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Rapid Math Tricks and Tips

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Divisibility Rules for numbers 3-13

Dividing by 3

Add up the digits: if the sum is divisible by three, then the number is as well. Examples:

1. 111111: the digits add to 6 so the whole number is divisible by three.

2. 87687687. The digits add up to 57, and 5 plus seven is 12, so the original number is divisible by three.

Divisibility Rules for numbers 3-13

Dividing by 4

Look at the last two digits. If the number formed by its last two digits is divisible by 4, the original number is as well.
Examples:

1. 100 is divisible by 4.

2. 1732782989264864826421834612 is divisible by four also, because 12 is divisible by four.

Divisibility Rules for numbers 3-13

Dividing by 5

If the last digit is a five or a zero, then the number is divisible by 5.

Divisibility Rules for numbers 3-13

Dividing by 6

Check 3 and 2. If the number is divisible by both 3 and 2, it is divisible by 6 as well.

Robert Rusher writes in:
Another easy way to tell if a [multi-digit] number is divisible by six . . . is to look at its [ones digit]: if it is even, and the sum of the [digits] is a multiple of 3, then the number is divisible by 6.

Divisibility Rules for numbers 3-13

Dividing by 7

To find out if a number is divisible by seven, take the last digit, double it, and subtract it from the rest of the number.
Example: If you had 203, you would double the last digit to get six, and subtract that from 20 to get 14. If you get an answer divisible by 7 (including zero), then the original number is divisible by seven. If you don't know the new number's divisibility, you can apply the rule again.

Divisibility Rules for numbers 3-13

Dividing by 9

Add the digits. If that sum is divisible by nine, then the original number is as well.

Divisibility Rules for numbers 3-13

Dividing by 10

If the number ends in 0, it is divisible by 10.

Divisibility Rules for numbers 3-13

Dividing by 11

Take any number, such as 365167484.

Add the first, third, fifth, seventh,.., digits.....3 + 5 + 6 + 4 + 4 = 22

Add the second, fourth, sixth, eighth,.., digits.....6 + 1 + 7 + 8 = 22

If the difference, including 0, is divisible by 11, then so is the number.

22 - 22 = 0 so 365167484 is evenly divisible by 11.

Divisibility Rules for numbers 3-13

Dividing by 12

Check for divisibility by 3 and 4.

Multiplication Tips

Multiplying by five

Here is an easy way to find an answer to a 5 times question.
If you are multiplying 5 times an even number: halve the number you are multiplying by and place a zero after the number. Example: 5 × 6, half of6 is 3, add a zero for an answer of 30. Another example: 5 × 8, half of8 is 4, add a zero for an answer of 40.

If you are multiplying 5 times an odd number: subtract one from the number you are multiplying, then halve that number and place a 5 after the resulting number. Example: 5 × 7: -1 from 7 is 6, half of 6 is 3, place a 5 at the end of the resulting number to produce the number 35. Another example:5 × 3: -1 from 3 is 2, half of 2 is 1, place a 5 at the end of this number toproduce 15.

Multiplication Tips

Multiplying by nine

Diana Grinwis says: To multiply by nine on your fingers, hold up ten fingers - if the problem is 9 × 8 you just put down your 8 finger and there's your answer: 72. (If the problem is 9 × 7 just put down your 7 finger: 63.)

Tamzo explains this a little differently:

1. Take the number you are multiplying 9 by and subtract one. That number is the first number in the solution.

2. Then subtract that number from nine. That number is the second number of the solution.

Examples:

4 * 9 = 36

1. 4-1=3

2. 9-3=6

3. solution = 36

8 * 9 = 72

1. 8-1=7

2. 9-7=2

Examples:
4 * 9 = 36

1. 4-1=3
2. 9-3=6
3. solution = 36

8 * 9 = 72

1. 8-1=7
2. 9-7=2
3. solution = 72

5 * 9 = 45

1. 5-1=4
2. 9-4=5
3. solution = 45

Sergey writes in: Take the one-digit number you are multipling by nine, and insert a zero to its right. Then subtract the original number from it.
For example: if the problem is 9 * 6, insert a zero to the right of the six, then subtract six:
9 * 6 = 60 - 6 = 54

Multiplication Tips

Multiplying any number by 11

Now let's look at the easy way...

11 × 54321

=54+54+33+22+11
= 597531

Do you see the pattern? In a way, you're simply adding the digit to whatever comes before it.

But you must work from right to left. The reason I work from right to left is that if the numbers, when added together, sum to more than 9, then you have something to carry over.

Let's look at another example...

11 × 9527136

Well, we know that 6 will be the last number in the answer. So the answer now is

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But you must work from right to left. The reason I work from right to left is that if the numbers, when added together, sum to more than 9, then you have something to carry over.

Let's look at another example...

11 × 9527136

Well, we know that 6 will be the last number in the answer. So the answer now is

???????6.
Calculate the tens place: 6+3=9, so now we know that the product has the form
??????96.
3+1=4, so now we know that the product has the form
?????496.
1+7=8, so
????8496.
7+2=9, so
???98496.
2+5=7, so
??798496.
5+9=14.
Here's where carrying digits comes in: we fill in the hundred thousands place with the ones digit of the sum 5+9, and our product has the form
?4798496.
We will carry the extra 10 over to the next (and final) place.
9+0=9, but we need to add the one carried from the previous sum:
9+0+1=10.

So the product is 104798496.

Multiplication Tips

Multiplying by thirteen

Put the tens digit on the left, the unit number on the right, add them up together in the middle. Then add double the number to the previous result.

For example: 13 × 22
Step 1: (2 × 100) + 2 + [(2 + 2) × 10] = 242.
Step 2: 22 × 2 = 44.
Answer: 242 + 44 = 286.

If the two digits sum to more than ten, then you carry the one to add it to the number on the left and continue.

For example: 13 × 65
Step 1: (6 × 100) + 5 + [(6 + 5) × 10] = 715.
Step 2: 65 × 2 = 130.
Answer: 715 + 130 = 845.

Multiplication Tips

Multiplying by sixteen

First, multiply the number in question by 10. Then multiply half the number by 10. Then add those two results together with the number itself to get your final answer.

For example: 16×24
Step 1: $24 \times 10 = 240$
Step 2: $(24 \times 1/2) \times 10 = 12 \times 10 = 120$
Step 3: add steps 1 and 2 and the number $= 240 + 120 + 24 = 384$

Finding Percentages (11)

Finding2 1/2 percent of a number

1. Choose a number (start with 2 digits and advance to 3 with practice).
2. Divide by 4 (or divide twice by 2).
3. Move the decimal point one place to the left.

Example:

1. If the number selected is **86**:
2. Divide 86 by 4: 86/4 = 21.5
3. Move the decimal point one place to the left.: 2.15
4. So **2 1/2% of 86 = 2.15**.

See the pattern?

1. If the number selected is **648**:
2. Divide 648 by 2 twice: 648/2 = 324, 324/2 = 162
3. Move the decimal point one place to the left.: 16.2
4. So **2 1/2% of 648 = 16.2**.

Practice dividing by 4, or by 2 twice, and you will be able to find these answersfaster than with a calculator.

Finding Percentages (11)

Finding5 percent of a number

1. Choose a large number (or sum of money).
2. Move the decimal point one place to the left.
3. Divide by 2 (take half of it).

Example:

1. If the amount of money selected is **$850**:
2. Move the decimal point one place to the left.: 85
3. Divide by 2: 85/2 = 42.50
4. So **5% of $850 = $42.50**.

See the pattern?

1. If the amount of money selected is **$4500**:
2. Move the decimal point one place to the left.: 450
3. Divide by 2: 450/2 = 225
4. So **5% of $4500 = $225**.

Finding Percentages (11)

Finding15 percent of a number

1. Choose a 2-digit number.
2. Multiply the number by 3.
3. Divide by 2.
4. Move the decimal point one place to the left.

Example:

1. If the number selected is **43**:
2. Multiply by 3: 3 × 43 = 129
3. Divide by 2: 129/2 = 64.5
4. Move the decimal point one place to the left: 6.45
5. So **15% of 43 = 6.45**.

See the pattern?

1. If the number selected is **72**:
2. Multiply by 3: 3 × 72 = 216
3. Divide by 2: 216/2 = 108
4. Move the decimal point one place to the left: 10.8
5. So **15% of 72 = 10.8**.

Finding20 percent of a number

1. Choose a 2-digit number.
2. Divide the number by 5.

Example:

1. If the number selected is **38**:
2. Divide by 5: 38/5 = 7.6
3. So **20% of 38 = 7.6**.

See the pattern?

1. If the number selected is **74**:
2. Divide by 5: 74/5 = 14.8
3. So **20% of 74 = 14.8**.

Finding Percentages (11)

Finding25 percent of a number

1. Divide by 4.

Example:

1. If the number selected is **86**:
2. Divide 86 by 4: 86/4 = 21.5
3. So **25% of 86 = 21.5**.

See the pattern?

1. If the number selected is **73**:
2. Divide 4: 73/4 = 18.25.
3. So **25% of 73 is 18.25**.

Finding Percentages (11)

Finding33 1/3 percent of a number

1. Choose a number.
2. Divide the number by 3.

Example:

1. If the number selected is **74**:
2. Divide by 3: 74/3 = 24 2/3.
3. So **33 1/3% of 74 = 24 2/3**.

See the pattern?

1. If the number selected is **93**:
2. Divide by 3: 93/3 = 31.
3. So **33 1/3% of 93 = 31**.

Finding Percentages (11)

Finding40 percent of a number

1. Choose a 2-digit number.
2. Multiply the number by 4.
3. Move the decimal point one place to the left.

Example:

1. If the number selected is **21**:
2. Multiply by 4: 4 × 21 = 84
3. Move the decimal point one place to the left: 8.4.
4. So **40% of 21 = 8.4**.

See the pattern?

1. If the number selected is **73**:
2. Multiply by 4: 4 × 73 = 280 + 12 = 292.
3. Move the decimal point one place to the left: 29.2.
4. So **40% of 73 = 29.2**.

Finding Percentages (11)

Finding45 percent of a number

1. Choose a 2-digit number.
2. Multiply the number by 9.
3. Divide by 2.
4. Move the decimal point one place to the left.

Example:

1. If the number selected is **36**:
2. Multiply by 9: 9 × 36 = 270 + 54 = 324
3. Divide by 2: 324/2 = 162
4. Move the decimal point one place to the left: 16.2
5. So **45% of 36 = 16.2**.

See the pattern?

1. If the number selected is **52**:
2. Multiply by 9: 9 × 52 = 450 + 18 = 468
3. Divide by 2: 468/2 = 234
4. Move the decimal point one place to the left: 23.4
5. So **45% of 52 = 23.4**.

Finding Percentages (11)

Finding55 percent of a number

1. Choose a 2-digit number.
2. Multiply the number by 11. (Add digits from right to left - see examples).
3. Divide by 2.
4. Move the decimal point one place to the left.

Example:

1. If the number selected is **81**:
2. Multiply by 11: 11 × 81 = 891
   right digit is 1
   next digit to left is 1 + 8 = 9
   last digit to left is 8
3. Divide by 2: 891/2 = 445.5
4. Move the decimal point one place to the left: 44.55
5. So **55% of 81 = 44.55**.

See the pattern?

1. If the number selected is **59**:
2. Multiply by 11: 11 × 59 = 649
   right digit is 9
   next digit to left is 9 + 5 = 14 (use the 4 and carry 1)
   last digit to left is 5 + 1 = 6
3. Divide by 2: 649/2 = 324.5
4. Move the decimal point one place to the left: 32.45
5. So **55% of 59 = 32.45**.

Finding Percentages (11)

Finding70 percent of a number

1. Choose a 2-digit number.
2. Multiply the number by 7.
3. Move the decimal point one place to the left.

Example:

1. If the number selected is **21**:
2. Multiply by 7: 7 × 21 = 147
3. Move the decimal point one place to the left: 14.7
4. So **70% of 21 = 14.7**.

See the pattern?

1. If the number selected is **63**:
2. Multiply by 7: 7 × 63 = 420 + 21 = 441
3. Move the decimal point one place to the left: 44.1
4. So **70% of 63 = 44.1**.

Finding Percentages (11)

Finding75 percent of a number

1. Choose a number.
2. Multiply the number by 3.
3. Divide this product by 4.

Example:

1. If the number selected is **73**:
2. Multiply the number by 3: 3 × 73 = 210 + 9 = 219.
3. Divide this product by 4: 219/4 = 54.75.
4. So **75% of 73 = 54.75**.

