ACTIVITY WORKSHEET

NAME: _____

BY HAND

Following standard scientific procedure, round numbers only at the end.

1. Multiply your age in Earth years by 365.25 to get your age in Earth days. There are technically 365.25 days in a year; that is why every four years, there is a *leap year* with one extra day.
2. Divide that number by 1.027 to get your age in Martian days. You must divide since a Martian day has the length of about 1.027 Earth days; in other words, a Martian day is a longer unit of time than an Earth day.
3. There are about 668.599 Martian days in a Martian year, so divide your number by that to get your age in Martian years.
4. Round this number down to the nearest whole number to get your Martian age as you would tell it to someone else.

Here is an example for someone who is aged 15 (in Earth years):

Earth years are represented by E_{years}. Earth days are represented by E_{days}.

Martian years are represented by M_{years}. Martian days are represented by M_{days}.

$$15\,T_{years} \times \frac{365.25\,E_{days}}{1\,T_{year}} = 5478.75\,E_{days}$$

$$5478.75\,E_{days} \times \frac{1\,M_{day}}{1.027\,T_{days}} = 5334.712755598832\,M_{days}$$

$$5334.712755598832\,M_{days} \times \frac{1\,M_{year}}{668.599\,M_{days}} = 7.978942169519894\,M_{years} \approx 7\,M_{years}$$

We round this number down to 7 because, even thought you are very close to being 8 years old, you would still say you are 7.

PROGRAMMING

Now, repeat the calculation you did above—only this time, using JavaScript.

1. Open your favourite Web browser and hit the F12 key. There should be a clickable tab called "Console" at the top of the window that just appeared. (If this doesn't work, search "Open developer tools Chrome/Firefox/your browser" and follow along from there.)

2. In the **console**, type your first **statement**. Create a **variable** that stores your age in Earth years by typing the following code and hitting the Enter key. The example below is for someone who is 15; replace 15 with your own age.

```
var earthAgeInYears = 15;
```

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3. Convert your age to Earth days by typing the following code and hitting the Enter key.

```
var earthAgeInDays = earthAgeInYears * 365.25;
```

4. Convert your age to Martian days.

```
var marsAgeInDays = earthAgeInDays / 1.027;
```

5. Convert your age to Martian years and remove the numbers after the decimal point. `Math.trunc()` simply removes the digits after the decimal point in the number.

```
var marsAgeInYears = Math.trunc(marsAgeInDays / 668.599);
```

6. Finally, print your age in the console. console.log() prints messages to the console. The message in orange should appear.

```
console.log('Your age on Mars is about ' + marsAgeInYears + ' years old.');
```

```
Your age on Mars is about 7 years old.
```

ADVANCED VERSION

Copy the following code and paste it all at once in the console, then hit Enter. What happens? Afterwards, try to understand what's going on in each line. Make sure to type a positive number (and not a negative number or a word) into the popup text box. What happens if you don't? How is this accounted for in the code?

```
var earthAgeInYears = -1;
while(!(earthAgeInYears > 0)) {
        var input = prompt('Please enter your age. You must enter a number greater
        than 0.');
        earthAgeInYears = parseInt(input);
}
var earthAgeInDays = earthAgeInYears * 365.25;
var marsAgeInDays = earthAgeInDays / 1.027;
var marsAgeInYears = Math.trunc(marsAgeInDays / 668.599);
console.log('Your age on Mars is about ' + marsAgeInYears + ' years old.');
```

- The `while` keyword loops through the following code as long as the condition is true. Here, as long as what's inputted in the text box is not a positive number, it will keep asking for your age.
- `prompt()` creates a popup dialog that accepts an input.
- `parseInt(input)` converts `input` from a word into a number, from JavaScript's viewpoint. It just so happens that anything entered into `prompt()` in line 1 will be interpreted as a word, even numbers like "15," so this is a necessary step in order to do calculations with `input`.

CONCLUSION

Coding is a useful tool that, among other things, simplifies complex or repetitive calculations for scientists and engineers.

In this exercise, you wrote a small program to convert your Earth age to your Martian age. It may have been slower than doing it by hand—but imagine you had to convert the ages of everyone at your school. Doing all that by hand would take a long time! The JavaScript program reuses the same calculation logic for any input, so you will only have to go through the writing process once. You can then instantly convert any amount of ages afterwards.