Concept: Patterns, Patterns, Patterns

Name:

COMPUTER COMPONENT

Instructions: In UMATH X follow the **Content Menu** path:

Algebra > Patterns, Patterns, Patterns

Work through all Sub Lessons of the following Lessons **in order**:

- *Output is Pattern*
- *Object Patterns*
- *Number Patterns*
- *Sequences*
- *Generating & Comparing Number Patterns*
- *Sum of a Sequence*
- *Patterns to Formulas*
- *Factor Pairs in Arrays*
- *Prime and Composite*
- *Common Factors/GCF*
- *Patterns in the Multiplication Table*
- *Sieve of Eratosthenes*
- *Patterns with 9*

As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

Patterns are all around us…

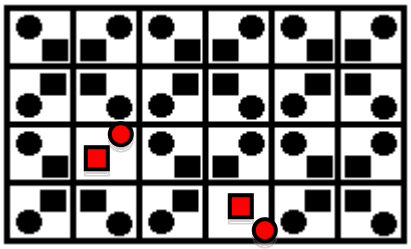
OFF COMPUTER EXERCISES

1. Extend each picture pattern by drawing the next 5 shapes.

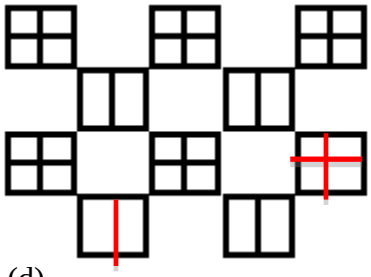
(a) 

(b) 

(Complete each picture pattern by drawing the missing pieces.)



(c)



(d)

2. Extend each number pattern by writing the next 5 numbers.

(a) 34, 39, 44, 49, 54, ***59, 64, 69, 74, 79***

(b) 2, 6, 14, 30, 62, ***126, 254, 510, 1022, 2046***

(c) 11, 6, 9, 4, 7, ***2, 5, 0, 3, -2***

(d) 5, 5, 10, 15, 25, ***40, 65, 105, 170, 275***

(e) 4, 5, 7, 10, 14, ***19, 25, 32, 40, 49***

3. A pattern of blocks looks like this:

1 2 3 …

How many blocks would be in the 7th design? ***28 blocks***

How many blocks would be in the 10th design? ***55 blocks***

How many blocks would be in the 13th design? ***91 blocks***

Explain your thinking. Did you need to draw each pattern to determine the 10th design? Is there a more efficient way?

No, you do not need to draw each pattern to determine the 10th design. I have determined that the term value, in this growing pattern, is a result of adding the term number to the previous total. For instance, to establish how many blocks were required to build the 10th design, I simply added 8, 9 and 10 to the number of blocks required to build the 7tdesign. 28 + 8(from the 8th term) + 9(from the 9th term) + 10(from the 10th term)

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4. Write the formula for the following patterns.

(a)

COLUMN 1	COLUMN 2
1	2
2	6
3	10

4	14
5	18

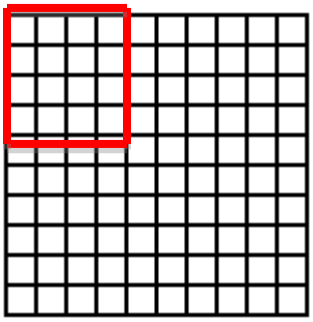
The Formula is: ***Multiply Column 1 by 4 and subtract 2***

(b)

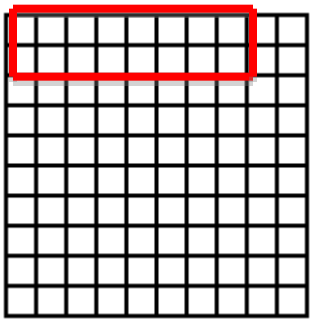
COLUMN 1	COLUMN 2
1	4
2	7
3	10
4	13
5	16

The Formula is: ***Multiply Column 1 by 3 and add 1***

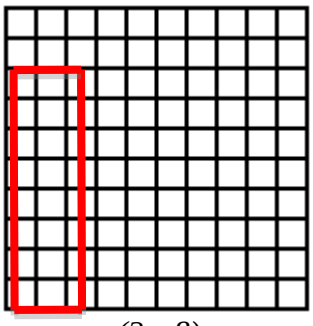
5.
(a) Draw all the possible rectangles containing 16 squares.



