Using Variables for Finding the Day of the Week for any Given Date
Reverend Christian Zeller's Formula

There is a formula invented by the German clergyman Christian Zeller (1824–1899) for figuring out the day of the week of a given date.   This would be a good exercise for students in algebra who are learning to use variables and to evaluate formulas.   You will need to explain the greatest integer function to them (indicated by brackets [] in the formula below).   At this level, just explain it as integer division (disregard the remainder).

 Reverend Zeller's Day Date Formula will convert the date mm/dd/yyyy to the day of the week.

 First Zeller had to fix the months:
    JAN = 11 of the previous year
    FEB = 12 of the previous year
    MAR = 1
    APR = 2
    MAY = 3
    JUN = 4
    JUL = 5
    AUG = 6
    SEP = 7
    OCT = 8
    NOV = 9
    DEC = 10
You may think of this as starting the year with March.   If the date that you are using is in January or February, you must use the PREVIOUS year in the formula.

 Let M = new month from above
 Let C = first two digits of the year
 Let Y = last two digits of the year
 Let D = day of the month

Compute the following sum:

$$SUM = \left[\frac{13M-1}{5}\right] + \left[\frac{Y}{4}\right] + \left[\frac{C}{4}\right] + D + Y - 2C$$

Remember that [ ] means Greatest Integer Function. If Sum < 0, add 7 to SUM.

Next, find the remainder of SUM / 7.

0 = SUNDAY	3 = WEDNESDAY	6 = SATURDAY
1 = MONDAY	4 = THURSDAY	
2 = TUESDAY	5 = FRIDAY	

EXAMPLES:

(1) Determine the day of the week on which Abraham Lincoln was shot (April 14, 1865).
  M = 2   C = 18   Y = 65   D = 14

$$SUM = \left[\frac{13(2)-1}{5}\right] + \left[\frac{65}{4}\right] + \left[\frac{18}{4}\right] + 14 + 65 - 2(18) = 68$$

  Dividing SUM by 7, the remainder = 5, which is FRIDAY

(2) Determine the day of the week on which the Columbine High School massacre occurred (April 20, 1999).

  M = 2   C = 19   Y = 99   D = 20

$$SUM = \left[\frac{13(2)-1}{5}\right] + \left[\frac{99}{4}\right] + \left[\frac{19}{4}\right] + 20 + 99 - 2(19) = 114$$

  Dividing SUM by 7, the remainder = 2, which is TUESDAY

(3) Determine the day of the week on which February 28, 2014 fell.
  M = 12   C = 20   Y = 13 (PREVIOUS YEAR)   D = 28

$$SUM = \left[\frac{13(12)-1}{5}\right] + \left[\frac{13}{4}\right] + \left[\frac{20}{4}\right] + 28 + 13 - 2(20) = 40$$

  Dividing SUM by 7, the remainder = 5, which is FRIDAY

(4) Determine the day of the week on which Mount Saint Helens erupted (May 18, 1980).
  M = 3   C = 19   Y = 80   D = 18

$$SUM = \left[\frac{13(3)-1}{5}\right] + \left[\frac{80}{4}\right] + \left[\frac{19}{4}\right] + 18 + 80 - 2(19) = 91$$

  Dividing SUM by 7, the remainder = 0, which is SUNDAY