

SHERBORNE SCHOOL.

ENTRANCE SCHOLARSHIP EXAMINATION, 1949.

Mathematics I.

(2 hours).

1. A's age is equal to the sum of B's and C's. Five years ago A was three times as old as B. Show that in ten years' time A will be one and a half times as old as C.
2. If $x = 10^a$, a is called the logarithm of x to the base 10. Prove that $\log xy = \log x + \log y$.
State the corresponding rule for division.
Find the value of $\frac{.4287 \times .008756}{.0003873}$
Make a rough estimate of the answer to this calculation before you start.
3. In a box containing 250 eggs 36% are bad. Some are hens' eggs, of which 25% are bad; some are ducks' eggs, of which 50% are bad. How many were there of each kind?
4. A plate of steel of thickness 2.73 inches is in the shape of a rectangle whose length is 3.28 times its breadth. Its weight is 8337 pounds. Taking 1 cubic foot of steel to weigh 492 pounds, find the length and breadth of the plate correct to the nearest hundredth of an inch.
5. Find the factors of
 - (i) $(y + 1)^4 - 1$.
 - (ii) $2x^2 + xy - 3y^2 + x - y$.
 - (iii) $30x^2 - xy - 42y^2$.
 - (iv) $x^3 - 19x - 30$.

6. Four circles, C_1, C_2, C_3, C_4 , are external to one another. C_1 touches C_2 at P, C_2 touches C_3 at Q, C_3 touches C_4 at R, C_4 touches C_1 at S. Prove that P, Q, R and S lie on a circle.
7. State the conditions that two triangles shall be similar.
ABCD is a cyclic quadrilateral and BD, AC meet at O. Prove that the triangles AOD and BOC are similar and that $\frac{AD \cdot CD}{BC \cdot AB} = \frac{DO}{BO}$.
8. An observer 600 ft. above sea level noticed that the angle of depression of a boat approaching him directly was 20° . Two minutes later the angle of depression was 35° , the course of the boat remaining unchanged. What was the speed of the boat in feet per sec.?

[TURN OVER