6. What is meant by *latent heat?*
What is the latent heat of water-substance, 1st. in melting, 2nd. in evaporating at atmospheric pressure?
Find the temperature obtained by passing an ounce of steam at 212°F. into 10 lbs. of water at 50°F.

7. In spring and Autumn the surface of the plaster on the outside walls of buildings in which there has been no fire for some time, is often found quite wet. Whence comes this dampness? By what experiments could you prove the correctness of your explanation?

8. Around a straight rod three rings are painted, the first red the second green, and the third blue. What will be the appearance of the rod looked at through a triangular glass prism held with the 'edges' parallel to the length of the rod? Why?

CHEMISTRY.

Examiner—JOHN SEATH, B.A.

1. A glass containing dirty water is given you. How would you render the water clear, and how would you ascertain whether the clear water contains any dissolved solid or gaseous matter?

2. Give a list of experiments by which you would demonstrate the nature of combustion and of flame.

3. Describe, and give the reason for, each step in the preparation of pure hydrogen from sheet zinc and strong commercial sulphuric acid.

4. Name the compounds you can form, using only the elements oxygen, sulphur, hydrogen, and nitrogen. Indicate briefly in each case how the compounds you mention may be most easily prepared, giving also the equations that represent the reactions.

5. The following gases are contained each in a glass jar: oxygen, hydrogen, carbon monoxide, ammonia, hydrochloric acid, sulphur dioxide, and nitrogen dioxide. Give in each case a distinguishing test.

MACBETH.

Examiner—J. E. HODGSON, M.A

1. "For, as *the entire course of the action turns on the agency of the Weird Sisters*, it were in strict keeping with poet's usual manner to begin *by thus striking the key note of the whole play.*—*Hudson.*
Shew, by references to the play, the truth of the italicised portions of the above criticism.

2. How does Macbeth induce the murderers to undertake the murder of Banquo?

3. Glamis thou art, and Cawdor; and shalt be
What thou art promis'd:—yet do I fear thy nature;
It is too full o' the milk of human kindness,
To catch the nearest way: thou wouldst be great;
Art not without ambition; but without
The illness should attend it. What thou wouldst highly,
That thou wouldst holily; wouldst not play false,
And yet wouldst wrongly win: thou'dst have, great Glamis,
That which cries "Thus thou must do, if thou have it";
And that which rather thou dost fear to do,
Than wishest should be undone.

(*a*) Investigate the accuracy of Lady Macbeth's estimate of her lord's character.

(*b*) Discuss the literary form of this extract.

4. McB "The thane of Cawdor lives,
A prosperous gentleman."—*Act I., Scene 3.*
What inconsistency is there in this speech?

5. Quote, from the play, references to (*a*) Death, (*b*) Ambition.

6. Assign each of the following speeches to its proper character, and give the context:—

(*a*) "The earth hath bubbles as the water hath
And these are of them."

(*b*) "There's no art
To find the mind's construction in the face."

(*c*) "There's husbandry in Heaven;
Their candles are all out."

(*d*) "Naught's had, all's spent,
When our desire is got without content."

(*e*) "And some I see
That two-fold balls and treble sceptres carry."

(*f*) "The queen that bore thee,
Oft'ner upon her knees than on her feet,
Died every day she lived."

(*g*) "Now does he feel his title
Hang loose upon him, like a giant's robe
Upon a dwarfish thief."

Practical Department.

THE INVERSION OF THE DIVISOR.

Division is the process of separating a number, called a dividend into parts containing a given number, for the purpose of ascertaining how many such parts it contains; or, it is the process of separating the dividend into a given number of equal parts, to ascertain how many each part contains.

I separate twelve sticks into parts of three sticks each by placing three in a group, and continuing the process until the number is exhausted. By counting I ascertain that there are four groups.

I separate twelve sticks into three equal groups by starting the three groups with one stick in each. I increase the groups equally until the number is exhausted. By counting any one of the groups I find that there are four sticks in each.

A fraction is one or more of the equal parts of one. Take the problem $12 \div \frac{3}{4} = ?$. This problem obviously belongs to the first class mentioned above. A child who has not learned his "tables" may answer the question, for he may separate each of the twelve objects into four equal parts, and then build groups of three each until the fourths are all grouped. By counting the groups he will obtain the answer to the question, which may be read as follows:—How many groups, each containing three fourths, can be made with twelve ones?

The more advanced pupil may first ascertain how many such groups can be made from one. Instead of separating each of the twelve into fourths, one may be so treated. By trial it will then be found that four fourths will form one group of three fourths and one third of another, or four thirds of a group. Twelve will make twelve times as many.

If this process be continued it will soon become apparent that the denominator of the divisor indicates the size and the number of equal parts into which the one is to be separated; or, in other words, it is the numerator and denominator of the preliminary dividend. Since this numerator is to be divided by the numerator of the divisor, the process may be abbreviated by dividing the denominator of the divisor by its numerator; or, in common language, by "inverting the divisor."

It thus becomes clear that if a fraction be "inverted," it t expresses the quotient arising from dividing one by that fraction
If the dividend should be a fraction the process is the same.
$\frac{3}{4} \div \frac{5}{8} = ?$
One divided by $\frac{5}{8} = \frac{8}{5}$. $\frac{3}{5}$ divided by $\frac{5}{8} = \frac{3}{5}$ of $\frac{8}{5} = \frac{24}{25}$.
This method seems preferable to the following:—
$\frac{3}{5} \div 5 = \frac{3}{25}$. $\frac{3}{5}$ divided by $\frac{1}{8}$ of $5 = 8$ times $\frac{3}{25} = \frac{24}{25}$.
It is preferable—

1. Because by our definition $\frac{1}{8}$ of 5 is not a fraction.

2. Pupils are troubled in recognizing the truth that 5 is times $\frac{5}{8}$.—*C. in Illinois School Journal.*