

CODING WITH SIMPLE AND COMPOUND INTEREST

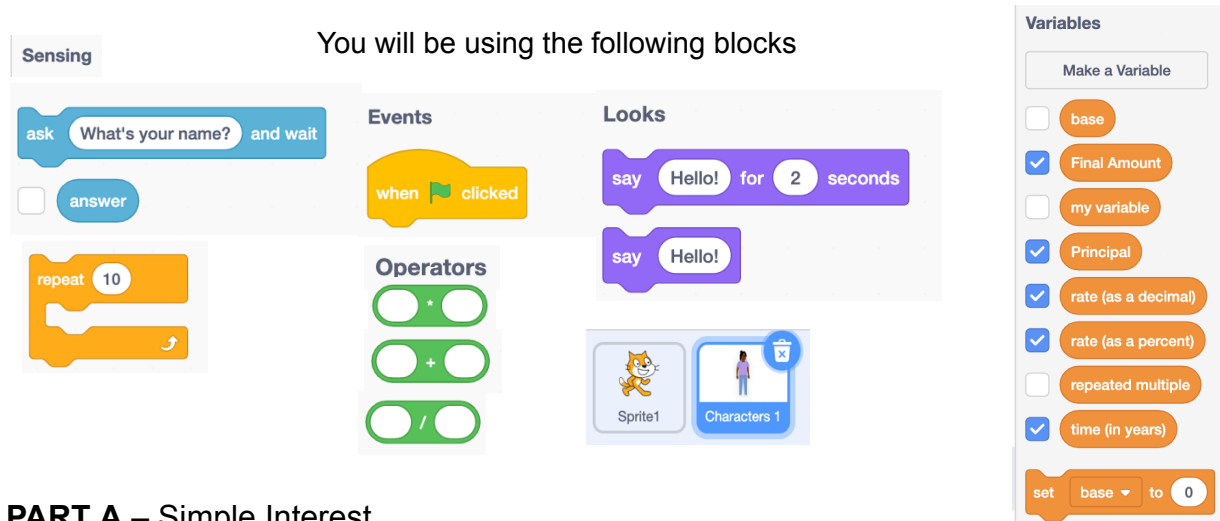
PART A – Simple Interest code scramble and test

