math III

(15) $5293 \times 5293 \times 5293 \times 5293 \times 5293 \times 5293$

$= 9 \quad = 9 \quad = 9$

$8 \; 1$

$= 9$

(6) Look at the numbers under column A

multiples of 1

8 (8) 9 (16) 17 (24) 25 (32) 33 ⋮

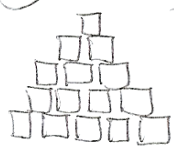
So use $\frac{101}{8} = R5$

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 ~~-13~~

after 12th stop

solve by addition:

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

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)

$3 \cdot 3 \cdot 3 \cdot 3 = 3^4 = 9 \cdot 9 = 1$ 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 7.

(9) Su M T W R F Sat (work backwards)

1 2 3 4...

...11...

...18 19

20 21 22 23 24 25

$25 - 7 = 18$

$18 - 7 = 11$

$11 - 7 = 4$

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

(16)

M.	T	W	R	F	S	Sn
J_1						
J_2						
J_3						
J_4						

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

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

X if 30th were Monday
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:

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

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

$n - 1 = 75$

$n = 76$

(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)

$2x + 5y = 81$
people people people

solve for x & y:

$\begin{cases} x+y=30 \\ 2x+5y=81 \end{cases}$

$\begin{cases} -2x-2y=-60 \\ 2x+5y=81 \end{cases}$ 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

$20 + 5w = 65$
$5w = 45$
$w = \$9$