See the pattern?

1. If the number selected is **51**:
2. Multiply the number by 3: 3 × 51 = 153.
3. Divide this product by 4: 153/4 = 38.25.
4. So **75% of 51 = 38.25**.

Squaring Numbers (88)

Squaring a 2-digit number beginning with 1

1. Take a 2-digit number beginning with 1.
2. Square the second digit
   (keep the carry) _ _ X
3. Multiply the second digit by 2 and
   add the carry (keep the carry) _ X _
4. The first digit is one
   (plus the carry) X _ _

Example:

1. If the number is **16**, square the second digit:
   6 × 6 = 36 _ _ 6
2. Multiply the second digit by 2 and
   add the carry: 2 × 6 + 3 = 15 _ 5 _
3. The first digit is one plus the carry:
   1 + 1 = 2 2 _ _
4. So **16 × 16 = 256**.

See the pattern?

1. For 19 × 19, square the second digit:
   9 × 9 = 81 _ _ 1
2. Multiply the second digit by 2 and
   add the carry: 2 × 9 + 8 = 26 _ 6 _
3. The first digit is one plus the carry:
   1 + 2 = 3 3 _ _
4. So **19 × 19 = 361**.

Squaring Numbers (88)

Squaring a 2-digit number beginning with 5

1. Take a 2-digit number beginning with 5.
2. Square the first digit.
3. Add this number to the second number to find the first part of the answer.
4. Square the second digit: this is the last part of the answer.

Example:

1. If the number is **58**, multiply 5 × 5 = 25 (square the first digit).
2. 25 + 8 = 33 (25 plus second digit).
3. The first part of the answer is 33   3 3 _ _
4. 8 × 8 = 64 (square second digit).
5. The last part of the answer is 64   _ _ 6 4
6. So **58 × 58 = 3364**.

See the pattern?

1. For 53 × 53, multiply 5 × 5 = 25 (square the first digit).
2. 25 + 3 = 28 (25 plus second digit).
3. The first part of the answer is 28   2 8 _ _
4. 3 × 3 = 9 (square second digit).
5. The last part of the answer is 09   _ _ 0 9
6. So **53 × 53 = 2809**.

Squaring a 2-digit number beginning with 9

1. Take a 2-digit number beginning with 9.
2. Subtract it from 100.
3. Subtract the difference from the original number: this is the first part of the answer.
4. Square the difference: this is the last part of the answer.

Example:

1. If the number is **96**, subtract: 100 - 96 = 4, 96 - 4 = 92.
2. The first part of the answer is 92 _ _ .
3. Take the first difference (4) and square it: 4 × 4 = 16.
4. The last part of the answer is _ _ 16.
5. So **96 × 96 = 9216**.

See the pattern?

1. For 98 × 98, subtract: 100 - 98 = 2, 98 - 2 = 96.
2. The first part of the answer is 96 _ _.
3. Take the first difference (2) and square it: 2 × 2 = 4.
4. The last part of the answer is _ _ 04.
5. So **98 × 98 = 9604**.

Squaring a 2-digit number ending in 1

1. Take a 2-digit number ending in 1.
2. Subtract 1 from the number.
3. Square the difference.
4. Add the difference twice to its square.
5. Add 1.

Example:

1. If the number is **41**, subtract 1: 41 - 1 = 40.
2. 40 × 40 = 1600 (square the difference).
3. 1600 + 40 + 40 = 1680 (add the difference twice to its square).
4. 1680 + 1 = 1681 (add 1).
5. So **41 × 41 = 1681**.

See the pattern?

1. For 71 × 71, subtract 1: 71 - 1 = 70.
2. 70 × 70 = 4900 (square the difference).
3. 4900 + 70 + 70 = 5040 (add the difference twice to its square).
4. 5040 + 1 = 5041 (add 1).
5. So **71 × 71 = 5041**.

Squaring Numbers (88)

Squaring a 2-digit number ending in 2

1. Take a 2-digit number ending in 2.
2. The last digit will be _ _ _ 4.
3. Multiply the first digit by 4: the 2nd number will be the next to the last digit: _ _ X 4.
4. Square the first digit and add the number carried from the previous step: X X _ _.

Example:

1. If the number is **52**, the last digit is _ _ _ 4.
2. 4 × 5 = 20 (four times the first digit): _ _ 0 4.
3. 5 × 5 = 25 (square the first digit), 25 + 2 = 27 (add carry): 2 7 0 4.
4. So **52 × 52 = 2704**.

See the pattern?

1. For 82 × 82, the last digit is _ _ _ 4.
2. 4 × 8 = 32 (four times the first digit): _ _ 2 4.
3. 8 × 8 = 64 (square the first digit), 64 + 3 = 67 (add carry): 6 7 2 4.
4. So **82 × 82 = 6724**.

Squaring Numbers (88)

Squaring a 2-digit number ending in 3

1. Take a 2-digit number ending in 3.
2. The last digit will be _ _ _ 9.
3. Multiply the first digit by 6: the 2nd number will be the next to the last digit: _ _ X 9.
4. Square the first digit and add the number carried from the previous step: X X _ _.

Example:

1. If the number is **43**, the last digit is _ _ _ 9.
2. 6 × 4 = 24 (six times the first digit): _ _ 4 9.
3. 4 × 4 = 16 (square the first digit), 16 + 2 = 18 (add carry): 1 8 4 9.
4. So **43 × 43 = 1849**.

See the pattern?

1. For 83 × 83, the last digit is _ _ _ 9.
2. 6 × 8 = 48 (six times the first digit): _ _ 8 9.
3. 8 × 8 = 64 (square the first digit), 64 + 4 = 68 (add carry): 6 8 8 9.
4. So **83 × 83 = 6889**.

Squaring Numbers (88)

Squaring a 2-digit number ending in 4

1. Take a 2-digit number ending in 4.
2. Square the 4; the last digit is 6: _ _ _ 6 (keep carry, 1.)
3. Multiply the first digit by 8 and add the carry (1); the 2nd number will be the next to the last digit: _ _ X 6 (keep carry).
4. Square the first digit and add the carry: X X _ _.

Example:

1. If the number is **34**, 4 × 4 = 16 (keep carry, 1); the last digit is _ _ _ 6.
2. 8 × 3 = 24 (multiply the first digit by 8), 24 + 1 = 25 (add the carry):
   the next digit is 5: _ _ 5 6. (Keep carry, 2.)
3. Square the first digit and add the carry, 2: 1 1 5 6.
4. So **34 × 34 = 1156**.

See the pattern?

1. For 84 × 84, 4 × 4 = 16 (keep carry, 1); the last digit is _ _ _ 6.
2. 8 × 8 = 64 (multiply the first digit by 8), 64 + 1 = 65 (add the carry):
   the next digit is 5: _ _ 5 6. (Keep carry, 6.)
3. Square the first digit and add the carry, 6: 7 0 5 6.
4. So **84 × 84 = 7056**.

Squaring Numbers (88)

Squaring a 2-digit number ending in 5

1. Choose a 2-digit number ending in 5.
2. Multiply the first digit by the next consecutive number.
3. The product is the first two digits: XX _ _.
4. The last part of the answer is always 25: _ _ 2 5.

Example:

1. If the number is **35**, 3 × 4 = 12 (first digit times next number). 1 2 _ _
2. The last part of the answer is always 25: _ _ 2 5.
3. So **35 × 35 = 1225**.

See the pattern?

1. For 65 × 65, 6 × 7 = 42 (first digit times next number): 4 2 _ _.
2. The last part of the answer is always 25: _ _ 2 5.
3. So **65 × 65 = 4225**.

Squaring Numbers (88)

Squaring a 2-digit number ending in 6

1. Choose a 2-digit number ending in 6.
2. Square the second digit (keep the carry): the last digit of the answer is always 6: _ _ _ 6
3. Multiply the first digit by 2 and add the carry (keep the carry): _ _ X _
4. Multiply the first digit by the next consecutive number and add the carry: the product is the first two digits: XX _ _.

Example:

1. If the number is **46**, square the second digit : 6 × 6 = 36; the last digit of the answer is 6 (keep carry 3): _ _ _ 6
2. Multiply the first digit (4) by 2 and add the carry (keep the carry): 2 × 4 = 8, 8 + 3 = 11; the next digit of the answer is 1: _ _ 1 6
3. Multiply the first digit (4) by the next number (5) and add the carry: 4 × 5 = 20, 20 + 1 = 21 (the first two digits): 2 1 _ _
4. So **46 × 46 = 2116**.

See the pattern?

1. For 76 × 76, square 6 and keep the carry (3): 6 × 6 = 36; the last digit of the answer is 6: _ _ _ 6
2. Multiply the first digit (7) by 2 and add the carry: 2 × 7 = 14, 14 + 3 = 17; the next digit of the answer is 7 (keep carry 1): _ _ 7 6
3. Multiply the first digit (7) by the next number (8) and add the carry: 7 × 8 = 56, 56 + 1 = 57 (the first two digits: 5 7 _ _
4. So **76 × 76 = 5776**.

Squaring a 2-digit number ending in 7

1. Choose a 2-digit number ending in 7.
2. The last digit of the answer is always 9: _ _ _ 9
3. Multiply the first digit by 4 and add 4 (keep the carry): _ _ X _
4. Multiply the first digit by the next consecutive number and add the carry: the product is the first two digits: XX _ _.

Example:

1. If the number is **47**:
2. The last digit of the answer is 9: _ _ _ 9
3. Multiply the first digit (4) by 4 and add 4 (keep the carry): 4 × 4 = 16, 16 + 4 = 20; the next digit of the answer is 0 (keep carry 2): _ _ 0 9
4. Multiply the first digit (4) by the next number (5) and add the carry (2): 4 × 5 = 20, 20 + 2 = 22 (the first two digits): 2 2 _ _
5. So **47 × 47 = 2209**.

See the pattern?

1. For 67 × 67
2. The last digit of the answer is 9: _ _ _ 9
3. Multiply the first digit (6) by 4 and add 4 (keep the carry): 4 × 6 = 24, 24 + 4 = 28; the next digit of the answer is 0 (keep carry 2): _ _ 8 9
4. Multiply the first digit (6) by the next number (7) and add the carry (2): 6 × 7 = 42, 42 + 2 = 44 (the first two digits): 4 4 _ _
5. So **67 × 67 = 4489**.

Squaring Numbers (88)

Squaring a 2-digit number ending in 8

1. Choose a 2-digit number ending in 8.
2. The last digit of the answer is always 4: _ _ _ 4
3. Multiply the first digit by 6 and add 6 (keep the carry): _ _ X _
4. Multiply the first digit by the next consecutive number and add the carry: the product is the first two digits: XX _ _.

Example:

1. If the number is **78**:
2. The last digit of the answer is 4: _ _ _ 4
3. Multiply the first digit (7) by 6 and add 6 (keep the carry): 7 × 6 = 42, 42 + 6 = 48; the next digit of the answer is 8 (keep carry 4): _ _ 8 4
4. Multiply the first digit (7) by the next number (8) and add the carry (4):
   7 × 8 = 56, 56 + 4 = 60 (the first two digits): 6 0 _ _
5. So **78 × 78 = 6084**.

See the pattern?

1. For 38 × 38
2. The last digit of the answer is 4: _ _ _ 4
3. Multiply the first digit (3) by 6 and add 6 (keep the carry): 3 × 6 = 18, 18 + 6 = 24; the next digit of the answer is 4 (keep carry 2): _ _ 4 4
4. Multiply the first digit (3) by the next number (4) and add the carry (2):
   3 × 4 = 12, 12 + 2 = 14 (the first two digits): 1 4 _ _
5. So **38 × 38 = 1444**

Learn the pattern, practice other examples, and you will be a whiz at givingthese squares

Squaring a 2-digit number ending in 9

1. Choose a 2-digit number ending in 9.
2. The last digit of the answer is always 1: _ _ _ 1
3. Multiply the first digit by 8 and add 8 (keep the carry): _ _ X _
4. Multiply the first digit by the next consecutive number and add the carry: the product is the first two digits: XX _ _.

Example:

1. If the number is **39**:
2. The last digit of the answer is 1: _ _ _ 1
3. Multiply the first digit (3) by 8 and add 8 (keep the carry): 8 × 3 = 24, 24 + 8 = 32; the next digit of the answer is 2 (keep carry 3): _ _ 2 1
4. Multiply the first digit (3) by the next number (4) and add the carry (3): 3 × 4 = 12, 12 + 3 = 15 (the first two digits): 1 5 _ _
5. So **39 × 39 = 1521**.

See the pattern?

1. For 79 × 79
2. The last digit of the answer is 1: _ _ _ 1
3. Multiply the first digit (7) by 8 and add 8 (keep the carry): 8 × 7 = 56, 56 + 8 = 64; the next digit of the answer is 4 (keep carry 6): _ _ 4 1
4. Multiply the first digit (7) by the next number (8) and add the carry (6): 7 × 8 = 56, 56 + 6 = 62 (the first two digits): 6 2 _ _
5. So **79 × 79 = 6241**.

Practice other examples using this pattern, and in no time you'll be ableto give these squares faster than someone using a calculator.

Squaring Numbers (88)

Squaring numbers made up of ones

1. Choose a a number made up of ones (up to nine digits).
2. The answer will be a series of consecutive digits beginning with 1, up to the number of ones in the given number, and back to 1.

Example:

1. If the number is **11111**, (5 digits) -
2. The square of the number is **123454321**.
(Begin with 1, up to 5, then back to 1.)

See the pattern?

1. If the number is **1111111**, (7 digits) -
2. The square of the number is **1234567654321**.
(Begin with 1, up to 7, then back to 1.).

This is an easy one, but it should be good for a quick example of your mentalmath abilities. Challenge a friend and BEAT THE CALCULATOR!

Squaring Numbers (88)

Squaring numbers made up of threes

1. Choose a a number made up of threes.
2. The square is made up of:
    1. one fewer 1 than there are repeating 3's
    2. zero
    3. one fewer 8 than there are repeating 3's (same as the 1's in the square)
    4. nine.

Example:

1. If the number to be squared is **3333**:
2. The square of the number has:

```
three 1's (one fewer than
digits in number)                  11 1 _ _ _ _ _
next digit is 0                    __ _ 0 _ _ _ _
three 8's (same number as 1's)     _ _ _ _ 8 8 8 _
a final 9                          __ _ _ _ _ _ 9
```

3. So **3333 × 3333 = 11108889**.

See the pattern?

1. If the number to be squared is **333**:
2. The square of the number has:

```
two 1's                            11 _ _ _ _ _
next digit is 0                    __ _ 0 _ _ _
two 8's                            __ _ _ 8 8 _
a final 9                          __ _ _ _ _ 9
```

3. So **333 × 333 = 110889**.

Squaring Numbers (88)

Squaring numbers made up of sixes

1. Choose a a number made up of sixes.
2. The square is made up of:
    1. one fewer 4 than there are repeating 6's
    2. 3
    3. same number of 5's as 4's
    4. 6

Example:

1. If the number to be squared is **666**
2. The square of the number has:

```
4's (one less than digits
    in number)          44
3                            3
5's (same number as 4's)       5 5
6                                  6
```

3. So **666 × 3666333 = 443556**.

See the pattern?

1. If the number to be squared is **66666**
2. The square of the number has:

```
4's (one less than digits
     in number)          44 4 4
3                                3
5's (same number as 4's)             55 5 5
6                                          6
```

3. So **66666 × 66666 = 4444355556**.

Squaring Numbers (88)

Squaring numbers made up of nines

1. Choose a a number made up of nines (up to nine digits).
2. The answer will have one less 9 than the number, one 8, the same number of zeros as 9's, and a final 1

Example:

1. If the number to be squared is **9999**
2. The square of the number has:

```
one less nine than the number  9 9 9
one 8                                8
the same number of zeros as 9's        0 0 0
a final 1                                    1
```

3. So **9999 × 9999 = 99980001**.

See the pattern?

1. If the number to be squared is **999999**
2. The square of the number has:

```
one less nine than the number  9 9 9 9 9
one 8                                    8
the same number of zeros as 9's            00 0 0 0
a final 1                                          1
```

3. So **999999 × 999999 = 999998000001**.

This is not a very demanding mental math exercise, but it is an interesting pattern.

Squaring Numbers (88)

Squaring numbers in the 20s

1. Square the last digit (keep the carry) _ _ X
2. Multiply the last digit by 4, add the carry _ X _
3. The first digit will be 4 plus the carry: X _ _

Example:

If the number to be squared is 24:

1. Square the last digit (keep the carry):
   4 × 4 = 16 (keep 1) _ _ 6
2. Multiply the last digit by 4, add the carry:
   4 × 4 = 16, 16 + 1 = 17 _ 7 _
3. The first digit will be 4 plus the carry:
   4 (+ carry): 4 + 1 = 5 5 _ _
4. So **24 × 24 = 576**.

See the pattern?

If the number to be squared is 26:

1. Square the last digit (keep the carry):
   6 × 6 = 36 (keep 3) _ _ 6
2. Multiply the last digit by 4, add the carry:
   4 × 6 = 24, 24 + 3 = 27 (keep 2) _ 7 _
3. The first digit will be 4 plus the carry:
   4 (+ carry): 4 + 2 = 6 6 _ _.
4. So **26 × 26 = 676**.

Squaring Numbers (88)

Squaring numbers in the 30s

1. Square the last digit (keep the carry) _ _ _ X
2. Multiply the last digit by 6, add the carry _ _ X _
3. The first digits will be 9 plus the carry: X X _ _

Example:

If the number to be squared is 34:

1. Square the last digit (keep the carry):
   4 × 4 = 16 (keep 1) _ _ _ 6
2. Multiply the last digit by 6, add the carry:
   6 × 4 = 24, 24 + 1 = 25 _ _ 5 _
3. The first digits will be 4 plus the carry:
   9 (+ carry): 9 + 2 = 11 1 1 _ _
4. So **34 × 34 = 1156**.

See the pattern?

If the number to be squared is 36:

1. Square the last digit (keep the carry):
   6 × 6 = 36 (keep 3) _ _ _ 6
2. Multiply the last digit by 6, add the carry:
   6 × 6 = 36, 36 + 3 = 39 (keep 3) _ _ 9 _
3. The first digits will be 9 plus the carry:
   9 (+ carry): 9 + 3 = 12 1 2 _ _.
4. So **36 × 36 = 1296**.

With some practice you will be giving these squares quickly.

Squaring Numbers (88)

Squaring numbers in the 40s

1. Square the last digit (keep the carry) _ _ X
2. Multiply the last digit by 8, add the carry _ X _
3. The first digits will be 16 plus the carry: X X _ _

Example:

If the number to be squared is 42:

1. Square the last digit:
   2 × 2 = 4 _ _ _ 4
2. Multiply the last digit by 8:
   8 × 2 = 16 _ _ 6 _
3. The first digits will be 16 plus the carry:
   16 (+ carry): 16 + 1 = 17 1 7 _ _
4. So **42 × 42 = 1764**.

See the pattern?

If the number to be squared is 48:

1. Square the last digit (keep the carry):
   8 × 8 = 64 (keep 6) _ _ _ 4
2. Multiply the last digit by 8, add the carry:
   8 × 8 = 64, 64 + 6 = 70 (keep 7) _ _ 0 _
3. The first digits will be 16 plus the carry:
   16 (+ carry): 16 + 7 = 23 2 3 _ _
4. So **48 × 48 = 2304**.

With some practice you will be giving these squares quickly.

Squaring Numbers (88)

Squaring numbers in the 50s

1. Square the last digit (keep the carry) _ _ _ X
2. Multiply the last digit by 10, add the carry _ _ X _
3. The first digits will be 25 plus the carry: X X _ _

Example:

If the number to be squared is 53:

1. Square the last digit (keep the carry):
   3 × 3 = 9 (keep 3) _ _ _ 9
2. Multiply the last digit by 10, add the carry:
   10 × 3 = 30 (keep 3) _ _ 0 _
3. The first digits will be 25 plus the carry:
   25 (+ carry): 25 + 3 = 28 2 8 _ _
4. So **53 × 53 = 2809**.

See the pattern?

If the number to be squared is 56:

1. Square the last digit (keep the carry):
   6 × 6 = 36 (keep 3) _ _ _ 6
2. Multiply the last digit by 10, add the carry:
   10 × 6 = 60, 60 + 3 = 63 _ _ 3 _
3. The first digits will be 25 plus the carry:
   25 (+ carry): 25 + 6 = 31 3 1 _ _
4. So **53 × 53 = 3136**.

Practice and you will soon be producing these products quickly and accurately.

Squaring Numbers (88)

Squaring numbers in the 60s

1. Square the last digit (keep the carry) _ _ _ X
2. Multiply the last digit by 12, add the carry _ _ X _
3. The first digits will be 36 plus the carry: X X _ _

Example:

If the number to be squared is 63:

1. Square the last digit (keep the carry):
   3 × 3 = 9 (keep 3) _ _ _ 9
2. Multiply the last digit by 12, add the carry:
   12 × 3 = 36 (keep 3) _ _ 6 _
3. The first digits will be 36 plus the carry:
   36 (+ carry): 36 + 3 = 39 3 9 _ _
4. So **63 × 63 = 3969**.

See the pattern?

If the number to be squared is 67:

1. Square the last digit (keep the carry):
   7 × 7 = 49 (keep 4) _ _ _ 9
2. Multiply the last digit by 12, add the carry:
   12 × 7 = 84, 84 + 4 = 88 _ _ 8 _
3. The first digits will be 36 plus the carry:
   36 (+ carry): 36 + 8 = 44 4 4 _ _
4. So **67 × 67 = 4489**.

Use this pattern and you will be squaring these numbers with ease.

Squaring numbers in the 70s

1. Square the last digit (keep the carry) _ _ _ X
2. Multiply the last digit by 14, add the carry _ _ X _
3. The first digits will be 49 plus the carry: X X _ _

Example:

If the number to be squared is 72:

1. Square the last digit:
   2 × 2 = 4 _ _ _ 4
2. Multiply the last digit by 14:
   14 × 2 = 28 (keep the carry) _ _ 8 _
3. The first digits will be 49 plus the carry:
   49 (+ carry): 49 + 2 = 51 5 1 _ _
4. So **72 × 72 = 5184**.

See the pattern?

If the number to be squared is 78:

1. Square the last digit (keep the carry):
   8 × 8 = 64 (keep 6) _ _ _ 4
2. Multiply the last digit by 14, add the carry:
   14 × 8 = 80 + 32 = 112
   112 + 6 = 118 (keep 11) _ _ 8 _
3. The first digits will be 49 plus the carry (11):
   49 (+ carry): 49 + 11 = 60 6 0 _ _.
4. So **78 × 78 = 6084**.

Squaring numbers in the 80s

1. Square the last digit (keep the carry) _ _ X
2. Multiply the last digit by 16, add the carry _ X _
3. The first digits will be 64 plus the carry: X X _ _

Example:

If the number to be squared is 83:

1. Square the last digit:
   3 × 3 = 9 _ _ _ 9
2. Multiply the last digit by 16:
   16 × 3 = 30 + 18 = 48 _ _ 8 _
3. The first digits will be 64 plus the carry:
   64 (+ carry): 64 + 4 = 68 6 8 _ _
4. So **83 × 83 = 6889**.

See the pattern?

If the number to be squared is 86:

1. Square the last digit (keep the carry):
   6 × 6 = 36 (keep 3) _ _ _ 6
2. Multiply the last digit by 16, add the carry:
   16 × 6 = 60 + 36 = 96 96 + 3 = 99 (keep 9) _ _ 9 _
3. The first digits will be 64 plus the carry:
   64 (+ carry): 64 + 9 = 73 7 3 _ _
4. So **86 × 86 = 7396**.

Squaring Numbers (88)

Squaring numbers in the hundreds

1. Choose a number over 100 (keep it low for practice, then go higher when expert).
2. The last two places will be the square of the last two digits (keep any carry) _ _ _ X X.
3. The first three places will be the number plus the last two digits plus any carry: X X X _ _.

Example:

1. If the number to be squared is **106**:
2. Square the last two digits (no carry): 6 × 6 = 36: _ _ _ 3 6
3. Add the last two digits (06) to the number: 106 + 6 = 112: 1 1 2 _ _
4. So **106 × 106 = 11236**.

See the pattern?

1. If the number to be squared is **112**:
2. Square the last two digits (keep carry 1): 12 × 12 = 144: _ _ _ 4 4
3. Add the last two digits (12) plus the carry (1) to the number: 112 + 12 + 1 = 125: 1 2 5 _ _
4. So **112 × 112 = 12544**.

With a little practice your only limit will be your ability to square the lasttwo digits!

