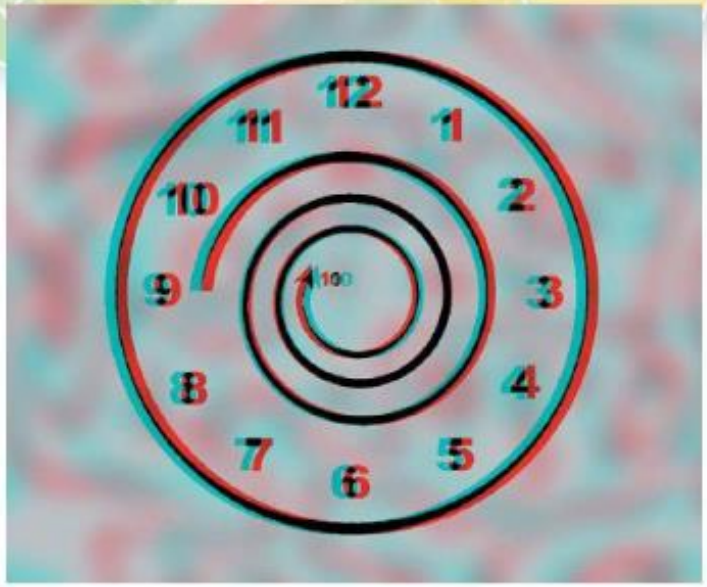
2.4 CRAZY CLOCKS AND CHECKING OUT BARS

Cyclical Clock Arithmetic and Bar Codes

> *A rule to trick th' arithmetic.*
>
> RUDYARD KIPLING



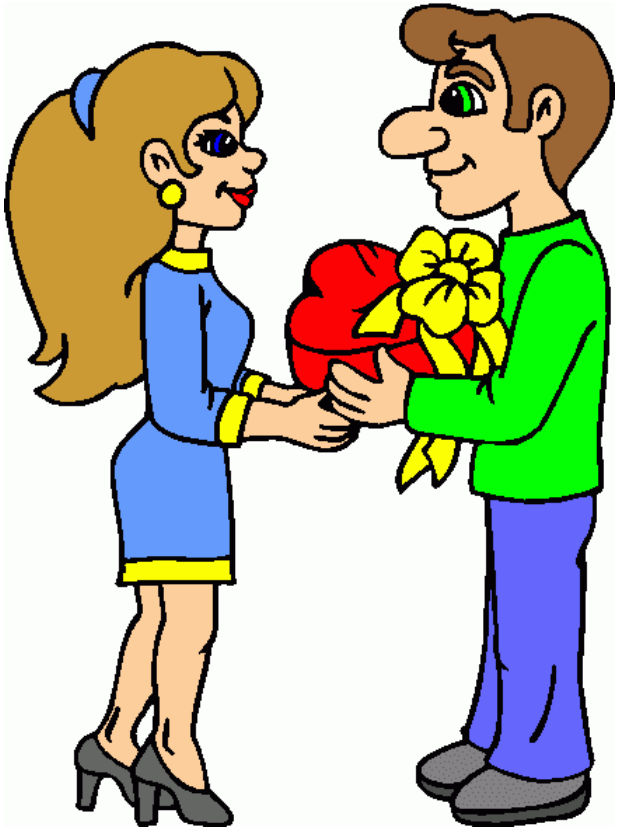
Use your *Heart of Mathematics* 3D glasses to view this picture.

QUESTION OF THE DAY:

Today is Thursday, January 24th. On what day of the week will the Fourth of July fall this year?

