3. Multiply $5x + 2y - 7z$ by $3x - 2y - z$, and divide the product by $x + 3y + 5z$.
4. Simplify (1.) $a - (b - c) - \left\{ b - (a - c) \right\} - \left[a - \left\{ 2b - (a - c) \right\} \right]$.
   (2.) $(ax + by)(ay + bx) - (ax - by)(ay - bx)$.
5. Resolve into elementary factors $a^4 - x^4$, $a^6 + x^6$, $a^4 + a^2x^2 + x^4$. Hence find their lowest common multiple.
6. Simplify $\frac{(a+b)(2a-3b)}{4} - \left\{ \frac{a^2}{2} - \frac{1}{3}(a - 4b)(3a - 2b) - \frac{1}{4}\left(b^2 - \frac{ab}{2}\right) \right\}$.
7. Prove that $\frac{a+b}{ab}\left(\frac{1}{a} - \frac{1}{b}\right) + \frac{b+c}{bc}\left(\frac{1}{b} - \frac{1}{c}\right) = \frac{a+c}{ac}\left(\frac{1}{a} - \frac{1}{c}\right)$.
8. Find the value of $ax + by$ when $x = \frac{cq - br}{aq - bp}$; $y = \frac{ar - cp}{aq - bp}$.
9. Solve the equations—

$$\tfrac{1}{14}(3x + \tfrac{2}{3}) - \tfrac{1}{7}(4x - 6\tfrac{2}{3}) = \frac{5x - 6}{2}.$$

$$(a+b)\left\{x - \overline{a - b}\right\} + (b + c)\left\{x - \overline{b - c}\right\} = (c + a)\left\{x - \overline{c - a}\right\}.$$

10. A boy, being asked to divide one half of a certain number by 4 and the other half by 6, and to add together the two quotients, attempted to obtain the result at one step by dividing the whole number by 5; but his answer was 2 too small. What was the number?

Class D.—Euclid (optional).

Saturday, March 27th.—Afternoon, 2.30 *to* 5.30.

1. Distinguish between a problem and a theorem. Point out the part of a proposition in which use may be made of preceding problems.
2. The angles at the base of an isosceles triangle are equal to one another; and, if the equal sides be produced, the angles on the other side of the base shall be equal to one another.
3. Any two sides of a triangle are together greater than the third side.
   Show that the difference between two sides of a triangle is less than the third side.
4. If a straight line fall upon two parallel straight lines, it makes the alternate angles equal to one another, and the exterior angle equal to the interior and opposite angle on the same side, and also the two interior angles on the same side together equal to two right angles.
5. Triangles on equal bases and between the same parallels are equal to one another.
   Show that equal triangles, which are between the same parallels, are on equal bases.
9. If a straight line be divided into any two parts, the square on the whole line is equal to the squares on the two parts together with twice the rectangle contained by the two parts.
7. To describe a square that shall be equal to a given rectilineal figure.

Class D.—Chemistry (optional).

Wednesday, March 31st.—Morning, 10 *to* 1.

1. Explain fully how oxygen may be made and collected for experiments.
2. Write down the *names, symbols,* and *atomic weights* of ten of the non-metallic elements.
3. Describe all the kinds of *carbon,* stating how they differ from and resemble each other.
4. Describe as many experiments as you can for showing the properties of *oxygen, nitrogen,* and *carbonic acid.*
5. What substances are formed when *carbon, hydrogen, sulphur,* and *phosphorus,* respectively, are burnt?
6. Describe an experiment to show that there is no loss of substance when a candle is burnt.
7. How do (a) *living animals* and (b) *living plants* affect the composition of the atmospheric air?
8. Write down the chemical symbols for *water, ammonia, nitric acid, sulphuric acid, chloride of lime, black oxide of manganese, chlorate of potash, chloride of sodium.*
9. Explain the process for making either *nitric acid* or *hydrochloric acid,* giving the symbols and equations.
10. Give two equations for the manufacture of *hydrogen* for class experiments.
11. Explain fully the process for the manufacture of *one* of the following:—*Sulphuric acid, chloride of lime, phosphorus.*
12. From what sources does *carbonic acid* come into the atmosphere? And how is any excess of it removed?

Class D.—Electricity (optional).

Saturday, March 27th.—Morning, 10 *to* 1.

[Note.—Candidates are not to attempt more than ten questions.]

1. Give a general account of terrestrial magnetism.
2. How would you make experiments to illustrate magnetic induction before a class?
3. How may experiments be made to show electrical attraction and repulsion, conduction and insulation, with very simple apparatus—such in fact as may be found in almost any house?
4. Give an account of experiments which prove electricity to be on the surface of bodies.
5. Describe how to determine the kind of electricity with which a body is charged.
6. Leyden jars are frequently made with movable covers. What experiments may be made with them? Give details of the experiment which proves the charge to reside on the surface of the glass, and not on the covers.
7. Give an account of various simple ways of producing an electric current