Squaring numbers in the 200s

1. Choose a number in the 200s (practice with numbers under 210, then progress to larger ones).
2. The first digit of the square is 4: 4 _ _ _ _
3. The next two digits will be 4 times the last 2 digits: _ X X _ _
4. The last two places will be the square of the last digit: _ _ _ X X

Example:

1. If the number to be squared is **206**:
2. The first digit is 4: 4 _ _ _ _
3. The next two digits are 4 times the last digit: 4 × 6 = 24: _ 2 4 _ _
4. Square the last digit: 6 × 6 = 36: _ _ _ 3 6
5. So **206 × 206 = 42436**.

For larger numbers work right to left:

1. Square the last two digits (keep the carry): _ _ _ X X
2. 4 times the last two digits + carry: _ X X _ _
3. Square the first digit + carry: X _ _ _ _

See the pattern?

1. If the number to be squared is **225**:
2. Square last two digits (keep carry): 25x25 = 625 (keep 6): _ _ _ 2 5
3. 4 times the last two digits + carry: 4x25 = 100; 100+6 = 106 (keep 1): _ 0 6 _ _
4. Square the first digit + carry: 2x2 = 4; 4+1 = 5: 5 _ _ _ _
5. So **225 × 225 = 50625**.

Squaring Numbers (88)

Squaring numbers in the 300s

1. Choose a number in the 300s (practice with numbers under 310, then progress to larger ones).
2. The first digit of the square is 9: 9 _ _ _ _
3. The next two digits will be 6 times the last 2 digits: _ X X _ _
4. The last two places will be the square of the last digit: _ _ _ X X

Example:

1. If the number to be squared is **309**:
2. The first digit is 9: 9 _ _ _ _
3. The next two digits are 6 times the last digit: 6 × 9 = 54: _ 5 4 _ _
4. Square the last digit: 9 × 9 = 81: _ _ _ 8 1
5. So **309 × 309 = 95481**.

For larger numbers reverse the steps:

1. Square the last two digits (keep the carry): _ _ _ X X
2. 6 times the last two digits + carry: _ X X _ _
3. Square the first digit + carry: X _ _ _ _

See the pattern?

1. If the number to be squared is **325**:
2. Square last two digits (keep carry): 25x25 = 625 (keep 6): _ _ _ 2 5
3. 6 times the last two digits + carry: 6x25 = 150; 150+6 = 156 (keep 1): _ 5 6 _ _
4. Square the first digit + carry: 3x3 = 9; 9+1 = 10: 1 0 _ _ _ _
5. So **325 × 325 = 105625**.

Squaring Numbers (88)

Squaring numbers in the 400s

1. Choose a number in the 400s (keep the numbers low at first; then progress to larger ones).
2. The first two digits of the square are 16: 1 6 _ _ _ _
3. The next two digits will be 8 times the last 2 digits: _ _ X X _ _
4. The last two places will be the square of the last two digits: _ _ _ _ X X

Example:

1. If the number to be squared is **407**:
2. The first two digits are 16: 1 6 _ _ _ _
3. The next two digits are 8 times the last 2 digits: 8 × 7 = 56: _ _ 5 6 _ _
4. Square the last digit: 7 × 7 = 49: _ _ _ 4 9
5. So **407 × 407 = 165,649**.

For larger numbers reverse the steps:

1. Square the last two digits (keep the carry): _ _ _ _ X X
2. 8 times the last two digits + carry: _ _ X X _ _
3. 16 + carry: X X _ _ _ _

See the pattern?

1. If the number to be squared is **425**:
2. Square the last two digits (keep the carry): 25 × 25 = 625 (keep 6): _ _ _ _ 2 5
3. 8 times the last two digits + carry: 8 × 25 = 200; 200 + 6 = 206 (keep 2): _ _ 0 6 _ _
4. 16 + carry: 16 + 2 = 18: 1 8 _ _ _ _
5. So **425 × 425 = 180,625**.

Squaring Numbers (88)

Squaring numbers in the 500s

1. Choose a number in the 500s (start with low numbers at first; then graduate to larger ones).
2. The first two digits of the square are 25: 2 5 _ _ _ _
3. The next two digits will be 10 times the last 2 digits: _ _ X X _ _
4. The last two places will be the square of the last two digits: _ _ _ _ X X

Example:

1. If the number to be squared is **508**:
2. The first two digits are 25: 2 5 _ _ _ _
3. The next two digits are 10 times the last 2 digits: 10 × 8 = 80: _ _ 8 0 _ _
4. Square the last digit: 8 × 8 = 64: _ _ _ 6 4
5. So **508 × 508 = 258,064**.

For larger numbers reverse the steps:

1. Square the last two digits (keep the carry): _ _ _ _ X X
2. 10 times the last two digits + carry: _ _ X X _ _
3. 25 + carry: X X _ _ _ _

See the pattern?

1. If the number to be squared is **525**:
2. Square the last two digits (keep the carry): 25 × 25 = 625 (keep 6): _ _ _ _ 2 5
3. 10 times the last two digits + carry: 10 × 25 = 250; 250 + 6 = 256 (keep 2): _ _ 5 6 _ _
4. 25 + carry: 25 + 2 - 27: 2 7 _ _ _ _
5. So **425 × 425 = 275,625**.

Squaring Numbers (88)

Squaring numbers in the 600s

1. Choose a number in the 600s (practice with smaller numbers, then progress to larger ones).
2. The first two digits of the square are 36: 3 6 _ _ _ _
3. The next two digits will be 12 times the last 2 digits: _ _ X X _ _
4. The last two places will be the square of the last two digits: _ _ _ _ X X

Example:

1. If the number to be squared is **607**:
2. The first two digits are 36: 3 6 _ _ _ _
3. The next two digits are 12 times the last 2 digits: 12 × 07 = 84: _ _ 8 4 _ _
4. Square the last 2 digits: 7 × 7 = 49: _ _ _ _ 4 9
5. So **607 × 607 = 368,449**.

For larger numbers reverse the steps:

1. If the number to be squared is **625**:
2. Square the last two digits (keep carry): 25x25 = 625 (keep 6): _ _ _ _ 2 5
3. 12 times the last 2 digits + carry: 12x25 = 250 + 50 = 300 + 6 = 306: _ _ 0 6 _ _
4. 36 + carry: 36 + 3 = 39: 3 9 _ _ _ _
5. So **625 × 625 = 390,625**.

Squaring Numbers (88)

Squaring numbers in the 700s

1. Choose a number in the 700s (practice with smaller numbers, then progress to larger ones).
2. Square the last two digits (keep the carry): _ _ _ _ X X
3. Multiply the last two digits by 14 and add the carry: _ _ X X _ _
4. The first two digits will be 49 plus the carry: X X _ _ _ _

Example:

1. If the number to be squared is **704**:
2. Square the last two digits (keep the carry): 4 × 4 = 16: _ _ _ _ 1 6
3. Multiply the last two digits by 14 and add the carry: 14 × 4 = 56: _ _ 5 6 _ _
4. The first two digits will be 49 plus the carry: 4 9 _ _ _ _
5. So **704 × 704 = 495,616**.

See the pattern?

1. If the number to be squared is **725**:
2. Square the last two digits (keep the carry): 25 × 25 = 625: _ _ _ _ 2 5
3. Multiply the last two digits by 14 and add the carry: 14 × 25 = 10 × 25 + 4 × 25 = 250 + 100 = 350. 350 + 6 = 356: 56: _ _ 5 6 _ _
4. The first two digits will be 49 plus the carry: 49 + 3 = 52: 5 2 _ _ _ _
5. So **725 × 725 = 525,625**.

Squaring numbers between 800 and 810

1. Choose a number between 800 and 810.
2. Square the last two digits:
   _ _ _ _ X X
3. Multiply the last two digits by 16
   (keep the carry): _ _ X X _ _
4. Square 8, add the carry: X X _ _ _ _

Example:

1. If the number to be squared is **802**:
2. Square the last two digits:
   2 × 2 = 4: _ _ _ _ 0 4
3. Multiply the last two digits by 16:
   16 × 2 = 32: _ _ 3 2 _ _
4. Square 8: 6 4 _ _ _ _
5. So **802 × 802 = 643,204**.

See the pattern?

1. If the number to be squared is **807**:
2. Square the last two digits:
   7 × 7 = 49: _ _ _ _ 4 9
3. Multiply the last two digits by 16
   (keep the carry): 16 × 7 = 112: _ _ 1 2 _ _
4. Square 8, add the carry (1): 6 5 _ _ _ _
5. So **807 × 807 = 651, 249**.

Squaring Numbers (88)

Squaring numbers in the 900s

1. Choose a number in the 900s - start out easy with numbers near 1000; then golower when expert.
2. Subtract the number from 1000 to get the difference.
3. The first three places will be the number minus the difference: X X X _ _ _.
4. The last three places will be the square of the difference: _ _ _ X X X
   (if 4 digits, add the first digit as carry).

Example:

1. If the number to be squared is **985**:
2. Subtract 1000 - 985 = 15 (difference)
3. Number - difference: 985 - 15 = 970: 9 7 0 _ _ _
4. Square the difference: 15 × 15 = 225: _ _ _ 2 2 5
5. So **985 × 985 = 970225**.

See the pattern?

1. If the number to be squared is **920**:
2. Subtract 1000 - 920 = 80 (difference)
3. Number - difference: 920 - 80 = 840: 8 4 0 _ _ _
4. Square the difference: 80 × 80 = 6400: _ _ _ 4 0 0
5. Carry first digit when four digits: 8 4 6 _ _ _
6. So **920 × 920 = 846400**.

Squaring Numbers (88)

Squaring numbers between 1000 and 1100

1. Choose a number between 1000 and 1100.
2. The first two digits are: 1,0 _ _, _ _ _
3. Find the difference between your number and 1000.
4. Multiply the difference by 2: 1,0 X X, _ _ _
5. Square the difference: 1,0 _ _, X X X

Example:

1. If the number to be squared is **1007**:
2. The first two digits are: 1,0 _ _, _ _ _
3. Find the difference: 1007 - 1000 = 7
4. Two times the difference: 2 × 7 = 14:
   1,0 1 4, _ _ _
5. Square the difference: 7 × 7 = 49:
   1,0 1 4, 0 4 9
6. So **1007 × 1007 = 1,014,049**.

See the pattern?

1. If the number to be squared is **1012**:
2. The first two digits are: 1,0 _ _, _ _ _
3. Find the difference: 1012 - 1000 = 12
4. Two times the difference: 2 × 12 = 24:
   1,0 2 4, _ _ _
5. Square the difference: 12 × 12 = 144:
   1,0 2 4, 1 4 4
6. So **1012 × 1012 = 1,024,144**.

Start with lower numbers and then extend your expertise to all the numbers between1000 and 1100. Remember to add the first digit as carry when the square of the differenceis four digits.

Squaring Numbers (88)

Squaring numbers between 2000 and 2099

1. Choose a number between 2000 and 2099. (Start with numbers below 2025 to begin with, then graduate to larger numbers.)
2. The first two digits are: 4 0 _ _ _ _ _
3. The next two digits are 4 times the last two digits:
   4 0 X X _ _ _
4. For the last three digits, square the last two digits in the number chosen (insert zeros when needed):
   4 0 _ _ X X X

Example:

1. If the number to be squared is **2003**:
2. The first two digits are: 4 0 _ _ _ _ _
3. The next two digits are 4 times the last two:
   4 × 3 = 12: _ _ 1 2 _ _ _
4. For the last three digits, square the last two:
   3 × 3 = 9: _ _ _ _ 0 0 9
5. So **2003 × 2003 = 4,012,009**.

See the pattern?

For larger numbers, reverse the order:

1. If the number to be squared is **2025**:
2. For the last three digits, square the last two:
   25 × 25 = 625: _ _ _ _ 6 2 5
3. The middle two digits are 4 times the last two (keep the carry):
   4 × 25 = 100 (keep carry of 1): _ _ 0 0 _ _ _
4. The first two digits are 40 + the carry:
   40 + 1 = 41: 4 1 _ _ _ _ _
5. So **2025 × 2025 = 4,100,625**.

