

Arranging Yummy Doggy Treats in Boxes

Table of Treats, Student Sheet 1

Name: _____

Date: _____

Number of treats	Dimensions of the Bases of the Boxes	Number of Boxes	Factors	Next 5 Multiples
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

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Table of Treats, Student Sheet 2

Name: _____

Date: _____

Number of treats	Dimensions of the Bases of the Boxes	Number of Boxes	Factors	Next 5 Multiples
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

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Discussion Questions, Student Sheet 4 (optional)

Name: _____

Date: _____

1. Look at your table and record 5 patterns or results you find interesting.

a. _____

b. _____

c. _____

d. _____

e. _____

2. In the table, circle 2, 3, 5, and 7 numbers of treats with a red pencil. What do these numbers have in common?

3. These numbers are called **prime numbers**. There are more prime numbers from 1 to 40. In the table, find the other numbers of treats that are prime numbers and circle them with your red marker. Then list the prime numbers from 1 to 40.

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Student Sheet 4b (optional)

Name: _____

Date: _____

4. In the table, circle 4, 6, 8, and 9 numbers of treats with a black pencil. What do these numbers have in common?

5. These numbers are called **composite numbers**. In the table, find the numbers of treats from 1 to 40 that are composite numbers and circle them with a black pencil. Then list the composite numbers from 1 to 40.

6. . What number has not been circled? _____

This number is neither prime nor composite. Why?

Extension Questions:

7. Find the next 5 prime numbers greater than 40.

8. Find the next 5 composite numbers greater than 40.

9. Challenge, find all of the factors of the numbers you have listed in questions 7 and 8? Record them on a separate piece of paper.

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Answer Key: Table of Treats

Number of treats	Dimensions of Boxes	Number of Boxes	Factors	Next 5 multiples
1	1 x 1	1	1	0, 1, 2, 3, 4
2	1 x 2, 2 x 1	2	1,2	0, 2, 4, 6, 8
3	1 x 3, 3 x 1	2	1,3	0, 3, 6, 9,12
4	1x4, 2x2, 4 x 1	3	1,2,4	0, 4, 8, 12, 16
5	1 x 5, 5 x 1	2	1,5	0, 5, 10, 15, 20
6	1 x 6, 2 x 3, 3 x 2, 6 x 1	4	1,2,3,6	0, 6, 12, 18, 24
7	1 x 7, 7 x 1	2	1,7	0, 7, 14, 21, 28
8	1 x 8, 2 x 4, 4 x 2, 8 x 1	4	1,2,4,8	0, 8, 16, 24, 32
9	1 x 9, 3 x 3, 9 x 1	3	1,3,9	0, 9, 18, 27, 36
10	1 x 10, 2 x 5, 5 x 2, 10 x 1,	4	1,2,5,10	0, 10, 20, 30, 40
11	1 x 11, 11 x 1	2	1,11	0, 11, 22, 33, 44
12	1 x 12, 2 x 6, 3 x 4, 4 x 3, 6 x 2, 12 x 1	6	1,2,3,4,6,12	0, 12, 24, 36, 48
13	1 x 13, 13 x 1	2	1,13	0, 13, 26, 39, 52
14	1 x 14, 2 x 7, 7 x 2, 14 x 1	4	1,2,7,14	0, 14, 28, 42, 56
15	1 x 15, 3 x 5, 5 x 3, 15 x 1	3	1,3,5,15	0, 15, 30, 45, 60
16	1 x 16, 2 x 8, 4 x 4, 8 x 2, 16 x 1	5	1,2,4,8,16	0, 16, 32, 48, 54
17	1 x 17, 17 x 1	2	1, 17	0, 17, 34, 51, 68
18	1 x 18, 2 x 9, 3 x 6, 6 x 3, 9 x 2, 18 x 1	6	1,2,3,6,9,18	0, 18, 36, 54, 72
19	1 x 19, 19 x 1	2	1, 19	0, 19, 38, 57, 76
20	1 x 20, 2 x 10, 4 x 5, 5 x 4, 10 x 2, 20 x 1,	6	1,2,4,5,10,20	0, 20, 40, 60, 80
Number of treats	Dimensions of Boxes	Number of Boxes	Factors	Next 5 Multiples (optional)

