sem2supp day 1 – matrices HW

Determine the dimensions of the matrix.

1. $\begin{bmatrix} 3 & 5 & -7 \\ 1 & 2 & 9 \\ -2 & 6 & 1 \\ 4 & -3 & 5 \end{bmatrix}$ 4×3

2. $\begin{bmatrix} 4 & 9 \\ -5 & 1 \\ 2 & -6 \end{bmatrix}$ 3×2

3. $\begin{bmatrix} 4 \\ 3 \end{bmatrix}$ 2×1

4. $\begin{bmatrix} 1 & 4 & 5 & -2 \\ -6 & 2 & 0 & 3 \\ 3 & 8 & -1 & 4 \end{bmatrix}$ 3×4

Tell whether the matrices are *equal* or *not equal*.

5. $\begin{bmatrix} 3 & 4 \\ -7 & 1 \end{bmatrix}, \begin{bmatrix} 3 & 4 \\ 7 & -1 \end{bmatrix}$ ≠

6. $[2 \quad -1 \quad 6], \begin{bmatrix} 2 \\ -1 \\ 6 \end{bmatrix}$ ≠

7. $\begin{bmatrix} 1 & 0 \\ 4 & -3 \end{bmatrix}, \begin{bmatrix} \frac{2}{2} & 0 \\ \frac{8}{2} & -\frac{3}{1} \end{bmatrix}$ =

Perform the indicated operation, if possible. If not possible, state the reason.

8. $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 0 \\ 4 & 1 \end{bmatrix} = \begin{bmatrix} 3 & 3 \\ 6 & 5 \end{bmatrix}$

9. $\begin{bmatrix} 2 \\ 5 \end{bmatrix} + \begin{bmatrix} -3 \\ 1 \end{bmatrix} = \begin{bmatrix} -1 \\ 6 \end{bmatrix}$

10. $[4 \quad 0] + [2 \quad -4] = [6 \quad -4]$

11. $\begin{bmatrix} 2 \\ -7 \end{bmatrix} + [-3 \quad 4]$ dims ≠

12. $\begin{bmatrix} 0 & 4 \\ -3 & 1 \end{bmatrix} - \begin{bmatrix} 2 & 1 \\ -4 & -2 \end{bmatrix} = \begin{bmatrix} -2 & 3 \\ 1 & 3 \end{bmatrix}$

13. $\begin{bmatrix} 3 \\ -4 \end{bmatrix} - \begin{bmatrix} 4 \\ 7 \end{bmatrix} = \begin{bmatrix} -1 \\ -11 \end{bmatrix}$

14. $\begin{bmatrix} 1 & 4 \\ -5 & 8 \end{bmatrix} - \begin{bmatrix} 1 & 4 \\ -5 & 8 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

15. $\begin{bmatrix} 1 & 1 \\ 2 & -1 \end{bmatrix} - [3 \quad 5]$ dims ≠

16. $\begin{bmatrix} 0 & 0 \\ 0 & 4 \end{bmatrix} + \begin{bmatrix} -13 & 2 \\ 1 & -7 \end{bmatrix} = \begin{bmatrix} -13 & 2 \\ 1 & -3 \end{bmatrix}$

Perform the indicated operation.

17. $2\begin{bmatrix} 1 & 6 \\ -3 & 2 \end{bmatrix} = \begin{bmatrix} 2 & 12 \\ -6 & 4 \end{bmatrix}$

18. $-3\begin{bmatrix} 1 & 0 \\ -3 & 6 \end{bmatrix} = \begin{bmatrix} -3 & 0 \\ 9 & -18 \end{bmatrix}$

19. $5\begin{bmatrix} 2 \\ -5 \end{bmatrix} = \begin{bmatrix} 10 \\ -25 \end{bmatrix}$

20. $-4[-3 \quad 6 \quad 1] = [12 \quad -24 \quad -4]$

21. $8\begin{bmatrix} 3 \\ 0 \\ -5 \end{bmatrix} = \begin{bmatrix} 24 \\ 0 \\ -40 \end{bmatrix}$

22. $-1\begin{bmatrix} 2 & 5 & -3 \\ 6 & -1 & -7 \\ 0 & 0 & 9 \end{bmatrix} = \begin{bmatrix} -2 & -5 & 3 \\ -6 & 1 & 7 \\ 0 & 0 & -9 \end{bmatrix}$

Solve the matrix for *x* and *y*.

