

Set all cell phones to off or silent - no vibrating.

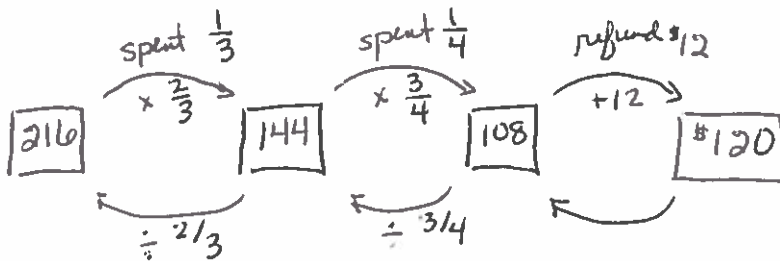
1. [6 pts] State Polya's Four Steps, in order.

-2 1 error
-1 2nd error

- 1) Understand
- 2) Devise a plan.
- 3) Carry it out
- 4) Look back.

2. [15 pts] Show clear work in solving this problem or else explain your reasoning verbally.

Daniel spent one third of his money at Barnes and Noble, then one fourth of what was left at Walmart, and finally got a \$12 refund at Best Buy. If he ended up with \$120, how much did he start with?



-8
1296

\$216

3. [6 pts] Name two strategies that you used or could have used in solving the problem above.

- Work backwards
- Draw a diagram
- Write an equation

Guess + check.

4. Consider this sequence of diagrams:



(a) [3 pts] How many dots are in Figure a_6 ?

$$6 \times 6 + 5 = 41$$

See other version.

(b) [10 pts] Find a formula for the number of dots in Figure a_n . Show clear work or reasoning. You may not use a_{n-1} in your formula.

Pos.	1	2	3	4
Term	1	5	14	29
		$n^2 + 1$	$n^2 + 2$	$n^2 + 3$

$$a_n = n^2 + n - 1$$

Pos	1	2	3	4
Term		1	2	3
		$n-1$	$n-1$	$n-1$

a_2 has $2 \times 2 + 1$
 a_3 has $3 \times 3 + 2$
 a_4 has $4 \times 4 + 3$

a_n has $n \times n + n - 1$

5. (a) [8 pts] Find the first five terms of an arithmetic sequence whose third term is 600 and whose common difference is -15 .

-3 backwards.

$$\underline{630} \quad \underline{615} \quad \underline{600} \quad \underline{585} \quad \underline{570}$$

-15

(b) [8 pts] Find a formula for the sequence described above. You may not use a_{n-1} in your formula.

-2 -15
-3 not 630.

$$a_n = 630 - 15(n-1)$$

6. [12 pts] Compute the sum $57 + 64 + 71 + \dots + 904$; show clear work.

$$\begin{aligned} & \frac{904 + 897 + 890 + \dots + 57}{961 + 961 + \dots + 961} = 961(122) \\ & = 117242 \\ & \div 2 \end{aligned}$$

(4)

(4)

$$\begin{aligned} 904 - 57 &= 847 \\ \div 7 &= 121 \text{ new terms} \end{aligned}$$

$= 58,621$

(4)

7. [8 pts] Often on the first day of classes at SRU, there are more cars in Vincent lot than there are legal parking spaces. Verbally explain how we can use the concept of one-to-one correspondence to recognize this fact, without counting cars and spaces.

Every legal space has a car in it, + there are still cars left over. That means there are more cars.

8. For this entire problem, let $U = \{20, 21, 22, \dots, 29\}$, $A = \{21, 23, 25, 27, 29\}$, $B = \{x \mid x \leq 24\}$.

(a) [4 pts] Use correct set-builder notation to describe the set A .

$$A = \{x \mid x \text{ is odd} \\ \& \text{ in } U.\}$$

(b) [4 pts] Use correct listing notation to describe the set B .

(-2) stops at 20.

$$B = \{20, 21, 22, 23, 24\}$$

(c) [6 pts] Fill in each blank with the correct choice of \in or \notin :

i. $\{23\} \notin A$

ii. $23 \in B$

iii. $\emptyset \notin A$

(d) [10 pts] How many subsets does A have? List four of them all having different cardinalities.

(2)

(2) each.

$$2^5 = 32$$

- \emptyset
- $\{21\}$
- $\{21, 23\}$
- $\{21, 23, 25\}$
- and others.