# Always, Sometimes or Never True - Set #1

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**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:

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**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!

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The aim of this assessment 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 or proofs to support  your conclusions

For each statement, say whether it is always, sometimes or never true.
You must provide **several examples or counterexamples** to support your decision.
Try also to provide **convincing** reasons for your decision.
You may even be able to provide a **proof** in some cases.

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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:

**4. If two rectangles have the same perimeter, they have the same area.**

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

Reasons or examples:

**5. Pentagons have fewer right angles than rectangles.**

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

Reasons or examples:

**6. Quadrilaterals tessellate.**

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

Reasons or examples: