Number I Year 9

Introduction

"Number" is just the modern term for what would have been called Arithmetic in the past. That is the Maths associated with calculations with numbers, particularly percentages and proportions.

Language

Students need to take some time to learn all the terms associated with numbers. For many students failure to take the time to learn the language severely affects their ability to understand what are otherwise quite simple questions.

Rounding

Rounding to specified decimal places is in Year 9 (and rounding to significant figures in Year 10).

The number is chopped off at the specified number of decimal places (d.p.). Then if the following digit is 5, 6, 7, 8 or 9 then the last digit is increased by 1.

6.8463 to 2 d.p. = 6.84|63 = 6.85 rounded up because the next digit is a 6

7.3541 to 2 d.p. = 7.35|49 = 7.35 not rounded up, because the next digit is a 4

The answer must be given to the correct number of decimal places, so we still write any zeros at the end of the number.

7.0033 to 2 d.p. = 7.00|33 = 7.00 (not 7, even though that is the same value)

Only the digit immediately after the cut-off point is considered. It does not matter what follows that, even if it is a string of 9s.

54.84999 to 1 d.p. = 54.8|4999 = 54.8

If the rounded up digit is a 9, then the rounding is carried up to the next digit.

4.97 to 1 d.p. = 4.9|7 = 5.0

Students should always round to a sensible number of decimal places, even when the question does not specify the number. "Sensible" depends a bit on the context, but it is rarely reasonable to give answers to more than a couple of decimal places.

BEDMAS

The order of operations is important, particularly as students move into Algebra.

B = Brackets. These are done first.

$10 - (2 + 7) = 10 - 9 = 1$ whereas: $10 - 2 + 7 = 8 + 7 = 15$

E = Exponents (the powers of the numbers). They are done after brackets but before all else.

$8 + 6^2 = 8 + 36 = 44$ whereas $(8 + 6)^2 = 14^2 = 196$

DM = Division and Multiplication. They go before addition and subtraction.

$3 + 5 \times 8 = 3 + 40 = 43$

$4 \times 7 - 6 \div 3 = 28 - 2 = 26$

AS = Addition and Subtraction. They are done last.

A subtraction sign only applies to the number immediately following it.

$5 - 3 + 2 = 4$ $5 - 3 + 2$ does **not** mean $5 - (3 + 2) = 0$

The line of a square root sign or fraction indicates effectively that the items are bracketed. This is particularly important to remember when using a calculator.

$\sqrt{4 + 21}$	$= \sqrt{(4 + 21)}$	$= \sqrt{25}$	$= 5$	(not $\sqrt{4} + 21 = 23$)
$\frac{4}{2 + 2}$	$= \frac{4}{(2 + 2)}$	$= \frac{4}{4}$	$= 1$	(not $4 \div 2 + 2 = 4$)
$\frac{4 + 8}{2}$	$= \frac{(4 + 8)}{2}$	$= \frac{12}{2}$	$= 6$	(not $4 + 8 \div 2 = 8$)

Negative Numbers

Although students can mostly get by at lower levels using a calculator, they are **severely** disadvantaged when they attempt Algebra if they have not mastered negatives.

A negative results when a larger number is taken away from a smaller number.

$10 - 12 = {}^{-}2$

Subtracting a negative is the same as adding a positive.

$8 - {}^{-}6 = 8 + 6$

When we multiply or divide with negatives, we calculate the number answer as usual. Afterwards, we add up all the negatives, and cancel out any pairs.

${}^{-}5 \times 8 = {}^{-}40$

${}^{-}5 \times {}^{-}8 = {}^{--}40 = {}^{+}40$

${}^{-}5 \times {}^{-}8 \div {}^{-}2 = {}^{---}20 = {}^{-}20$

The phrase "two negatives make a positive" should be avoided, as it confuses students when adding two negative numbers. It is much better to say "**two side-by-side negatives cancel**" or similar. Two negative answers added together give a negative.

${}^{-}7 + {}^{-}8 = {}^{-}15$

Adding a negative is the same thing as subtracting the positive. There is no difference between a "minus" and a "negative", which is why the same sign is used.

$5 - 3 = 5 + {}^{-}3$

We can reorder a sum with addition (but not subtraction). One way to simplify sums with negatives or subtractions is to use the ability to reorganise additions into any order.

${}^{-}3 + 5 \quad = 5 + {}^{-}3 \quad = 5 - 3 \quad = 2$

$7 - 13 + 8 \quad = 7 + {}^{-}13 + 8 \quad = 7 + 8 + {}^{-}13 \quad = 15 - 13 \quad = 2$