Squaring Numbers (88)

Squaring numbers between 3000 and 3099

1. Choose a number between 3000 and 3099. (Start with numbers below 3025 to begin with, then graduate to larger numbers.)
2. The first two digits are: 9 0 _ _ _ _ _
3. The next two digits are 6 times the last two digits:
   9 0 X X _ _ _
4. For the last three digits, square the last two digits in the number chosen (insert zeros when needed):
   9 0 _ _ X X X

Example:

1. If the number to be squared is **3004**:
2. The first two digits are: 9 0 _ _ _ _ _
3. The next two digits are 6 times the last two:
   6 × 4 = 24: _ _ 2 4 _ _ _
4. For the last three digits, square the last two:
   4 × 4 = 16: _ _ _ _ 0 1 6
5. So **3004 × 3004 = 9,024,016**.

See the pattern?

For larger numbers, reverse the order:

1. If the number to be squared is **3025**:
2. For the last three digits, square the last two:
   25 × 25 = 625: _ _ _ _ 6 2 5
3. The middle two digits are 6 times the last two (keep the carry):
   6 × 25 = 150 (keep carry of 1): _ _ 5 0 _ _ _
4. The first two digits are 90 + the carry:
   90 + 1 = 91: 9 1 _ _ _ _ _
5. So **3025 × 3025 = 9,150,625**.

Squaring numbers between 4000 and 4099

1. Choose a number between 4000 and 4099.
2. For numbers less than 4013:
3. The first three digits are: 1 6 0 _ _ _ _ _
4. The next two digits are 8 times the last two digits:
   _ _ _ X X _ _ _
5. For the last three digits, square the last two digits in the number chosen (insert zeros when needed):
   _ _ _ _ _ X X X

Example:

1. If the number to be squared is **4005**:
2. The first three digits are: 1 6 0 _ _ _ _ _
3. The next two digits are 8 times the last two:
   8 × 5 = 40: _ _ 4 0 _ _ _
4. For the last three digits, square the last two:
   5 × 5 = 25: _ _ _ _ _ 0 2 5
5. So **4005 × 4005 = 16,040,025**.

See the pattern?

For numbers greater than 4012, reverse the order:

1. If the number to be squared is **4080**:
2. For the last three digits, square the last two:
   80 × 80 = 6400, carry 6: _ _ _ _ 4 0 0
3. The middle two digits are 8 times the last two (keep the carry):
   8 × 80 = 640 (keep carry of 6), 40 + 6:
   _ _ _ 4 6 _ _ _
4. The first three digits are 160 + the carry:
   160 + 6 = 166: 1 6 6 _ _ _ _ _
5. So **4080 × 4080 = 16,646,400**.

Squaring numbers between 5000 and 5099

1. Choose a number between 5000 and 5099.
2. The first three digits are: 2 5 0 _ _ _ _ _
3. The next two digits are 10 times the last two digits:
   2 5 0 X X _ _ _
4. For the last three digits, square the last two digits in the number chosen (insert zeros when needed):
   2 5 0 _ _ X X X

Example:

1. If the number to be squared is **5004**:
2. The first three digits are: 2 5 0 _ _ _ _ _
3. The next two digits are 10 times the last two:
   10 × 4 = 40: _ _ 4 0 _ _ _
4. For the last three digits, square the last two:
   4 × 4 = 16: _ _ _ _ _ 0 1 6
5. So **5004 × 5004 = 25,040,016**.

See the pattern?

For numbers greater than 5011, reverse the order:

1. If the number to be squared is **5012**:
2. For the last three digits, square the last two:
   12 × 12 = 144: _ _ _ _ 1 4 4
3. The middle two digits are 10 times the last two (keep the carry):
   10 × 12 = 120 (keep carry of 1):
   _ _ _ 2 0 _ _ _
4. The first three digits are 150 + the carry:
   250 + 1 = 251: 2 5 1 _ _ _ _ _
5. So **5012 × 5012 = 25,120,144**.

Squaring numbers between 6000 and 6099

1. Choose a number between 6000 and 6099.
2. The first three digits are: 3 6 0 _ _ _ _ _
3. The next two digits are 12 times the last two digits:
   _ _ _ X X _ _
4. For the last three digits, square the last two digits in the number chosen (insert zeros when needed):
   _ _ _ _ _ X X X

Example:

1. If the number to be squared is **6004**:
2. The first three digits are: 3 6 0 _ _ _ _ _
3. The next two digits are 12 times the last two:
   12 × 4 = 48: _ _ _ 4 8 _ _ _
4. For the last three digits, square the last two:
   4 × 4 = 16: _ _ _ _ 0 1 6
5. So **6004 × 6004 = 36,048,016**.

See the pattern?

For numbers greater than 6008, reverse the order:

1. If the number to be squared is **6020**:
2. For the last three digits, square the last two:
   20 × 20 = 400: _ _ _ _ 4 0 0
3. The middle two digits are 12 times the last two:
   12 × 20 = 240 (keep carry): _ _ _ 4 0 _ _ _
4. The first digits are 360 + the carry:
   360 + 2 = 362: 3 6 2 _ _ _ _ _
5. So **3025 × 3025 = 36,240,400**.

Squaring Numbers (88)

Squaring numbers between 7000 and 7099

1. Choose a number between 7000 and 7099.
2. The first three digits are: 4 9 0 _ _ _ _ _
3. The next two digits are 4 times the last two digits, with zero added: _ _ _ X X _ _
4. For the last three digits, square the last two digits in the number chosen (insert zeros when needed): _ _ _ _ _ X X X

Example:

1. If the number to be squared is **7004**:
2. The first three digits are: 4 9 0 _ _ _ _ _
3. The next two digits are 4 times the last two, with zero added: 4 × 4 = 16; 16 + 40 = 56: _ _ _ 5 6 _ _ _
4. For the last three digits, square the last two: 4 × 4 = 16: _ _ _ _ _ 0 1 6
5. So **7004 × 7004 = 49,056,016**.

See the pattern?

For numbers greater than 7007, reverse the order:

1. If the number to be squared is **7025**:
2. For the last three digits, square the last two: 25 × 25 = 625: _ _ _ _ _ 6 2 5
3. For the middle two digits, add zero to the last two, then add 4 times the last two: 250 + 4 × 25: 250 + 100 = 350 (keep carry): _ _ _ 5 0 _ _ _
4. The first three digits are 490 + the carry: 490 + 3 = 493: 4 9 3 _ _ _ _ _
5. So **7025 × 7025 = 49,350,625**.

Squaring Numbers (88)

Squaring special numbers (3's and final 1)

1. Choose a number with repeating 3's and a final 1.
2. The square is made up of:
   1. One fewer 1 than there are repeating 3's
   2. 09
   3. The same number of 5's as there are 1's in the square;
   4. A final 61

Example:

1. If the number to be squared is **3331**:
2. The square has:

```
Two 1's (one fewer than
   repeating 3's)            11
Next digits: 09                  0 9
Two 5's (same as 1's in square)      5 5
A final 61                              6 1
```

3. So **the square of 3331 is 11,095,561**.

See the pattern?

1. If the number to be squared is **333331**:
2. The square has:

```
Four 1's (one fewer than
   repeating 3's)       1 1 1 1
Next digits: 09                  0 9
Four 5's (same as 1's in square)    5 5 5 5
A final 61                                  6 1
```

3. So **the square of 333331 is 111,109,555,561**.

Squaring Numbers (88)

Squaring special numbers (3's and final 2)

1. Choose a number with repeating 3's and a final 2.
2. The square is made up of:
   1. the same number of 1's as there are repeating 3's;
   2. a zero;
   3. the same number of 2's as there are 1's in the square;
   4. a final 4.

Example:

1. If the number to be squared is **3332**:
2. The square has:

```
three 1's (number of 3's
   in number)                11 1
a zero                            0
three 2's (same as 1's in square)   2 2 2
a final 4                                4
```

3. So **the square of 3332 is 11,102,224**.

See the pattern?

1. If the number to be squared is **333332**:
2. The square has:

```
five 1's (number of 3's
   in number)              11 1 1 1
a zero                              0
five 2's (same as 1's in square)      2 2 2 2 2
a final 4                                     4
```

3. So **the square of 333332 is 111,110,222,224**.
   These big squares should be quite impressive, and difficult for others to checkunless they have a huge calculator.

Squaring Numbers (88)

Squaring special numbers (3's and final 4)

1. Choose a number with repeating 3's and a final 4.
2. The square is made up of:
   1. the same number of 1's as there are digits in the number;
   2. one fewer 5;
   3. a final 6

Example:

1. If the number to be squared is **3334**:
2. The square has:

```
four 1's (number of digits
   in number)               11 1 1
three 5's (one fewer)               5 5 5
a final 6                                6
```

3. So **the square of 3334 is 11,115,556**.

See the pattern?

1. If the number to be squared is **333334**:
2. The square has:

```
six 1's          1 1 1 1 11
five 5's                    5 5 5 5 5
a final 6                             6
```

3. So **the square of 333334 is 111,111,555,556**.

Squaring Numbers (88)

Squaring special numbers (3's and final 5)

1. Choose a number with repeating 3's and a final 5.
2. The square is made up of:
   1. the same number of 1's as there are repeating 3's in the number;
   2. one more 2 than there are repeating 3's;
   3. a final 5.

Example:

1. If the number to be squared is **3335**:
2. The square has:

```
three 1's (same as repeating 3's)  1 1 1
four 2's (one more than
   repeating 3's)                        2 2 2 2
a final 5                                        5
```

3. So **the square of 3335 is 11,122,225**.

See the pattern?

1. If the number to be squared is **333335**:
2. The square has:

```
five 1's (same as
   repeating 3's)      1 1 1 1 1
six 2's (one more than
   repeating 3's)                22 2 2 2 2
a final 5                                   5
```

3. So **the square of 333335 is 111,112,222,225**.

Squaring Numbers (88)

Squaring special numbers (3's and final 6)

1. Choose a number with repeating 3's and a final 6.
2. The square is made up of:
   1. the same number of 1's as there are repeating 3's in the number;
   2. one 2
   3. one fewer 8 than there are repeating 3's;
   4. a final 96.

Example:

1. If the number to be squared is **3336**:
2. The square has:

```
three 1's (same as
   repeating 3's)     1 1 1
one 2                       2
two 8's (one fewer than
   repeating 3's)             8 8
a final 96                        9 6
```

3. So **the square of 3336 is 11,128,896**.

See the pattern?

1. If the number to be squared is **333336**:
2. The square has:

```
five 1's (same as
   repeating 3's)   1 1 1 1 1
one 2                         2
four 8's (one fewer than
   repeating 3's)               8 8 8 8
a final 96                              9 6
```

3. So **333336 × 3333336 = 111,112,888,896**.

Squaring Numbers (88)

Squaring special numbers (3's and final 7)

1. Choose a number with repeating 3's and a final 7.
2. The square is made up of:
 1. the same number of 1's as there are repeating 3's in the number;
 2. one 3
 3. one fewer 5 than there are repeating 3's;
 4. a final 69.

Example:

1. If the number to be squared is **3337**:
2. The square has:

```
three 1's (same as
   repeating 3's)     1 1 1
one 3                       3
two 5's (one fewer than
   repeating 3's)             5 5
a final 69                        6 9
```

3. So **the square of 3337 is 11,135,569**.

See the pattern?

1. If the number to be squared is **333337**:
2. The square has:

```
five 1's (same as
   repeating 3's)   1 1 1 1 1
one 2                         2
four 5's (one fewer than
   repeating 3's)               5 5 5 5
a final 69                              6 9
```

3. So **333337 × 3333337 = 111,113,555,569**.

Squaring special numbers (3's and final 8)

1. Choose a number with repeating 3's and a final 8.
2. The square is made up of:
   1. the same number of 1's as there are repeating 3's in the number;
   2. one 4
   3. one fewer 2 than there are repeating 3's;
   4. a final 44.

Example:

1. If the number to be squared is **33338**:
2. The square has:

```
four 1's (same as
   repeating 3's)     1 1 1 1
one 4                         4
three 2's (one fewer than
   repeating 3's)              2 2 2
a final 44                           4 4
```

3. So **the square of 33338 is 1,111,422,244**.

See the pattern?

1. If the number to be squared is **3333338**:
2. The square has:

```
six 1's (same as
   repeating 3's)   1 1 1 1 1 1
one 4                          4
five 2's (one fewer than
   repeating 3's)                2 2 2 2 2
a final 44                                 4 4
```

3. So **3333338 × 3333338 = 11,111,142,222,244**.

Squaring Numbers (88)

Squaring special numbers (3's and final 9)

1. Choose a number with repeating 3's and a final 9.
2. The square is made up of:
   1. the same number of 1's as there are repeating 3's in the number;
   2. one 4
   3. two fewer 8's than there are repeating 3's;
   4. a final 921.

