Tues_01_25

Tuesday, January 25, 2022 2:13 PM

Reminders

1. Sections 1.1, 1.2, 1.3 due on MyMathLab on Friday 01/28, 11:59 pm

2. Exam #1 on 02/15, I will upload a Study guide on the Course page on my website
(Exam #1 will cover 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 2.4)

Problem Session

(1) In arithmetic sequence, the nth term a_n is given by $a_n = a_1 + (n-1)d$

a_1 = first term
d = common difference

Find

(a) the 11th term of 2, 6, 10, 14, ...

(2)

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          1          — Row 1
        1   1        — Row 2
      1   2   1      — Row 3
    1   3   3   1    — Row 4
  1   4   6   4   1  — Row 5
1   5   10  10  5   1
```

(a) Write the next 3 rows

(b) what is this called?

(c) where have you seen this before?

$(a+b)^2 = a^2 + 2ab + b^2$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$(a+b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$

$(a+b)^5 = a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$

Solution

1. nth term

$a_n = a_1 + (n-1)d$

$a_{11} = a_1 + (11-1)d$

a_1 = first term = 2

d = common difference = 4

2, 6, 10, 14, ...

Find the 11 th term

$a_{11} = 2 + (11-1)4$

$= 2 + 10(4) = 42$

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(2) Pascal's Triangle

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

1 5 10 10 5 1

1 6 15 20 15 6 1

1.3 Polya's four step method for problem solving

1. Understand the problem
2. Devise a plan
3. Carry out your plan
4. look back and check

On Exercise from 1.3 Homework

Use inductive Reasoning to determine the units digit of the number 3^{60}

unit digit		$a^m \cdot a^n = a^{m+n}$
2	$2^1 - 2^5 - 2^9$	

Of the number 3^{60}

Powers of 3

$3^1 = 3$
$3^2 = 9$
$3^3 = 27$
$3^4 = 81$
$3^5 = 243$
$3^6 = 729$
$3^7 = 2187$
$3^8 = 6561$
$3^9 = 19683$
$3^{10} = 59049$
$3^{11} = 177147$
$3^{12} = 531441$

$3^{60} = 3^{14(4)} \cdot 3^4$

unit digit	
3	$3^1 = 3^5 = 3^9$
9	$3^2 = 3^6 = 3^{10}$
7	$3^3 = 3^7 = 3^{11}$
1	$3^4 = 3^8 = 3^{12}$

$a^m \cdot a^n = a^{m+n}$

$2^3 \cdot 2^2 = 2^{3+2}$

$8 \cdot 4 \stackrel{?}{=} 2^5$

$32 = 32$

unit digit	
3	$3^1 = 3^4 \cdot 3^1 = 3^{2(4)} \cdot 3^1$
9	$3^2 = 3^4 \cdot 3^2 = 3^{2(4)} \cdot 3^2$
7	$3^3 = 3^4 \cdot 3^3 = 3^{2(4)} \cdot 3^2$
1	$3^4 = 3^4 \cdot 3^4 = 3^{2(4)} \cdot 3^4$

Simon Says problem

Two agents are required to get exactly 4 gallons of water using 3 gallon and 5 gallon jugs having no markers.

I want you to use Polya's solution steps to solve the riddle.

Solution 1

1. Fill the 3 gallon Jar, pour into the 5 gallon Jar
2. Fill the 3 gallon Jar, pour into 5 gallon Jar until 5 gallon Jar is full. What you have left in 3 gallon Jar is exactly 1 gallon
3. Empty the 5 gallon Jar, pour the 1 gallon in the 3 gallon Jar into the 5 gallon Jar
4. Fill the 3 gallon Jar and Pour into 5 gallon Jar, you should have exactly 4 gallon in the 5 gallon Jar.

Solution 2

1. Fill the 5 gallon jar, pour into 3 gallon jar. What you have left in the 5 gallon jar is 2 gallon

2. Empty the 3 gallon jar, pour the 2 gallon in the 5 gallon jar into the 3 gallon jar.

3. Fill the 5 gallon jar, pour into the 3 gallon jar until 3 gallon jar is full. What you have left in the 5 gallon jar is exactly 4 gallon.

(Let me know if you are able to find any other unique solution to this riddle).