

Intermediate and Third Class.

EUCLID.

1. State the differences between a square, an oblong, a rhombus and a rhomboid.

What name employed in Euclid will apply to all of them? What to the first two only?

2. Upon the same base, and upon the same side of it, there cannot be two triangles having their sides terminated in one extremity of the base equal to one another, and also those terminated in the other extremity.

3. Equal triangles upon the same base and upon the same side of it are between the same parallels.

4. To find a point within a triangle such that if lines be drawn from it to the angular points the three triangles thus formed shall be equal.

5. The straight line drawn through the points of bisection of two sides of a triangle is parallel to the third side.

6. If a straight line be divided equally and also unequally, the rectangle contained by the unequal parts is less than the square upon one of the equal parts, by the square upon the line between the points of division.

7. Show that the proposition of question 6 includes the following, viz.:—The rectangle under the sum and difference of two lines is equal to the difference of the squares upon the lines.

8. Of all rectangles with the same perimeter the square has the greatest area.

First Class Teachers—Grade C.

ARITHMETIC.

1. Define a recurring decimal, and classify the several kinds.

Prove, in any way, a rule for converting a mixed circulating decimal into its equivalent vulgar fraction, and apply your rule to convert $.1013257$. (Book-work.)

2. Perform the operations here indicated, employing contracted multiplication and division, and retaining six decimals throughout:

$$\frac{.3472 + .03172}{6146.38} \div .0004675.$$

Ans. $.1317647$.

3. In the expression "six per cents are at 103," explain fully what is meant.

(Book-work.)

A person sells a certain amount of 5 per cents for 86, and invests in the 6 per cents at 103, and by so doing changes his income by one dollar.

Is the change an increase or a decrease? How much stock did he sell?

Ans. Increase; \$10300.

4. A man buys a note, drawn for 2 years at 6 per cent. interest, and which is now 6 months old, at 15 per cent. true discount. After keeping it 9 months, and receiving one payment of interest, he sells it to a bank at 8 per cent. bank discount. What per cent. does he make upon his money while invested?

Ans. $18\frac{1}{3}$ per cent.

5. *A*, *B* and *C*, whose rates of walking are $3\frac{1}{2}$, 4 and 5 miles an hour respectively, walk on circular tracks whose circumferences are 8, 10 and 15 miles respectively, and whose centres are in the same straight line. At the same instant they start from points on this line, and on the same side of the centres. Find (1) when first they will be all on this line at the same time; (2) all at same time at the points from which they started; (3) whether they will ever be all at the same instant at points on opposite sides of the circles to the starting points.

6. Lead is 11.4 times, and zinc 7.2 times as heavy as water. If 3 pounds of lead and 2 pounds of zinc be melted together, compare the weight of the alloy with that of water.

Ans. 9.504.

7. *A*, *B* and *C* start at the same time, and from the same point, to travel around an island 26 miles in circuit. *A* goes 10 miles and *B* 4 miles per hour in the same direction, and *C* goes 5 miles per hour in the opposite direction. When and where will they first be all together again?

Ans. In $8\frac{3}{4}$ hours, and $8\frac{3}{4}$ miles from point of starting in direction that the two go.

Algebraical symbols will be allowed in the three following questions:—

8. It is required to make a hollow leaden cylinder open at both ends, 10 inches long, with its wall one inch thick, and which is to weigh 25 pounds. Find its outside diameter.