

II. The pendulum of one clock makes 24 beats in 20"; that of another 36 beats in 40". If they start at the same time, when first will the beats occur together?

Ans. 434 seconds.

III. *A* can do as much work in 4 hours as *B* in 6; and *B* in $3\frac{1}{2}$ as *C* in 5. *A* does half a certain piece of work in 12 hours; in what time can it be finished by *B* and *C*, working separately equal times, and *C* succeeding *B*?

Ans. $21\frac{1}{2}$ hrs.

IV. A note for \$500, made March 9th at three months, is discounted April 11th, at 8 per cent. What is received for the note? (True discount.)

Ans. \$493.619214.

V. The unclaimed dividends on a certain amount of stock which pays 6 per cent. per annum amounted in 3 years to \$1152. The stock was sold at a discount of $12\frac{1}{2}$ per cent. on its par value. What sum was realized?

Ans. \$5600.

VI. Teas at 3s. 6s., 4s. and 6s. a pound are mixed to produce a tea worth 5s. a pound. What is the least integral number of pounds that the mixture can contain?

Ans. 7 lbs.

VII. A man buys 150 lbs. of sugar, and after selling 100 lbs. finds he has been parting with it at a loss of 5 per cent. At what rate per cent. advance on the cost must he sell the remaining 50 lbs. that he may gain 10 per cent. on the entire transaction?

Ans. 40 per cent.

VIII. Each member of a pedestrian club walks as many miles as there are members in the club, and the expense of the trip is for each member as many pence per mile as there are members in the club. The total expense is £50 13s. 11d. How many members are there?

Ans. 23 members.

IX. The hour, minute and second hands of a watch are on concentric axes. When first after 12 o'clock will the direction of the second hand produced backwards bisect the angle between the hour and the minute hands?

Ans. $30\frac{319}{1420}$ seconds past 12 o'clock.

EXCIIID.

1. With three given straight lines only one triangle can be formed.

What is the character of the triangle formed by the lines whose lengths are given by $\sqrt{27}$, $\sqrt{48}$ and $\sqrt{125}$?

2. If one side of a triangle be produced the exterior angle is equal to the sum of the two opposite interior angles.

ABC is an isosceles triangle, having the equal angles at *B* and *C*. *BF* and *CF* are drawn bisecting the angles *B* and *C*, and intersecting in *F*.

Show that the angle *BFC* is equal to the sum of the vertical angle and one of the basal angles.

3. The sum of the interior angles of any rectilinear figure is $2(n-2)$ right angles, where *n* denotes the number of sides.

Prove this and examine if it be true when the figure has one reentrant angle.

4. *ABC* is a triangle, and *AD* bisects the base *BC* in *D*. Show that the sum of the squares upon the two sides is equal to twice the square upon half the base, together with twice the square upon the bisecting line.

KLMN is a square, *O* the point of intersection of its diagonals, and *P* any point whatever.

$PK^2 + PL^2 + PM^2 + PN^2$ is greater than four times PO^2 by the square upon the diagonal.

5. In any triangle the square upon the side subtending an acute angle is less than the squares upon the sides containing the angle by twice the rectangle contained by one of those sides and the line intercepted between the acute angle and the perpendicular let fall upon it from the opposite angle. (Euc. II. 13).

6. In the triangle *ABC*, the perpendiculars *BD* and *CE* from *B* and *C* upon the opposite sides intersect in *F*. Show that the rectangle contained by *BF* and *BD* is equal to that contained by *BE* and *BA*.

7. In Euc. II. 11, find a point *H* in *AB* produced so that *AB · BH* is equal to the square upon *AH*.