# Computation Station

☆



Tricks



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#### **Find the Patterns! Addition**

Addition facts are easier when you know the patterns! Take a look at the addition table below: Do you notice any patterns?

+	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	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	13
2	2	3	4	5	6	7	8	9	10	11	12	13	14
3	3	4	5	6	7	8	9	10	11	12	13	14	15
4	4	5	6	7	8	9	10	11	12	13	14	15	16
5	5	6	7	8	9	10	11	12	13	14	15	16	17
6	6	7	8	9	10	11	12	13	14	15	16	17	18
7	7	8	9	10	11	12	13	14	15	16	17	18	19
8	8	9	10	11	12	13	14	15	16	17	18	19	20
9	9	10	11	12	13	14	15	16	17	18	19	20	21
10	10	11	12	13	14	15	16	17	18	19	20	21	22
11	11	12	13	14	15	16	17	18	19	20	21	22	23
12	12	13	14	15	16	17	18	19	20	21	22	23	24

These patterns follow three main rules. Review the rules below and then complete the exercise below:

<u>Rule One.</u> The even numbers on the above table are 2, 4, 6, 8, 10, and 12. When you add any even number to another even number, your answer will be an even number. EX:

2+2=4 4 is an even number.

6 + 12 = 18 18 is an even number.

<u>Rule Two.</u> The odd numbers on the above table are 1, 3, 5, 7, 9, and 11. When you add any even number to an odd number, your answer will be an odd number. EX: 3 + 4 = 7 7 is an odd number.

<u>Rule Three.</u> When you add any number to itself, your answer will always be an even number.

EX:

4 + 4 = 8 8 is an even number.

5 + 5 = 10 10 is an even number (Even though 5 is an odd number!)

Based on the three rules above, pay attention to whether the answer is even or odd. Put a check next to the answers that have to be wrong:

1. 4 + 8 = 12 \_\_\_\_\_ 2. 6 + 8 = 17 \_\_\_\_\_ 3. 42 + 24 = 65 \_\_\_\_\_ 4. 16 + 18 = 23 \_\_\_\_\_ 5. 102 + 86 = 188 \_\_\_\_\_ 6. 1002 + 144 = 1,143\_\_\_\_\_ 7.3+8=11 8. 3 + 12 = 16 \_\_\_\_\_ 9.3 + 42 = 45 \_\_\_\_\_ 10. 3 + 34 = 38 \_\_\_\_\_ 11. 3 + 110 = 114\_\_\_\_\_ 12. 3 + 3.654 = 3.657\_\_\_\_\_ 13. 6 + 6 = 12 \_\_\_\_\_ 14. 66 + 66 = 132 \_\_\_\_\_ 15. 666 + 666 = 1.331 16. 24 + 24 = 48 = \_\_\_\_\_ 17. 22 + 22 = 43 = -----18. 3,432 + 3,432 = 6,865

### **Find the Patterns! Multiplication**

Similar to addition facts, multiplication facts follow patterns, too. Observe the multiplication table below.

	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

Review the three multiplication rules and complete the exercise.

#### Rule One.

When you multiply any number by an even number the product is always even.  $3 \times 4 = 12$  3 is an odd number, but 4 is even. Notice that the product, 12, is even.

 $2 \times 6 = 12$  2, 6, and 12 are all even.

#### Rule Two.

When you multiply any number by 3, the digits of the product always add up to a multiple of 3.

The multiples of 3 up to 100 are as follows:

3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51,

54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 99.

EX: 3 × 4 = 12. Add: 1 + 2 = 3. 3 is a multiple of 3 because 3 × 1 = 3

3 × 12 = 36. Add: 3 + 6 = 9. 9 is a multiple of 3 because 3 × 3 = 9

#### Rule Three.

When you multiply any number by 5, the last digit of the answer has to be either 5 or 0.

EX:

 $5 \times 3 = 15$  The last digit of the product is 5.

 $5 \times 12 = 60$ , and notice that the last digit of the answer is 0.



Based on the three rules above, put a check next to the answers that have to be wrong:

1. 6 × 8 = 48 \_\_\_\_\_ 2. 24 × 14 = 336 \_\_\_\_\_ 3. 16 × 28 = 447 \_\_\_\_\_ 4. 30 × 32 = 960 \_\_\_\_\_ 5. 146 × 86 = 12,556 \_\_\_\_\_ 6. 152 × 92 = 13,985 \_\_\_\_\_ 7. 3 × 11 = 33 \_\_\_\_\_ 8. 3 × 12 = 35 \_\_\_\_\_ 9. 3 × 21 = 63 \_\_\_\_\_ 10. 3 × 13 = 38 \_\_\_\_\_ 11. 3 × 25 = 75 \_\_\_\_\_ 12. 3 × 30 = 91 \_\_\_\_\_ 13.5×4=20 \_\_\_\_\_ 14. 5 × 12 = 72 \_\_\_\_\_ 15. 5 × 17 = 85 \_\_\_\_\_ 16.5×18 = 88 \_\_\_\_\_ 17. 5 × 20 = 100 \_\_\_\_\_ 18.5×22 = 106 \_\_\_\_\_



1000

### Multiplying by 10, 100, or 1,000!

Multiplying any number by 10, 100, or even 1,000 is easy if you know these tricks.

If you have to multiply any number by 10, just place a 0 at the end of the original number.

EX: 10 × 14 = 140

If you have to multiply a number by 100, just place two 0s at the end of the original number.

EX: 100 × 14 = 1400

And if you have to multiply a number by 1,000, just place three 0s at the end of the original number.

EX: 1000 × 14 = 14,000

#### Answer the following problems:

- $10 \times 24 = 240$
- 1. 10 x 12 = \_\_\_\_\_
- 2. 10 x 32 = \_\_\_\_\_
- 3. 10 x 87 = \_\_\_\_\_
- 4. 10 x 376 = \_\_\_\_\_
- 5. 10 x 6,395 = \_\_\_\_\_



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100 x 24 = 2,400
6. 100 x 16 =
7. 100 x 38 =
8. 100 x 94 =
9. 100 x 672 =
10. 100 x 4,936 =
1,000 x 24 = 24,000
1,000 x 24 = 24,000 11. 1,000 x 17 =
1,000 x 24 = 24,000 11. 1,000 x 17 = 12. 1,000 x 39 =
$1,000 \times 24 = 24,000$ $11. 1,000 \times 17 = \_$ $12. 1,000 \times 39 = \_$ $13. 1,000 \times 91 = \_$

15. 1,000 x 3,386 = \_\_\_\_\_

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### Relating Single Digit Addition to a Double Digit.