Example:

1. If the number to be squared is **33339**:
2. The square has:

```
four 1's (same as
   repeating 3's)     1 1 1 1
one 4                         4
two 8's (two fewer than
   repeating 3's)               8 8
a final 921                         9 2 1
```

3. So **33339 × 33339 is 1,111,488,921**.

See the pattern?

1. If the number to be squared is **3333339**:
2. The square has:

```
six 1's (same as
   repeating 3's)   1 1 1 1 1 1
one 4                           4
four 8's (two fewer than
   repeating 3's)                 8 8 8 8
a final 921                               9 2 1
```

3. So **the square of 3333339 = 11,111,148,888,921**.

Squaring Numbers (88)

Squaring special numbers (6's and final 1)

1. Choose a number with repeating 6's and a final 1.
2. The square is made up of:
   1. one fewer 4 than there are repeating 6's
   2. 36
   3. two fewer 8's than there are repeating 6's
   4. A final 921

Example:

1. If the number to be squared is **6661**:
2. The square has:

```
two 4's (one fewer than
      repeating 6's)             44
Next digits: 36                    3 6
one 8 (two fewer than repeating 6's)   8
A final 921                              9 2 1
```

3. So **the square of 6661 is 44,368,921**.

See the pattern?

1. If the number to be squared is **666661**:
2. The square has:

```
four 4's (one fewer than
      repeating 6's)    44 4 4
Next digits: 36                 3 6
three 8's                           8 8 8
A final 921                               9 2 1
```

3. So **the square of 666661 is 44,4436,888,921**.

Squaring Numbers (88)

Squaring special numbers (6's and final 2)

1. Choose a number with repeating 6's and a final 2.
2. The square is made up of:
   1. one fewer 4 than there are repeating 6's
   2. 38
   3. same number of 2's as 4's in the square
   4. a final 44

Example:

1. If the number to be squared is **6662**:
2. The square has:

```
two 4's (one fewer than
      repeating 6's)           44
Next digits: 38                    3 8
two 2's (same number as repeating 6's) 2 2
A final 44                                 4 4
```

3. So **the square of 6662 is 44,382,244**.

See the pattern?

1. If the number to be squared is **666662**:
2. The square has:

```
four 4's (one fewer than
      repeating 6's)   44 4 4
Next digits: 38                3 8
four 2's (same as repeating 6's)   2 2 2 2
A final 44                                 4 4
```

3. So **the square of 666662 is 444,438,222,244**.

Squaring Numbers (88)

Squaring special numbers (6's and final 3)

1. Choose a number with repeating 6's and a final 3.
2. The square is made up of:
   1. one fewer 4 than there are repeating 6's
   2. 39
   3. same number of 5's as 4's in the square
   4. a final 69

Example:

1. If the number to be squared is **6663**:
2. The square has:

```
two 4's (one fewer than
      repeating 6's)           44
Next digits: 39                   3 9
two 5's (same number as repeating 6's) 5 5
A final 69                                6 9
```

3. So **the square of 6663 is 44,395,569**.

See the pattern?

1. If the number to be squared is **666663**:
2. The square has:

```
four 4's (one fewer than
      repeating 6's)   44 4 4
Next digits: 39                3 9
four 5's (same as repeating 6's)   5 5 5 5
A final 69                                6 9
```

3. So **the square of 666663 is 444,439,555,569**.

Squaring Numbers (88)

Squaring special numbers (6's and final 4)

1. Choose a number with repeating 6's and a final 4.
2. The square is made up of:
   1. the same number of 4's as repeating 6's
   2. 0
   3. one fewer 8 than repeating 6's
   4. a final 96

Example:

1. If the number to be squared is **6664**:
2. The square has:

```
three 4's (same number as
      repeating 6's)           44 4
next digit: 38                       0
two 8's (one fewer than repeating 6's) 8 8
a final 96                               9 6
```

3. So **the square of 6664 is 44,408,896**.

See the pattern?

1. If the number to be squared is **666664**:
2. The square has:

```
five 4's (same number as
      repeating 6's)   44 4 4 4
next digit: 0                    0
four 8's (one fewer than
      repeating 6's)               8 8 8 8
a final 96                               9 6
```

3. So **the square of 666664 is 444,440,888,896**.

Squaring Numbers (88)

Squaring special numbers (6's and final 5)

1. Choose a number with repeating 6's and a final 5.
2. The square is made up of:
   1. same number of 4's as repeating 6's
   2. same number of 2's as repeating 6's
   3. a final 25

Example:

1. If the number to be squared is **6665**:
2. The square has:

```
three 4's (same number as
      repeating 6's)        44 4
three 2's (same number as
      repeating 6's)              2 2 2
A final 25                              2 5
```

3. So **the square of 6665 is 44,422,225**.

See the pattern?

1. If the number to be squared is **666665**:

```
five 4's (same number as
      repeating 6's)   44 4 4 4
five 2's (same number as
      repeating 6's)             2 2 2 2 2
A final 25                                 2 5
```

2. So **the square of 666665 is 444,442,222,225**.

Squaring Numbers (88)

Squaring special numbers (6's and final 7)

1. Choose a number with repeating 6's and a final 7.
2. The square is made up of:
   1. The same number of 4's as there are digits in the number;
   2. One fewer 8;
   3. A final 9.

Example:

1. If the number to be squared is **6667**:
2. The square has:
```
four 4's (number of digits
   in number)              4 4 4 4
three 8's (one fewer)              8 8 8
a final 9                               9
```
3. So **the square of 6667 is 44448889**.

See the pattern?

1. If the number to be squared is **667**:
2. The square has:
```
three 4's    4 4 4
two 8's           8 8
a final 9             9
```
3. So **the square of 667 is 444889**.

Use a *big* number - others will need a powerful calculator or lots of timeto check your answer!

Squaring Numbers (88)

Squaring special numbers (6's and final 8)

1. Choose a number with repeating 6's and a final 8.
2. The square is made up of:
   1. the same number of 4's as there are repeating 6's in the number;
   2. one 6
   3. the same number of 2's as repeating 6's;
   4. a final 4.

Example:

1. If the number to be squared is **6668**:
2. The square has:

```
three 4's (same as
   repeating 6's)     4 4 4
one 6                        6
three 2's (same number as
   repeating 3's)              2 2 2
a final 4                            4
```

3. So **the square of 6668 is 44,462,224**.

See the pattern?

1. If the number to be squared is **666668**:
2. The square has:

```
five 4's (same number as
   repeating 6's)    4 4 4 4 4
one 6                          6
five 2's (same number as
   repeating 6's)                2 2 2 2 2
a final 4                                  4
```

3. So **666668 × 666668 = 444,446,222,224**.

Squaring Numbers (88)

Squaring special numbers (6's and final 9)

1. Choose a number with repeating 6's and a final 9.
2. The square is made up of:
   1. the same number of 4's as there are repeating 6's;
   2. a 7
   3. one fewer 5 than there are repeating 6's;
   4. A final 61.

Example:

1. If the number to be squared is **6669**:
2. The square has:
```
same number of 4's as repeating 6's: 4 4 4a 7
7 one fewer 5 than repeating 6's                5 5a final 61
6 1
```
3. So **the square of 6669 is 44,475,561**.

See the pattern?

1. If the number to be squared is **666669**:
2. The square has:
```
same number of 4's as 6's: 4 4 4 4 4a 7
7 one fewer 5 than repeating 6's         5 5 5 5a final 61
6 1
```
3. So **666,669 × 666,669 = 44,447,555,561**.

Use the pattern to amaze your friends with yourmultiplying abilities.

Squaring Numbers (88)

Squaring special numbers (9's and final 1)

1. Choose a number with repeating 9's and a final 1.
2. The square is made up of:
   1. one fewer 9 than there are repeating 9's
   2. 82
   3. the same number of 0's as there are 9's in the square
   4. A final 81

Example:

1. If the number to be squared is **9991**:
2. The square has:

```
One fewer 9 than the
   repeating 9's:        9 9
82                          8 2
same number of 0's as 9's
   in the square                00
a final 81                          8 1
```

3. So **9991 × 9991 = 99820081**.

See the pattern?

1. If the number to be squared is **999991**:
2. The square has:

```
one fewer 9 than the
   repeating 9's:       9 9 9 9
82                          8 2
same number of 0's as 9's
   in the square                   00 0 0
a final 81                               8 1
```

3. So **999991 × 999991 = 999982000081**.

Those big products ought to impress your friends, and they will need a BIG calculatorto keep up with you!

Squaring Numbers (88)

Squaring special numbers (9's and final 2)

1. Choose a number with repeating 9's and a final 2.
2. The square is made up of:
   1. one fewer 9 than there are repeating 9's
   2. 84
   3. the same number of 0's as there are 9's in the square
   4. A final 64

Example:

1. If the number to be squared is **9992**:
2. The square has:

```
one fewer 9 than the
   repeating 9's:         99
84                           8 4
same number of 0's as 9's
   in the square                0 0
a final 64                          6 4
```

3. So **9992 × 9992 = 99840064**.

See the pattern?

1. If the number to be squared is **999992**:
2. The square has:

```
one fewer 9 than the
   repeating 9's:      9 9 9 9
84                             84
same number of 0's as 9's
   in the square                  00 0 0
a final 64                               6 4
```

3. So **999992 × 999992 = 999984000064**.

With a little practice you will be finding these huge products with ease.

Squaring Numbers (88)

Squaring special numbers (9's and final 3)

1. Choose a number with repeating 9's and a final 3.
2. The square is made up of:
   1. one fewer 9 than there are repeating 9's
   2. 86
   3. the same number of 0's as there are 9's in the square
   4. A final 49

Example:

1. If the number to be squared is **9993**:
2. The square has:

```
one fewer 9 than the
   repeating 9's:         99
86                           8 6
same number of 0's as 9's
   in the square                  0 0
a final 49                            4 9
```

3. So **9993 × 9993 = 99860049**.

See the pattern?

1. If the number to be squared is **999993**:
2. The square has:

```
one fewer 9 than the
   repeating 9's:      9 9 9 9
86                             86
same number of 0's as 9's
   in the square                    00 0 0
a final 49                                 4 9
```

3. So **999993 × 999993 = 999986000049**.

Using this pattern you will be able to square these large numbers with ease.

Squaring Numbers (88)

Squaring special numbers (9's and final 4)

1. Choose a number with repeating 9's and a final 4.
2. The square is made up of:
    1. one fewer 9 than there are repeating 9's
    2. 88
    3. the same number of 0's as there are 9's in the square
    4. A final 36

Example:

1. If the number to be squared is **9994**:
2. The square has:

```
one fewer 9 than the
   repeating 9's:        9 9
88                          8 8
same number of 0's as 9's
   in the square                00
a final 36                         3 6
```

3. So **9994 × 9994 = 99880036**.

See the pattern?

1. If the number to be squared is **999994**:
2. The square has:

```
one fewer 9 than the
   repeating 9's:   9 9 9 9
88                         8 8
same number of 0's as 9's
   in the square                0 0 0 0
a final 36                            3 6
```

3. So **999994 × 999994 = 999988000036**.

Squaring Numbers (88)

Squaring special numbers (9's and final 5)

1. Choose a number with repeating 9's and a final 5.
2. The square is made up of:
   1. same number of 9's as there are repeating 9's
   2. same number of 0's
   3. a final 25

Example:

1. If the number to be squared is **9995**:
2. The square has:

```
same number of 9's as
   repeating 9's:         9 9 9
same number of 0's as 9's
   in the square               00 0
a final 25                          2 5
```

3. So **9995 × 9995 = 99900025**.

See the pattern?

1. If the number to be squared is **999995**:
2. The square has:

```
same number of 9's as
   repeating 9's:        9 9 9 9
same number of 0's as 9's
   in the square               0 0 0 0
a final 25                             2 5
```

3. So **999995 × 999995 = 99990000025**.

Squaring Numbers (88)

Squaring special numbers (9's and final 6)

1. Choose a number with repeating 9's and a final 6.
2. The square is made up of:
    1. same number of 9's as there are repeating 9's
    2. a 2
    3. one fewer 0 than repeating 9's
    4. a final 16

Example:

1. If the number to be squared is **9996**:
2. The square has:

```
same number of 9's
   as repeating 9's:    9 9 9
a 2                           2
one fewer 0 than there
   are 9's in the square        0 0
a final 16                          1 6
```

3. So **9996 × 9996 = 99920016**.

See the pattern?

