

7. The hypotenuse of a right-angled triangle is 335, and the base 140: what are the angles and perpendicular?
8. In a plane triangle ABC, let $A=45^\circ$, $a=57$, $b=64.3$: what are the other angles and the third side if the triangle is acute-angled, and also if it is obtuse-angled?
9. In a triangle DEF, let $DE=1756$, $DF=1214$, and $EF=1892$: what are the angles?
10. In the triangle ABC, the side $AB=210$, the side $AC=140$, and the angle $A=64^\circ 18'$: find the angles B and C, and the side BC.

ALGEBRA.

1. Find the value of $a-(b-c-d)$ and $a-b-(c-d)$, when $a, b, c, d = 8, 4, 2, 1$, respectively.
2. Reduce to its lowest terms $\frac{a^2-x^2}{a^2-2ax+x^2}$.
3. Complete the square in each of the following cases: x^2-x , x^2-7x , $x^2-\frac{3}{4}x$, $x^2+\frac{x}{2}$.
4. Simplify $\frac{3\frac{1}{2}-\frac{1}{2}(a-1)}{\frac{x+1}{6}-2\frac{1}{2}}$ and $\frac{2+a}{2a+2} + \frac{2-a}{2a-2} - \frac{a}{1+a^2}$.
5. Find the square of $\frac{2(a-x)}{3(a+x)}$; and the square root of a^2+x^2 to four terms.
6. Reduce $4a^2$ to the form of the cube root, and $4a^3$ to the form of the square root.
7. Solve the following equations:—
 (1.) $\frac{(a-b)x}{a+b} + c = \frac{(a+b)x}{a-b} - d$.
 (2.) $\left. \begin{aligned} 2(x-y) &= 3z-2. \\ x+1 &= 3(y+z). \\ 2x+3z &= 4(1-y). \end{aligned} \right\}$
8. Show that half the difference of two quantities added to half their sum is equal to the greater, and taken from half the sum is equal to the less.
9. Find the value of x in the equation $adx-acx^2=bcx-bd$.
10. The clocks of Venice go on to 24 o'clock: how many strokes do they strike in a day?
11. A man's capital increased until it was twice as much as he started with squared; but he had lost at various times sums amounting in all to five times what he started with; he then found that he had increased his original capital by £4,700: what was that capital?

GEOMETRY.

1. Give Euclid's definitions of a straight line, a circle, an acute-angled triangle, a parallelogram, and a square.
2. State generally the subject treated of in each of the first four Books of Euclid.
3. Draw a straight line perpendicular to a given straight line of unlimited length, from a given point without it.
4. If two triangles have two angles of the one equal to two angles of the other, each to each, and the sides adjacent to the equal angles in each also equal, then shall the other sides be equal, each to each, and also the third angle of the one equal to the third angle of the other.
5. The difference of the squares on two unequal lines is equal to the rectangle contained by their sum and their difference.
6. If any point be taken in the diameter of a circle which is not the centre, of all the straight lines which can be drawn from it to the circumference, the greatest is that in which the centre is, and the other part of that diameter is the least; and, of the rest, that which is nearer to the line which passes through the centre is always greater than one more remote: and from the same point there can be drawn only two equal straight lines to the circumference, one upon each side of the diameter.
7. If an equilateral and equiangular hexagon be inscribed in a circle, the side of the hexagon shall be equal to the semi-diameter of the circle.

CHEMISTRY.

1. What is meant by "hardness" of water? Explain Clark's test, and describe a process for removing the hardness.
2. Describe phosphorus, and the process by which it is manufactured.
3. Describe iodine and the tests for its detection. Describe its application to the determination of ozone.
4. Describe the manufacture of carbonates of soda and potash.
5. What is the difference in composition between cast iron, wrought iron, and steel; and what are their distinguishing properties?

NATURAL PHILOSOPHY.

1. Describe what is meant by the dew-point, and the methods of ascertaining it.
2. Explain the principle of the mountain barometer, and the method of its use in measuring altitudes, and the corrections which have to be applied.
3. Explain what is meant by specific gravity, and describe how it is ascertained for solids, fluids, and gases.
4. What is meant by the "specific heat" of a liquid; and how is it ascertained?
5. Give full explanations of what is meant by gravitation, friction, and capillary attraction.