PART B – Compound Interest code and questions

PART C – Using formulas and testing your code

PART D – Using code to compare the effects of changing different factors

You will be using the following blocks

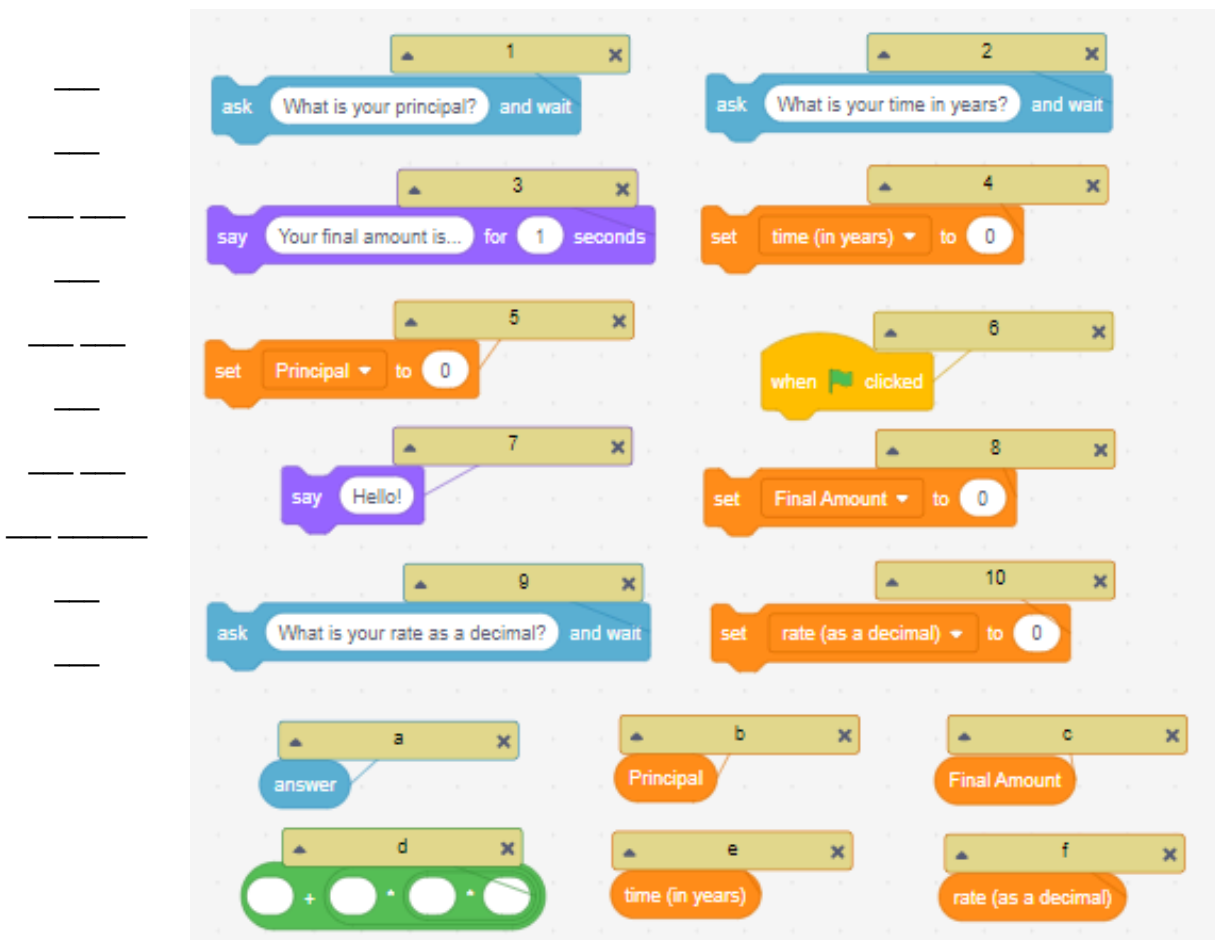


The image shows a Scratch block palette with the following sections:

- Sensing:**
 - ask "What's your name?" and wait
 - answer
 - repeat 10
- Events:**
 - when green flag clicked
- Looks:**
 - say "Hello!" for 2 seconds
 - say "Hello!"
 - Sprite1
 - Characters 1
- Operators:**
 - Mathematical operators: +, -, *, /
- Variables:**
 - Make a Variable
 - base
 - Final Amount
 - my variable
 - Principal
 - rate (as a decimal)
 - rate (as a percent)
 - repeated multiple
 - time (in years)
 - set base to 0

PART A – Simple Interest

Unscramble the following code. Write the order that the code should appear in on the lines, and then code it in scratch to ensure it runs.



The image shows a collection of 10 scrambled Scratch code blocks, numbered 1 through 10, and 6 variable labels (a-f). The blocks are:

- 1: ask "What is your principal?" and wait
- 2: ask "What is your time in years?" and wait
- 3: say "Your final amount is..." for 1 seconds
- 4: set time (in years) to 0
- 5: set Principal to 0
- 6: when green flag clicked
- 7: say "Hello!"
- 8: set Final Amount to 0
- 9: ask "What is your rate as a decimal?" and wait
- 10: set rate (as a decimal) to 0

The variable labels are:

- a: answer
- b: Principal
- c: Final Amount
- d: +
- e: time (in years)
- f: rate (as a decimal)

