Name:_____ Period:_____ Date:_____
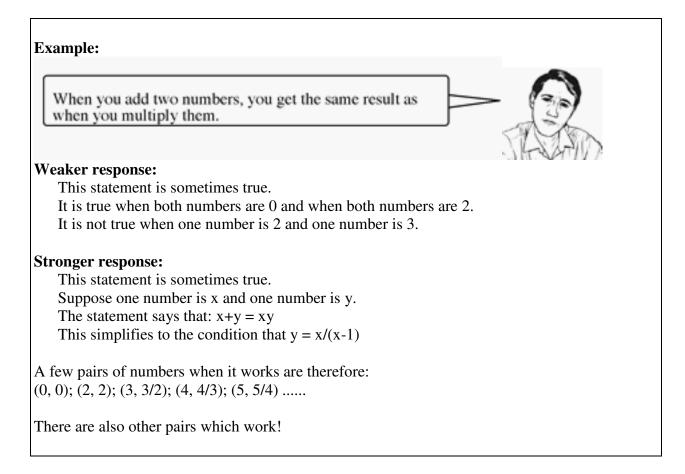
Always, Sometimes or Never True

Introduction:

You will be given a number of statements. You must decide if each statement is
- always true, or
- sometimes true, or
- never true

You must provide full and convincing reasons for your decision. If you think that a statement is sometimes true, you must fully explain *when* it is true and *when* it is not true.

Here is an example of what we mean:

Example:

When you add two numbers, you get the same result as when you multiply them.

Weaker response:
This statement is sometimes true.
It is true when both numbers are 0 and when both numbers are 2.
It is not true when one number is 2 and one number is 3.

Stronger response:
This statement is sometimes true.
Suppose one number is x and one number is y.
The statement says that: $x+y = xy$
This simplifies to the condition that $y = x/(x-1)$

A few pairs of numbers when it works are therefore:
(0, 0); (2, 2); (3, 3/2); (4, 4/3); (5, 5/4) ......

There are also other pairs which work!

The aim of this activity is to provide the opportunity for you to:
- test statements to see how far they are true;
- provide examples or counterexamples to support your conclusions
- provide convincing arguments to support your conclusions

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1. The more digits a number has, then the larger is its value.

Is this always, sometimes or never true? ....

Reasons or examples:

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2. If you multiply 12 by a number, the answer will be greater than 12.

Is this always, sometimes or never true? ....

Reasons or examples:

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3. The square of a number is greater than that number.

Is this always, sometimes or never true? ....

Reasons or examples:

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4. The sum of two integers is greater than either of the integers.

Is this always, sometimes or never true? ....

Reasons or examples:

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5. If you add the same number to the top and bottom of a fraction, the fraction gets bigger in value.

Is this always, sometimes or never true? ....

Reasons or examples:

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6. It doesn't matter which way you multiply, you get the same answer, like $a \times b = b \times a$.

Is this always, sometimes or never true? ....

Reasons or examples:

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7. If you divide the top and bottom of a fraction by the same number, the fraction gets smaller in value.

Is this always, sometimes or never true? ....

Reasons or examples:

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8. If you divide 12 by a number, the answer will be less than 12.

Is this always, sometimes or never true? ....

Reasons or examples:

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9. It doesn't matter which way you divide, you get the same answer, like $a \div b = b \div a$.

Is this always, sometimes or never true? ....

Reasons or examples:

10. If you multiply a four digit number by a one digit number, the answer will be a one digit number.

Is this always, sometimes or never true? ....

Reasons or examples:

11. The product of two numbers is larger than their sum (a•b > a+b).

Is this always, sometimes or never true? ....

Reasons or examples:

12. The product of a number and 0 is 0.

Is this always, sometimes or never true? ....

Reasons or examples: