SHERBORNE SCHOOL.

ENTRANCE SCHOLARSHIP EXAMINATION, 1948.

Mathematics II.

(2 hours).

1. In a certain test the marks scored by a class of boys were as follows:

Number of boys with given score:	4	7	6	8	15	11	9	7	4
Score:	89	93	95	98	100	103	107	110	111

Find the total number of boys and their average score. (You will find it easiest to find the average difference from 100 marks).

2. Factorise: (i) $12x^2 - x - 20$.
(ii) $(a + b)x^2 + (a + 2b)x + b$.
(iii) $(x + 1)^3 - 9x - 9$.

3. ABCD is a square of side 7". With A and C as centres and 7" radius two circular arcs are drawn connecting B and D. Find the area enclosed between them. (Take $\pi = 22/7$).

4. A lighthouse shows a narrow beam of red light which revolves from North through E, S and W making one revolution every 30 seconds. At the moment when the beam points north a white light is flashed and a fog-horn is sounded. A ship sees the white light, waits 11 seconds to hear the horn, and a further 12 seconds before the red light appears. If sound takes 5 seconds to travel a mile, what is the bearing and the shortest distance of the ship from the lighthouse? Are there any other possible values for the distance? (Neglect the time the light takes to travel).

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5. When the eldest son of a family was 21 his two younger brothers were 14 and 5. The father left £1000 to be divided among them in proportion to their ages at his death. It turned out that the two elder brothers together received three times as much as the youngest. How much did each receive?

6. Explain what you mean by the *definition* of a geometrical figure, as distinct from *theorems* about it. Illustrate the difference by giving in two clearly labelled columns the definitions of, and two simple theorems about, each of the following:
(i) a parallelogram (iii) an isosceles triangle
(ii) a rhombus (iv) a cyclic quadilateral.

7. In the figure, O is the centre of the large circle K and C the centre of the small circle L whose radius is half that of K and which touches K at Q. AOB is the diameter of K cutting L at P. Prove that
(i) $P\hat{C}Q = 2\ P\hat{O}Q$.
(ii) Arc PQ = arc AQ.
(iii) If the circle K is fixed and the circle L rolls inside it without slipping, the point of L which was at A will trace out the line AOB.

What will be the path of the diametrically opposite point of L?