

TDM	729.89	915.51	185.62	▲25.43%	FLR	660.27	745.28	85.01	▲12.88%
HUM	749.73	924.29	174.56	▲23.28%	UVD	155.59	181.57	25.98	▲16.70%
DMW	833.72	1004.01	170.29	▲20.43%	QVU	440.55	540.21	99.66	▲22.62%
YZJ	903.49	1127.46	223.97	▲24.79%	HZT	285.51	344.98	59.47	▲20.83%
GLY	982.07	1219.39	237.32	▲24.17%	PCW	811.44	1029.66	218.22	▲26.89%
VDA	113.74	143.41	29.67	▲26.09%	AIK	361.77	451.39	89.62	▲24.77%
UVV	468.08	535.41	67.33	▲14.38%	ZJJ	858.36	994.57	136.21	▲15.87%
...	RHJ	894.79	1046.88	151.89	▲16.97%

Compound Interest and Investing

“Compound interest is the eighth wonder of the world. He who understands it, earns it; he who doesn't, pays it.” - Albert Einstein



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You have 2 options:



Option 1: 1 penny that doubles every day for a month (30 Days)

Option 2: \$750,000 in one payment

What option do you choose?

Please silently write down your choice.



Watch this video to see which option would allow you to walk away with the most money at the end of the month.



<https://youtu.be/mdUUtBi3Uw0>

Let's look at Our 2 Options...

\$.01 Doubling Daily for 30 Days				
Day 1 - \$.01	Day 7 - \$.64	Day 13 - \$40.96	Day 19 - \$2,621.44	Day 25 - \$167,772.16
Day 2 - \$.02	Day 8 - \$1.28	Day 14 - \$81.92	Day 20 - \$5,242.88	Day 26 - \$335,544.32
Day 3 - \$.04	Day 9 - \$2.56	Day 15 - \$163.84	Day 21 - \$10,485.76	Day 27 - \$671,088.64
Day 4 - \$.08	Day 10 - \$5.12	Day 16 - \$327.68	Day 22 - \$20,971.52	Day 28 - \$1,342,177.28
Day 5 - \$.16	Day 11 - \$10.24	Day 17 - \$655.36	Day 23 - \$41,943.04	Day 29 - \$2,684,354.56
Day 6 - \$.32	Day 12 - \$20.48	Day 18 - \$1,310.72	Day 24 - \$83,886.08	Day 30 - \$5,368,709.12

\$750,000	
Day 1	Day 30
\$750,000	\$750,000

What does the penny problem have to do with compound interest?



How does the penny problem relate back to compound interest?

Getting 100% return every day, as we did in the penny example, is highly unlikely!