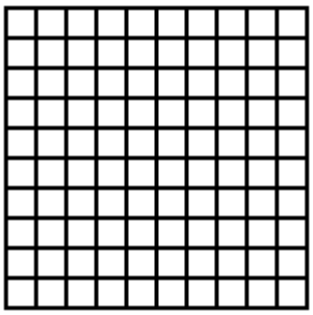
(4 x 4)

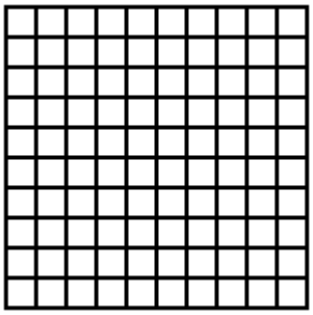


(8 x 2)



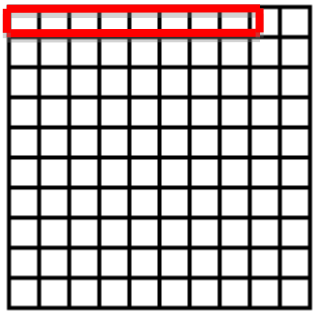
(2 x 8)



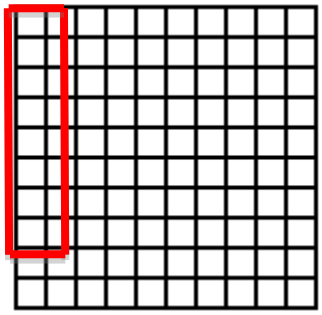


NOTE: *16 x 1 is another rectangle that may not be made on these grids.*

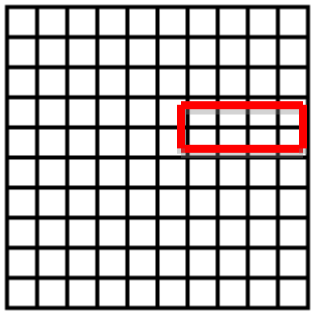
(b) Draw all the possible rectangles containing 8 squares.



(8 x 1)

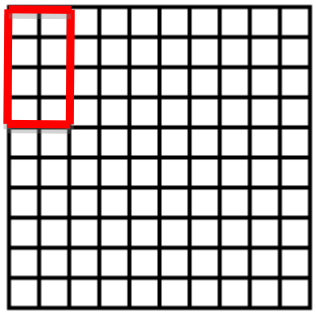


(1 x 8)



(4 x 2)

For thought…Is a square a rectangle?



(2 x 4)

A square is a 'regular' rectangle because all of its sides and angles are equal.

6.

(a) Circle the numbers that are prime numbers.

(31) 8 12 (5) (13) (3) 40 (7) 18

(b) Circle the numbers that are composite numbers.

2 83 71 (85) 43 (6) 1 (27) (14)

Is it possible to have an even number that is prime? If so, give an example

The number '2' is the only even prime number.

How many composite numbers, ending in '7', can you come up with.
NOTE: List as many as you can up to 100.

27, 57, 77 and 87 are all composite numbers ending in '7'.

7. *MATH IN ACTION*

First, some interesting chocolate facts:

- Cacao is a tree, native to South America, whose seeds are the source of cocoa and

chocolate.

- Chocolate manufacturers currently use 40% of the world's almonds and 20% of the world's peanuts.
- The U.S. produces more chocolate than any other country but the Swiss consume the most, followed closely by the English. Americans prefer milk chocolate, but dark chocolate's popularity is growing rapidly.

www.tea-or-chocolate.com/chocolate-facts.html

There are 36 peanut chocolate bars, 12 almond chocolate bars, and 30 dark chocolate bars. We want to put the same number of each chocolate bar into boxes to sell.

How many of each chocolate bar will go in the boxes, to ensure that they all have exactly the same contents?

Remember: If it is possible, it is always a good idea to show your solutions to a problem using pics/diagram, numbers and words. This will allow for you to demonstrate your thought process in a variety of ways.

Pictures/Diagrams	***Numbers/Calculation***
PPPPPP AA DDDDD PPPPPP AA DDDDD PPPPPP AA AAAAA	***The number 6 divides equally in to 36, 12 and 30.*** ***36 ÷ 6 = 6 peanut chocolate bars*** ***12 ÷ 6 = 2 almond chocolate bars*** ***30 ÷ 6 = 5 dark chocolate bars*** ***13 chocolate bars in each box***

Words/Written Explanation	How many boxes can we have? What is this number called?
First, we need to establish a number that divides equally in to all of the chocolate bar quantities. The number 6 divides equally in to 36, 12 and 30. ***Therefore, this will allow for: 6 peanut, 2 almond and 5 dark chocolate bars to be placed in each box. This will total 13 bars in each box.***	***We can/will have 6 boxes and this is called the 'Greatest Common Factor'.***

8.
(a) Complete this multiplication table by filling in the boxes.

Multiplication Chart

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

(b) What is the Sieve of Eratosthenes and how does it help you find the prime numbers from up to 100? Try listing those prime numbers in the space below.

Eratosthenes devised a 'sieve' to discover prime numbers. A sieve is like a strainer that you use to drain spaghetti when it is done cooking. The water drains out, leaving your spaghetti behind. Eratosthenes's sieve drains out composite numbers and leaves prime numbers behind.

The prime numbers from 1-100 include: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

(c) What is the pattern of the multiples of 9? Show a few examples by adding the digits in the multiples.

The pattern of the multiples of 9 is that when you add their respective digits together, you always get a sum of 9.

<u>For instance</u>…18: 1 + 8 = 9

27: 2 + 7 = 9

36: 3 + 6 = 9