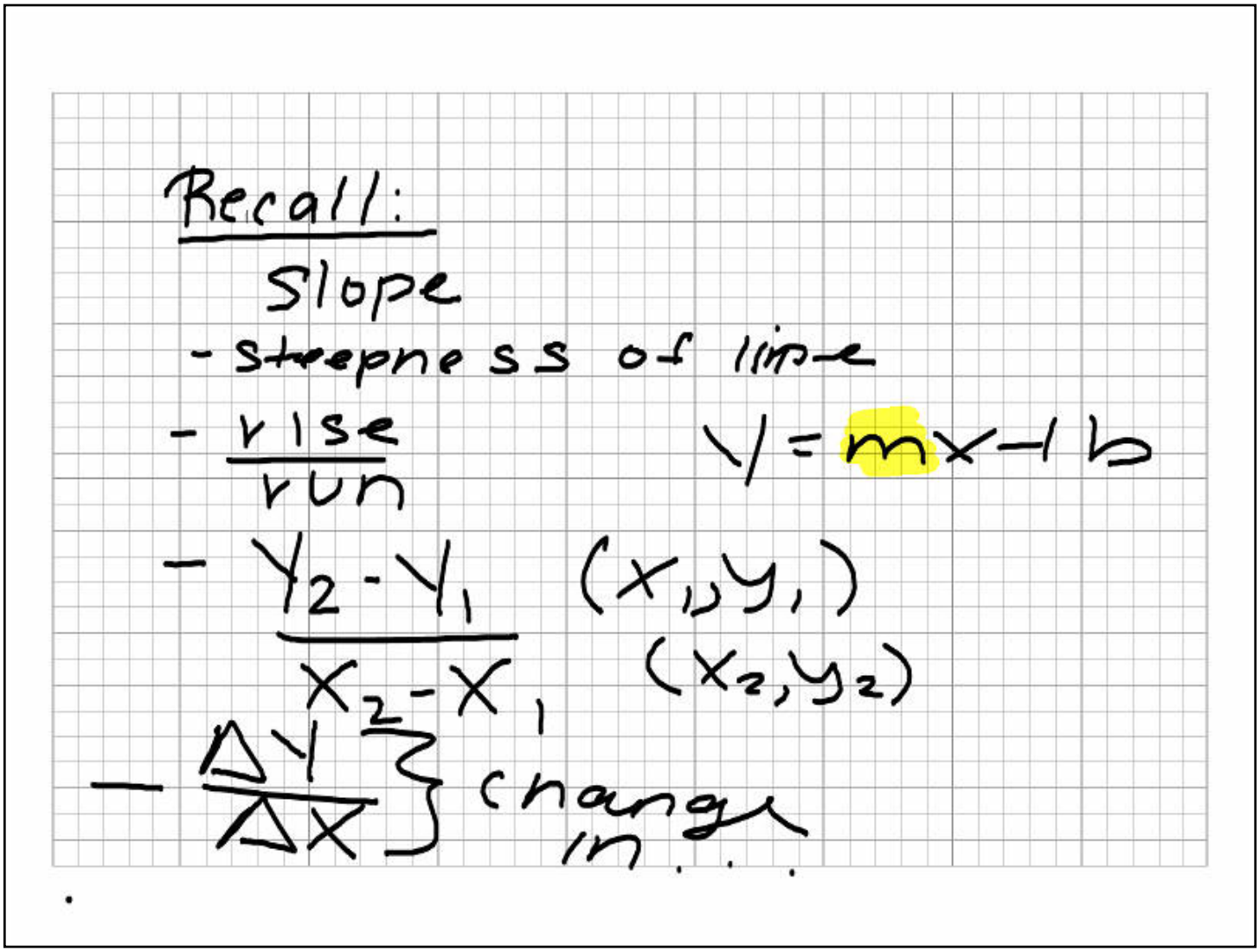
$$d = \frac{1}{5}t$$

↳ COV

$5 \cdot \frac{1}{5}$

$10 \cdot \frac{1}{5}$

t	d
(5	1)
10	2
15	3
20	4
25	5
30	6


Recall:
Slope
- steepness of line
- rise / run
- $\frac{y_2 - y_1}{x_2 - x_1}$ (x_1, y_1) (x_2, y_2)
- $\frac{\Delta y}{\Delta x}$ } change in . . .
$y = mx + b$