

- (1.) "A laggard in love and a dastard in war
Was to wed the fair Ellen of brave Lochinvar."
- (2.) "The *Pleasures of Memory* were published in 1792, and became at once popular."
- (3.) "Friendship which we once hoped and believed would never have grown cold."
- (4.) The Megarean Sect were the happy inventors of the logical syllogism.
- (5.) "The very head and front of my offending hath this extent, no more."
- (6.) "I read a play of Shakespear's."

ANALYSIS.

1. What is an *Adverbial* clause? Mention the various classes with an illustration of each.
2. Specify forms of *noun* and *adjective* clauses which are liable to be confounded.
3. Distinguish (with illustrations) between the *co-ordinating* and *restrictive* uses of the relative *who*.
4. Analyze both generally and in detail:—
....."And how he fell
From heaven they fabled, thrown by angry Jove
Sheer o'er the crystal battlements: from morn
To noon he fell, from noon to dewy eve
A summer's day; and with the setting sun
Dropped from the Zenith, like a falling star,
On Lemnos the Ægean isle; thus they relate,
Erring; for he with his rebellious rout
Fell long before; nor aught availed him now
To have built in heaven high towers; nor did he 'scape
By all his engines, but was headlong sent
With his industrious crew to build in hell."

ARITHMETIC.

1. In the multiplication of numbers, how do you prove the correctness of the operation by casting out the nines? Explain and give reasons for the rule, and show the errors to which it is liable.
2. What is the smallest number that can be exactly divided by the nine significant digits, and what number is that from which if there be taken 2-7th of .375 and to the remainder .53 of .3125 be added, the sum is 10?
3. A man paid $3\frac{1}{2}$ times as much for a horse as for a harness. If he had paid 10 p. c. less for the harness and 7 1-7th p. c. more for the horse, they would together have cost \$245.50. How much did he give for each?
4. The true discount on a sum of money for one year at 5 p. c. is \$1.00 greater than the sum of the true discount of one-half of it at 4 per cent. and the other half of it at 6 per cent. Find the amount.
5. Perform the operations indicated in the following:

$$\sqrt{\frac{2025}{4096}} \times \sqrt{2209}; \sqrt[3]{5} \text{ to three places of decimals; and}$$

$$\sqrt{\frac{129.4947}{60.75}}$$

6. I lent a sum of money at 6 per cent., and another sum at 7 per cent., the total interest being \$54. If I had lent the first sum at 7 per cent. and the second at 6 per cent., the total interest would have been \$50. Find the sum lent at each rate.
7. The ratio 63 : 52 results from compounding four ratios together; three of these are 7 : 8, 12 : 15 and 1-2 : 1-5. Express the fourth ratio in its simplest form.

GEOMETRY.

1. State the conditions under which it is proved in the first Book of Euclid (Hamblin Smith's Edition) that "If two plane triangles have three elements (an element being either a side or an angle) of the one respectively equal to three elements of the other, the triangles are equal in every respect." State the conditions under which equality of three elements does not involve equality of triangles.
2. The difference between the squares on any two straight lines is equal to the rectangle contained by the sum and difference of these lines.
3. In any quadrilateral the squares on the diagonals are together equal to twice the sum of the squares on the straight lines joining the middle points of opposite sides.

4. The diameter is the greatest chord in a circle, and of all others that which is nearer to the centre is always greater than one more remote; and the greater is nearer to the centre than the less.
5. If one of the equal sides of an isosceles triangle be the diameter of a circle, the circumference of the circle will bisect the base of the triangle.
6. In a given circle to inscribe a triangle, equiangular to a given triangle.
7. To describe a circle that shall touch two given lines, and pass through a given point.

ALGEBRA.

1. Express $x^{-\frac{3}{2}}$ without the use of a negative or a fractional exponent, and divide $x^{\frac{2}{3}} + 2x^{\frac{2}{3}} + 1 - x^{-\frac{2}{3}}$ by $x + x^{\frac{1}{2}} + x^{-\frac{1}{2}}$.
2. A and B run a mile. At the first heat, A gives B a start of 20 yards, and beats him by 30 seconds. At the second heat, A gives B a start of 32 seconds, and beats him by 9 5-11 yards. Find the rate per hour at which A runs.
3. Distinguish between an *imaginary* and an *irrational* quantity, and rationalize the denominators of—

$$\frac{4}{\sqrt{3} + \sqrt{2} + 1}$$

$$\text{and } \frac{x}{a - \sqrt{x}}$$

4. A person sculling in a thick fog meets one barge and overtakes another which is going at the same rate as the former. If *a* be the greatest distance to which he can see, and *b*, *c*, the distances that he sculls between the times of his first seeing and passing the barges, prove that

$$\frac{2}{a} = \frac{1}{b} + \frac{1}{c}$$

5. There are two numbers whose sum is 18, and the square of the greater divided by the less, plus the square of the less divided by the greater, is 27. What are the numbers?
6. Define Geometrical Progression, and sum the following series: 1, 3, 9, 27, to 12 terms.

UNIVERSAL HISTORY.

1. Name the most noticeable features of Grecian Society as depicted in the Iliad and Odyssey.
2. *Hindoos*—their language, literature, religion, commerce, caste, architecture.
3. Trace the effect on civilization and literature of the Teutonic invasion of the Roman Empire.
4. Write a brief sketch of the wars and conquests of Charlemagne.
5. Give names and chief works of principal writers in Philosophy, Science and Literature of the nineteenth century.
6. Write a short account of the Franco-Prussian war, giving its causes, principal battles, name and terms of the treaty by which it was terminated, and results of the war upon the German Empire.

PRACTICAL MATHEMATICS.

1. The sides of a triangle are 9 ch. 62 links, 6 ch. 38 links, and 7 ch. 20 links. Find its area.
2. Describe the azimuth compass. A ship is sailing in the direction N. E. $\frac{3}{4}$ E., find the number of points and of degrees, etc., between her course and the meridian, reckoning from the S. point.
3. A right-angled triangle has its base 16, and its perpendicular 12, and a triangle is cut off from it by a line parallel to the base, of which the area is 24. What are the lengths of the sides of that triangle?
4. Shew how to measure an inaccessible height when a horizontal base can be obtained, but not in the same vertical plane with the top of the object.
5. A circle 60 inches in diameter is to be divided into three equal portions by means of two concentric circles; what must be their diameters?
6. Explain the principle of Middle Latitude Sailing. Give the rule for finding Course, Departure, Distance, Diff. of Longitude by Mid. Lat. Sailing. Under what limitations would you apply this method?
7. From a cone, the circumference whose base is 10 feet, and whose slant height is 30 feet, a cone has been cut off whose slant height is 8 feet. What is the convex surface of the frustum?