If you know that 3 + 5 = 8 you can easily solve 30 + 50 because you don't have to worry about adding numbers in the ones column.

30 = 3 tens + 50 = 5 tens 80 = 8 tens

You can use the same rule to add numbers with three digits, or even 4 digits. For example,

300 = 3 hundreds + 500 = 5 hundreds 800 = 8 hundreds

Just take off the zeros and add the numbers. Then, make sure you put the zeros back!

Let's try it with different numbers:

6 + 5 = 11 60 + 50 + 110 600 + 500 = 1,100

Now, use this rule to add the following numbers. Write the correct answers on the following blanks:

1. 4 + 8 = 12

40 + 80 = \_\_\_\_\_

400 + 800 = 1,200

2.	4 + 3 = 7	3. 4 + 1 =	
	40 + 30 = 70	40 + 10 =	-
	400 + 300 =	400 + 100 =	-
4.	12 + 16 = 28	5. 15 + 18 = 33	
	120 + 160 = 280	150 + 180 = 330	
	1,200 + 1,600 =	1,500 + 1,800 =	
6.	14 + 17 =	7. 18 + 36 =	
	140 + 170 =	180 + 360 =	_
	140 + 170 = 1,400 + 1,700 =	180 + 360 = 1,800 + 3,600 =	_

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#### Using Estimation: Knowing What's Too Big and Too Small

Adding and subtracting large numbers can sometimes be difficult. Estimating is an easy way to figure out if your answer is close, or if you need to try again.

#### EX:

227 + 631 = \_\_\_\_

This looks hard. But there are some things you can know right away just by looking at it.

For example, what if you had an answer like 78? You should know immediately that it must be wrong. A 3-digit number + a 3-digit number can never equal a 2-digit number. It's too small!

OR, what if you had an answer like 12,428? You should also know this is wrong. A 3-digit number + a 3-digit number can never equal a 5-digit number. It's way too big!

If 227 + 631 is a difficult problem for you, you can still estimate an answer. You should be able to determine that the answer probably has 3 digits or, at most, 4 digits. (The actual answer is 858, a large three-digit number.) Note: The same thing is true for subtraction.

Answer the following multiple choice problems. None of the possible answers are correct, but one is closer to the correct answer than any of the others. Pick the answer provided that is closest to the correct answer.

1. 428 + 298 =	4.856 - 32 =
a. 650 b. 65 c. 6,500	a. 800 b. 8,000 c. 80
2. 82 + 45 =	5. 7,324 – 119 =
a. 11 b. 1,100 c. 110	a. 72 b. 720 c. 7,200
3.634 + 56 =	

a. 6,700 b. 67 c. 670



### Using Rounding Up or Down to Estimate an Answer

What is easier to do in your in head?

800 + 100 OR 372 + 621 ?

You probably chose 800 + 100. All you have to do is add 8 + 1 and add two zeros. Sometimes when you need a quick answer that doesn't have to be exact, you can estimate by rounding.

Let's take 372 + 621 again. How can we turn this into an easy problem with lots of zeros? You can do this by rounding to the nearest hundred.

- 1. Look at the number in the tens place, the one immediately to the right of the hundreds place.
- 2. If it is 5 or over, round up to the next hundred by adding 1 to the hundreds place.
- 3. For 372, the tens digit is 7. It's 5 or greater, so we add 1 to 3 and get 4 in the hundreds place. 4\_ \_.
- 4. What do we put in the tens and ones place? We put zeros because we have rounded up. 400.
- 5. Let's do the same with 621. Because 2 is less than 5, we round down to the nearest hundred which is 6.

Now it's time to do the addition

400 + 600 = 1,000.

This is our estimated answer. What's the exact answer? It's 993, which is pretty close in value.



Answer the following multiple choice questions by rounding up or rounding down the numbers in the problem provided. None of the possible answers is correct, but one is closer to the correct answer than any of the others. Pick the approximate answer provided that is closest to the correct answer.

1.328 + 598 = a. 800 b. 80 c. 8,000 2.52 + 49 = a.10 b. 1.000 c. 100 3.784 + 81 = a. 8,800 b. 88 c. 880 4.756 - 39 = a. 7,000 b.700 c. 70 5. 4.124 - 139 = a. 39 b. 390 c. 3,900



### **Mixed Problems Requiring Estimation**

Find the best estimate by rounding up or rounding down.

None of the possible answers are correct, but one is closer to the correct answer than any of the others. Pick the answer provided that is closest to the correct answer.

1. 327 + 516 =	a. 80	b. 800	c. 8,000
2. 689 + 173 =	a. 900	b. 9,000	c. 90
3. 542 + 198 =	a. 7,000	b. 70	c. 700
4. 263 + 77 =	a. 38	b. 380	c. 3,800
5. 482 + 237 =	a. 600	b. 700	c. 800
6. 617 – 426 =	a. 200	b. 2,000	c. 20
7. 387 + 187 =	a. 60	b. 6,000	c. 600
8. 871 – 329 =	a. 60	b. 600	c. 6,000
9. 352 – 51 =	a. 300	b. 30	c. 3,000
10. 78 + 491 =	a. 5,800	b. 580	c. 58
11. 789 + 821 =	a. 1,600	b. 1,500	c. 1,700
12. 835 – 263 =	a. 400	b. 500	c. 700

Challenge:

1. 4,279 + 2,912 =	a. 70,000	b. 7,000	c. 700
2. 3,897 + 5,267 =	a. 8,000	b. 80,000	c. 800
3. 5,933 – 3,361 =	a. 300	b. 3,000	c. 30,000



#### Fast Addition Moving Left to Right: The Break Down

One way to add large numbers quickly is to break down the second number into smaller parts and then add all the parts from left to right. For example:

34 + 27 = \_\_\_\_\_ is hard to do in your head. So, let's *break it down*.

```
27 is the same as 20 + 7.
Once you know this, the original problem becomes: 34 + 20 + 7 = ______.
Now add this in your head:
34 + 20 = 54.
Then, 54 + 7 = 61.
You have your answer: 34 + 27 = 61.
```

Here's another example in 4 steps:

48 + 87 = \_\_\_\_\_

1. Rewrite the second number: 87 = 80 + 7.

2. Write the new problem: 48 + 80 + 7 = \_\_\_\_\_

3. Add left to right 48 + 80 = 128. Now add the 7 128 + 7 = 135.

135 is the answer!

