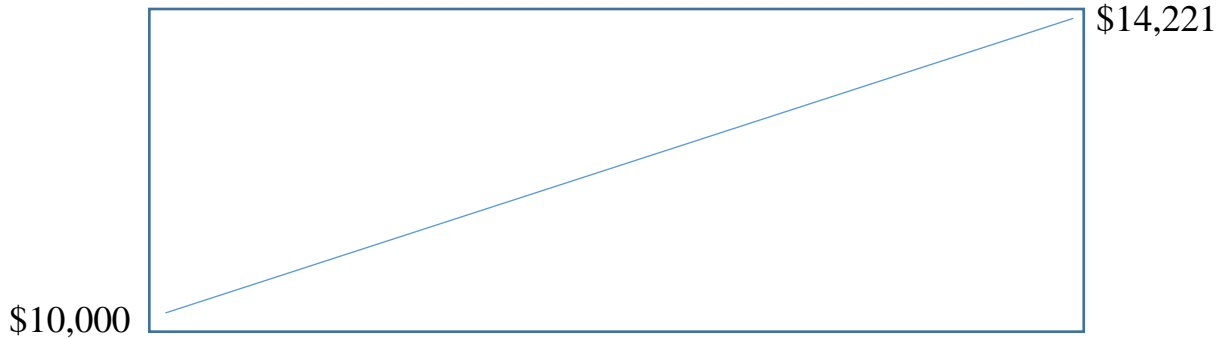


- Put \$10,000 in 8-year CD, bank agrees to pay annual compounded interest rate of 4.5%. How much will you have when the instrument matures in 8 yrs?

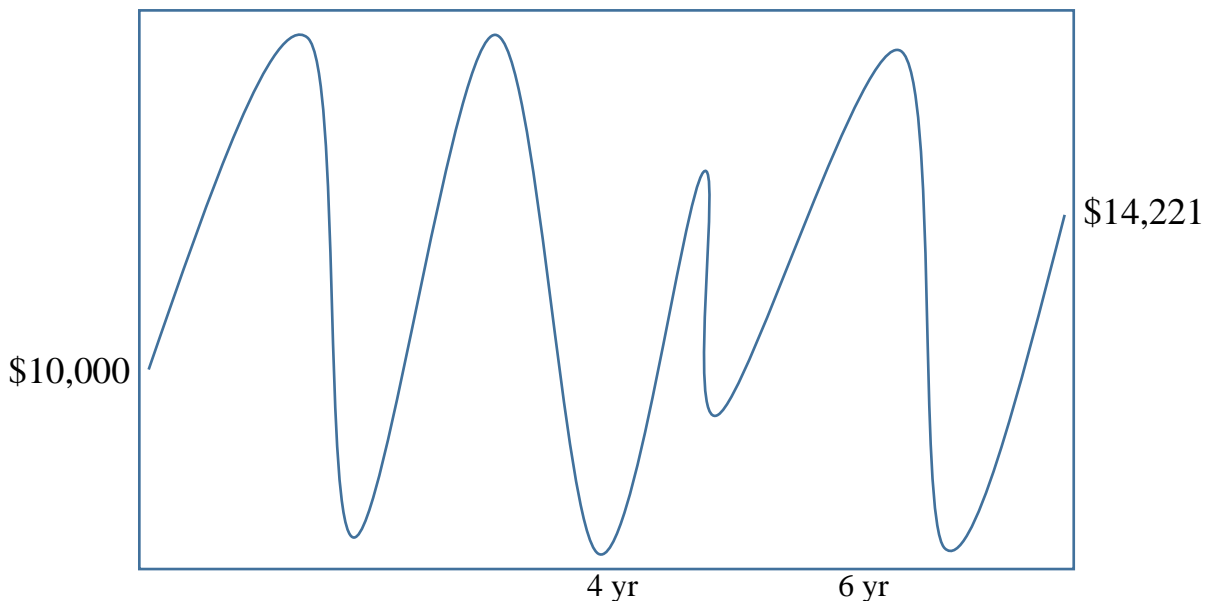
$$\$10,000 (1.045)^8 = \$14,221$$



- Now look after the fact: 8-year CD grew steadily from \$10,000 deposited to \$14,221 at maturity 8 years later; what compounded average annual interest rate did you earn?

$$\begin{aligned}
 & \$10,000 (1 + r)^8 = \$14,221 \\
 & (1 + r)^8 = 1.4221 \text{ so } \sqrt[8]{(1 + r)^8} = \sqrt[8]{1.4221} \\
 & 1 + r = 1.045 \text{ so } r = .045 \text{ or } 4.5\%
 \end{aligned}$$

- Buy a Cryptcoin for \$10,000, then after 8 years of erratic growth and decline its value is \$14,221. What has been the average annual rate of growth or return?



$$\begin{aligned}
 & \$10,000 (1 + r)^8 = \$14,221 \\
 & (1 + r)^8 = 1.4221 \text{ so } \sqrt[8]{(1 + r)^8} = \sqrt[8]{1.4221} \\
 & 1 + r = 1.045 \text{ so } r = .045 \text{ or } 4.5\%
 \end{aligned}$$

The CD's yearly return was fixed at 4.5%, so its average annual return over any interval within that 8 years was 4.5%. But Cryptcoin's average return over intervals other than the full 8 years would reflect when the measure was taken. From the purchase date until the end of year 4 the average annual return would have been negative, whereas for a 6-year interval the average annual return would have far exceeded 4.5%. The average periodic return for a collectible item could mask severe increases and declines in value.