1. If the number to be squared is **999996**:
2. The square has:

```
same number of 9's
   as repeating 9's: 9 9 9 9 9
a 2                            2
one fewer 0 than there
   are 9's in the square         0 0 0 0
a final 16                                1 6
```

3. So **999996 × 999996 = 99999200016**.

Squaring Numbers (88)

Squaring special numbers (9's and final 7)

1. Choose a number with repeating 9's and a final 7.
2. The square is made up of:
   1. the same number of 9's as there are repeating 9's
   2. 4
   3. the same number of 0's as there are 9's in the square
   4. A final 9

Example:

1. If the number to be squared is **9997**:
2. The square has:

```
same number of 9's as there are
   repeating 9's:                99 9
    4                                 4
same number of 0's as 9's
   in the square                        0 0 0
a final 9                                     9
```

3. So **9997 × 9997 = 99940009**.

See the pattern?

1. If the number to be squared is **999997**:
2. The square has:

```
same number of 9's as there are
   repeating 9's:          9 9 99 9
    4                               4
same number of 0's as 9's
   in the square                       00 0 0 0
a final 9                                       9
```

3. So **999997 × 999997 = 999994000009**.

Learn the pattern and it's easy!

Squaring Numbers (88)

Squaring special numbers (9's and final 8)

1. Choose a number with repeating 9's and a final 8.
2. The square is made up of:
   1. the same number of 9's as there are repeating 9's
   2. 6
   3. the same number of 0's as there are 9's in the square
   4. A final 4

Example:

1. If the number to be squared is **9998**:
2. The square has:

```
same number of 9's as there are
   repeating 9's:                99 9
    6                                 6
same number of 0's as 9's
   in the square                        0 0 0
a final 4                                     4
```

3. So **9998 × 9998 = 99,960,004**.

See the pattern?

1. If the number to be squared is **999998**:
2. The square has:

```
same number of 9's as there are
   repeating 9's:          9 9 99 9
    6                               6
same number of 0's as 9's
   in the square                       00 0 0 0
a final 4                                       4
```

3. So **999997 × 999997 = 999,996,000,004**.

Squaring Numbers (88)

Squaring special numbers (1 andrepeating 3's)

1. Choose a number with a 1 and repeating 3's.
2. The square is made up of:
   1. first digits: 1 & one fewer 7 than repeating 3's
   2. next digits: 6 & one fewer 8 than repeating 3's
   3. last digit: 9

Example:

1. If the number to be squared is **1333**:
2. The square has:

```
first digits: 1 and one fewer
    7 than 3's                      17 7
next digits: 6 and one fewer
    8 than 3's                           6 8 8
last digit: 9                                  9
```

3. So **1333 × 1333 = 1776889**.

See the pattern?

1. If the number to be squared is **133333**:
2. The square has:

```
first digits: 1 and one fewer
   7 than 3's               17 7 7 7
next digits: 6 and one fewer
   8 than 3's                       68 8 8 8
last digit: 9                                 9
```

3. So **133333 × 133333 = 17777688889**.

Squaring Numbers (88)

Squaring special numbers (1 andrepeating 6's)

1. Choose a number with a 1 and repeating 6's.
2. The square is made up of:
   1. first digits: 2 & one fewer 7 than repeating 6's
   2. next digits: same number of 5's as repeating 6's
   3. last digit: 6

Example:

1. If the number to be squared is **1666**:
2. The square has:
```
first digits: 2 and one fewer
    7 than 6's                      27 7
next digits: same number of 5's
    as 6's                               5 5 5
last digit: 6                                  6
```
3. So **1666 × 1666 = 2775556**.

See the pattern?

1. If the number to be squared is **166666**:
2. The square has:
```
first digits: 2 and one fewer
   7 than 6's                   27 7 7 7
next digits: same number of 5's
    as 6's                               5 5 5 5 5
last digit: 6                                      6
```
3. So **166666 × 166666 = 27777555556**.

Squaring Numbers (88)

Squaring special numbers (1 andrepeating 9's)

1. Choose a number with a 1 and repeating 9's.
2. The square is made up of:
 1. first digits: 3 & one fewer 9 than repeating 9's
 2. next digits: 6 & one fewer 0 than repeating 9's
 3. last digit: 1

Example:

1. If the number to be squared is **1999**:
2. The square has:

```
first digits: 3 and one fewer
    9 than 9's                      39 9
next digits: 6 and one fewer
    0 than 9's                            60 0
last digit: 1                                  1
```

3. So **1999 × 1999 = 3996001**.

See the pattern?

1. If the number to be squared is **199999**:
2. The square has:

```
first digits: 3 and one fewer
   9 than 9's                   39 9 9 9
next digits: 6 and one fewer
    0 than 9's      &                   60 0 0 0
last digit: 1                                    1
```

3. So **199999 × 199999 = 39999600001**.

Squaring Numbers (88)

Squaring special numbers (2 andrepeating 3's)

1. Choose a number with a 2 and repeating 3's.
2. The square is made up of:
1. first digits: 5 & one fewer 4 than repeating 3's
2. next digits: 2 & one fewer 8 than repeating 3's
3. last digit: 9

Example:

1. If the number to be squared is **2333**:
2. The square has:

```
first digits: 5 and one fewer
    4 than 3's                     54 4
next digits: 2 and one fewer
    8 than 3's                          2 8 8
last digit: 9                                 9
```

3. So **2333 × 2333 = 5442889**.

See the pattern?

1. If the number to be squared is **233333**:
2. The square has:

```
first digits: 5 and one fewer
   4 than 3's               54 4 4 4
next digits: 2 and one fewer
   8 than 3's                        28 8 8 8
last digit: 9                                9
```

3. So **233333 × 233333 = 5444288889**.

Squaring Numbers (88)

Squaring special numbers (2 andrepeating 6's)

1. Choose a number with a 2 and repeating 6's.
2. The square is made up of:
   1. first digits: 7 & two fewer 1's than repeating 6's
   2. next digits: 07 & one fewer 5 than repeating 6's
   3. last digit: 6

Example:

1. If the number to be squared is **2666**:
2. The square has:

```
first digits: 7 and two fewer
    1's than 6's                  7 1
next digits: 07 and one fewer
    5 than 6's                      0 7 5 5
last digit: 6                               6
```

3. So **2666 × 2666 = 7,107,556**.

See the pattern?

1. If the number to be squared is **266666**:
2. The square has:

```
first digits: 7 and two fewer
   1's than 6's              7 11 1
next digits: 07 and one fewer
   5 than 6's                     0 7 5 5 5 5
last digit: 6                                 6
```

3. So **266666 × 266666 = 71,110,755,556**.

Squaring Numbers (88)

Squaring special numbers (2 andrepeating 9's)

1. Choose a number with a 2 and repeating 9's.
2. The square is made up of:
   1. first digits: 8 & one fewer 9 than repeating 9's
   2. next digits: 4 & one fewer 0 than repeating 9's
   3. last digit: 1

Example:

1. If the number to be squared is **2999**:
2. The square has:

```
first digits: 8 and one fewer
    9 than 9's                      89 9
next digits: 4 and one fewer
    0 than 9's                           4 0 0
last digit: 1                                  1
```

3. So **2999 × 2999 = 8,994,001**.

See the pattern?

1. If the number to be squared is **299999**:
2. The square has:

```
first digits: 8 and one fewer
   9 than 9's                 89 9 9 9
next digits: 4 and one fewer
   0 than 9's                         40 0 0 0
last digit: 1                                 1
```

3. So **299999 × 299999 = 89,999,400,001**.

Squaring special numbers (3 andrepeating 6's)

1. Choose a number with a 3 and repeating 6's.
2. The square is made up of:
   1. first digits: 13 & two fewer 4's than repeating 6's
   2. next digits: 39 & one fewer 5 than repeating 6's
   3. last digit: 6

Example:

1. If the number to be squared is **3666**:
2. The square has:
```
first digits: 13 and two fewer
    4's than 6's                  1 3 4
next digits: 39 and one fewer
    5 than 6's                        3 9 5 5
last digit: 6                                 6
```
3. So **3666 × 3666 = 13,439,556**.

See the pattern?

1. If the number to be squared is **366666**:
2. The square has:
```
first digits: 13 and two fewer
   4's than 6's         1 3 44 4
next digits: 39 and one fewer
   5 than 6's                     3 9 5 5 5 5
last digit: 6                                 6
```
3. So **366666 × 366666 = 134,443,955,556**.

Squaring Numbers (88)

Squaring special numbers (3 andrepeating 9's)

1. Choose a number with a 3 and repeating 9's.
2. The square is made up of:
   1. first digits: 15 & one fewer 9 than repeating 9's
   2. next digits: 2 & one fewer 0 than repeating 9's
   3. last digit: 1

Example:

1. If the number to be squared is **3999**:
2. The square has:

```
first digits: 15 and one fewer
    9 than 9's                    1 5 9 9
next digits: 2 and one fewer
    0 than 9's                          2 0 0
last digit: 1                                 1
```

3. So **3999 × 3999 = 15,992,001**.

See the pattern?

1. If the number to be squared is **399999**:
2. The square has:

```
first digits: 15 and one fewer
   9 than 9's            1 5 9 9 9 9
next digits: 2 and one fewer
   0 than 9's                   20 0 0 0
last digit: 1                            1
```

3. So **399999 × 399999 = 159,999,200,001**.

Squaring Numbers (88)

Squaring special numbers (4 andrepeating 3's)

1. Choose a number with a 4 and repeating 3's.
2. The square is made up of:
   1. first digits: 18 & one fewer 7 than repeating 3's
   2. next digits: 4 & one fewer 8 than repeating 3's
   3. last digit: 9

Example:

1. If the number to be squared is **4333**:
2. The square has:

```
first digits: 18 and one fewer
    7 than 3's                    1 8 7 7
next digits: 4 and one fewer
    8 than 3's                          4 8 8
last digit: 9                                 9
```

3. So **4333 × 4333 = 18,774,889**.

See the pattern?

1. If the number to be squared is **433333**:
2. The square has:

```
first digits: 18 and one fewer
   7 than 3's              1 87 7 7 7
next digits: 4 and one fewer
   8 than 3's                        48 8 8 8
last digit: 9                                  9
```

3. So **433333 × 433333 = 187,777,488,889**.

Squaring Numbers (88)

Squaring special numbers (4 andrepeating 6's)

1. Choose a number with a 4 and repeating 6's.
2. The square is made up of:
   1. first digits: 21 & one fewer 7 than repeating 6's
   2. next digits: 1 & one fewer 5 than repeating 6's
   3. last digit: 6

Example:

1. If the number to be squared is **4666**:
2. The square has:

```
first digits: 21 and one fewer
    7 than 6's                  2 1 7 7
next digits: 1 and one fewer
    5 than 6's                        1 5 5
last digit: 6                               6
```

3. So **4666 × 4666 = 21,771,556**.

See the pattern?

1. If the number to be squared is **466666**:
2. The square has:

```
first digits: 21 and one fewer
   7 than 6's             2 17 7 7 7
next digits: 1 and one fewer
   5 than 6's                       15 5 5 5
last digit: 6                                6
```

3. So **466666 × 466666 = 217,777,155,556**.

Squaring Numbers (88)

Squaring special numbers (4 andrepeating 9's)

1. Choose a number with a 4 and repeating 9's.
2. The square is made up of:
    1. first digits: 24 & one fewer 9 than repeating 9's in the number
    2. next digits: same number of 0's as repeating 9's in the number
    3. last digit: 1

Example:

1. If the number to be squared is **4999**:
2. The square has:
```
first digits: 24 and one fewer
  9 than 9's (in the number)      2 4 9 9
next digits: same number of 0's
  as 9's (in the number)                  0 0 0
last digit: 1                                   1
```
3. So **4999 × 4999 = 24,990,001**.

See the pattern?

1. If the number to be squared is **499999**:
2. The square has:
```
first digits: 24 and one
  fewer 9 than 9's         2 49 9 9 9
next digits: same number
  of 0's as 9's                      00 0 0 0
last digit: 1                                 1
```
3. So **499999 × 499999 = 249,999,000,001**.

Squaring Numbers (88)

Squaring special numbers (5 andrepeating 3's)

1. Choose a number with a 5 and repeating 3's.
2. The square is made up of:
   1. first digits: 28 & one fewer 4 than repeating 3's
   2. next digits: 0 & one fewer 8 than repeating 3's
   3. last digit: 9

Example:

1. If the number to be squared is **5333**:
2. The square has:

```
first digits: 28 and one fewer
    4 than 3's                    2 8 4 4
next digits: 0 and one fewer
    8 than 3's                          0 8 8
last digit: 9                                 9
```

3. So **5333 × 5333 = 28,440,889**.

See the pattern?

