

to twice the rectangle contained by the whole and that part, together with the square on the other part.

Give the corresponding algebraical formula.

7. To divide a given straight line so that the rectangle contained by the whole and one part may be equal to the square on the other part.

Find a point in the line produced which divides the line into segments satisfying the above condition.

8. If two circles touch one another internally, the straight line which joins their centres, being produced, shall pass through the point of contact.

What is assumed in the above enunciation.

Two circles whose centres are *A* and *B* touch one another internally, and a straight line is drawn through the point of contact cutting the circumference in *P* and *Q*; shew that the radii *AP* and *BQ* are parallel.

9. Equal chords in a circle are equidistant from the centre; and, conversely, chords which are equidistant from the centre are equal.

If two equal cords of a circle intersect, shew that the segments of the one are equal respectively to the segments of the other.

10. Angles in the same segment of a circle are equal.

Through one of the points of intersection of two circles a line is drawn; show that the part of this line intercepted by the circumferences of the circle subtends a constant angle at the other point of intersection.

11. If a straight line touch a circle, and from the point of contact a chord be drawn, the angles which this chord makes with the tangent shall be equal to the angles in the alternate segments of the circle.

The perpendiculars dropped on the chord and on the tangent from the middle point of either are cut off by the chord are equal.

ARITHMETIC.

NOTE.—Candidates for University Scholarships will take only those questions marked with an asterisk. All other candidates (whether for Pass or Honours, Second Class or First Class Certificates) must take the

first three questions and any six of the remainder.

1. A note for \$876, dated May 17, for 90 days, and bearing interest at the rate of 8 per cent. per annum, is discounted at a bank on July 3 at 6 per cent. What are the proceeds of the note?

2. Explain the terms Exchange, Bill of Exchange, Par of Exchange.

What is meant by saying "the rate of sterling exchange is \$4 87 for 60-day bills?"

How is the par of exchange between two countries arrived at?

3. What capital should be invested in 6 per cent. stock at 104 to produce an income one-third greater than that derived from \$1,500 invested in 7 per cent. stock at 115?

What rate of interest is received on the money invested in each case?

* 4. Prove that a vulgar fraction may always be reduced to a terminated or to a repeating decimal.

* 5. Explain the method of contracted multiplication of decimals.

Employ this method to find the number of cubic yards in a cubic metre correct to four decimal places, a metre being equal to 1.09363 yds. linear measure.

* 6. A rectangular solid is hammered until its length is increased 10 per cent., and its width 15 per cent.; by how much per cent. has its thickness been diminished?

* 7. The cost of manufacturing a certain article depends partly on the cost of labour and partly on the cost of the raw material. Wages rise 25 per cent., but a reduction of one-sixth in the cost of material enables the manufacturer to produce 16 of the articles for what 15 cost him before the change. How much does the raw material for \$100 worth of the manufactured article now cost him?

* 8. The expense of constructing a railroad is \$2,000,000, two-fifths of which was borrowed on mortgage at 5 per cent., and the remaining three-fifths was held in shares. What must be the average weekly receipts so as to pay the shareholders 4 per cent., the expenses of working the road being 55 per cent. of the gross receipts?