On the left side of the image, there are lines for writing the order of the code blocks:

```

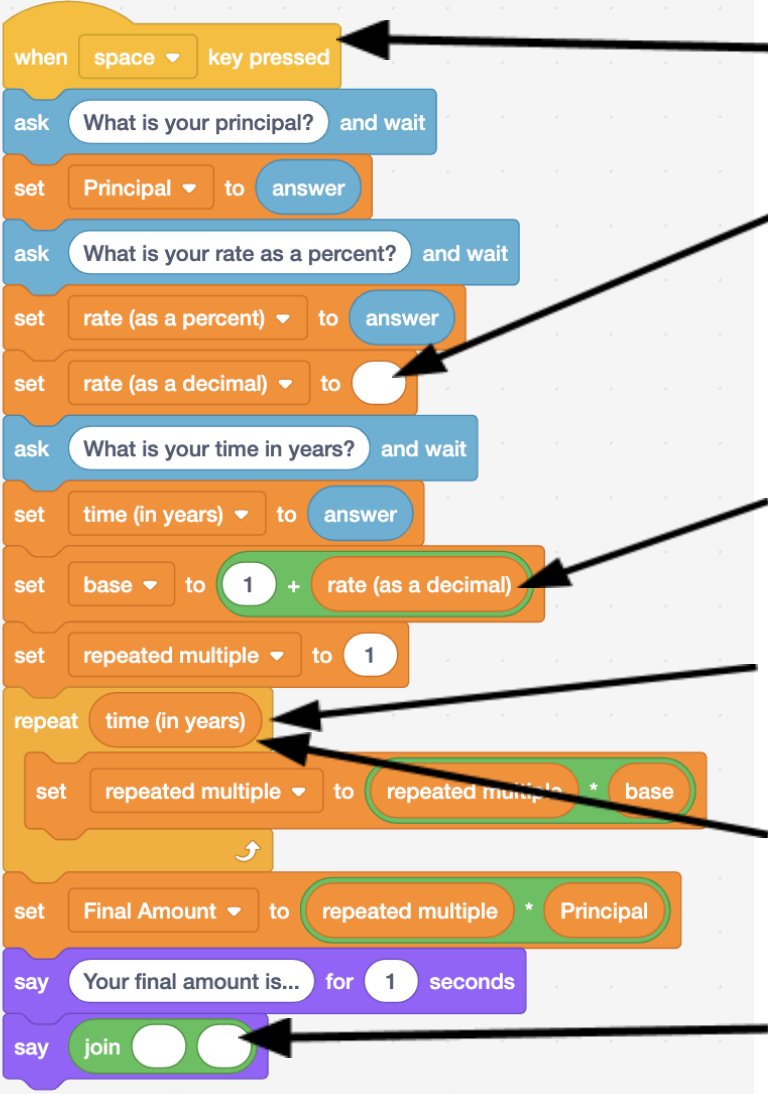
____
____
____
____
____
____
____
____

```

CODING WITH SIMPLE AND COMPOUND INTEREST

PART B – Compound Interest

Answer the following questions based on the code given.



The image shows a Scratch script for calculating compound interest. The script starts with an event block 'when space key pressed'. It then asks the user for the principal, rate as a percent, and time in years. It sets 'Principal' to the answer, 'rate (as a percent)' to the answer, and 'rate (as a decimal)' to an empty input field. It then asks for 'time in years' and sets 'time (in years)' to the answer. It sets 'base' to '1 + rate (as a decimal)' and 'repeated multiple' to '1'. A repeat loop is set to 'time (in years)' iterations, with the block 'set repeated multiple to repeated multiple * base'. After the loop, it sets 'Final Amount' to 'repeated multiple * Principal'. It says 'Your final amount is...' for 1 second, and finally says 'join' followed by two empty input fields.

1) What does this Events block do?

2) How would you code the program to convert the given %rate to decimal? Describe which blocks you would use.

3) Why do we set the base to "1 + rate"?

4) What is the purpose of the repeat?

5) Why is the repeat set to "time"?

6) How would you code the program to output the final amount with a \$ sign?

- 7) Select a different sprite and enter the above Compound Interest code. Do not delete your Simple Interest code.

CODING WITH SIMPLE AND COMPOUND INTEREST

PART C – Testing your code

Answer questions 1 & 2 by hand and then test your code:

Simple Interest

$$A = P + Prt$$

1. You deposit \$3500 in an account that pays 8.4% simple interest. Find the balance after 5 years.

Compound Interest

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

2. You deposit \$1500 in an account that pays 6% interest compounded yearly. Find the balance after 5 years.

Once you determine your code works correctly, answer the following questions using your code.

3. Which option gives the greater balance? Show the balance for each option.

Option A

Put \$500 in an account that pays 7.5% interest compounded yearly for 9 years.

Option B

Put \$700 in an account that pays 6.5% simple interest for 9 years.

Which investment is better?

CODING WITH SIMPLE AND COMPOUND INTEREST

PART D – Using code to compare the effects of changing different factors

4. Which option gives the greater balance? Show the balance for each option.
- a) Put \$2000 in an account that pays 8% interest compounded yearly for 8 years.
 - b) Put \$2000 in an account that pays 10% interest compounded yearly for 8 years.

Option A:

Option B:

5. What principal amount would you need to put in the account at 8% to have it equal the account at 10%?

6. Which option gives the greater balance? Show the balance for each option.
- a) Put \$5000 in an account that pays 5.5% interest compounded yearly for 14 years.
 - b) Put \$8000 in an account that pays 5.5% interest compounded yearly for 10 years.

Option A:

Option B:

7. What effect affects the final amount in an account more: Time, Principal amount, or rate? Explain your reasoning.

Extension

8. Change the coding to make the code depreciate instead of appreciate.
The original value of a purchase is \$1450. It depreciates at a rate of 5% per year every year. What is the value of the amount after 5 years?