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21	1 x 21, 3 x 7, 7 x 3, 21 x 1	4	1,3,7,21	0, 21, 42, 63, 84
22	1 x 22, 2 x 11, 11 x 2, 22 x 1	4	1,2,11,22	0, 22, 44, 66, 88
23	1 x 23, 23 x 1	2	1,2,23	0,23,46, 69, 92
24	1 x 24, 2 x 12, 3 x 8, 4 x 6 6 x 4, 8 x 3, 12 x 2, 24 x 1	8	1,2,3,4,6,8,12,24	0, 24, 48, 72, 96
25	1 x 25, 5 x 5, 25 x 1	3	1,5,25	0, 25, 50, 75, 100,
26	1 x 26, 2 x 13, 13, x 2, 26 x 1	4	1,2,13,26	0, 26, 52, 78, 104,
27	1 x 27, 3 x 9, 9 x 3, 27 x 1	4	1,3,9,27	0, 27, 54, 81, 108
28	1 x 28, 2 x 14, 4 x 7 7 x 4, 14 x 2, 29 x 1	4	1,2,4,7,14,28	0, 28, 56, 84, 112
29	1 x 29, 29 x 1	2	1,29	0, 29, 58, 87, 116
30	1 x 30, 2 x 15, 3 x 10, 5 x 6 6 x 5, 10 x 3, 15 x 2, 30 x 1	8	1,2,3,5,6,10,15,30	0, 30, 60, 90, 120
31	1 x 31, 31 x 1	2	1,31	0, 31, 62, 93, 124
32	1 x 32, 2 x 16, 4 x 8, 8 x 4, 16 x 2, 32 x 1	6	1,2,4,8,16,32	0, 32, 6, 96, 128
33	1 x 33, 3 x 11, 11 x 3, 33 x 1	4	1,3,11,33	0, 33, 66, 99, 132
34	1 x 34, 2 x 17, 17 x 2, 34 x 1	4	1,2,17,34	0, 34, 68, 102, 136
35	1 x 35, 5 x 7, 7 x 5, 35 x 1	4	1,5,7,35	0, 35, 70, 105, 140
36	1 x 36, 2 x 18, 3 x 12, 4 x 9, 6 x 6, 9 x 4, 12 x 3, 18 x 2, 36 x 1	9	1,2,3,4,6,9,12, 18 36	0, 36, 72, 108, 144
37	1 x 37, 37 x 1	2	1, 37	0, 37, 74, 111,148
38	1 x 38, 2 x 19, 19 x 2, 38 x 1	4	1,2,19,38	0, 38, 76, 114, 152
39	1 x 39, 3 x 13, 13 x 3, 39 x 1	4	1,3,13,39	0, 39, 78, 117, 156
40	1 x 40, 2 x 20, 4 x 10, 5 x 8, 8 x 5, 10 x 4, 20 x 2, 40 x 1	8	1,2,4,5,8,10,20,40	0, 40, 80, 120 160

Building Boxes: Answer Sheet and Discussion Sheet

1. Look at your table and record 5 patterns or results you find interesting.

(Possible answers)

- a) *Number of boxes is the same as the number of rectangles.*
- b) *All of the even numbers have a factor of 2*

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- c) *All of the even numbers except 2 have more than 2 factors.*
- d) *1,4,9,16,25 and 36 have an odd number of factors.*
- e) *The dimensions of the boxes are also the factors of the number.*
- f) *1 is the only number with only 1 factor.*
- g) *Odd numbers only have odd factors. Even numbers have even and odd factors.*
- h) *36 has the most factors, 9.*
- i) *Every third number has a factor of 3, every fourth number has a factor of 4, every fifth number has a factor of 5 and so on.*
- j) *All of the numbers with a factor of 6 also have a factor of 3 and a factor of 2.*
- k) *All of the numbers have 0 as their first multiple.*
- l) *All of the numbers have themselves as the second multiple*
- m) *The multiples of even numbers are all even*
- n) *The multiples of odd numbers are even, odd, even, odd*

Note: *As students share their patterns be sure they explain how they know it is true and can give examples. Ask questions like: How do you know? Convince me? Is that always true?*

Students may not have all of the patterns and that is fine. If there are some you want to be sure they see you can ask them questions to help them notice the pattern. For example, “Look at all of the numbers that have a factor of 6. What other factors do those numbers all have?”

Because students have only completed the chart to 32, they may draw some conclusions that would not be true if they continued the chart. For example for h) ask if they think there are any numbers that have more than 9 factors and what they might be. (Find a counter example)

2. Circle the numbers 2, 3, 5, and 7 with a red marker. What do these numbers have in common?

They all have exactly 2 factors.

(If that is all students say, ask them what they notice about those factors.)

The factors are always 1 and the number itself.

These numbers are called **prime** numbers. There are more prime numbers from 1 to 40. Find them and circle with your red marker.

List the prime numbers from 1 to 40.

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37

Ask: *what do you notice about the prime numbers?*

Some incorrect responses (such as they are all odd, or all odd numbers are prime) may come up. Do not correct the students, rather address these misconceptions by asking questions such as

Can you find an odd number that is not prime? How do you know it is not prime?

Why is 2 the only even prime number?

3. Circle the numbers 4,6,8, and 9 with a black pencil. What do these numbers have in common?

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They all have more than 2 factors.

These numbers are called **composite numbers**. Find the other composite numbers from 1 to 40 and circle them with a black pencil.

List the composite numbers from 1 to 40.

4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 22, 24, 25, 26, 27, 28, 30, 32, 33, 34, 35, 36, 38, 39, 40

Ask: *What do you notice about the composite numbers.*

4. What number has not been circled? 1

It is neither prime nor composite. Why?

One only has 1 factor. It is not prime because it doesn't have 2 factors. It is not composite because it doesn't have more than 2 factors.

Extension Questions:

5. Find the next 5 prime numbers greater than 40.

41, 43, 47, 53, 59

Talk about why 51 and 57 are not prime (they both have a factor of 3)

6. Find the next 5 composite numbers greater than 40.

42, 44, 45, 46, 48

What are some of the factors of these numbers other than 1 and the number itself?

7. Can you find all of the factors of the numbers you have listed in questions 5 and 6?

41 1, 41

42 1, 2, 3, 6, 7, 14, 21, 42

43 1, 43

44 1, 2, 4, 11, 22, 44

45 1, 3, 5, 9, 15, 45

46 1, 2, 23, 46

47 1, 47

48 1, 2, 3, 4, 6, 8, 12, 16, 24, 48

53 1, 53

59 1, 59