Write the number that should go where the blank spaces are in the following three-part solutions using the adding left to right method:

1.31 + 23 =

a. 23 = 20 + \_\_\_\_\_ b. 31 + 20 + 3 = c. 31 + 20 = 51. Then, 51 + \_\_\_\_\_ = 54. The answer is 54.

2.44 + 67 =

a. 67 = \_\_\_\_\_ + 7 b. 44 + 60 + 7 = c. 44 + 60 = 104. Then, 104 + \_\_\_\_\_ = 111. The answer is 111.

3. 27 + 52 =

a. 52 = \_\_\_\_\_ + \_\_\_\_ b. \_\_\_\_\_ + 50 + 2 = c. \_\_\_\_\_ + 50 = 77. Then, 77 + \_\_\_\_\_ = 79. The answer is 79.





Fast addition moving left to right is done in three steps. The three steps are as follows:

The problem is 32 + 23 = \_\_\_\_\_

* Step Two: Write the new problem: 32	
	+ 20 + 3 =
* Step Three: Add left to right: 32 + 20	= 52. Then, 52 + 3 = 55. The answer is 55.

In answering the problems below, use the three-step format (show your work):

Here's one more example before you do the rest of the problems by yourself. Fill in the blank spaces:

#### 37 + 55 =

a. 55 = 50 + <u>5</u>

b. 37 + 50 + 5 =

c. 37 + 50 = 87. Then, 87 + <u>5</u> = 92. The answer is 92.

1. 27 + 54 =



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2. 41 + 35 = \_\_\_\_\_

3. 18 + 77 = \_\_\_\_\_

4. 36 + 36 = \_\_\_\_\_

5. 62 + 26 = \_\_\_\_\_

6. 51 + 44 = \_\_\_\_\_





Everyone should memorize the multiplication tables. Sometimes, though, there are other ways to quickly multiply and divide numbers by recognizing patterns.

For example, to multiply by 2, you can memorize the multiplication table, or you can recognize that multiplying a number by 2 is just *doubling* that number. For example:

 $2 \times 8 = 16$ . Another way to find out the answer to  $2 \times 8$  is to recognize that doubling 8 (8 + 8) also equals 16.

This works for bigger numbers, too.  $2 \times 136 = 272$ . Another way to find out the answer to  $2 \times 136$  is to recognize that *doubling* 136 (136 + 136) also equals 272.

Another example of how recognizing patterns can help you multiply numbers is multiplying by 5. Any time you multiply a number by 5, the last digit in the answer *must be either* 5 *or* 0. If the last digit is anything other than a 5 or 0, it is wrong. For example:

- $5 \times 2 = 10$ : The first digit of this answer is 1, and the last digit is 0.
- 5 x 3 = 15: The last digit is 5
- 5 x 8 = 40: The last digit is 0
- 5 x 18 = 90: The last digit is 0
- 5 x 253 = 1,265: The last digit is 5
- 5 x 12 can't be 72 because the last digit is 2 (The answer is 70)

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**Problems:** 

2 x 9 = \_\_\_\_\_, 2 x 11 = \_\_\_\_\_, 2 x 15 = \_\_\_\_\_, 2 x 27 = \_\_\_\_\_,

2 x 32 = \_\_\_\_, 2 x 77 = \_\_\_\_, 2 x 112 = \_\_\_\_, 2 x 164 = \_\_\_\_,

 $2 \times 234 =$ \_\_\_\_\_,  $2 \times 367 =$ \_\_\_\_\_\_,  $2 \times 426 =$ \_\_\_\_\_\_.

5 x 7 = \_\_\_\_\_, 5 x 12 = \_\_\_\_\_, 5 x 14 = \_\_\_\_\_, 5 x 17 = \_\_\_\_\_,

5 x 20 = \_\_\_\_\_, 5 x 25 = \_\_\_\_\_.

Put a check by the problems that have to be wrong:

1.5 x 16 = 80 \_\_\_\_\_

2. 5 x 19 = 93 \_\_\_\_\_

3. 5 x 78 = 391 \_\_\_\_\_

4. 5 x 92 = 460 \_\_\_\_\_

5. 5 x 156 = 784 \_\_\_\_\_

6. 5 x 333 = 1665 \_\_\_\_\_





## Everyone should memorize the multiplication tables. Sometimes, though, there are other ways to quickly multiply and divide numbers by recognizing patterns.

To divide by 2 you can memorize the multiplication table, or you can recognize that dividing a number by 2 is just figuring out what *half* of the number is. For example:

6 divided by 2 = 3. *Half* of 6 is 3. You know this because 3 + 3 is 6. So, if you know *half* of 6 is 3, then you know how to divide by 2.

This works for bigger numbers too. 860 divided by 2 = 430. This means that 430 + 430 = 860 (which also means that 430 is *half* of 860). And 1,428 divided by 2 = 714. This means that 714 + 714 = 1,428 (which also means that 714 is *half* of 1,428).

To divide by 3 you can memorize the multiplication table, or you can recognize that dividing a number by 3 is just figuring out what *one-third* of the number is. For example:

6 divided by 3 = 2. *One-third* of 6 is 2. You know this because 2 + 2 + 2 is 6. So, if you know *one-third* of 6 is 2, then you know how to divide by 3.

This works for bigger numbers, too. 963 divided by 3 = 321. This means that 321 + 321 + 321 = 963 (which also means that 321 is *one-third* of 963). And 3,369 divided by 3 = 1,123. This means that 1,123 + 1,123 + 1,123 = 3,369 (which also means that 1,123 is *one-third* of 3,369).



Solve the division problems below using this method, and explain your answer.

Ex: 42 divided by 2 = \_\_\_\_\_. 21 + 21 = 42. Therefore, half of 42 = 21.

1. 40 divided by 2 = \_\_\_\_\_.

- 2. 44 divided by 2 = \_\_\_\_\_.
- 3. 68 divided by 2 = \_\_\_\_\_.
- 4. 100 divided by 2 = \_\_\_\_\_.
- 5. 146 divided by 2 = \_\_\_\_\_.
- Ex: 42 divided by 3 = \_\_\_\_\_\_. 14 + 14 + 14 = 42. Therefore, one-third of 42 is 14.
- 6. 9 divided by 3 = \_\_\_\_\_.
- 7. 15 divided by 3 = \_\_\_\_\_.
- 8. 21 divided by 3 = \_\_\_\_\_.
- 9. 33 divided by 3 = \_\_\_\_\_.
- 10. 51 divided by 3 = \_\_\_\_\_.





