

COMMON MISTAKES IN MATH AND PHYSICS:

Use a calculator to evaluate:

$$\frac{18}{3 \times 2}$$

Enter:

$$18 : 3 \times 2 \quad (\text{INCORRECT})$$

$$\text{Enter: } 18 : 3 : 2 = 3 \quad (\text{CORRECT})$$

Or

$$\text{Enter: } 18 : (3 \times 2) = 12 \quad (\text{CORRECT})$$

Calculate:

$$\frac{3+5}{3+1}$$

Cancel out the 3's from the numerator and the denominator.

$$5 / 1 = 5 \quad (\text{INCORRECT})$$

$$(3 + 5) : (3 + 1) = 8 / 4 = 2 \quad (\text{CORRECT})$$

You cannot cancel out the 3's in the above. You can cancel the 3's only if it is multiplication:

$$\frac{3 \times 5}{3 \times 1}$$

Evaluate: $a^5 + a^3$

$$a^5 + a^3 = a^8 \quad (\text{INCORRECT})$$

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You cannot add the exponents in the above example. You can add the exponents only if it is a multiplication:

$$a^5 \times a^3 = a^8 \quad (\text{CORRECT})$$

Expand: $(x + y)^2$

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

(INCORRECT)

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$$(x + y)^2 = x^2 + 2xy + y^2 \quad (\text{CORRECT})$$

Factor: $x^2 - y^2$

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

(INCORRECT
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$$x^2 - y^2 = (x - y)(x + y) \quad (\text{CORRECT})$$

Calculate:

INCORRECT:

$$\frac{2}{3} + \frac{5}{6} = \frac{7}{9}$$

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CORRECT:

$$\frac{2}{3} + \frac{5}{6} = \frac{4}{6} + \frac{5}{6} = \frac{9}{6} = \frac{3}{2}$$

Subtract (-2) from (7)

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INCORRECT

$$7 - 2 = 5$$

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$$7 - (-2) = 7 + 2 = 9 \quad (\text{CORRECT})$$

Calculate:

$$\frac{\log x^2}{\log x} = \frac{x^2}{x} = x$$

(INCORRECT)

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CORRECT:

$$\frac{\log x^2}{\log x} = \frac{2 \log x}{\log x} = 2$$

Evaluate: $6 \times 3 + 2$

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$$6 \times 3 + 2 = 6 \times 5 = 30 \quad (\text{INCORRECT})$$

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$6 \times 3 + 2 = 18 + 2 = 20$ (CORRECT)

x^2 means $2x$ (INCORRECT)

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x^2 does not mean $2x$.

$x^2 = (x)(x)$ (CORRECT)

INCORRECT

$\sin x^2$ means $\sin^2 x$ (INCORRECT)

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$\sin^2 x = (\sin x)(\sin x) = (\sin x)^2$ (CORRECT)

Calculate square of -3?

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$-3^2 = -9$ (INCORRECT)

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$(-3)^2 = 9$ (CORRECT)

$\sin(\cos x)$ means $(\sin x) \cdot (\cos x)$ (INCORRECT)

$(3 - x)^{1/2}$ means $3^{1/2} - x^{1/2}$ (INCORRECT)

Common Mistakes in Physics:

The normal force is always equal to the force of gravity.
(INCORRECT)

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Normal force is always perpendicular to the surface with which an object is in contact. Normal force is not always equal to force of gravity. Normal force is equal to the force of gravity if the object lies on a horizontal surface and if there is no acceleration in the direction of normal force and the component of any external force in the direction of the normal is zero. (CORRECT)

The coefficient of friction is equals to the friction force divided by force of gravity. (INCORRECT)

The coefficient of friction is equal to the friction force divided by the normal force. (CORRECT)

When the acceleration is constant, then the velocity is also constant. (INCORRECT)

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When the acceleration is constant, the velocity is not constant. When the acceleration is zero, then the velocity is constant. (CORRECT)

Students' Common Misconceptions about Studying:

I only need to study the problems the teacher has assigned.

(NEGATIVE THINKING)

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I should study all the problems and even some additional

problems from different books.

(BETTER THINKING)

I am so busy, so I study before the tests, quizzes or the exam.

(NEGATIVE THINKING)

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I should study regularly to understand the subject better.

(BETTER THINKING)

My teacher should have given me full mark for this question. S/he doesn't like me.

(NEGATIVE THINKING)

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After I get my test paper, I should go over all the questions in the test paper so that I can see my mistakes and learn from them. If I don't understand the teacher's marking, I should ask to the teacher.

(BETTER THINKING)

I have to memorize the method for solving a problem.

(NEGATIVE THINKING)

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I should learn both the concept and the method. Otherwise, if I get a different problem, I cannot solve it.

(BETTER THINKING)

After I solve a problem, I do not need to check the result.

(NEGATIVE THINKING)

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I should check the result to see if the result is reasonable. If it is not reasonable, I should go over it again.

(BETTER THINKING)

My teacher does not solve this problem with this method. S/he solves it differently.

(NEGATIVE THINKING)

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There is no one way to solve a problem. Instead, there are various ways solving a problem. It is useful to solve a problem several different ways.

(BETTER THINKING)