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DAY VOCATIONAL CERTIFICATE EXAMINATIONS, 1970

MATHEMATICS (NEW SYLLABUS)
PAPER II

MONDAY, 15th JUNE – 9.30 to 11.30 a.m.

INSTRUCTIONS

(a) Answer any five questions.
(b) All working must be clearly set out in your answer book.
(c) Mathematical Tables and squared paper are available from the Superintendent.
(d) All questions carry equal marks.

1. A married man with three children earns a salary of £2,000 a year. He need not pay income tax on the following:

(a) a personal allowance of £420;
(b) an earned income allowance of $\frac{1}{7}$ of £420;
(c) an allowance of £135 for each of his children;
(d) a life-insurance allowance of £35.

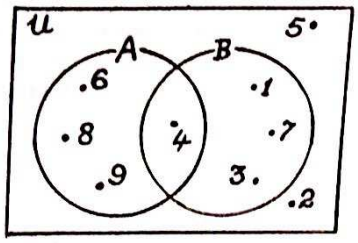
The man must however pay tax at the rate of 35p per pound on the remainder of his salary. Calculate:

(i) the amount of his salary free from income tax;
(ii) the amount of his salary on which he pays income tax; and
(iii) the amount of income tax he has to pay each year.

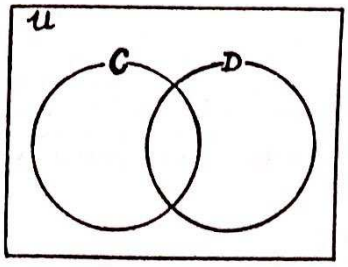
2. (a) Use logarithms or a slide rule to evaluate: $\frac{0{\cdot}375 \times \sqrt{5562}}{2{\cdot}26}$.

(b) Without using tables or a slide rule calculate the square root of 42 correct to three significant figures.

3. (a) The diagram shows the sets A and B in the universe U. From the diagram list the elements of each of the following sets:
(i) $A \cup B$, (ii) $A \cap B$, (iii) A', (iv) $B \setminus A$,
(v) $(A \cup B)'$.



(b) C and D are sets in the Universe U such that $C = \{x, y, z\}$, $D = \{z, t\}$ and $U = \{x, y, z, s, t\}$. Draw a set diagram similar to the one drawn here and in your diagram show each element of U in its proper place.



4. Find the solution set of each of the following:

(i) $3(x + 5) - 2(3x - 5) = 2(4x + 5) - 7$.

(ii) $x^2 - 7x + 12 = 0$.

(iii) $\left.\begin{matrix} 3x - y = 4 \\ 7x - 4y = 1 \end{matrix}\right\}$.

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5. (a) Graph on separate number lines the solution set of each of the following:

(i) $\{x \mid 1 < x < 7,\ x \in \mathrm{N}\}$

(ii) $\{x \mid 5x - 7 \leq 2x + 8,\ x \in \mathrm{N}\}$

(iii) $\{x \mid 1 < x < 7,\ x \in \mathrm{N}\} \cap \{x \mid 5x - 7 \leq 2x + 8,\ x \in \mathrm{N}\}$

where N is the set of natural numbers.

(b) Plot the solution set of each of the following on one graph sheet using the same reference axes, where x and y are integers and $1 \leq x \leq 6$ in each case:

(i) $\{(x, y) \mid y = x + 2\}$

(ii) $\{(x, y) \mid y = 2x - 1\}$.

From your graph write down the solution set of $\{(x, y) \mid y = x + 2\} \cap \{(x, y) \mid y = 2x - 1\}$.

6. The following table shows the result of a survey to find the favourite game of the boys in a certain school:

Game	Hurling	Football	Rugby	Soccer	Basketball
Number of boys	32	45	13	24	6

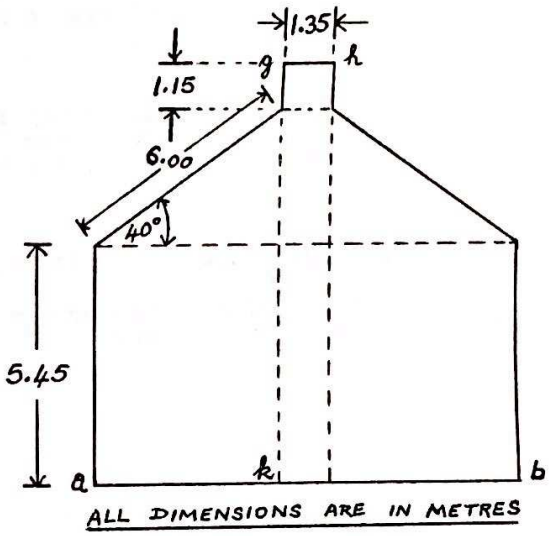
Using a circle of diameter 10 cm represent, as accurately and as neatly as you can, this statistical information on a pie-chart.

7. The diagram shows the end-view of a house where the points a, k, b are at ground level and the points g, h are at chimney-top level. With the aid of trigonometrical tables calculate, correct to the nearest centimetre,

(i) the width ($|ab|$) of the house, and

(ii) the height ($|kg|$) of the chimney-top above ground level.

(All dimensions in metres.)



8. (a) Prove that the angle at the centre of a circle is twice the angle at the circumference standing on the same arc.

(b) In the figure shown O is the centre of the circle and the measure of the angle at O is 100°. Calculate the values of x and y if a, b and c are points on the circumference.