23. $\begin{bmatrix} x & 3 \\ 5 & y \end{bmatrix} = \begin{bmatrix} 2 & 3 \\ 5 & -4 \end{bmatrix}$ x=2, y=−4

24. $\begin{bmatrix} 2x \\ 3 \\ 4 \end{bmatrix} = \begin{bmatrix} 10 \\ 3 \\ 4y \end{bmatrix}$ 2x=10, x=5; 4y=4, y=1

25. $[3x \quad -21] = [21 \quad 7y]$ 3x=21, x=7; 7y=−21, y=−3

26. ***Endangered and Threatened Species*** The matrices below show the number of endangered and threatened animal and plant species as of June 30, 1996. Use matrix addition to find the total number of endangered and threatened species. *(Source: 1997 Information Please Almanac)*

	ENDANGERED		THREATENED		total
	U.S.	Foreign	U.S.	Foreign	
Animal	320	521	115	41	435 562
Plant	431	1	94	2	525 3

$$\begin{bmatrix} 320 & 521 \\ 431 & 1 \end{bmatrix} + \begin{bmatrix} 115 & 41 \\ 94 & 2 \end{bmatrix} = \begin{bmatrix} 435 & 562 \\ 525 & 3 \end{bmatrix}$$

Determine the dimensions of the matrix.

1. $\begin{bmatrix} 3 & 5 & -7 \\ 1 & 2 & 9 \\ -2 & 6 & 1 \\ 4 & -3 & 5 \end{bmatrix}$

2. $\begin{bmatrix} 4 & 9 \\ -5 & 1 \\ 2 & -6 \end{bmatrix}$

3. $\begin{bmatrix} 4 \\ 3 \end{bmatrix}$

4. $\begin{bmatrix} 1 & 4 & 5 & -2 \\ -6 & 2 & 0 & 3 \\ 3 & 8 & -1 & 4 \end{bmatrix}$

Tell whether the matrices are *equal* or *not equal*.

5. $\begin{bmatrix} 3 & 4 \\ -7 & 1 \end{bmatrix}, \begin{bmatrix} 3 & 4 \\ 7 & -1 \end{bmatrix}$

6. $\begin{bmatrix} 2 & -1 & 6 \end{bmatrix}, \begin{bmatrix} 2 \\ -1 \\ 6 \end{bmatrix}$

7. $\begin{bmatrix} 1 & 0 \\ 4 & -3 \end{bmatrix}, \begin{bmatrix} \frac{2}{2} & 0 \\ \frac{8}{2} & -\frac{3}{1} \end{bmatrix}$

Perform the indicated operation, if possible. If not possible, state the reason.

8. $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix} + \begin{bmatrix} 2 & 0 \\ 4 & 1 \end{bmatrix}$

9. $\begin{bmatrix} 2 \\ 5 \end{bmatrix} + \begin{bmatrix} -3 \\ 1 \end{bmatrix}$

10. $\begin{bmatrix} 4 & 0 \end{bmatrix} + \begin{bmatrix} 2 & -4 \end{bmatrix}$

11. $\begin{bmatrix} 2 \\ -7 \end{bmatrix} + \begin{bmatrix} -3 & 4 \end{bmatrix}$

12. $\begin{bmatrix} 0 & 4 \\ -3 & 1 \end{bmatrix} - \begin{bmatrix} 2 & 1 \\ -4 & -2 \end{bmatrix}$

13. $\begin{bmatrix} 3 \\ -4 \end{bmatrix} - \begin{bmatrix} 4 \\ 7 \end{bmatrix}$

14. $\begin{bmatrix} 1 & 4 \\ -5 & 8 \end{bmatrix} - \begin{bmatrix} 1 & 4 \\ -5 & 8 \end{bmatrix}$

15. $\begin{bmatrix} 1 & 1 \\ 2 & -1 \end{bmatrix} - \begin{bmatrix} 3 & 5 \end{bmatrix}$

16. $\begin{bmatrix} 0 & 0 \\ 0 & 4 \end{bmatrix} + \begin{bmatrix} -13 & 2 \\ 1 & -7 \end{bmatrix}$

Perform the indicated operation.

17. $2\begin{bmatrix} 1 & 6 \\ -3 & 2 \end{bmatrix}$

18. $-3\begin{bmatrix} 1 & 0 \\ -3 & 6 \end{bmatrix}$

19. $5\begin{bmatrix} 2 \\ -5 \end{bmatrix}$

20. $-4\begin{bmatrix} -3 & 6 & 1 \end{bmatrix}$

21. $8\begin{bmatrix} 3 \\ 0 \\ -5 \end{bmatrix}$

22. $-1\begin{bmatrix} 2 & 5 & -3 \\ 6 & -1 & -7 \\ 0 & 0 & 9 \end{bmatrix}$

Solve the matrix for x and y.