1. If the number to be squared is **533333**:
2. The square has:

```
first digits: 28 and one fewer
   4 than 3's              2 84 4 4 4
next digits: 0 and one fewer
   8 than 3's                        08 8 8 8
last digit: 9                                  9
```

3. So **533333 × 533333 = 284,444,088,889**.

Squaring special numbers (5 andrepeating 6's)

1. Choose a number with a 5 and repeating 6's.
2. The square is made up of:
   1. first digits: 32 & two fewer 1's than repeating 6's
   2. next digits: 03 & one fewer 5 than repeating 6's
   3. last digit: 6

Example:

1. If the number to be squared is **5666**:
2. The square has:

```
first digits: 32 and two fewer
    1's than 6's                  3 2 1
next digits: 03 and one fewer
    5 than 6's                         0 3 5 5
last digit: 6                                  6
```

3. So **5666 × 5666 = 32,103,556**.

See the pattern?

1. If the number to be squared is **566666**:
2. The square has:

```
first digits: 32 and two fewer
   1's than 6's           3 2 1 1 1
next digits: 03 and one fewer
   1 than 6's                     0 3 5 5 5 5
last digit: 6                                 6
```

3. So **566666 × 566666 = 321,110,355,556**.

Squaring Numbers (88)

Squaring special numbers (5 andrepeating 9's)

1. Choose a number with a 5 and repeating 9's.
2. The square is made up of:
   1. first digits: 35 & two fewer 9's than repeating 9's
   2. next digits: 88 & one fewer 0 than repeating 9's
   3. last digit: 1

Example:

1. If the number to be squared is **5999**:
2. The square has:

```
first digits: 35 and two fewer
    9's than 9's                     3 5 9
next digits: 88 and one fewer
    0 than 9's                            8 8 0 0
last digit: 1                                     1
```

3. So **5999 × 5999 = 35,988,001**.

See the pattern?

1. If the number to be squared is **599999**:
2. The square has:

```
first digits: 35 and two fewer
   9's than 9's           3 5 9 9 9
next digits: 88 and one fewer
   0 than 9's                         8 8 0 0 0 0
last digit: 1                                     1
```

3. So **599999 × 599999 = 359,998,800,001**.

Squaring Numbers (88)

Squaring special numbers (6 andrepeating 3's)

1. Choose a number with a 6 and repeating 3's.
2. The square is made up of:
 1. first digits: 40 & two fewer 1's than repeating 3's
 2. next digits: 06 & one fewer 8 than repeating 3's
 3. last digit: 9

Example:

1. If the number to be squared is **6333**:
2. The square has:

```
first digits: 40 and two fewer
    1's than 3's                 4 0 1
next digits: 06 and one fewer
    8 than 3's                       0 6 8 8
last digit: 9                                9
```

3. So **6333 × 6333 = 40,106,889**.

See the pattern?

1. If the number to be squared is **633333**:
2. The square has:

```
first digits: 40 and two fewer
   1's than 3's             4 0 1 1 1
next digits: 06 and one fewer
   8 than 3's                        0 6 8 8 8 8
last digit: 9                                   9
```

3. So **633333 × 633333 = 401,110,688,889**.

Squaring Numbers (88)

Squaring special numbers (6 andrepeating 9's)

1. Choose a number with a 6 and repeating 9's.
2. The square is made up of:
   1. first digits: 48 & two fewer 9's than repeating 9's in the number
   2. next digits: 86 & one fewer 0 than repeating 9's in the number
   3. last digit: 1

Example:

1. If the number to be squared is **6999**:
2. The square has:

```
first digits: 48 and two fewer
    9's than rep. 9's            4 8 9
next digits: 86 and one fewer
    0 than rep. 9's                  8 6 0 0
last digit: 1                                 1
```

3. So **6999 × 6999 = 48,986,001**.

See the pattern?

1. If the number to be squared is **699999**:
2. The square has:

```
first digits: 48 and two fewer
   9's than rep. 9's      4 8 9 9 9
next digits: 86 and one fewer
   0 than rep. 9's                8 6 0 0 0 0
last digit: 1                                  1
```

3. So **699999 × 699999 = 489,998,600,001**.

Squaring Numbers (88)

Squaring special numbers (7 andrepeating 3's)

1. Choose a number with a 7 and repeating 3's.
2. The square is made up of:
   1. first digits: 53 & one fewer 7 than repeating 3's
   2. next digits: 2 & one fewer 8 than repeating 3's
   3. last digit: 9

Example:

1. If the number to be squared is **7333**:
2. The square has:

```
first digits: 53 and one fewer
    7 than 3's                  5 3 7 7
next digits: 2 and one fewer
    8 than 3's                        2 8 8
last digit: 9                               9
```

3. So **7333 × 7333 = 53,772,889**.

See the pattern?

1. If the number to be squared is **733333**:
2. The square has:

```
first digits: 53 and one fewer
   7 than 3's              5 3 7 7 7 7
next digits: 2 and one fewer
   8 than 3's                          2 8 8 8 8
last digit: 9                                     9
```

3. So **733333 × 733333 = 537,777,288,889**.

Squaring Numbers (88)

Squaring special numbers (7 andrepeating 6's)

1. Choose a number with a 7 and repeating 6's.
2. The square is made up of:
   1. first digits: 58 & two fewer 7's than repeating 6's
   2. next digits: 67 & one fewer 5 than repeating 6's
   3. last digit: 6

Example:

1. If the number to be squared is **7666**:
2. The square has:

```
first digits: 58 and two fewer
    7's than 6's                5 8 7
next digits: 67 and one fewer
    5 than 6's                       6 7 5 5
last digit: 6                                6
```

3. So **7666 × 7666 = 58,767,556**.

See the pattern?

1. If the number to be squared is **766666**:
2. The square has:

```
first digits: 58 and two fewer
   7's than 6's          5 87 7 7
next digits: 67 and one fewer
   5 than 6's                      6 75 5 5 5
last digit: 6                                 6
```

3. So **766666 × 766666 = 587,776,755,556**.

Squaring Numbers (88)

Squaring special numbers (7 andrepeating 9's)

1. Choose a number with a 7 and repeating 9's (use a mimimum of three 9's).
2. The square is made up of:
   1. first digits: 63 & two fewer 9's than repeating 9's in the number
   2. next digits: 84 & one fewer 0 than repeating 9's in the number
   3. last digit: 1

Example:

1. If the number to be squared is **7999**:
2. The square has:

```
first digits: 63 and two fewer
    9's than rep. 9's            6 3 9
next digits: 84 and one fewer
    0 than rep. 9's                  8 4 0 0
last digit: 1                                1
```

3. So **7999 × 7999 = 63,984,001**.

See the pattern?

1. If the number to be squared is **799999**:
2. The square has:

```
first digits: 63 and two fewer
   9's than rep. 9's      6 3 9 9 9
next digits: 84 and one fewer
   0 than rep. 9's                 8 4 0 0 0 0
last digit: 1                                   1
```

3. So **799999 × 799999 = 639,998,400,001**.

Squaring Numbers (88)

Squaring special numbers (8 andrepeating 3's)

1. Choose a number with an 8 and (at least 3) repeating 3's.
2. The square is made up of:
 1. first digits: 69 & two fewer 4's than repeating 3's
 2. next digits: 3 & same number of 8's as repeating 3's
 3. last digit: 9

Example:

1. If the number to be squared is **8333**:
2. The square has:

```
first digits: 60 and two fewer
    4's than 3's                    6 9 4
next digits: 3 and same number of
    8's as 3's                          3 8 8 8
last digit: 9                                   9
```

3. So **8333 × 8333 = 69,438,889**.

See the pattern?

1. If the number to be squared is **833333**:
2. The square has:

```
first digits: 69 and two fewer
   4's than 3's                6 9 4 4 4
next digits: 3 and same number of
   8's as 3's                           3 8 8 8 8 8
last digit: 9                                      9
```

3. So **833333 × 833333 = 694,443,888,889**.

Squaring Numbers (88)

Squaring special numbers (8 andrepeating 9's)

1. Choose a number with an 8 and repeating 9's (use a mimimum of three 9's).
2. The square is made up of:
   1. first digits: 80 & two fewer 9's than repeating 9's in the number
   2. next digits: 82 & one fewer 0 than repeating 9's in the number
   3. last digit: 1

Example:

1. If the number to be squared is **8999**:
2. The square has:

```
first digits: 80 and two fewer
    9's than rep. 9's            8 0 9
next digits: 82 and one fewer
    0 than rep. 9's                  8 2 0 0
last digit: 1                                 1
```

3. So **8999 × 8999 = 80,982,001**.

See the pattern?

1. If the number to be squared is **899999**:
2. The square has:

```
first digits: 80 and two fewer
   9's than rep. 9's      8 0 9 9 9
next digits: 82 and one fewer
   0 than rep. 9's                  8 2 0 0 0 0
last digit: 1                                  1
```

3. So **899999 × 899999 = 809,998,200,001**.

Squaring Numbers (88)

Squaring special numbers (9 andrepeating 3's)

1. Choose a number with a 9 and repeating 3's (use at least three 3's).
2. The square is made up of:
   1. first digits: 87 & two fewer 1's than repeating 3's
   2. next digits: 04 & one fewer 8 than repeating 3's
   3. last digit: 9

Example:

1. If the number to be squared is **9333**:
2. The square has:

```
first digits: 87 and two fewer
    1's than 3's                    8 7 1
next digits: 04 and one fewer
    8 than 4's                           0 4 8 8
last digit: 9                                    9
```

3. So **9333 × 9333 = 87,104,889**.

See the pattern?

1. If the number to be squared is **933333**:
2. The square has:

```
first digits: 87 and two fewer
   1's than 3's           8 71 1 1
next digits: 04 and one fewer
   8 than 3's                          0 48 8 8 8
last digit: 9                                     9
```

3. So **933333 × 933333 = 871,110,488,889**.

Squaring Numbers (88)

Squaring special numbers (9 andrepeating 6's)

1. Choose a number with a 9 and repeating 6's (use at least three 6's).
2. The square is made up of:
   1. first digits: 93 & two fewer 4's than repeating 6's
   2. next digits: 31 & one fewer 5 than repeating 6's
   3. last digit: 6

Example:

1. If the number to be squared is **9666**:
2. The square has:

```
first digits: 93 and two fewer
    4's than 6's                    9 3 4
next digits: 31 and one fewer
    5 than 6's                           3 1 5 5
last digit: 6                                    6
```

3. So **9666 × 9666 = 93,431,556**.

See the pattern?

1. If the number to be squared is **966666**:
2. The square has:

```
first digits: 93 and two fewer
   4's than 6's            9 34 4 4
next digits: 31 and one fewer
   5 than 6's                          3 15 5 5 5
last digit: 6                                     6
```

3. So **966666 × 966666 = 934,443,155,556**.

Squaring Numbers (88)

Squaring a repeating 6-digit number

1. Choose a number with repeating 6's .
2. The square is made up of:
   1. One less 4 than there are digits in the number;
   2. One 3;
   3. The same number of 5's as 4's;
   4. A final 6.

Example:

1. If the number to be squared is **666**:
2. The square has:

```
one less 4 than digits in
   the number                    4 4
one 3                                3
same number of 5's as 4's              5 5
a final 6                                 6
```

3. So **the square of 666 is 443556**.

See the pattern?

1. If the number to be squared is **66666**:
2. The square has:

```
one less 4 than digits in
   the number)                    4 4 4 4
one 3                                     3
same number of 5's as 4's                   5 5 5 5
a final 6                                           6
```

3. So **the square of 66666 is 4444355556**.

Squaring Numbers (88)

Squaring 2 2's, 3 3's, etc., then dividing by square of single digit

1. Choose a number with 2 repeating 2's, 3 repeating 3's, 4 repeating 4's, etc., up to 9 repeating 9's.
2. Square the number.
3. Divide that product by the square of the single digit of the selected number.
4. The answer is a sequence beginning with 1 and going up to the single digit of the number, and back down to 1.

Example:
If the number to be squared is **333**:
The answer is 12321.

If the number to be squared is **666666**:
The answer is 12345654321.
Try to vary the procedure with a last step so the answeris not so obvious. That will make this trick more interesting. You might ask that some number, perhaps 321, be added as a last step. Then the last three digits of the answer would be 642.