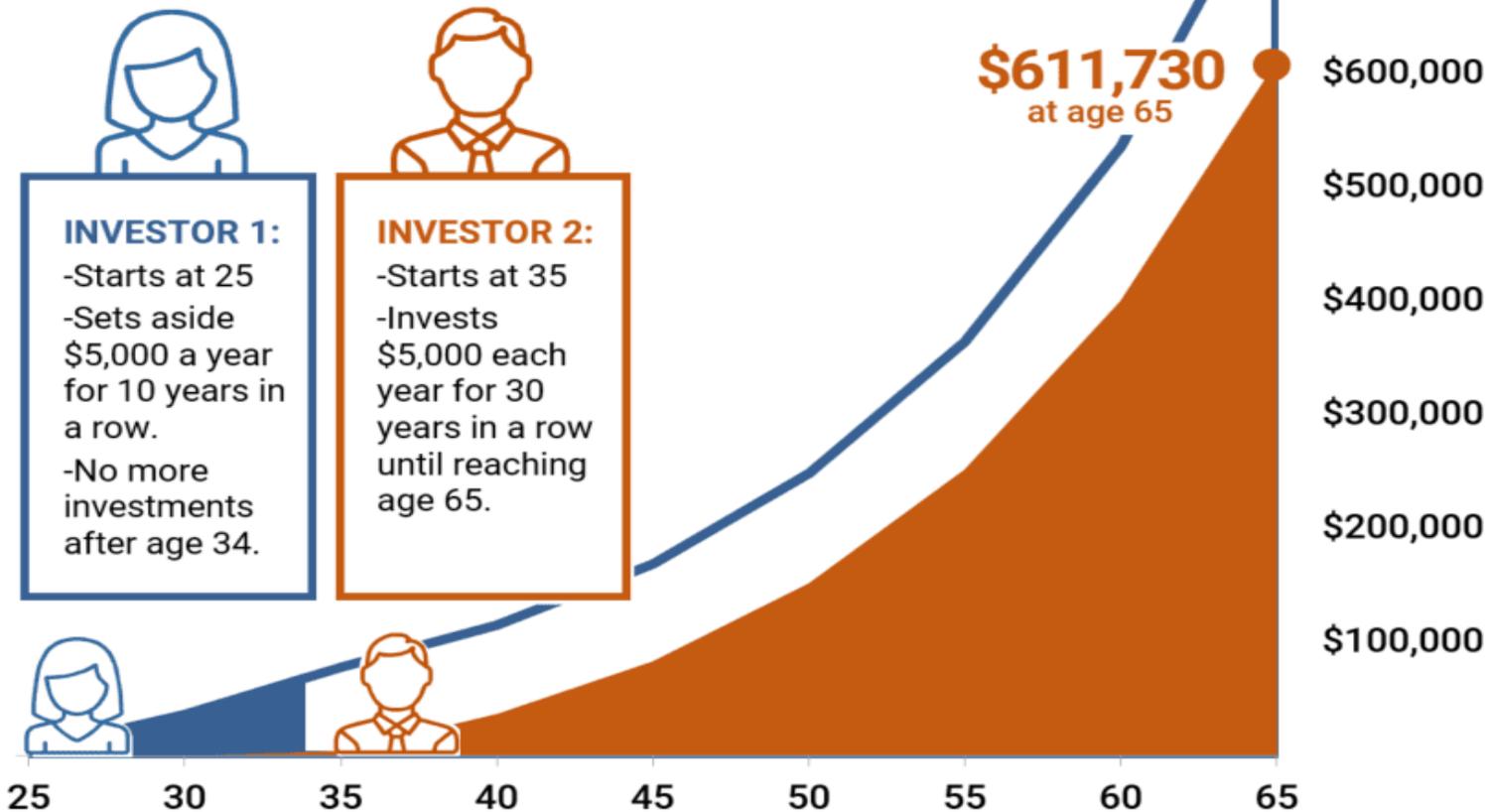
However, the principle of compounding holds true for smaller returns too. It will take longer than a month to make your fortune like it did in the doubling penny example – the big idea here? **Compounding helps your money make money** no matter what rate of return you are working with.

This example shows why compounding is a core aspect of good personal finance and **the reason why the rich get richer**. Basically, it comes down to an age-old tenet – **when you're young, you have an asset money can't buy: TIME.**



COMPOUND INTEREST: WHO WILL EARN MORE?

This example shows how the earlier a person takes advantage of compound interest, the more time that money has to grow.



INVESTOR 1:

- Starts at 25
- Sets aside \$5,000 a year for 10 years in a row.
- No more investments after age 34.

INVESTOR 2:

- Starts at 35
- Invests \$5,000 each year for 30 years in a row until reaching age 65.

Even with a larger sum of money invested, Investor 2 never catches up to Investor 1 because she has TIME on her side.

**Total Investments:
Investor 1 - \$50k
Investor 2 - \$150k**

NOTES: Assumes an 8 percent interest rate, compounded annually. Balances shown are approximate.
SOURCE: Author's calculations.

Stop and discuss:

Why is compound interest important for high school students to understand?



Compound Interest Calculator

Use the link to the compound interest calculator to calculate the answers to the questions on the following slide.