23. $\begin{bmatrix} x & 3 \\ 5 & y \end{bmatrix} = \begin{bmatrix} 2 & 3 \\ 5 & -4 \end{bmatrix}$

24. $\begin{bmatrix} 2x \\ 3 \\ 4 \end{bmatrix} = \begin{bmatrix} 10 \\ 3 \\ 4y \end{bmatrix}$

25. $\begin{bmatrix} 3x & -21 \end{bmatrix} = \begin{bmatrix} 21 & 7y \end{bmatrix}$

26. ***Endangered and Threatened Species*** The matrices below show the number of endangered and threatened animal and plant species as of June 30, 1996. Use matrix addition to find the total number of endangered and threatened species. *(Source: 1997 Information Please Almanac)*

ENDANGERED

	U.S.	Foreign
Animal	320	521
Plant	431	1

THREATENED

	U.S.	Foreign
Animal	115	41
Plant	94	2

Geometry
Sequences and Patterns Homework

Name Key
Date _____ Period _____

Patterns
Find the next two terms of each sequence.

1. 1, 10, 100, 1000, 10000 , 100,000 (×10)

2. 0, 10, 21, 33, 46, 60, 75 , 91 (+10, +11, +12, +13, +14)

3. 1, $\frac{1}{4}$, $\frac{1}{9}$, $\frac{1}{16}$, $\frac{1}{25}$, $\frac{1}{36}$, $\frac{1}{49}$, $\frac{1}{64}$ (+3, +5, +7, +9, +11)

4. 1, 2, 4, 8, 16, 32 , 64 ×2

5. 0, 3, 8, 15, 24, 35, 48 , 63 (+3 +5 +7 +9 +11 +13)

6. 5, -10, 20, -40, 80, -160 , 320 ×-2

7. 7, 10, 13, 16, 19, 22, 25 , 28 (+3 +3 +3 +3 +3)

8. 8, 4, 0, -4, -8, -12 , -16 (-4 -4 -4 -4)

Sequence notation

Write the first four terms of each sequence.

9. $a_n = \frac{n+4}{n}$ $a_1 = \frac{1+4}{1} = 5$ $a_2 = \frac{2+4}{2} = \frac{6}{2} = 3$ $a_3 = \frac{3+4}{3} = \frac{7}{3}$ $a_4 = \frac{4+4}{4} = \frac{8}{4} = 2$ 5, 3, $\frac{7}{3}$, 2

10. $a_n = 2n+5$ $a_1 = 2\cdot1+5 = 7$ $a_2 = 2\cdot2+5 = 9$ $a_3 = 2\cdot3+5 = 11$ $a_4 = 2\cdot4+5 = 13$ 7, 9, 11, 13

11. $a_n = \frac{2}{3} - \frac{1}{3}n$ $a_1 = \frac{2}{3} - \frac{1}{3} = \frac{1}{3}$ $a_2 = \frac{2}{3} - \frac{2}{3} = 0$ $a_3 = \frac{2}{3} - \frac{3}{3} = -\frac{1}{3}$ $a_4 = \frac{2}{3} - \frac{4}{3} = -\frac{2}{3}$ $\frac{1}{3}$, 0, $-\frac{1}{3}$, $-\frac{2}{3}$

Finding the rule for the *n*th term of a sequence

Write a rule for the *n*th term of the given sequence.

12. 1, 4, 7, 10, ... $a_n = 1 + 3(n-1) = 1 + 3n - 3 = \boxed{3n-2}$

+3 +3 +3

13. $\frac{9}{2}, \frac{5}{1}\frac{11}{2}, \frac{6}{1}\frac{13}{2}$, ... $a_n = \frac{9+1(n-1)}{2} = \frac{9+n-1}{2} = \boxed{\frac{8+n}{2}}$

