UC IRVINE MATH CEO
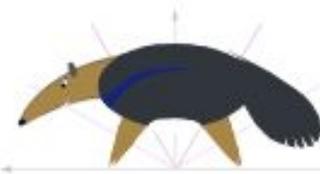
Community Educational Outreach
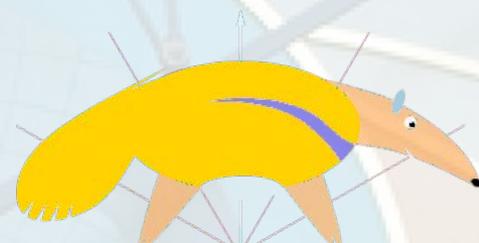
Meeting 4 Student's Booklet

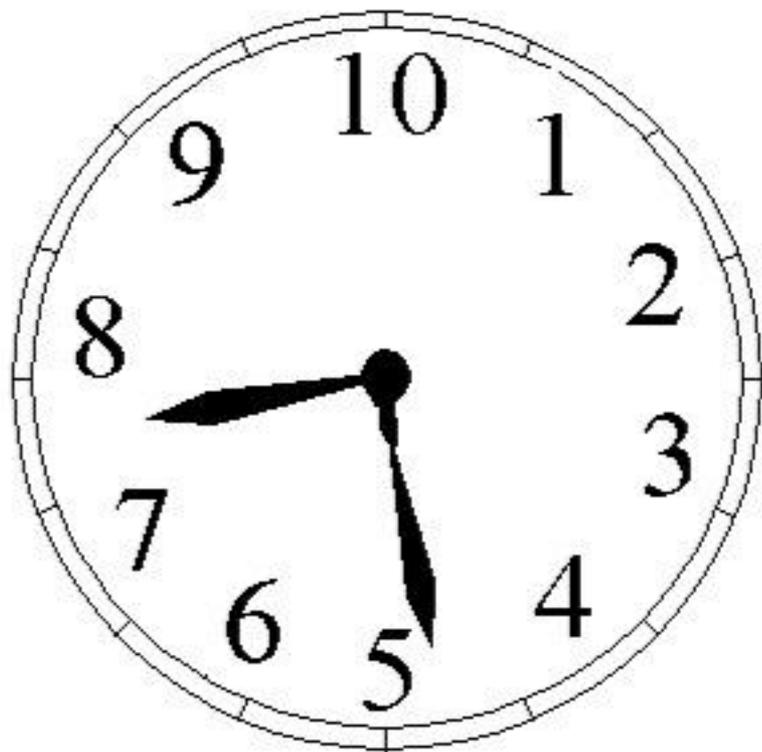# Fun Arithmetic

October 19, 2016 @ UCI

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http://www.math.uci.edu/mathceo/
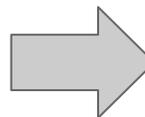
1 Clock Mathematics

You have a curious friend, George. He asks::

- *It is now 2.10pm, what will it be in 78 hours?*

The first step to answer George's question is to find out how many days go by in 78 hours… Can you tell?

78 hrs = _____ days + _____ hrs

Can you now answer George's question?

Write your answer here:

The table below should help.

Note: every row of the table represents a day…

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120

Building a time machine

1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 am

Ask your volunteer to find the handouts that contain the two tables shown on this page.

Cut the out big table and tape it onto the given plastic bottle. Also cut out the stripe containing the hours of the day (pictured above), but do not
tape it on the bottle.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119

Using the time machine

1 am	2 am	3 am	4 am	5 am	6 am	7 am	8 am	9 am	10 am	11 am	12 am	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm	7 pm	8 pm	9 pm	10 pm	11 pm	12 am

Let's use our time machine to answer George's question:

- *It is now 2.10pm, what will it be in 78 hours?*

Move the ring with the hours of the day, until the 0 in the big table is aligned with 2pm.

Look for the number 78 in the table. What hour of the day is it aligned to?

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119

1 Clock Mathematics, continued

You have a curious friend, George, asks a bunch of more questions… Can you find the answers?

- *It is now 2.30pm, what will it be in 100 hours?*

- *It is now 2.42pm, what will it be in 500 hours?*

- *If the current time is 2:58pm, what time was it 36 hours ago?*

- *If the current time is 7:03am, what time will it be in 533 minutes?*

Hint: 533 min = _____ hour + _____ min

2 Daily Mathematics

This time your curious friend George is wondering about days of the week….

- *Today it's a Wednesday. On what day of the week will the presidential elections take place?*
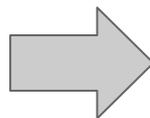
Note: November 8 is in 20 days from today.

> **This table should help.**
>
> **Note: every row of the table represents a week…**

The first step to answer George's question is to find out how many weeks go by in 20 days… Can you tell?

20 days = _____ weeks + _____ days

Can you now answer George's question?

> **Write your answer here:**

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49
50	51	52	53	54	55	56
57	58	59	60	61	62	63

Building another time machine

M	T	W	Th	F	S	Su

Ask your volunteer to find the handouts that contain the two tables shown on this page.

Cut the out big table and tape it onto the given plastic bottle. Also cut out the stripe containing the days of the week (pictured above), but do not
tape it on the bottle.

