Math III

(15) $5273 \times 5273 \times 5273 \times 5273 \times 5273 \times 5273$

$= 9 \qquad = 9 \qquad = 9$

$81 \qquad = 9$

(6) Look at the numbers under column A

multiples of 8

A
1
8
9
16
17
24
25
32
33
⋮

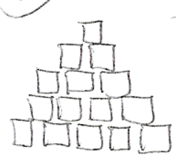
So use $\frac{101}{8} = R5$

or

A	B	C	D
⋮			
96	95	94	93
97	98	99	100
			101

in col D

(7) Solve Algebraically:



stop	persons	total
1st	1	1
2nd	2	3
3rd	3	6
4th	4	10
5th	5	15

formula:

$$\frac{(1+b)b}{2} = 78$$

solve for b:

$(1+b)b = 156$

$b + b^2 = 156$

rewrite: $b^2 + b - 156 = 0$

use factoring: (or quad formula) $(b-12)(b+13) = 0$

$b = 12$ or $\cancel{-13}$

after 12th stop

Solve by addition:

$1+2+3+\dots+10 = 55$

11th stop: 66

12nd stop: 78

(8) Look at the pattern:

$3^1 = 3$

$3 \cdot 3 = 3^2 = 9$

$3 \cdot 3 \cdot 3 = 3^3 = 7$ (ends in)

$3 \cdot 3 \cdot 3 \cdot 3 = 3^4 = 9 \cdot 9 = \underline{1}$ cycles: 1, 3, 9, 7

$3^5 = 1 \cdot 3 = 3$

$3^5 \cdot 3^1 = 3^3 \cdot 3^3 = 3^6 = 3 \cdot 3 = 9$ 35 3's: find $\frac{35}{4} = R?$

$3^5 \cdot 3^2 = 3^3 \cdot 3^4$ $3^7 = 3 \cdot 9 = 7 = 7 \cdot 1$

$3^4 \cdot 3^4 = 3^8 = 1 \cdot 1 = 1 \Rightarrow$ so every 4, 8, ... multiples of 4 will cycle back to 1.

$\frac{35}{4} = R3$ which is $\underline{\underline{7}}$.

(9). Sn M T W R F Sat (work backwords)

Sn	M	T	W	R	F	Sat
		1	2	3	4...	
	...				11...	
			...		18	19
20	21	22	23	24	25	

$$\begin{array}{r} 25 \\ -7 \\ \hline 18 \\ -7 \\ \hline 11 \\ -7 \\ \hline 4 \end{array}$$

Tuesday

(10)

2-days ago	yesterday	today				
Sun	Mon	Tues	Wed	Thur	Fri	Sat
		1	2	3	4	5
6	7	8	...			
	...	15 ...				
	...	22 ...				
		⋮				

want $7 \times n + 1 \leq 365$ days later +1 day

let $n = 52$

$7 \times 52 + 1 = 364 + 1 = 365$ Wed!

Wed

(16)

M. T W R F S Sn

J1
J2
J3
J4

if 30th were Saturday
then 24, 17, 10, 3 are Sn.

If 30th were Sunday
X then 30, 23, 16, 9, 2
(5 Sundays)

if 30th were Monday
X then 29, (29-7), 22-7, 15-7, 8-7
=22 =15 =8 =1 are Sundays

if 30th were Tues, then 28, 21, 14, 7 are sundays

Since there are exactly 4 sundays, June 30th could not fall on a Sunday or Monday.

(17) every 24 hours will give the same time; So $\frac{1000}{24} = R?$

Since $\frac{1000}{24} = R16$, 2pm + 12 hours = 2 AM

2AM + 4 hours = 6 AM

(18)

3	1st
10	2nd
17	3rd
24	4th
31	5th
⋮	⋮
528	nth

use:

$7 \cdot (n-1) + 3 = 528$
$\quad - 3$

$\frac{7(n-1)}{7} = \frac{525}{7}$

$n-1 = 75$

$n = 76$

(19) 30 tables total → 2 types of tables
2-people & 5 people

let $X = $ 2-people table
$y = $ 5-people table

$X + y = 30$ (tables)

$\underbrace{2X}_{\text{people}} + \underbrace{5y}_{\text{people}} = \underbrace{81}_{\text{people}}$

solve for X & y:

$$\begin{cases} (X+y=30)(-2) \\ 2X+5y=81 \end{cases}$$

$$\begin{bmatrix} -2X-2y=-60 \\ 2X+5y=81 \end{bmatrix}$$ use addition

$3y = 21$
$y = 7$

use $X+y=30$
$X+7=30$
$X = 23$ 2-people table

or use trial & error (make tables) to solve

(20)

1st	2nd	3rd	4th	5th

$W + W+2 + W+4 + W+6 + W+8 = 65$

let $w = $ \$ earned the 1st day

$20 + 5W = 65$
$5W = 45$
$\boxed{W = \$9}$