Multiplying by 3 is easier than multiplying by other numbers because of a certain pattern. When you multiply any number by 3, the digits of the answer must add up to a multiple of 3. Here are the multiples of 3 up to 100:

3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 99.

 $3 \times 4 = 12$ . If you add together the two digits of the answer, you get 3. That is because 1 + 2 = 3. 3 is the first number on the list of multiples of 3 above. This is how you know the answer is right! If the answer is not on the list above, it is wrong.

 $3 \times 16 = 48$ . Add up the two digits of the answer, 4 + 8 = 12. Since 12 is on the list of multiples of 3 above, the answer is probably right.

Solve the multiplication problems below and check your answer using this method. Show your work.

- 1.3 x 8 = \_\_\_\_\_
- 2. 3 x 11 = \_\_\_\_\_
- 3. 3 x 14 = \_\_\_\_\_
- 4. 3 x 19 = \_\_\_\_\_
- 5. 3 x 20 = \_\_\_\_\_
- 6. 3 x 27 = \_\_\_\_\_

Answer the question. Then, put a check by the problems that have to be wrong:

- Ex:  $3 \times 9 = 26$ . Does 2 + 6 = a multiple of 3? (In other words, is 8 on the list above?) No.
- 7. 3 x 13 = 39. Does 3 + 9 = a multiple of 3? \_\_\_\_\_
- 8. 3 x 15 = 45. Does 4 + 5 = a multiple of 3? \_\_\_\_\_
- 9. 3 x 21 = 62. Does 6 + 2 = a multiple of 3? \_\_\_\_\_
- 10. 3 x 26 = 78. Does 7 + 8 = a multiple of 3? \_\_\_\_\_
- 11. 3 x 33 = 97. Does 9 + 7 = a multiple of 3? \_\_\_\_\_





Review the multiplication and division patterns, then solve the problems below.

<u>Multiplying by 2:</u> Recognize that multiplying a number by 2 is just doubling that number. For example:  $2 \times 8 = 16$ . Another way to find out the answer to  $2 \times 8$  is to recognize that doubling 8 (8 + 8) also equals 16.

<u>Multiplying by 5:</u> Any time you multiply a number by 5, the last digit in the answer must be either 5 or 0. If the last digit is anything other than a 5 or 0, it is wrong.

<u>Dividing by 2:</u> Recognize that dividing a number by 2 is just figuring out what half of the number is. For example: 6 divided by 2 = 3. Half of 6 is 3. You know this because 3 + 3 is 6. So, if you know half of 6 is 3, then you know how to divide by 2.

<u>Multiplying by 3</u>: Multiplying by 3 is easier than you think because of a certain pattern. When you multiply any number by 3, the digits of the answer must add up to a multiple of 3. For example,  $3 \times 4 = 12$ . If you add together the two digits of the answer, you get 3. That is because 1 + 2 = 3.

2 x 4 =	, 2 x 50 =	, 2 x 13 =	, 2 x 18 =	, 2 x 22 =	, 2 x 27 =	,
2 x 47 =	, 2 x 32 =	, 2 x 41 =	, 2 x 28 =	, 2 x 45 =	, 2 x 39 =	_•
5 x 7 =	, 5 x 11 =	, 5 x 12 =	, 5 x 14 =	, 5 x 17 =	, 5 x 18 =	_ /
5 x 20 =	, 5 x 21 =	, 5 x 22 =	, 5 x 30 =	, 5 x 31 =	, 5 x 32 =	_•
6 divided b	by 2 =	, 12 divided by	2 =, 1	14 divided by 2 =	=,	
20 divided	by 2 =	_, 22 divided b	y 2 = ,	24 divided by 2	=,	
30 divided	by 2 =	_, 40 divided b	y 2 =,	50 divided by 2	. =,	
46 divided	by 2 =	_·				
2	2 44	2 12	2 42	2 22	2 24	
3 x 4 =	$(3 \times 1) = ($	$ 3 \times 12 = \_$	$3 \times 13 = 10^{-1}$	, 3 x 20 = _	, 3 x 21 =	_ ′
3 x 22 =	, 3 x 30 =	, 3 x 31 =	, 3 x 32 =	, 3 x 40 =	, 3 x 41 =	





Unlike with other numbers, multiplying any *single-digit* number by 9 results in a recognizable pattern. For example:

 $2 \times 9 = 18$ 1 + 8 = 9 $3 \times 9 = 27$ 2 + 7 = 9 $4 \times 9 = 36$ 3 + 6 = 9 $5 \times 9 = 45$ 4 + 5 = 9

You should notice that  $2 \times 9 = 18$  and that adding together the two digits of the answer equals 9. In other words, 1 + 8 = 9.

Fill out the rest of the chart by writing the correct number on the blank spaces.

- 6 x 9 = **54 5** + **4** = 9
- 7 x 9 = **63** \_\_\_\_\_ + \_\_\_\_ = 9
- 8 x 9 = **72** \_\_\_\_\_ + \_\_\_\_ = 9
- 9 x 9 = **81** \_\_\_\_\_ + \_\_\_\_ = 9

Does this pattern work for 9 x 10? Yes or No?

Does it work for 9 x 11? Yes or No?

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### Multiplying by 6 Using Patterns 🗙 6

Unlike with other numbers, multiplying *even* numbers by 6 results in a recognizable pattern. For example:

 $6 \times 2 = 12$   $6 \times 4 = 24$   $6 \times 6 = 36$  $6 \times 8 = 48$ 

You should notice that the number that is multiplied by six (the second number in the equations above) is the same as the last digit of the answer. For example, if you multiply 6 by 2, the last digit of the answer is also 2. (The answer is 12.) This happens every time you multiply six by an even number. (This doesn't work for *odd* numbers.)

Write the correct number on the blank spaces.

1.  $6 \times 10 = 60$ 2.  $6 \times 12 =$ \_\_\_\_\_ 3.  $6 \times 14 =$ \_\_\_\_ 4.  $6 \times 16 =$ \_\_\_\_ Challenge questions: 5.  $6 \times 18 =$ \_\_\_\_

6. 6 x 26 = \_\_\_\_\_

7. 6 x 42 = \_\_\_\_\_

8. 6 x 74 = \_\_\_\_\_



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#### **Computation Station**

Find the Patterns! Addition Find the Patterns! Multiplication Multiplying by 10, 100, or 1,000! Relating Single Digit Addition to a Double Digit Using Estimation: Knowing What's Too Big and Too Small Using Rounding Up or Down to Estimate an Answer Mixed Problems Requiring Estimation Fast Addition Moving Left to Right: The Break Down Fast Addition Moving Left to Right Multiplying by 2 and 5 Using Patterns Dividing by 2 and 3 Using Patterns Multiplying by 3 Using Patterns Multiplying by 9 Using Patterns Multiplying by 9 Using Patterns Multiplying by 6 Using Patterns Name\_

#### **Find the Patterns! Addition**

Date\_\_\_\_

Addition facts are easier when you know the patterns! Take a look at the addition table below: Do you notice any patterns?

