

6. At the foot of a mountain the elevation of its summit is found to be 45° . After ascending for one mile, at a slope of $12^\circ 30'$ towards the summit, its elevation is found to be 65° . Determine the height of the mountain in feet.

7. Given $A=45^\circ$, $a=57$, $b=64.3$. Find the other two angles and side.

8. Given $C=27^\circ 45'$, $a=1,280$, $b=1,860$. Find the other two angles and side and area.

9. Given $A=47^\circ 24'$, $C=80^\circ 45'$, $b=446$. Find a and c .

ALGEBRA.

1. Divide $(x+y)^3+z^3$ by $x+y+z$.

2. Find $(\sqrt{a}+\sqrt{b})^3$.

3. Reduce $ab^2 - \frac{a^2b^2-b^3}{a}$ to a fractional form, and $\frac{x^4}{x^2-y^2}$ to a mixed quantity.

4. Simplify $\frac{\frac{m^2+n^2}{n} - m}{\frac{1}{n} - \frac{1}{m}} \times \frac{m^2-n^2}{m^2+n^2}$.

5. Reduce to an entire surd $2a^2x\sqrt{2a}$; to a common index $2a^{\frac{2}{3}}$ and $3a^{\frac{2}{3}}$. Multiply $(a+b)^{\frac{1}{2}}$ by $(a-b)^{\frac{1}{2}}$; and divide $(a+b)^{\frac{1}{2}}$ by $(a-b)^{\frac{1}{2}}$.

6. Give the fifth term of $(a^2-b^2)^{12}$.

7. Extract the square root of $x^{\frac{1}{2}} - 2x^{\frac{1}{2}}(y^{\frac{1}{2}}+z) + y^{\frac{1}{2}}(y^{\frac{1}{2}}+2z) + z^2$.

8. Solve the equations: $a+x+\sqrt{a^2+x^2}=b$; $\frac{5x}{x+4} - \frac{3x-2}{2x-3}=2$.

9. £20 being divided into three amounts, you find that if from half the first you take one-third of the second and one-fourth of the third you have £2; whereas if you add one-fourth of the second and one-third of the third to a fifth of the first you have £4 16s. 8d. Find the amounts.

10. Find two consecutive numbers whose product is 342.

11. A and B purchase three hundred pounds' worth of stock each. A buys 3-per-cents. and B 4-per-cents. B receives £1 more interest than A . Stocks rise 10 per cent., and they sell out; when A receives £10 more than B . At what prices were the stocks originally purchased?

GEOMETRY.

1. If two straight lines cut each other, the angles which they make at the point where they cut are together equal to four right angles.

2. If the straight line joining the vertex of a triangle to the middle point of the base be greater than half the base, the angle at the vertex is acute.

3. Show that the parallelograms about the diagonal of a square are likewise squares.

4. Describe a square that shall be equal to a given rectilineal figure.

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

6. Describe a circle about a given equilateral and equiangular pentagon.

7. The base of a triangle is given in position, and its vertical angle in magnitude: find the locus of the centre of its inscribed circle.

CHEMISTRY.

1. Describe phosphorus, its mode of preparation, and its oxygen compounds.

2. Describe ammonia, its composition, preparation, compounds, and uses.

3. Describe the compounds of sulphur and oxygen, and their uses in the arts.

4. What is the difference between a mechanical mixture and a chemical compound? Illustrate by examples of solids, fluids, and gases.

5. Describe the qualitative analyses of solutions to distinguish salts of copper, iron, barium, calcium, potassium, sodium.

NATURAL PHILOSOPHY.

1. Describe the lifting-pump and hydraulic ram.

2. Explain and illustrate the terms capillary attraction, friction, gravitation, and specific gravity.

3. What is meant by specific heat and latent heat?

4. Describe the theory of spectrum analysis.

5. Describe the chemical and dynamical methods for producing the electric light.

HISTORY.

1. What was the condition of the people of Great Britain—(a) prior to the Roman invasion; (b) for a century after the Norman Conquest; (c) for a century after the accession of the Tudors?

2. In what directions, and how, were the British dominions increased or decreased during the eighteenth century?

3. Give the provisions of the principal laws relating to religion and liberty enacted in the reign of Charles II.

4. When, why, and between whom were the following treaties made, and what were their provisions: Wallingford, Bretigny, Ryswick, Utrecht, Paris (in Victoria's reign)?

5. Mention continental sovereigns contemporary with the following English monarchs, and state why their names are of importance to the student of English history: Richard I., Henry VIII., Anne, George II., George III.