Grade 5 Measurement Relationships
Specific Expectation:
By the end of Grade 5, students will:
-solve problems involving the relationship between a 12-hour clock and a 24-hour clock (e.g., 15:00 is 3 hours after 12 noon, so 15:00 is the same as 3:00 p.m.)

SAMPLE PROGRAM:

Create a program that will convert the 24 hour clock time entered by the user to 12 hour clock time (hours only). The program will also indicate whether the time is in the morning (AM) or afternoon (PM).

Applying George Polya's four-step model to solving this problem:

Understand the Problem (the exploratory stage)

Teacher ensures students can convert from 24 hour to 12 hour clock time (suggest backward approach... give students answer, they determine rules):

> *How to change the hour from a 24 Hour Clock time to 12 Hour Clock time:*
>
> *If the number is above 12*, then it is afternoon. We also need to subtract 12 from the time.
>
> *If the number is 12 or less*, then it is morning. We do not need to subtract 12 from the time.
>
> E.g. 14:00
>
> 14 is greater than 12, so it is PM
> 14 – 12 = 2
> 14 hours in a 24 hour clock is 2 PM in 12 hour clock time.
>
> E.g. 3:00
>
> 3 is less than 12, so it is AM
> 3 hours in a 24 hour clock is 3 AM in 12 hour clock time.

INPUT Value(s):

-24 Hr Clock Time (variable)

OUTPUT Value(s):

-12 Hr Clock Time (variable)
-AM or PM (variable)

Make a Plan

Algorithm (in pseudocode):
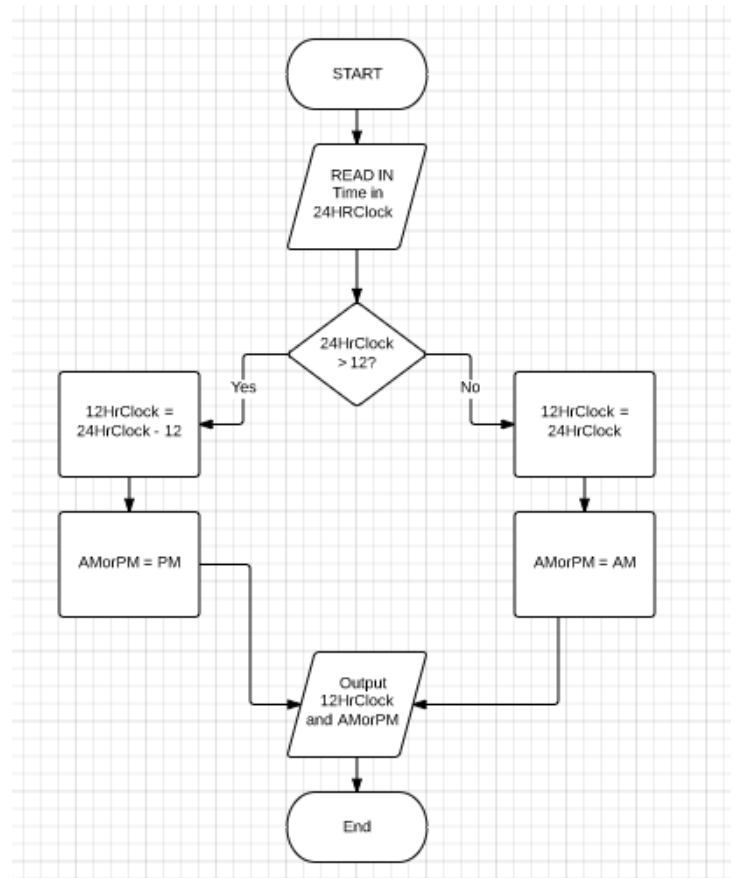
```
Declare variables:  24hourclocktime, 12hourclocktime, AMorPM

Ask user for time in 24 hour clock
Store user answer in 24hourclocktime

If 24hourclocktime > 12 then
    12hourclocktime = 24hourclocktime - 12
    AMorPM = PM
Else
    12hourclocktime = 24hourclocktime
    AMorPM = AM
End If

Output to user the time in the 12 Hour Clock Time as well as whether it is
AM or PM.
```

Flowchart:

Carry Out the Plan

Actual coding here!

Here is the link to a tutorial explaining how to create this program:
https://www.youtube.com/watch?v=2ca96J_9UcA&feature=youtu.be

Look Back at the Solution

Try different values (e.g., 1, 5, 13, 22) to ensure it works

Extensions:

- Include error checking – ensure user cannot enter a negative number or a number higher than 24
- Include minutes
- Output images of daylight/night time depending on if the time is AM or PM
- Output images of clock times, depending on time entered by user
- Create a program that will ask the user for the time in eastern standard time zone and convert it to another time zone, indicated by the user

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By: Lisa Floyd
       @lisaannefloyd