						1							
+	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	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	13
2	2	3	4	5	6	7	8	9	10	11	12	13	14
3	3	4	5	6	7	8	9	10	11	12	13	14	15
4	4	5	6	7	8	9	10	11	12	13	14	15	16
5	5	6	7	8	9	10	11	12	13	14	15	16	17
6	6	7	8	9	10	11	12	13	14	15	16	17	18
7	7	8	9	10	11	12	13	14	15	16	17	18	19
8	8	9	10	11	12	13	14	15	16	17	18	19	20
9	9	10	11	12	13	14	15	16	17	18	19	20	21
10	10	11	12	13	14	15	16	17	18	19	20	21	22
11	11	12	13	14	15	16	17	18	19	20	21	22	23
12	12	13	14	15	16	17	18	19	20	21	22	23	24

These patterns follow three main rules. Review the rules below and then complete the exercise below:

<u>Rule One.</u> The even numbers on the above table are 2, 4, 6, 8, 10, and 12. When you add any even number to another even number, your answer will be an even number. EX:

2+2=4 4 is an even number.

6 + 12 = 18 18 is an even number.

<u>Rule Two.</u> The odd numbers on the above table are 1, 3, 5, 7, 9, and 11. When you add any even number to an odd number, your answer will be an odd number. EX: 3 + 4 = 7 7 is an odd number.

<u>Rule Three.</u> When you add any number to itself, your answer will always be an even number.

EX:

4 + 4 = 8 8 is an even number.

5 + 5 = 10 10 is an even number (Even though 5 is an odd number!)

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ANSWERS	
3ased on the three rules above, pay attention Put a check next to the answers that have to	to whether the answer is even or odd. be wrong:
1.4+8=12	
2. 6 + 8 = 17	
3. 42 + 24 = 65	
4. 16 + 18 = 23	
5. 102 + 86 = 188	
6. 1002 + 144 = 1,143	
7. 3 + 8 = 11	
8. 3 + 12 = 16	
9. 3 + 42 = 45	
10. 3 + 34 = 38	
11. 3 + 110 = 114	
12. 3 + 3,654 = 3,657	
13. 6 + 6 = 12	
14. 66 + 66 = 132	
15. 666 + 666 = 1,331	
16. 24 + 24 = 48 =	
17. $22 + 22 = 43 = \checkmark$	
18. 3,432 + 3,432 = 6,865	

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Name\_

### Find the Patterns! Multiplication

Date\_

Similar to addition facts, multiplication facts follow patterns, too. Observe the multiplication table below.

	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

Rule One	•
When you 3 × 4 = 12	multiply any number by an even number the product is always ev 3 is an odd number, but 4 is even. Notice that the product, 12, is e
2 × 6 = 12	2, 6, and 12 are all even.
Rule Two	•
When you to a multip	multiply any number by 3, the digits of the product always add up vle of 3.
The multip	les of 3 up to 100 are as follows:
2 6 0	12 15 18 21 21 27 20 22 20 20 12 15 18 51

3 is a multiple of 3 because  $3 \times 1 = 3$ 

3 × 12 = 36. Add: 3 + 6 = 9. 9 is a multiple of 3 because 3 × 3 = 9

#### Rule Three.

When you multiply any number by 5, the last digit of the answer has to be either 5 or 0.

EX:  $5 \times 3 = 15$  The last digit of the product is 5.

 $5 \times 12 = 60$ , and notice that the last digit of the answer is 0.

nume	Date
ANSWERS Based on the three rules above put a check	next to the onswers that have to be wrong
1. $6 \times 8 = 48$	
2. 24 × 14 = 336	
3. 16 × 28 = 447	
4. 30 × 32 = 960	
5. 146 × 86 = 12,556	
6. 152 × 92 = 13,985	
7. 3 × 11 = 33	
8. 3 × 12 = 35	
9. 3 × 21 = 63	
10. 3 × 13 = 38	
11. 3 × 25 = 75	
12. 3 × 30 = 91	
13. 5 × 4 = 20	
14. 5 × 12 = 72	
15. 5 × 17 = 85	
16. 5 × 18 = 88	
17. 5 × 20 = 100	
18. 5 × 22 = 106	
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ANSWERS	Multiplying by 10, 100, or 1,000!
Multiplying a easy if you l	any number by 10, 100, or even 1,000 is know these tricks.
lf you have to original numb	multiply any number by 10, just place a 0 at the end of the er.
EX: 10 × 14 = 14	0
lf you have to original numb	multiply a number by 100, just place two 0s at the end of the er.
EX: 100 × 14 = 2	L400
And if you hav end of the orig	ve to multiply a number by 1,000, just place three 0s at the ginal number.
EX: 1000 × 14 =	14,000
	Answer the following problems:
10 x 24 = 240	)
1. 10 x 12 = _	120
2. 10 x 32 = _	320
3. 10 x 87 = _	870
4. 10 x 376 =	3,760
5. 10 x 6,395	= <u>63,950</u>

Name	Date
100 x 24 = 2,400	
6. 100 x 16 = <b>1,600</b>	
7. 100 x 38 = <u>3,800</u>	
8. 100 x 94 =	
9. 100 x 672 = <b>67,200</b>	
10. 100 x 4,936 = <b>493,600</b>	
1,000 x 24 = 24,000	
11. 1,000 x 17 = <b>17,000</b>	
12. 1,000 x 39 = <b>39,000</b>	
13. 1,000 x 91 = <b>91,000</b>	
14. 1,000 x 289 = <b>289,000</b>	
15. 1,000 x 3,386 = <b>3,386,00</b>	

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	Date
Relatin	ng Single Digit Addition to a Double Digit.
If you know that 3 + about adding numb	5 = 8 you can easily solve 30 + 50 because you don't have to worry pers in the ones column.
	30 = 3 tens
	+ 50 = 5  tens
You can use the sam	ne rule to add numbers with three digits, or even 4 digits. For example,
	300 = 3 hundreds
	+ 500 = 5 hundreds
	800 = 8 hundreds
Just take off the zer	os and add the numbers. Then, make sure you put the zeros back!
Let's try it with diffe	rent numbers:
6 + 5 = 11	
60 + 50 + 110	
600 + 500 = 1,1	.00
Now, use this rule to following blanks:	add the following numbers. Write the correct answers on the
1. 4 + 8 = 12	
40 + 80 = _1	120
400 + 800 =	- 1,200

