

PROPERTIES OF THESE COMMERCIAL VARIETIES.

(1) Cast Iron is not a definite compound of Carbon and Silicon with Iron, hence its appearance and properties will vary with the quantity of Carbon and Silicon present. "Carbon is found in Cast Iron, (1) as scales of graphite, giving rise to grey or mottled Cast Iron; and (2) in combination, forming white Cast Iron." It is lighter and more easily fused than the other varieties of Iron; is brittle, and can not be *welded*. Treated with acids, it develops evil-smelling Hydrocarbons, &c.

(2) Wrought Iron is nearly pure Iron (having not more than $\frac{1}{2}$ proc. of Carbon, with traces of Silicon and Manganese). It melts only at the highest white heat, is fibrous, very tenacious, capable of polish, can be welded, &c.

(3) Steel contains about one proc. of Carbon (Nitrogen and traces of Silicon, Aluminium and Manganese). Steel has a grey-white color; is fine-grained, less tenacious and harder than Wrought Iron, capable of the highest polish, becomes very hard and brittle when quickly cooled. Heat changes the color of Steel: at 215°C (heated in air) it becomes *straw yellow*, then dark blue and purple; at 282°C , violet, then dark blue, and finally light blue.

PUBLIC SCHOOL DEPARTMENT.

HOW TO TEACH MENTAL ARITHMETIC.*

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EXERCISE VII.

Addition and Subtraction.

For this exercise a space on the floor of the school-room is required of sufficient length to allow the whole class to stand in a straight line, and of sufficient depth for at least two ranks of pupils.

Instructions to the Teacher. Place the class on the floor in a straight line, and let them number forwards and backwards until each pupil is familiar with his own number. In a class of 12 the first position will be as follows:

1 2 3 4 5 6 7 8 9 10 11 12

At the word "one," let No. 1 extend the left hand horizontally from the elbow; at 3, 5, 7, &c., the other odd numbers do the same. At the word "forward," all the odd numbers step forward one pace with the left foot, halt, and drop the left hand: thus 2nd position.

2 4 6 8 10 12
1 3 5 7 9 11

Let each rank number forwards and backwards, each pupil saying his own number. The teacher may give the word of command "Front rank number forwards," "Front rank number backwards," "Rear rank number forwards," "Rear rank number backwards," or 1, 11, 2, 12 respectively, or point to the pupil who is to begin, or merely look at him. This exercise will teach pupils to add and subtract by twos. The position of the pupils should be changed from day to day. After a time the lowest number may be some other than one, for instance the

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