Time

- 9:00 (9 o’clock)
  - 37 hours



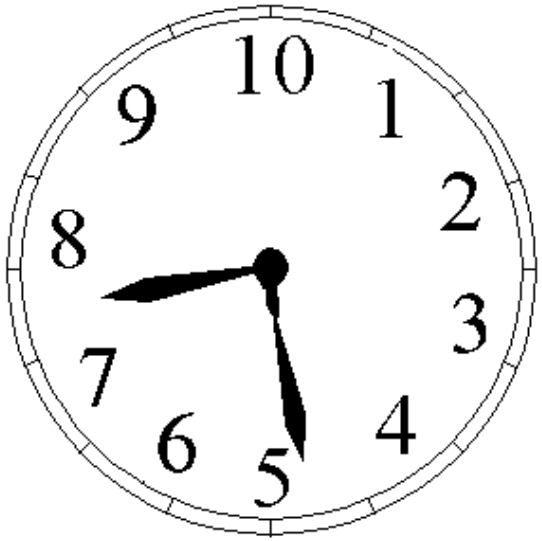
Mod Clock Arithmetic

Use clock arithmetic to add these numbers:

- $9 + 37 =$ _____
- $6 + 12 =$ _____
- $7 + 22 =$ _____
- $(4 \times 7) + 20 =$ _____

Mod Clock Arithmetic

- **Use clock arithmetic on a 10 hour clock to add these numbers:**
  - $7 + 16 =$ _____
  - $3 + 32 =$ _____



  - $(4 \times 7) + 20 =$ _____

Question of the Day

- ***Today is <u>Thursday</u>, January 24th. On what day of the week will the Fourth of July fall this year?***

Mod Clock Arithmetic

- **Use clock arithmetic on a 7 hour clock to add:**
  - $13 + 25 =$

Modular Arithmetic

- Is $7^2 + (5 \times 57) \equiv 40 \bmod 48$?

- Is $2^4 + 5^{301} + (6 \times 31) \equiv 2 \bmod 5$?

Modular Arithmetic

- Fill in the blanks in the following equivalences with any correct answer other than the number itself.
  - $15(mod 2) \equiv$ _____
  - $64(mod 71) \equiv$ _____
  - $3^2(mod 5) \equiv$ _____
  - $2^{100}(mod 7) \equiv$ _____

What Good is Modular Arithmetic?

$$3d_1 + d_2 + 3d_3 + d_4 + 3d_5 + d_6 + 3d_7 + d_8 + 3d_9 + d_{10} + 3d_{11} + c$$

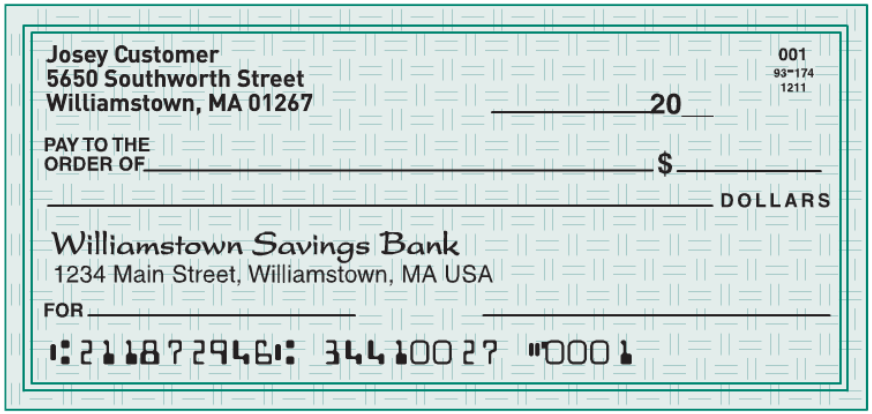
$$\equiv 0 \bmod 10$$

More About UPC

- What is the check digit from the following barcode?

- What is the missing number from the following barcode?

Checking Checks



$$7n_1 + 3n_2 + 9n_3 + 7n_4 + 3n_5 + 9n_6 + 7n_7 + 3n_8 + 9n_9 \equiv 0 \bmod 10$$

Homework

- Cut a 12 digit barcode off of product you have at home. Attach it to your homework and show that:

$$3d_1 + d_2 + 3d_3 + d_4 + 3d_5 + d_6 + 3d_7 + d_8 + 3d_9 + d_{10} + 3d_{11} + c \equiv 0 \bmod 10$$

- Read 2.4 Crazy Clocks and Checking Out Bars pgs. 86-97.
- Mindscapes 2.4 #1, 2, 3, 4, 6, 7, 9, 13, 26, 32, 37
- A Million Things
- Famous Mathematician