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me	. Date
2. 4 + 3 = 7	3. $4 + 1 = 5$
40 + 30 = 70	40 + 10 = <u>50</u>
400 + 300 = <u>700</u>	400 + 100 = <u>500</u>
e. 12 + 16 = 28	5. 15 + 18 = 33
120 + 160 = 280	150 + 180 = 330
1,200 + 1,600 = <u>2,800</u>	1,500 + 1,800 = <u>3,300</u>
5. <u>14</u> + <u>17</u> = <u><u>31</u></u>	7. 18 + 36 = <u>54</u>
140 + 170 = <u>310</u>	180 + 360 = <u>540</u>
1,400 + 1,700 = <u>3,100</u>	1,800 + 3,600 = <u>5,400</u>

Name		Date
ANSWERS	Using Estimation: Know	ing What's Too Big and Too Small
Adding and suk easy way to fig	btracting large numbers ca Jure out if your answer is c	an sometimes be difficult. Estimating is an close, or if you need to try again.
EX: 227 + 631 =		
This looks hard	. But there are some thing	s you can know right away just by looking at it.
For example, w You should kno A 3-digit numbe	hat if you had an answer li ow immediately that it must er + a 3-digit number can ne	ike 78? t be wrong. ever equal a 2-digit number. It's too small!
OR, what if you You should also A 3-digit pumbe	had an answer like 12,428? how this is wrong.	aver equal o 5-digit pumber. It's way too big
R 3-aigit harnot		ever equal a 3-algic hamber. It's wag too kig.
lf 227 + 631 is a d You should be (The actual ans Note: The same	lifficult problem for you, yo able to determine that the swer is 858, a large three-d e thing is true for subtractio	ou can still estimate an answer. answer probably has 3 digits or, at most, 4 digits. ligit number.) on.
Answer the follow to the correct answ	ing multiple choice problems. N ver than any of the others. Pick t	lone of the possible answers are correct, but one is closer the answer provided that is <u>closest</u> to the correct answer.
1.	428 + 298 =	4. 856 – 32 =
a.	650	a. 800
b.	65	b. 8,000
C.	6,500	c. 80
2.	82 + 45 =	5. 7,324 – 119 =
a.	11	a. 72
b.	1,100	b. 720
C.	110	c. 7,200
3.	634 + 56 =	
a.	6,700	
b.	67	
C.	670	



Name	Date
Answer the following multiple choice questions by roundi down the numbers in the problem provided. None of the correct, but one is closer to the correct answer than any the approximate answer provided that is closest to the c	ing up or rounding possible answers is y of the others. Pick correct answer.
1. 328 + 598 =	
a. 800 b. 80 c. 8,000	
2. 52 + 49 =	
a. 10 b. <u>1</u> ,000 c. 100	
3. 784 + 81 =	
a. 8,800 b. 88 c. 880	
4. 756 - 39 =	
a. 7,000 b. 700 c. 70	
5. 4,124 - 139 =	
a. 39 b. 390 c. 3,900	



ANSWERS	Mixed F	Problem	s Requiri	ing Estimation
Find the best of	estimate by	y roundin	ig up or re	ounding down.
None of the po answer than a the correct ar	ossible answ any of the c nswer.	wers are others. Pi	correct, k ck the an	out one is closer to the correct swer provided that is closest to
1. 327 + 516 = <u>8</u>	00	a. 80	b. 800	c. 8,000
2. 689 + 173 = <u>9</u>	00	a. 900	b. 9,000	c. 90
3. 542 + 198 = <mark>7</mark>	00	a. 7,000	b. 70	c. 700
4. 263 + 77 =	80	a. 38	b. 380	c. 3,800
5. 482 + 237 = <mark>7</mark>	00	a. 600	b. 700	c. 800
6. 617 – 426 = <u>2</u>	00	a. 200	b. 2,000	c. 20
7. 387 + 187 = <u>6</u>	00	a. 60	b. 6,000	c. 600
8. 871 – 329 = <u>6</u>	00	a. 60	b. 600	c. 6,000
9. 352 – 51 = <u>3</u>	00	a. 300	b. 30	c. 3,000
10. 78 + 491 = <u>5</u>	80	a. 5,800	b. 580	c. 58
11. 789 + 821 =	1,600	a. 1,600	b. 1,500	c. 1,700
	500	400	h 500	~ 700

1.4,279+2,912 = /,000	a. 70,000	b. 7,000	c. 700
2. 3,897 + 5,267 = <u>8,000</u>	a. 8,000	b. 80,000	c. 800
3. 5,933 – 3,361 = <u>3,00</u> 0	a. 300	b. 3,000	c. 30,000

