gular points of a square is equal to three times the square itself, the locus of the point is a circle whose diameter is equal to a side of the square.

4. The angle at the centre of a circle is double the angle at the circumference upon the same part of the circumference.

Hence shew that the angle in a segment less than a semi-circle is greater than a right angle, and in one greater than a semi-circle is less than a right angle.

5. If a point be taken within a circle the rectangle under the segments of any chord through it is constant. Prove only the general case.

Given, the vertical angle and base of a triangle, and also the rectangle contained by the difference between the other two sides and one of them, construct the triangle.

6. Describe a circle to touch three given straight lines.

If the three points in which an escribed circle of a triangle touches the sides be joined, the triangle so formed will be obtuse-angled.

7. AB is a given straight line, C its middle point, and D another fixed point in it. CE is drawn at right angles to AB and in it any point F is taken; FD is produced to G, so that as F changes its position in CE the rectangle FD, DG is always equal to the rectangle AD,DB, shew that the locus of G is a circle.

8. Triangles of the same altitude are one to another as their bases.

Triangles are to one another in the ratio compounded of the ratios of their altitudes and bases; prove this after the manner of Euclid.

9. To describe a rectilineal figure that shall be similar to one and equal to another given rectilineal figure.

Intermediate.

ARITHMETIC.

1. (*a*) Find the L. C. M. of 545, 26487, 1853, 11421.

(*b*) One kind of brick is $4\frac{1}{2}$ inches long and $2\frac{3}{4}$ high; another 5 inches long and $3\frac{1}{2}$ high. What is the size of the least piece of wall, height being same as length, that can be constructed of either kind of brick?

(*a*) 105815565.

(*b*) L. C. M. of $\frac{9}{2}$ and $\frac{11}{4}$ is $\frac{99}{8}$.

" " 5 and $\frac{7}{2}$ is $\frac{35}{2}$.

" " $\frac{99}{8}$ and $\frac{35}{2}$ is $\frac{3465}{2}$.

$\therefore$ a wall of height = length = $\frac{3465}{2}$ in.

is the least piece that can be constructed as required.

2. Define the numerator and denominator of a fraction, and from your definitions *prove* that $\frac{2}{3}\times 5=\frac{10}{3}$, $\frac{2}{3}\times\frac{5}{7}=\frac{10}{21}$.

Bookwork.

3. Simplify

$$\left\{\frac{\frac{3}{5}\text{ of }11\frac{1}{2}+\frac{3}{7}\text{ of }7\frac{7}{9}}{33\frac{1}{6}-6\frac{1}{6}}+8\frac{7}{10}\right\} \div \left\{\frac{\frac{1}{2}\text{ of }6\frac{3}{4}-2\frac{1}{8}}{25+\frac{1}{7}\text{ of }3\frac{1}{8}}\right\}$$

Add together $\frac{3}{7}$ of 1 wk. 2 dys. 17 hrs, $\frac{1}{2}$ of 17 hrs. 23 min. 26 sec., and $\frac{1}{7}$ of 2 days.

$173\frac{3}{4}\frac{4}{10}\frac{3}{14}$; 5 dys. 21 hrs. 11 min. $53\frac{13}{38}$ sec.

4. Describe briefly the metric system of measures.

If a gallon contain 277 cub. in., and a dekalitre contain 17.6077 pints, express a metre in inches.

1 dekalitre $=\frac{1}{100}$ cb. metre.

$=\frac{277}{8}\times 17.6077$ cb. in.

$\therefore$ 1 metre $=\sqrt[3]{\frac{277\times 1760.77}{8}}$ in.

$=39.36$ in.

5. If A walk 7 hours a day, and B 6 hours a day, and if, under like conditions, B can walk 6 miles while A is walking 5, how many days will A be walking down hill a distance which B accomplished up hill in 3 days; supposing that a man's rate of walk-