5.1 Simple and Compound Interest

Interest: percentage of a borrowed amount that is owed at the end of a year in addition to the original amount.

Simple Interest: The same exact amount of interest each year is added to the original amount borrowed. Think “constant interest added.”

Compound Interest: Interest is calculated each year and added into the amount borrowed before being calculated the next year. Think “calculating Interest on the Interest.”

Vocabulary/Formulas:

P = Principal : P is the original amount borrowed

r = Rate: r is the interest rate as a decimal

t = Time: t is the year

A = Amount: A is the total amount owed (or your balance) after t years

Simple Interest formula for amount owed:

$$A = P + (Pr)t$$

Compound Interest formula for amount owed:

$$A = P + (1 + r)^t$$

Suppose that Nico deposits $1000 into an account that earns 5% simple interest each year.
Suppose that Raul deposits $1000 into an account that earns 5% compound interest each year.

Create your formula for each situation.

Nico (Simple Interest)

$$A = P + (Pr)t$$
$$A = 1000 + (1000 \cdot 0.05)t$$
$$A = 1000 + 50t$$

Raul (Compound Interest)

$$A = P(1+r)^t$$
$$A = 1000(1+0.05)^t$$
$$A = 1000(1.05)^t$$

1. Use the simple and compound interest formulas from the situations for Nico's simple interest account and Raul's compound interest account to complete the table. Round the values to the nearest cent.

Quantity	Time	Simple Interest Balance	Compound Interest Balance
Units	*years*	*dollars*	*dollars*
Expression	t	$A = 1000 + 50t$	$A = 1000(1.05)^t$
	0	1000	1000
	1	1050	1050
	2	1100	1102.50
	8	1400	1477.46
	100	6000	131,501.26