Name	Date
Fast Addition Moving Left to Right: T	he Break Down 도 🗗
One way to add large numbers quickly is to break down the add all the parts from left to right. For example:	second number into smaller parts and then
34 + 27 = is hard to do in your head. So, let's <i>break it d</i>	own.
27 is the same as $20 + 7$ . Once you know this, the original problem becomes: $34 + 20$ Now add this in your head: 34 + 20 = 54. Then, $54 + 7 = 61$ . You have your answer: $34 + 27 = 61$ .	+7=
Here's another example in 4 steps:	
48 + 87 =	
1. Rewrite the second number: 87 = 80 + 7.	
2. Write the new problem: 48 + 80 + 7 =	
3. Add left to right 48 + 80 = 128. Now add the 7 128 + 7 = 135.	
135 is the answer!	
Write the number that should go where the blank spaces are adding left to right method:	e in the following three-part solutions using the
1. 31 + 23 =	
a. 23 = 20 + <u>3</u> b. 31 + 20 + 3 = c. 31 + 20 = 51. Then, 51 + <u>3</u> = 54. The answer is 54.	
2. 44 + 67 =	
a. 67 = <u>60</u> + 7 b. 44 + 60 + 7 = c. 44 + 60 = 104. Then, 104 + <u>7</u> = 111. The answer is	111.
3. 27 + 52 =	
a. $52 = 50 + 2$ b. $27 + 50 + 2 =$ c. $27 + 50 = 77$ . Then, $77 + 2 = 79$ . The answer is	79.
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ANSWERS	Fast Addition Moving Left to Right
<sup>-</sup> ast additio	n moving left to right is done in three steps. The three steps are as follows:
The proble	em is 32 + 23 =
* Step Or	e: Rewrite the second number: 23 = 20 + 3
* Step Tw	o: Write the new problem: 32 + 20 + 3 =
* Step Th	ree: Add left to right: 32 + 20 = 52. Then, 52 + 3 = 55. The answer is 55.
Here's one r	g the problems below, use the three-step format (show your work):
Here's one r blank space 37 + 55 =	g the problems below, use the three-step format (show your work): more example before you do the rest of the problems by yourself. Fill in the es:
Here's one r blank space <b>37 + 55 =</b> a. 55 = 50	g the problems below, use the three-step format (show your work): more example before you do the rest of the problems by yourself. Fill in the es: +5
Here's one r blank space <b>37 + 55 =</b> a. 55 = 50 + b. 37 + 50 +	g the problems below, use the three-step format (show your work): more example before you do the rest of the problems by yourself. Fill in the es: + <u>5</u>
Here's one r blank space <b>37 + 55 =</b> a. 55 = 50 + b. 37 + 50 + c. 37 + 50 =	g the problems below, use the three-step format (show your work): more example before you do the rest of the problems by yourself. Fill in the es: +5 5 = = 87. Then, 87 +5 = 92. The answer is 92.
Here's one r blank space <b>37 + 55 =</b> a. 55 = 50 b. 37 + 50 + c. 37 + 50 = <u>1. 27 + 54 =</u>	g the problems below, use the three-step format (show your work): more example before you do the rest of the problems by yourself. Fill in the s: +5 5 = = 87. Then, 87 +5 = 92. The answer is 92.
Here's one r blank space 37 + 55 = a. 55 = 50 b. 37 + 50 + c. 37 + 50 = 1. 27 + 54 = 54 =	g the problems below, use the three-step format (show your work): more example before you do the rest of the problems by yourself. Fill in the es: +5

2. 41 + 35 =				
35 =	= 30 + 5 41 + 30 + 5 = 41 + 30 = 71. Then, 71 ·	1 + 5 = 76. The answer is 76.		
3. 18 + 77 =				
77 :	= 70 + 7			
	18 + 70 + 7 =			
	18 + 70 = 88. Then, 88	+ / = 95. The answ	er is 95.	
4. 36 + 36 =	=			
36	= 30 + 6			
	36 + 30 + 6 =			
	36 + 30 = 66. Then, 66	+ 6 = 72. The answ	er is 72.	
5. 62 + 26 =	=			
26	= 20 + 6			
	62 + 20 + 6 =	_		
	62+ 20 = 82. Then, 82 -	+ 6 = 88. The answe	r is 88.	
6. 51 + 44 =	=			
44 =	= 40 + 4			
	51 + 40 + 4 =			
	51 + 40 = 91. Then, 91 -	+ 4 = 95. The answe	r is 95.	

Date

Name\_



Everyone should memorize the multiplication tables. Sometimes, though, there are other ways to quickly multiply and divide numbers by recognizing patterns.

For example, to multiply by 2, you can memorize the multiplication table, or you can recognize that multiplying a number by 2 is just *doubling* that number. For example:

 $2 \times 8 = 16$ . Another way to find out the answer to  $2 \times 8$  is to recognize that doubling 8 (8 + 8) also equals 16.

This works for bigger numbers, too.  $2 \times 136 = 272$ . Another way to find out the answer to  $2 \times 136$  is to recognize that *doubling* 136 (136 + 136) also equals 272.

Another example of how recognizing patterns can help you multiply numbers is multiplying by 5. Any time you multiply a number by 5, the last digit in the answer *must be either* 5 *or* 0. If the last digit is anything other than a 5 or 0, it is wrong. For example:

- $5 \times 2 = 10$ : The first digit of this answer is 1, and the last digit is 0.
- 5 x 3 = 15: The last digit is 5
- $5 \times 8 = 40$ : The last digit is 0
- 5 x 18 = 90: The last digit is 0
- 5 x 253 = 1,265: The last digit is 5
- 5 x 12 can't be 72 because the last digit is 2 (The answer is 70)

Name	Date
Problems: ANSWERS	
$2 \times 9 = 18$ , $2 \times 11 = 22$ , $2 \times 15 = 30$	, 2 x 27 = <u>54</u> ,
$2 \times 32 = 64$ , $2 \times 77 = 154$ , $2 \times 112 = 224$	, 2 x 164 = <u>328</u> ,
$2 \times 234 = 468$ , $2 \times 367 = 734$ , $2 \times 426 = 852$	. •
$5 \times 7 = 35$ , $5 \times 12 = 60$ , $5 \times 14 = 70$	_,5x17=_ <u>85</u> ,
$5 \times 20 = 100$ , $5 \times 25 = 125$ .	
Put a check by the problems that have to be wrong	:
1.5 x 16 = 80	
2. 5 x 19 = 93	
3. 5 x 78 = 391	
4. 5 x 92 = 460	
5. 5 x 156 = 784	
6. 5 x 333 = 1665	
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Everyone should memorize the multiplication tables. Sometimes, though, there are other ways to quickly multiply and divide numbers by recognizing patterns.

To divide by 2 you can memorize the multiplication table, or you can recognize that dividing a number by 2 is just figuring out what *half* of the number is. For example:

6 divided by 2 = 3. *Half* of 6 is 3. You know this because 3 + 3 is 6. So, if you know *half* of 6 is 3, then you know how to divide by 2.

This works for bigger numbers too. 860 divided by 2 = 430. This means that 430 + 430 = 860 (which also means that 430 is *half* of 860). And 1,428 divided by 2 = 714. This means that 714 + 714 = 1,428 (which also means that 714 is *half* of 1,428).

To divide by 3 you can memorize the multiplication table, or you can recognize that dividing a number by 3 is just figuring out what *one-third* of the number is. For example:

6 divided by 3 = 2. *One-third* of 6 is 2. You know this because 2 + 2 + 2 is 6. So, if you know *one-third* of 6 is 2, then you know how to divide by 3.

This works for bigger numbers, too. 963 divided by 3 = 321. This means that 321 + 321 + 321 = 963 (which also means that 321 is *one-third* of 963). And 3,369 divided by 3 = 1,123. This means that 1,123 + 1,123 + 1,123 = 3,369 (which also means that 1,123 is *one-third* of 3,369).

