fore each of these we may place an i, giving 15 combinations of three ing the circumference in E and F respectively, prove that the arc different letters. But each group of three letters may be written in A E is equal to the arc A F. three different ways total number $= 3 \times 15 = 45$.

10. Writing fractional exponents we have

 $1 + 2x^{\frac{1}{2}} + 3x - x^2 - 2x^{\frac{3}{2}} + x^3$, and by inspection we see the square root is $1 + x^{\frac{1}{2}} + x - x^{\frac{3}{2}}$.

$$\frac{\partial}{\partial 5} = (1+4)^{\frac{1}{3}} = 1 + \frac{\frac{1}{3} \cdot 4}{1} + \frac{\frac{1}{3}(\frac{1}{3}-1)}{1\cdot 2} \cdot 4^{2} + \frac{\frac{1}{3}(\frac{1}{3}-1)(\frac{1}{3}-2)}{1\cdot 2\cdot 3} 4^{3} + \&c$$

= $1 + \frac{1}{3} - \frac{1}{9} + \frac{3}{310} - \&c.$

EUCLID.

Eraminer-T. C. L. ARMSTRONG, M.A., LL.B.

TIME - THREE HOURS. SECOND CLASS

1. Draw a straight line at right angles to a given straight line from a given point in that line.

From the extremity of a line draw a line at right angles to it.

2. The angles which one straight line makes with another upon one side of it are either two right angles, or are together equal to two right angles.

Define right angle, perpendicular, problem, theorem.

3. If any side of a triangle be produced, the exterior angle is equal to the two interior and opposite angles; and the three interior angles of every triangle are equal to two right angles.

What proposition follows as a corollary from this *i*

Show that the angle in an equilateral triangle is g of a right angle, that in a pontagon is # of a right angle; and that in a hexagon is 1 of a right angle. 4. The complements of the parallelograms which are about the di-

ameter of any parallelogram, are equal to one another.

If the given parallelogram be a square, show that the parallelograms about the diameter are also squares.

5. If a straight line be divided into any two parts the squares of the whole line and of one of the parts are equal to twice the rectangle contained by the whole and that part, together with the square of the other part.

EUCLID.

Examiner - A. DAWSON, ESQ. M. A.

TIME-THREE HOURS. -FIRST CLASS.

1. Any two sides of a triangle are greater than the third side.

The difference between any two sides of a triangle is less than the third side.

2 The opposite sides and angles of a parallelogram are equal to one another and the diagonal bisects it; that is divide it into two equal parts.

Define a rhombus, an oblong, a scalene triangle.

parallelogram without altering the area thereof ?

8. To describe a parallelogram equal to a given triangle, and having an angle equal to a given angle.

4. If a straight line be divided into two equal parts, and also into two unequal parts, the rectangle contained by the unequal parts, together with the square on the line between the points of section is equal to the square on half the line.

Construct a rectangle equal to the difference between two given squares.

5. To divide a given straight line into two equal parts, so that the rectangle contained by the whole and one of the parts, may be equal to the square on the other part.

If one side of a triangle be bisected, the sum of the squares on the other two sides is double of the square on half the side bisected, and of the square of the line drawn from the point of bisection to the opposite angle of the triangle.

6. If any two points be taken in the circumference of a circle, the straight line which joins them shall fall within the circle.

How would you answe, the assertion that this proposition is selfevident ?

Through one of the points of intersection of two equal circles draw the longest double chord.

7. The angles in the same segment of a circle are equal to one another.

About the triangle A B C describe a circle, from the points B and C lot fall perpendiculars on the opposite sides of the triangle meet | because he has no thoughts. - Iowa Normal Mouthly.

8. To describe a circle about a given equilatoral and equiangular hoxagon.

Does Euclid's definition of proportional quantities include incommonsurable quantities ? Define and explain.

9. If a straight line be drawn parallel to the base of a triangle to cut the sides or the sides produced, it will cut them proportionally; and convorsely.

Is this converse universally true?

10. Similar triangles are to one another in the duplicate ratio of their homologous sides.

Bisect a triangle by a line drawn parallel to one of its sides.

HINTS.

1. I. 20. If ABC be any triangle, we have AB < BC and CA. Take AC from the unequals, and AB - CA < BC. 2. I. 34. Book-work. So long as the base is unchanged, and the

parallelogram remains between the same parallels, the area is constant.

3. 1. 42. 4. II. 5. The difference between the square on half the line and the square on the line between the points of section is equal to the rectangle contained by the unequal parts. Hence the construction : place the less of the two given squares so that two of its sides may be in the same straight lines with the sides of the greater square, and its diagonal part of the greater diagonal, produce Sc.

II. 11. See Pott's Euc. Exercises on Bk. II. prop. 3. Б

6. III. 2. See Pott's note on this proposition. Join the centres. Through the point of intersection draw a line parallel to this double radius.

7. III. 21. The arcs are equal if the angle ABE = angle FCA, and since the sides AB and AC are cut at right angles this follows from I. 15 and I. 32.

8. Converse of IV. 15. Yes. See Pott's note Bk. V. Def. 3.

9. VI. 2. The enunciation is not sufficiently limited. In order that the converse may be universally true the enunciation ought to specify that the segments terminated at the vertex are to be homologous terms in the ratios, otherwise the alternate segments might have the same ratio but the line would not be parallel to the base.

10. VI. 19. See Pott's Euc. Bk. VI. Ex. 42. Hints &c., where the solution is given.

STATICS.

Examiner-E. L. BYINGTON, M.A.

TIME-TWO HOURS FOR THE THREE SUBJECTS. - FIRST CLASS.

Define the terms Statics, Volume, Density, Moment. 1.

What elements of a force are necessary to ascertain its effects ? 3. Find the resultant of two forces of P. lbs. each, acting on a body so as to make an angle of 120°. What angle will the resultant make with each of the forces / ANS. 120"

The diagonals of a par d'elegram bisect each other. What changes can be made in the shape and dimensions of a angle made by the given force and the resultant is 30°. What is the other force and what angle does it make with the given force ? Ans. 6 lbs.; 90°

HYDROSTATICS.

1. State the two laws upon which the mathematical theory of Hydrostatics depends.

- 2. Describe Nicholson's Hydrometer and method of use.
- 3. How is a Barometer made? Explain its principle.

4. Why is the human body not crushed by the pressure of the atmosphere?

PHYSICS.

1. Distinguish Molecule from Atom.

2 Name the states of aggregation of matter.

3. What is meant by Conservation of Energy?

4. What is a Spectrum? Why does a Prism divide a ray of light?

5. How may positive and negative Electricity be easily developed and distinguished?

6. What is meant by Electrical Induction ?

THE BEAUTY OF REPETITION. - Imagine yourself sentenced to sit quietly for thirty minutes and read over and over the same four or five versus from the average third or fourth reader ! If a scholar's thoughts do not "wander from the lesson" after a second or third reading, it is because the scholar buy the second or third reading, it is