

# Shrewsbury School.

ARITHMETIC PRIZE,  
1936.

1. In 100 yds race A beat B by ~~20~~<sup>16</sup> yds. Where will A pass B in a 5 mile race run round a track of 220 yds. circumference. How many laps would A have to make in order to pass B exactly at the starting point.

2. One car does 20 m.p.g. of petrol, 1800 m.p.g. of oil and uses five tyres in 18000 miles. Another does 700 m.p.g. of oil and uses five tyres in 21000 miles. How many miles does the second do per gallon of petrol if the two cars cost the same to run.

Petrol costs 1/4d. per gall., oil 3/6d. per gall. and tyres are £2/10s. each.

3. On an average the weight of an egg is proportional to the cube of its length. Half a dozen eggs costing 10 pence measure 2.5 in, 2.3 in, 2.25 in, 2.6 in, 1.9 in, 2.05 in. Five eggs costing 9 pence measure 2.45 in, 2.7 in, 1.95 in, 2.35 in, 2.4 in. Which is the better value and by how much per cent. if all the eggs are equally fresh ?

4. The road from A to B is made up as follows : 1 mile level ; 2 miles up hill ;  $3\frac{1}{2}$  miles down hill ;  $\frac{1}{2}$  mile level ;  $2\frac{1}{2}$  miles up hill, in that order. A car leaves A for B followed five minutes later by another. Their speeds are 30 m.p.h. up hill, 60 m.p.h. on the level and 120 m.p.h. down hill. What is their greatest distance apart and how far apart are they when the first car reaches B ?

5. On a cylinder of paper of radius 3 in. and height 6 in. two uniform spirals are cut starting at opposite ends of a diameter of the base, and making exactly two revolutions before reaching the top. Find the area and perimeter of the two pieces into which the paper is cut. [ $\pi = \frac{22}{7}$ ]

6. The manager of a business is paid £500 out of the profits and also 10% of what is then left. His income tax is calculated as follows. The first £150 free, on the next £200 the rate is 2/3d. in the £1, and on the rest 4/- in the £1. He pays £96 in tax one year. What were the original profits of the business ?

7. Find the smallest number which when divided by 29, 31, 37 leaves 16, 25, 13 respectively.

8. The compound interest on £2164 at 5% is £2334, 16s. How much more is this than at simple interest. What rate % at compound interest would produce the same interest as 5% at the simple rate. The period of time is the same throughout.

9. A cylinder whose height is 14 ins. and whose base has radius 4 ins. is filled with water to a height of 4 ins. A solid cone whose base radius is 3 ins. and whose height is 7 ins. is placed in it. Find the height to which the water rises.

10. Find the value correct to four places of decimals of:—

(1)  $3769.178 \times 2459.76$

(2)  $\frac{1}{2} - \frac{1}{2^3 3} + \frac{1}{2^5 5} - \frac{1}{2^7 7} + \frac{1}{2^9 9} - \dots$   
 $+ \frac{1}{3} - \frac{1}{3^3 3} + \frac{1}{3^5 5} - \frac{1}{3^7 7} + \frac{1}{3^9 9} - \text{etc.}$