

SHREWSBURY SCHOOL.

MATHEMATICS PRIZE.

1940.

(Note.—It is possible to obtain full marks without doing all the questions.)

1. A sum of money was put out at Compound Interest. The first year's Interest was £65 2s. 1d., and the fourth year's Interest £73 4s. 8d. Find the sum of money and the rate per cent.
2. A certain length of pathway has to be constructed. It is found that 6 men can construct one-fifth all but half a mile in 2 days, while 36 men can construct half a mile more than two-fifths in one day. What is the length of the path ?
3. A column of men marching at 3 m.p.h. takes 28 minutes to march completely through a street, and a column of twice its length marching at $3\frac{1}{2}$ m.p.h. takes 35 minutes. Find the length of the street.
4. $25\frac{3}{4}$ feet of wire are used to make a rectangular piece of wire netting 12" long by 9" wide. If the meshes so formed are square and have their sides parallel to those of the whole rectangle, what is the area of each mesh ?
5. Solve the equations $x^2 + xy + x = 14$
 $y^2 + xy + y = 28$

6. If one of each of the angles of regular polygons of p , q and r sides together make up four right angles, prove that

$$\frac{1}{p} + \frac{1}{q} + \frac{1}{r} = \frac{1}{2}$$

7. Three straight lines meet at a point. Show how to draw a fourth to cut them so that the two intercepted segments may have given lengths.

(Hint.—First get two intercepts in the right ratio. This will give the direction.)

8. F and G are the feet of the perpendiculars from A to the bisectors of the angles B and C of the triangle ABC. Prove that FG is parallel to BC.

9. ABC is a triangle with a right angle at A. Circles are described on AC and BC as diameters. Prove that with the middle point of AB as centre a third circle can be described which will touch the first two.

10. A mound of earth has a rectangular base 100 feet by 80 feet. Its height is 20 feet, the top is rectangular and horizontal, and each of its sides is inclined at an angle of 60° to the base. Find the inclination of each sloping edge of the mound and also the area of the top.