

Thou liest in Abraham's bosom all the year ;  
And worshipping at the Temple's inner shrine,  
God being with thee when we know it not.

(a) Designate this sonnet by an appropriate title.

(b) Write explanatory notes, giving a concise account of Wordsworth's philosophical tenets as embodied in this sonnet.

(c) By what this sonnet is regarded as one of the finest in our language. Show, as well as possible, wherein its perfection consists.

#### IV.

8. Contrast the styles of Chaucer, Pope, and Wordsworth, illustrating your answer from their works.

9. In the same manner, contrast the attitudes of these authors towards Man and Nature.

### GEOMETRICAL OPTICS.

Examiner—J. C. Glashan.

1. State the laws of reflection of light.

Determine the position of a luminous point so that its four images formed by one reflection at each of four vertical plane mirrors may lie in a straight line.

2. Determine the geometrical focus of a pencil of rays after direct reflection at a spherical surface.

If a pencil of rays issue from a point  $P$  in a diameter  $AB$  of a sphere of radius  $r$ , and if  $u$  and  $v$  be the distances from  $A$  and  $B$  respectively of the geometrical foci after direct reflection from  $A$  and  $B$ , show that

$$(2r - u + v)(r - u + v) = (u + v)^2.$$

3. State the laws of refraction of light.

The rays of a luminous point 12 inches above the surface of still water 12 inches deep, enter the water, are reflected from the bottom of the vessel, and emerge. Determine the position of the final image formed.

4. Determine the geometrical focus of a pencil of rays after direct refraction of a spherical surface.

A small pencil of rays directly incident on the surface of a refracting sphere of radius 2 inches, is brought to a focus at a point  $3\frac{1}{2}$  inches from the centre of the sphere. Find the refracting index, the origin of the pencil of rays being 10 feet from the centre of the sphere.

5. Show how to determine by experiment the focal length of a lens.

The back of a double convex lens is quicksilvered. A small pencil of rays directly incident on the lens, enters it and is reflected. Find the geometrical focus of the emerging rays.

6. Describe the Galilean telescope and determine its magnifying power for an eye that cannot see distinctly beyond  $x$  feet. What are the advantages and what the disadvantages of this telescope?

The magnifying power of an opera glass when directed to a distant object is 4, but when adjusted to an object at a distance of 30 feet from the object glass, the magnifying power is 5. Determine the focal lengths of the eye-glass and the object-glass.

7. Determine the image of a straight line reflected in a spherical concave mirror.

### Practical Department.

One of the most objectionable practices in recitation is the habit, still tolerated in many schools, of the children thrusting up their hands, beating the air, and snapping the fingers, whenever a special question is put to one of their number. The result is confusion of the mind and intimidation of the spirit of all save the few whose power of the rapid phrasing and ready reckoning brings them to the front in this cheap sort of competitive recitation. Every pupil in a class has a right to a quiet and respectful attention, and ample time and favorable conditions for putting his knowledge of a subject into suitable language. The great danger of our graded school-work

that the brilliant group at the head will do the work, and the rank and file be left practically untaught; and the habit of which we speak is mischievous in producing this result.

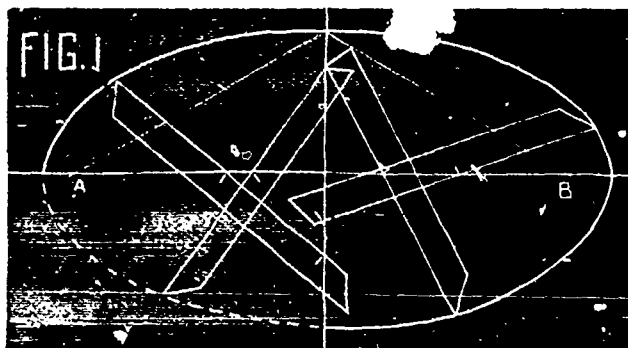
### DRAWING.

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(The Editor of this Department will be glad to answer questions for information addressed to him in care of the SCHOOL JOURNAL.)

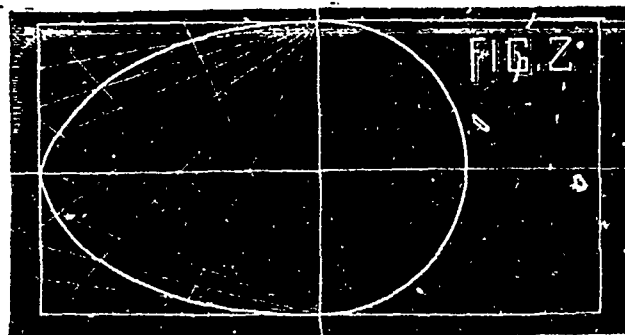
#### VI.

In our last paper we discussed the drawing of circles, before giving many examples of patterns composed of these, let us first describe some of the modes of drawing the ellipse and oval, curved figures which are generally more artistic in their combinations than the more regular form of the circle. An ellipse is a curved figure with two axes, the transverse and conjugate, or major and minor; if these cut at right angles we have a right ellipse, (Figs. 1 and 2),



if at any other angle, an oblique ellipse, (Fig. 3). The length of the semi-major axis, measured from the extremities of the minor will give the foci (A, B, Fig. 1).

The best practical plan of drawing an ellipse, if of large size, is to find these foci, then placing two pins at the points take a double piece of string equal to twice the length of one of the foci from the other extremity of the major axis, by keeping the string on these pins, the point of a pencil stretching it will describe an ellipse; thus this figure can be drawn even on rough ground. Another plan (Fig. 1) is to take a small slip of paper, mark the lengths the semi axes from the same end, then keeping these two points continually on the axes, its end will mark an ellipse, and a series of



points will be found through which the figure can be drawn by hand,—this freehand work has, in fact, to be done in every case. In (Fig. 2), another mode is adopted—through the extremities of the axes draw lines parallel to them, forming a rectangle, then divide the semi-axis, and the semi-side of the rectangle into the same number of equal parts, join the points in the axis with the opposite end of the undivided axis, and produce these lines into the opposite quadrant, next join the other end of the undivided axis with the points marked on the side, the intersection of these lines will give a series of points in the ellipse, through which the figure may be drawn in Fig. 1. The advantage of this method