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	32	33	34
35	36	37	38	39	40	41
42	43	44	45	46	47	48
49	50	51	52	53	54	55
56	57	58	59	60	61	62

Using the new time machine

M	T	W	Th	F	S	Su

Let's use our time machine to answer George's question:

- *Today is a Wednesday. What day of the week will it be on November 8 (Election day, 20 days from now)?*

Move the ring with the days of the week, until the 0 in the big table is aligned with Wednesday.

Look for the number 20 in the table. What day of the week is it aligned to?

0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	32	33	34
35	36	37	38	39	40	41
42	43	44	45	46	47	48
49	50	51	52	53	54	55
56	57	58	59	60	61	62

2 Daily Mathematics, continued

You have a curious friend, George, asks a bunch of more questions… Can you find the answers?

- *If today is Wednesday, what will it be 50 days from now?*

- *If today is Wednesday, what day was it 32 days ago?*

- *On what day will New Year's Eve fall this year?*

- *Today is October 19, 2016, and it's a Wednesday.* What day of the week will it be on this date next year? What day was it on this day last year?

3 Mathematics on a stripe

From the handout, cut the stripes then use tape (on the back) to stick them together and form a really long stripe with numbers from 0 to 55...
(You'll need 3 stripes per table. The volunteer holds the OFFICIAL STRIPE.)

0	1	2	3	4	5	6	7	8	9	10	11	12	13

14	15	16	17	18	19	20	21	22	23	24	25	26	27

28	29	30	31	32	33	34	35	36	37	38	39	40	41

42	43	44	45	46	47	48	49	50	51	52	53	54	55

3 Mathematics on a stripe

Divide the group into 2 teams. Each team has a stripe to play with, and completes one of these activities. The coloring should be done on the OFFICIAL STRIPE only.

Take the stripe and wrap it onto itself, so that the value 6 covers 0, 7 covers 1, etc.
Color with **green** all values that align with 16 (including 4 itself).

Which values did you obtain?

_____

What do these values have in common? *They are not multiples of 6. Instead the are…*

_____

Extend the stripe. Place a token in the value 1. Make it take leaps of +6 until the token gets out of the stripe. Color each value in which the token lands, including its starting position, with **red**.
What can you say about the values in red?

What do these values have in common?*They are not multiples of 6. Instead the are…*

_____

Now shuffle the teams and let them pick another activities. Like before, each team has a stripe to play with, but the coloring should be done on the OFFICIAL STRIPE only.

Place a token in the value 26.

Make a leap of plus or minus a multiple of 6. Color the landing value with **black**. Repeat this many times until you think that you have colored all possible values.

What can you say about the values in black? *They are not multiples of 6. Instead the are…*

_____

Take N = 29 tokens. Create as many groups of 6 as possible. If the remainder (the number of tokens left) is equal to 5, then color the 29 with yellow. Now do the same for N = 13 and N = 23.
Now do the same mentally for all values from 0 to 55.

What can you say about all yellow-colored values? *They are not multiples of 6. Instead the are…*

_____

The entire group does this activity together.

N

S

Consider the hexagon with the arrow. Which always start "facing north" and moves clockwise.
Pick a number N from 0 to 55 and mentally move the arrow N times. If the arrow ends up facing south, color the value N in the stripe with **blue**. Otherwise, don't color it.

Do this with all values from 0 to 55.

What can you say about all blue-colored values?

_____
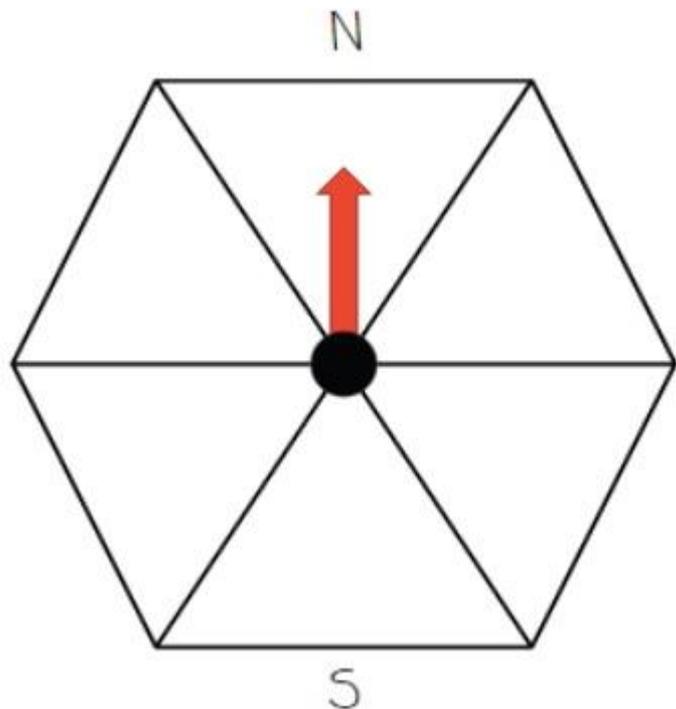
What can you say about the numbers that were not colored?

_____

4 The chip game

Play the following game with a friend at your table.

Start with 7 chips in a pile. You and your partner take turns removing chips. You have the choice of removing 1, 2 or 3 chips at each turn. The person who removes the last chip wins.

Take turns being the first player. Is there a strategy to ensure that one of the players wins?

First, play with 7 chips to get a sense of the game. Then reduce the number of chips to figure out the strategy.

- Who wins if there are only 3 chips?
- What if there are only 4 chips?
- 5 chips?
- 6 chips?
- 7 chips?

What if you had a larger number of chips? Play the game…