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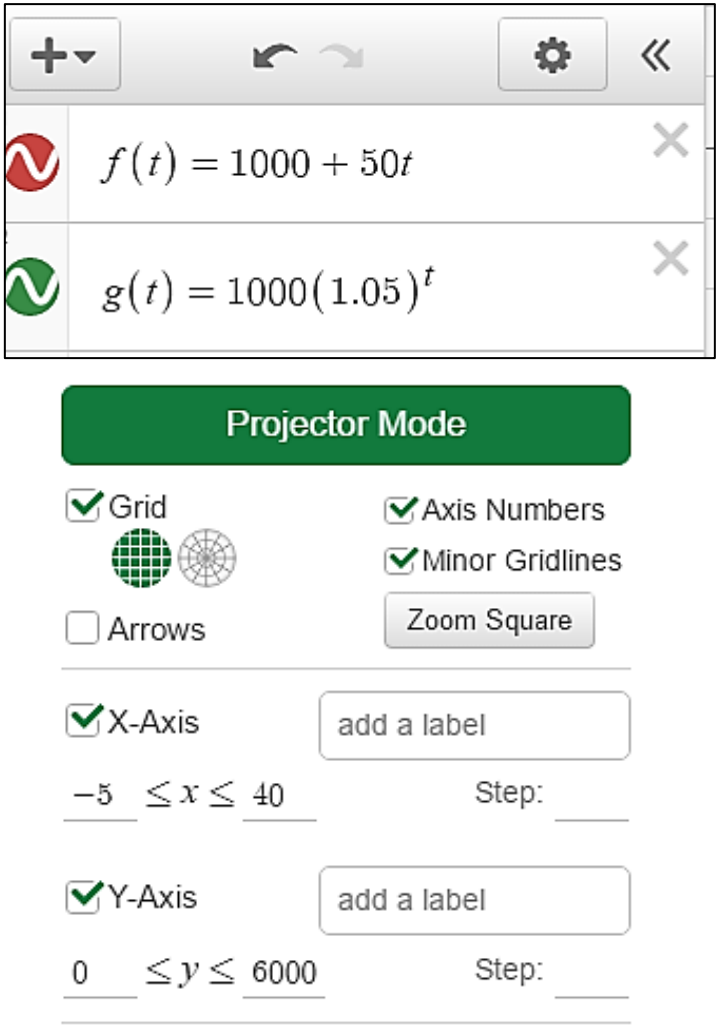
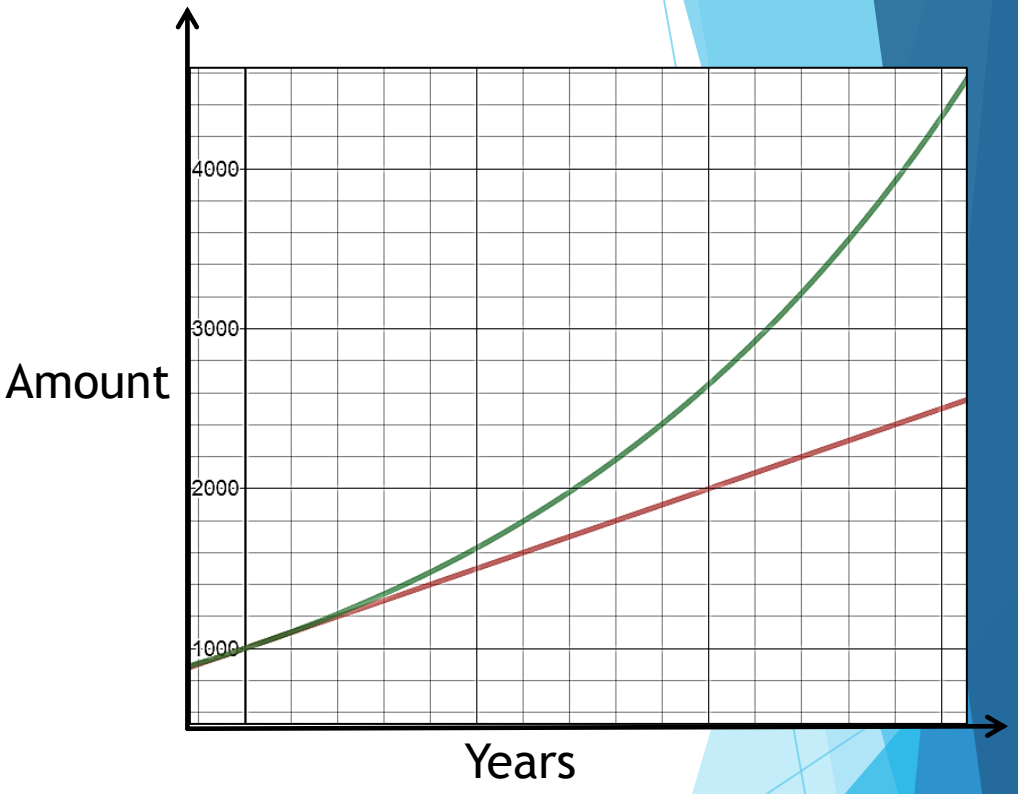
Which of these interest formulas is Arithmetic and which is geometric? Why?

2. Terrell is looking for some financial advice. He has the option to deposit $1000 into the simple interest account just like Nico's account, or a compound interest account just like Raul's account. The compound interest account would cost him a one-time start-up fee of $200. The simple interest account is free. Into which account would you tell Terrell to put his money and why?

Short term – Simple; Long Term - Compound

3. Graph the simple interest and compound interest functions on desmos.com. Then, sketch and label the graphs on the given grid.





What kind of functions are these? Linear? Absolute Value? Exponential? Quadratic?

Simple Interest – Linear
Compound Interest - Exponential

Check for Students' Understanding

Suppose that your family deposited $10,000 in an interest bearing account for your college fund that earns 4% simple interest each year and a friend's family deposited $10,000 in an interest bearing account for their child's college fund that earns 4% compound interest each year.

Use the simple and compound interest formulas to complete the table and round the values in the table to the nearest cent.

P = 10,000
r = 0.04

$A = P + (Pr)t$

$A = 10000 + (10000 \cdot 0.04)t$

$A = 10000 + 400t$

$A = P(1+r)^t$

$A = 10000(1+0.04)^t$

$A = 1000(1.04)^t$

	Time	Simple Interest Balance	Compound Interest Balance
Units	*years*	*dollars*	*dollars*
Expression	t	$A = 10000 + 400t$	$A = 10000(1.04)^t$
	0	10,000	10,000
	1	10,400	10,400
	2	10,800	10,816
	3	11,200	11,248.64
	10	14,000	14,802.44

How much money will you and your friend have in the college funds when you each turn 18 years old?

You - $17,200; Your friend - $20,258.17