Name	- Date
Solve the division problems below using	) this method, and explain your answer.
Ex: 42 divided by 2 = 21 + 21 =	42. Therefore, half of 42 = 21.
1.40 divided by $2 = 20$ .	
2. 44 divided by $2 = 22$ .	
3. 68 divided by $2 = 34$ .	
4. 100 divided by $2 = 50$ .	
5. 146 divided by $2 =73$ .	
Ex: 42 divided by 3 = 14 + 14 +	- 14 = 42. Therefore, one-third of 42 is 14.
6. 9 divided by $3 = 3$ .	
7. 15 divided by $3 = 5$ .	
8. 21 divided by $3 = _7$ .	
9.33 divided by $3 = 11$ .	
10.51 divided by $3 = 17$ .	
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### Multiplying by 3 Using Patterns 🔀

Multiplying by 3 is easier than multiplying by other numbers because of a certain pattern. When you multiply any number by 3, the digits of the answer must add up to a multiple of 3. Here are the multiples of 3 up to 100:

3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 99.

 $3 \times 4 = 12$ . If you add together the two digits of the answer, you get 3. That is because 1 + 2 = 3. 3 is the first number on the list of multiples of 3 above. This is how you know the answer is right! If the answer is not on the list above, it is wrong.

 $3 \times 16 = 48$ . Add up the two digits of the answer, 4 + 8 = 12. Since 12 is on the list of multiples of 3 above, the answer is probably right.

Solve the multiplication problems below and check your answer using this method. Show your work.

- 1.3 x 8 = <u>24</u>
- 2. 3 x 11 = <u>33</u>
- 3. 3 x 14 = <u>42</u>
- 4. 3 x 19 = <u>57</u>
- 5. 3 x 20 = <u>60</u>
- 6. 3 x 27 = <u>81</u>

Answer the question. Then, put a check by the problems that have to be wrong:

Ex:  $3 \times 9 = 26$ . Does 2 + 6 = a multiple of 3? (In other words, is 8 on the list above?) No.

7. 3 x 13 = 39. Does 3 + 9 = a multiple of 3? <u>Yes</u>

- 8. 3 x 15 = 45. Does 4 + 5 = a multiple of 3? <u>Yes</u>
- 9. 3 x 21 = 62. Does 6 + 2 = a multiple of 3? <u>No</u>
- 10. 3 x 26 = 78. Does 7 + 8 = a multiple of 3? <u>Yes</u>
- 11. 3 x 33 = 97. Does 9 + 7 = a multiple of 3? <u>No</u>

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Name \_



Review the multiplication and division patterns, then solve the problems below.

<u>Multiplying by 2:</u> Recognize that multiplying a number by 2 is just doubling that number. For example:  $2 \times 8 = 16$ . Another way to find out the answer to  $2 \times 8$  is to recognize that doubling 8 (8 + 8) also equals 16.

Multiplying by 5: Any time you multiply a number by 5, the last digit in the answer must be either 5 or 0. If the last digit is anything other than a 5 or 0, it is wrong.

<u>Dividing by 2:</u> Recognize that dividing a number by 2 is just figuring out what half of the number is. For example: 6 divided by 2 = 3. Half of 6 is 3. You know this because 3 + 3 is 6. So, if you know half of 6 is 3, then you know how to divide by 2.

<u>Multiplying by 3:</u> Multiplying by 3 is easier than you think because of a certain pattern. When you multiply any number by 3, the digits of the answer must add up to a multiple of 3. For example,  $3 \times 4 = 12$ . If you add together the two digits of the answer, you get 3. That is because 1 + 2 = 3.

 $2 \times 4 = \underline{8}, 2 \times 50 = \underline{100}, 2 \times 13 = \underline{26}, 2 \times 18 = \underline{36}, 2 \times 22 = \underline{44}, 2 \times 27 = \underline{54},$   $2 \times 47 = \underline{94}, 2 \times 32 = \underline{64}, 2 \times 41 = \underline{82}, 2 \times 28 = \underline{56}, 2 \times 45 = \underline{90}, 2 \times 39 = \underline{78}.$   $5 \times 7 = \underline{35}, 5 \times 11 = \underline{55}, 5 \times 12 = \underline{60}, 5 \times 14 = \underline{70}, 5 \times 17 = \underline{85}, 5 \times 18 = \underline{90},$  $5 \times 20 = \underline{100}, 5 \times 21 = \underline{105}, 5 \times 22 = \underline{110}, 5 \times 30 = \underline{150}, 5 \times 31 = \underline{155}, 5 \times 32 = \underline{160}.$ 

6 divided by 2 = 3, 12 divided by 2 = 6, 14 divided by 2 = 7,

20 divided by 2 = 10, 22 divided by 2 = 11, 24 divided by 2 = 12,

30 divided by 2 = 15, 40 divided by 2 = 20, 50 divided by 2 = 25,

46 divided by 2 = 23.

 $3 \times 4 = 12$ ,  $3 \times 11 = 33$ ,  $3 \times 12 = 36$ ,  $3 \times 13 = 39$ ,  $3 \times 20 = 60$ ,  $3 \times 21 = 63$ ,

 $3 \times 22 = 66$ ,  $3 \times 30 = 90$ ,  $3 \times 31 = 93$ ,  $3 \times 32 = 96$ ,  $3 \times 40 = 120$ ,  $3 \times 41 = 123$ .

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- 6 x 9 = **54 5** + **4** = 9
- $7 \times 9 = 63$  <u>6</u> + <u>3</u> = 9
- $8 \times 9 = 72$  7 + 2 = 9

Does this pattern work for 9 x 10? Yes or No?

Does it work for 9 x 11? Yes or No?

Date\_

Name.

**ANSWERS** 

#### Multiplying by 6 Using Patterns 🗙 6

Unlike with other numbers, multiplying *even* numbers by 6 results in a recognizable pattern. For example:

 $6 \times 2 = 12$   $6 \times 4 = 24$   $6 \times 6 = 36$  $6 \times 8 = 48$ 

You should notice that the number that is multiplied by six (the second number in the equations above) is the same as the last digit of the answer. For example, if you multiply 6 by 2, the last digit of the answer is also 2. (The answer is 12.) This happens every time you multiply six by an even number. (This doesn't work for *odd* numbers.)

Write the correct number on the blank spaces.

 $1.6 \times 10 = 60$ 

2. 6 x 12 = **72** 

3. 6 x 14 = **84** 

4. 6 x 16 = <u>96</u>

Challenge questions:

5.6 x 18 = **108** 

6. 6 x 26 = **156** 

7.6 x 42 = **252** 

8. 6 x 74 = **444** 

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