$\frac{9}{2}, \frac{10}{2}, \frac{11}{2}, \frac{12}{2}, \frac{13}{2}$

14. 2, 4, 8, 16, ... $2, 2\cdot2, 2\cdot2\cdot2, 2\cdot2\cdot2\cdot2$

×2

$\boxed{a_n = 2^n}$

15. 4, 9, 16, 25, ... $\boxed{a_n = (n+1)^2}$

$2^2 3^2 4^2 5^2$

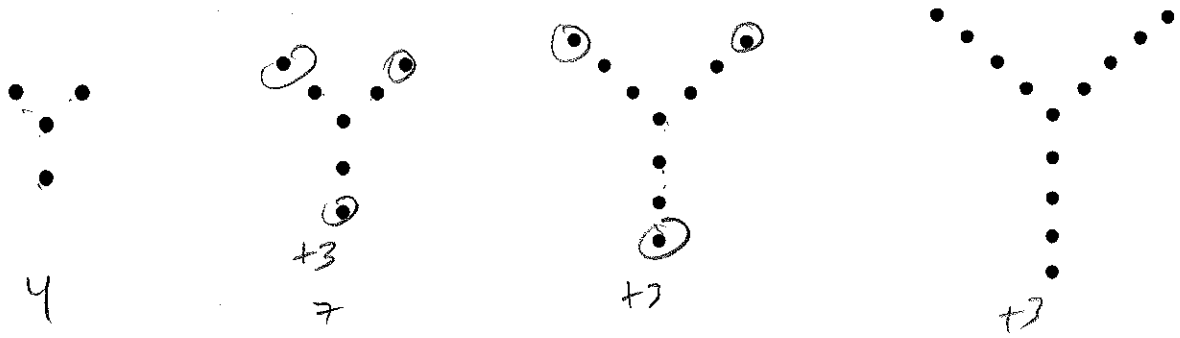
16. Find the value of the *n*th term and the 100th term in each sequence.

Term	1	2	3	4	5	6	...	*n*	...	100
Value	7	11	15	19	23	27	...	$3+4n$	...	403

+4 +4 +4 +4 +4

$a_n = 7 + 4(n-1)$
$= 7 + 4n - 4$
$= 3 + 4n$

17. If the pattern of dot-figures is continued, how many dots will be in the 100th figure?



$a_n = 4 + 3(n-1)$
$= 4 + 3n - 3$
$= 3n + 1$

$a_{100} = 3(100) - 1$ $\boxed{299 \text{ dots}}$

Geometry
Sequences and Patterns Homework

Name_____
Date_____Period_____

Patterns

Find the next two terms of each sequence.

1. 1, 10, 100, 1000, _____ , _____

2. 0, 10, 21, 33, 46, 60, _____ , _____

3. 1, $\frac{1}{4}$, $\frac{1}{9}$, $\frac{1}{16}$, $\frac{1}{25}$, $\frac{1}{36}$, _____ , _____

4. 1, 2, 4, 8, 16, _____ , _____

5. 0, 3, 8, 15, 24, 35, _____ , _____

6. 5, -10, 20, -40, 80, _____ , _____

7. 7, 10, 13, 16, 19, 22, _____ , _____

8. 8, 4, 0, -4, -8, _____ , _____

Sequence notation

Write the first four terms of each sequence.

9. $a_n = \frac{n+4}{n}$

10. $a_n = 2n+5$

11. $a_n = \frac{2}{3} - \frac{1}{3}n$

Finding the rule for the *n*th term of a sequence

Write a rule for the *n*th term of the given sequence.

12. 1, 4, 7, 10, ……..

13. $\frac{9}{2}, 5, \frac{11}{2}, 6, \frac{13}{2}, \ldots\ldots$

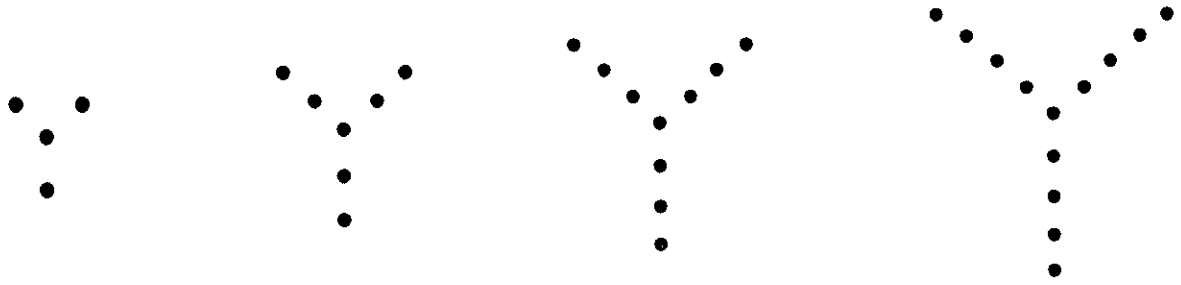
14. 2, 4, 8, 16, ……..

15. 4, 9, 16, 25, …….

