

Math Tutoring Tips – Common Computation Errors Made by High School Students

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I have been tutoring math for over tens years for students from kindergarten to grade 12 so I have experience in understanding why some of the high school students just could not do well in math. Some of the problems are inherent from their elementary math. The followings are some common mistakes made or areas where the students lack of sufficient knowledge by some high school students.

(1) Not skillful in the operation of negative integers.

For example, questions such as $2 - (-3)$, $2 + (-3)$

(2) Not skillful in fractions operations

- did not do reducing.

For example, in Grade 6 if this question $\frac{1}{2} \times \frac{4}{6} = \frac{4}{12}$ is not required to be reduced then in grade 11 when the question is presented:

Simplify $\frac{1}{(x-2)^2} \times \frac{(x-2)^3}{x}$

The student must relearn that a fraction must be reduced so it is a good idea to have the habit to reduce fractions in the elementary grades.

Since students did not do enough fractions operations in elementary schools, some errors made in high school rational operations are as follows:

$$\frac{2x^2 - 1}{2} = x^2 - 1$$

$$\frac{x^2}{2} - \frac{3x+1}{2} = \frac{x^2 - 3x + 1}{2}$$

$$\frac{x^2 + 2x}{x+3} = \frac{x+2}{3}$$

- did not know how to do fraction ends in negative result such as $2\frac{1}{2} - 3$.
- Could not do the followings:
 $6 \times \frac{2}{12}$, so students have trouble to understand on how to multiply both sides by 2 for the following problem:

$$6 + x = \frac{12 + x}{2}$$

(3) Not enough work is done on 4 basic operations.

Have trouble of doing these kinds of questions by hand: $17 - 8$, $13 - 9$, $12 - 8$

$$0.2 \overline{)0.0204}$$

(4) Not enough work is done on factoring or preparations for factorization.

Questions like all kinds of trinomial factoring such as factoring $2x^2 + 5x + 1$

Errors made on the followings:

$$(x + y)^2 = x^2 + y^2$$

$$\sqrt{x^2 + y^2} = x + y$$

(5) Did not do vertical enough fraction operations which affect the ability of trigonometric identities.

Question such as to simplify $\frac{\frac{1}{2}}{\frac{2}{3}}$ and the problem of proving the following

trigonometric identity algebraically.

$$\frac{1 - \tan x}{1 - \cot x} = -\tan x$$

(6) Not skillful in cross multiplications.

Questions such as to find x , when $\frac{2}{7} = \frac{9}{x}$, This ability affects the trigonometric ratios etc.

(7) Did not solve equation in continuity.

Some students do work in piece-meal fashion.

Solve x for the equation $\frac{2}{3} - \frac{1}{2} \times \frac{4}{5} = x - \frac{3}{4}$

Some students would do partial work of $\frac{1}{2} \times \frac{4}{5} = \frac{2}{5}$ in one place then substitute it into the left side of equation. The student should do the following way in continuity:

$$\frac{2}{3} - \frac{2}{5} = x - \frac{3}{4}$$

$$\frac{10}{15} - \frac{6}{15} = x - \frac{3}{4}$$

$$\frac{4}{15} = x - \frac{3}{4}$$

$$\frac{4}{15} + \frac{3}{4} = x$$

$$x = \frac{16}{60} + \frac{45}{60}$$

$$= \frac{61}{60}$$

(8) Do not have good work habits.

Did not keep notes in binders and write notes in loose sheets and did not go through the notes I gave to them or tips I taught them.

(9) Assume the variable is not 0.

$$\text{Solve } \frac{x^2}{x} = 1$$

Assume $x \neq 0$,

$$x^2 - x = 0$$

$$x(x-1) = 0$$

$$x = 1$$

$$x^2 = x$$

$$\text{Solve } x^2 - x = 0$$

$$x(x-1) = 0$$

$$x = 0, x = 1$$

(10) Do not understand about functions.

The followings are mistakes.

$$\log(a+b) = \log a + \log b$$

$$\cos(a+b) = \cos a + \cos b$$

(11) Do not understand the following exponents fully.

$$\left(\frac{2}{3}\right)^{-1} = \frac{3}{2}$$

$$\left(\frac{2^{-1}}{3^{-1}}\right)^{-1} = \frac{2}{3}$$

$$\left(\frac{2^{-1}}{3}\right)^{-1} = \frac{2}{3^{-1}} = 2 \times 3 = 6$$

$$\left(\frac{2}{3^{-1}}\right)^{-1} = \frac{2^{-1}}{3} = \frac{1}{2 \times 3} = \frac{1}{6}$$

$$(-2)^2 = 2^2 = 4$$

$$-2^2 = -4$$

$$-(-2)^2 = -4$$

$$(2x)^2 = 2^2 x^2 = 4x^2$$

(12) Do not understand the following radicals fully.

$$\sqrt{2x} = (2x)^{\frac{1}{2}} = 2^{\frac{1}{2}} x^{\frac{1}{2}}$$

$$2\sqrt{x} = 2x^{\frac{1}{2}}$$

At *Ho Math and Chess*, we would give each student a free evaluation to identify the problem areas and then come up with a plan on how to help students improve. More details could be found at www.mathandchess.com.