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(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1948.

MATHEMATICS—Arithmetic.

TUESDAY, 15th JUNE—MORNING, 10 TO 12.

Six questions may be answered.

Mathematical Tables may be obtained from the Superintendent.

1. Find, to the nearest penny, the cost of 5 cwt. 3 qrs. 23 lb. at £3 17s. 8½d. per cwt.
[28 marks.]

2. If 1 metre=39.370113 inches find, to *two significant figures*, the percentage error made in using

(a) 8 kilometres as an approximation for 5 miles,

(b) $(1 + \frac{1}{10} - \frac{1}{100})$ yards as an approximation for 1 metre.
[30 marks.]

3. A manufacturer sells a certain article to a wholesaler at a profit of 20% on its cost of manufacture, and he in turn makes a profit of 15% in disposing of it to a retailer.

The retailer now marks the article for sale at £14 7s. 6d. and then sells it to a customer at a discount of 10% off the marked price. He thus makes a profit of 25%.

Find the cost of manufacturing the article and the amount gained by each seller.

[30 marks.]

4. Find, as accurately as your Tables allow, the rate per cent. per annum compound interest at which £572 will amount to £643 10s. in 4 years.

Find also the least number of years in which the principal will more than double itself at this rate of compound interest.

[30 marks.]

5. A man invests half his savings in a 4% Stock at 100 and the other half in 5½% Stock. What is the price of the second Stock, which gives a 10% greater return than the first Stock?

If the man's gross annual income is £409 10s., how much has he invested?

[35 marks.]

6. The following table gives D, the distance in miles of the horizon (at sea) from a point h feet above sea-level :—

h	10	30	50	100	150	200	300	400	500	600
D	3.9	6.7	8.7	12.2	15	17.3	21.2	24.5	27.4	30

Illustrate on a graph the relationship between D and h , and estimate from your graph (i) the distance of the horizon from a point 120 ft. above sea-level, (ii) the height above sea-level of a point from which the distance of the horizon is 20 miles.

[35 marks.]

7. A buoy consists of a right circular cone standing on a hemisphere so that the base of the cone coincides with the flat surface of the hemisphere. Its total height is 7 feet, and the common diameter of the base of the cone and of the hemisphere is 3 feet.

When placed in water the buoy floats vertically so that $\frac{7}{8}$ of its volume is immersed. Find the height of the top of the buoy above the surface of the water, giving your answer in feet correct to *three significant figures*.

[35 marks.]

8. Use your Tables to find the value of T from the formula

$$T = 2\pi \sqrt{\left\{ \frac{1}{g} \left(\frac{Mk^2 + ma^2}{Mh + ma} \right) \right\}},$$

where $\pi = 3.142$, $g = 32.19$, $M = 18.6$, $m = 6.5$, $k = 0.97$, $h = 1.77$, $a = 0.83$.

Or

Use contracted methods of multiplication and division to evaluate

$$\frac{429.071 \times 0.753964}{(13.5842)^2}$$

correct to *three significant figures*. The calculation throughout should be carried no further than is necessary to attain the required degree of accuracy.

[35 marks.]