16. Find the value of the *n*th term and the 100^{th} term in each sequence.

Term	1	2	3	4	5	6	…	*n*	…	100
Value	7	11	15	19	23	27	…		…	

17. If the pattern of dot-figures is continued, how many dots will be in the 100^{th} figure?



Geometry Name Key

Special Topic: Recursive Sequences

A **recursive rule** gives the beginning term or terms of a sequence and then a **recursive equation** that tells how a_n is related to one or more preceding terms.

Example: Write the first five terms of the sequence:

$a_1 = 4, \quad a_n = a_{n-1} + 3$

$a_1 = 4$

$a_2 = a_{2-1} + 3 = a_1 + 3 = 4 + 3 = 7$

$a_3 = a_{3-1} + 3 = a_2 + 3 = 7 + 3 = 10$

$a_4 = a_{4-1} + 3 = a_3 + 3 = 10 + 3 = 13$

$a_5 = a_{5-1} + 3 = a_4 + 3 = 13 + 3 = 16$

Write the first five terms of the sequence.

1. $a_1 = 3, \quad a_n = a_{n-1} - 2$

3, 1, -1, -3, -5

2. $a_1 = -3, \quad a_n = -2a_{n-1}$

-3, 6, -12, 24, -48

3. $a_1 = -2, \quad a_n = 3a_{n-1} + 1$

-2, -5, -14, -41, -122

4. $a_1 = 32, \quad a_n = \frac{1}{2}a_{n-1} + 4$

32, 20, 14, 11, $\frac{19}{2}$

5. $a_1 = 2, \quad a_n = (a_{n-1})^2$

2, 4, 16, 256, 65536

6. $a_1 = 2, \; a_2 = 5, \; a_n = a_{n-1} + a_{n-2}$

2, 5, 7, 12, 19

Geometry
Homework: Recursive Sequences

Name_____

1. $a_1 = 3, \quad a_n = a_{n-1} + 5$

   3, 8, 13, 18, 23

2. $a_1 = 15, \quad a_n = a_{n-1} - 5$

   15, 10, 5, 0, -5

3. $a_1 = -2, \quad a_n = 4a_{n-1}$

   -2, -8, -32, -128, -512

4. $a_1 = 1, \quad a_n = 100a_{n-1}$

   1, 100, 10000, 1000000, 100000000

5. $a_1 = -2, \quad a_n = 3a_{n-1} + 1$

   -2, -5, -14, -41, -122

6. $a_1 = 8, \quad a_n = 2a_{n-1} - 6$

   8, 10, 14, 22, 38

7. $a_1 = -1, \; a_2 = 4,$
   $a_n = a_{n-1} \cdot a_{n-2}$

   -1, 4, -4, -16, 64

8. $a_1 = 2, \; a_n = n^2 - a_{n-1}$

   2, 2, 7, 9, 16

   4-2 9-2 16-7 25-9

Geometry Name_____

Special Topic: Recursive Sequences

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Example: Write the first five terms of the sequence:

$$a_1 = 4, \quad a_n = a_{n-1} + 3$$

$$a_1 = 4$$
$$a_2 = a_{2-1} + 3 = a_1 + 3 = 4 + 3 = 7$$
$$a_3 = a_{3-1} + 3 = a_2 + 3 = 7 + 3 = 10$$
$$a_4 = a_{4-1} + 3 = a_3 + 3 = 10 + 3 = 13$$
$$a_5 = a_{5-1} + 3 = a_4 + 3 = 13 + 3 = 16$$

Write the first five terms of the sequence.

1. $a_1 = 3, \quad a_n = a_{n-1} - 2$

2. $a_1 = -3, \quad a_n = -2a_{n-1}$

3. $a_1 = -2, \quad a_n = 3a_{n-1} + 1$

4. $a_1 = 32, \quad a_n = \frac{1}{2}a_{n-1} + 4$

5. $a_1 = 2, \quad a_n = \left(a_{n-1}\right)^2$

6. $a_1 = 2, \ a_2 = 5, \ a_n = a_{n-1} + a_{n-2}$

Geometry
Homework: Recursive Sequences

Name_____

1. $a_1 = 3, \quad a_n = a_{n-1} + 5$

2. $a_1 = 15, \quad a_n = a_{n-1} - 5$

3. $a_1 = -2, \quad a_n = 4a_{n-1}$

4. $a_1 = 1, \quad a_n = 100a_{n-1}$

5. $a_1 = -2, \quad a_n = 3a_{n-1} + 1$

6. $a_1 = 8, \quad a_n = 2a_{n-1} - 6$

7. $a_1 = -1, \ a_2 = 4,$
$a_n = a_{n-1} \cdot a_{n-2}$

8. $a_1 = 2, \ a_n = n^2 - a_{n-1}$