<https://www.investor.gov/financial-tools-calculators/calculators/compound-interest-calculator>

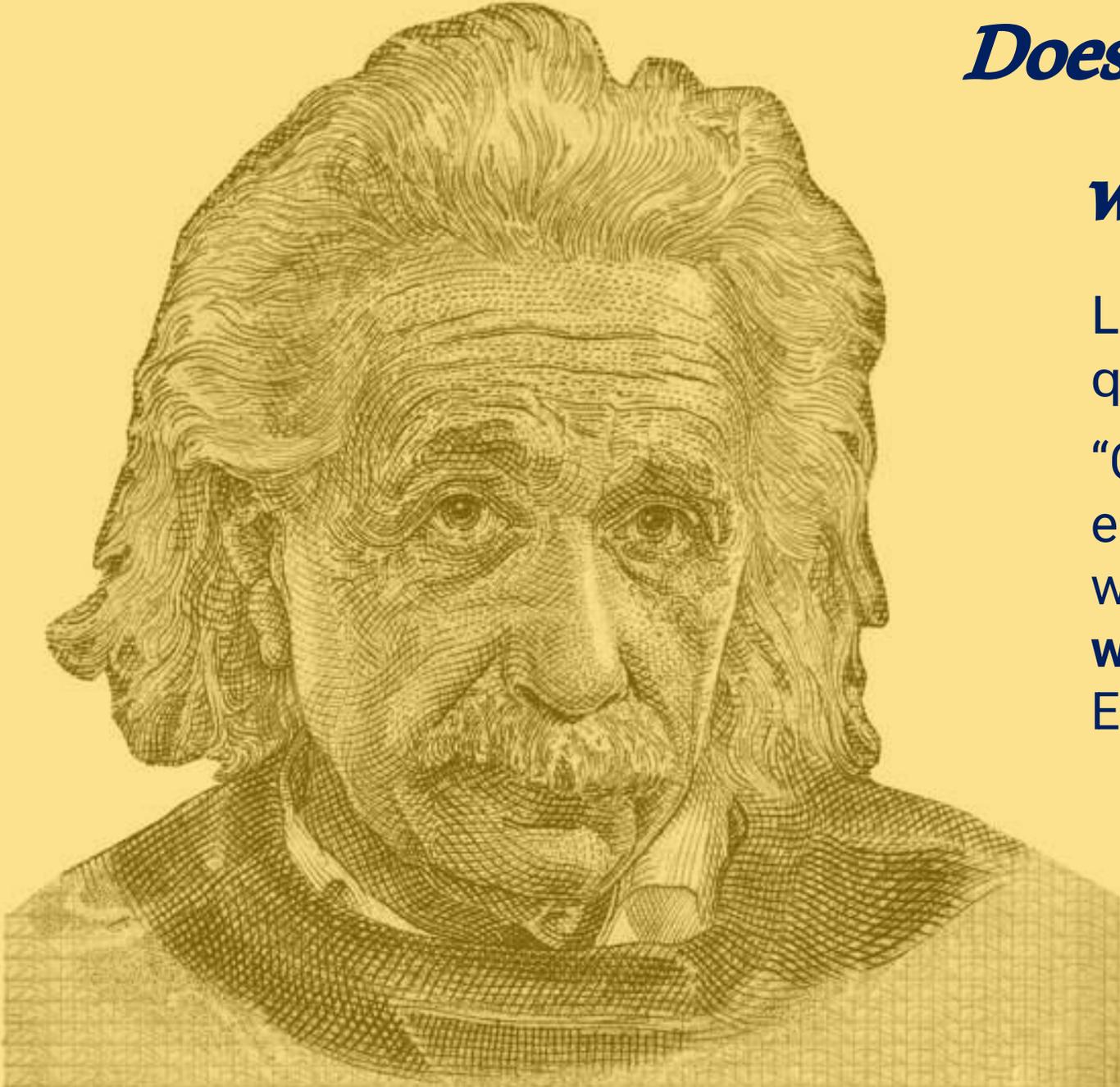
Compound Interest Scenarios:

1. Sadie decides that instead of buying a new laptop for college with her graduation money she is going to continue to use her old one and invest her money. She uses her graduation money and some money she saved from her summer job – a total of \$3000! If she invests when she turns 18 and earns an average of 8% per year, how much money will her \$3000 be worth when she turns 28? 38? 48? 58? 68?
2. Sadie enjoys seeing her money grow so she decides to give up her daily stop at the coffee shop and brew her coffee at home. She was spending around \$5 a day at the coffee shop - \$35 a week! With around 4 weeks in a month, she now has an extra \$140 to invest monthly. With this one change, how much money will she now have when she turns 28? 38? 48? 58? 68?

How much will Sadie's investment be worth?

Age	\$3000 Investment	Amount Invested	\$3000 + \$140 Per Month	Amount Invested
28	\$6,476	\$3,000	\$30,814	\$19,800
38	\$13,982	\$3,000	\$90,862	\$36,600
48	\$30,187	\$3,000	\$220,503	\$53,400
58	\$65,173	\$3,000	\$500,388	\$70,200
68	\$140,704	\$3,000	\$1,104,638	\$80,000

What observations can you make about this chart?



Does compounding always work in your favor?

Let's go back to Einstein's quote...

"Compound interest is the eighth wonder of the world. He who understands it, earns it; **he who doesn't, pays it.**" - Albert Einstein

Let's think of buying a home...

This is where interest can work against you. You may have heard of people shopping for the best "rate" when borrowing money to buy a home.

The lower the rate a home buyer (or car, boat, or any other purchase requiring a loan...) can obtain, the lower their payments will be.

Use this loan calculator to figure out how much each person will pay in interest on the following slide.

https://www.pnwfcu.org/resources/calculators/?CALCULATORID=HF02&TEMPLATE_ID=www.pnwfcu.org_1

Loan Scenarios:

1. Chase buys a car for \$27,000. At the first dealership he visited they offered to finance him for 60 months at 6% interest. At the second dealership they offered to finance the same car for the same price for 60 months at 2% interest. **How much will Chase save in interest over the life of the loan?**

2. Veronica is purchasing her first home. She shops rates and finds the best rate she can get is 3.4% for a 30-year fixed loan on her \$429,000 home. **If she puts 10% down, how much interest will she pay over the life of the loan?**

3. Timmy was also buying a home for \$429,000 but didn't know shopping rates was important, so he took the first 30-year loan offered to him at 4.2%. When Veronica told him she had a lower rate he figured, "No biggie! It's less than one percent." **If he also puts 10% down, how much more will Timmy pay than Veronica over the life of the loan?**

1. Chase saved \$2,924.13 over the life of the loan by finding a lower rate.
2. Over the life of the loan Veronica will pay \$230,321.46 in interest charges.
3. Over the life of the loan Timmy will pay \$63,291 more than Veronica for a total of \$293,612.54 in interest payments.

Lesson Learned? The math never lies – always do the math before making a major purchase you'll be financing! Once you know what it *really* costs, is it still a financially wise purchase for you?

Stop and discuss:

Why is it important
to “shop rates”
when making a
major purchase?



Compound vs. Simple Interest

Watch this video to understand the difference between compound and simple interest.
<https://youtu.be/wf91rEGw88Q>



Stop and discuss:

As a borrower, what kind of interest would you want to pay?

As an investor, what kind of interest would you want to earn?



Use Your Knowledge:

Imagine you are 65 and have withdrawn some of your savings. You have decided to gift \$10,000 to your young nephew or niece for graduation. Write a letter to accompany the check that explains why he or she should start saving and investing early.

Use the following terms in your letter:

**Compound
Investment**

**Time
Return**



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For additional questions contact Kristin Mullady at
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For additional practice with Compound Interest check out our math material at
<https://www.pnwfcu.org/resources/school-resources/high-school/>