AN ROINN OIDEACHAIS

BRAINSE AN GHAIRMOIDEACHAIS

CERTIFICATE EXAMINATION

for

DAY VOCATIONAL COURSES, 1964

MATHEMATICS

WEDNESDAY, 17th JUNE—10 a.m. to 1 p.m.

INSTRUCTIONS.

(a) Attempt Question 1 and six others.
(b) The marks allotted to each question are shown in brackets.
(c) Mathematical Tables and $\frac{1}{10}$ in. graph paper are supplied.
(d) Special credit will be given to candidates who display neatness and order in answering.
(e) All the work must be shown in the answer book.

1. (a) Simplify $\dfrac{(5\frac{1}{5} - 3\frac{1}{3}) \div \frac{3}{5} \text{ of } 1\frac{1}{6}}{14\frac{2}{3} - 5\frac{1}{7} \text{ of } 2\frac{1}{3}}$.

(b) An alloy is made up of 1 part silver, 2 parts lead and 5 parts tin by weight. What is the percentage of each metal in the alloy and what weight of each is required to make $2\frac{1}{2}$ cwt. of this alloy ?

(c) Find the cost of 9 ton 12 cwt. 2 qr. at £9 16s. 6d. per ton.

(d) Find an expression for x from the equation $dx + 2cx - 5bx - 3ax = 18$ and find the value of x when $a = 2{\cdot}3$, $b = -3{\cdot}1$, $c = 1{\cdot}3$ and $d = -5{\cdot}2$.

(e) A barometer reading is given as 756 mm. Convert this reading to inches, given 1 yard = 0·9144 metre.

(20 marks.)

2. The cross-section of a strip of metal is shown in Fig. 1.
If a length of 3 metres of this strip weighs 1·87 kilograms, what is the density of the metal ?
(Density = wt. in gms. per c.c.)

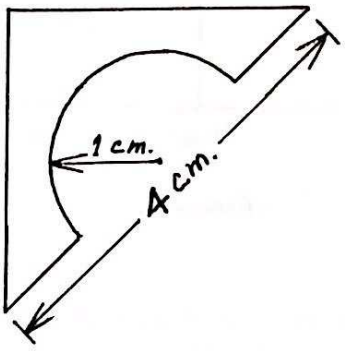

Fig. 1.

(12 marks.)

3. Draw a graph to convert the attendances made by students at evening classes to percentage attendances, if the maximum attendance possible is 65.
Mark on your graph the percentages corresponding to 61 and 39 attendances and the actual attendances corresponding to 40 per cent and 83 per cent.

(12 marks.)

4. (a) If $2{\cdot}24 = 10^{0{\cdot}3502}$, what is the logarithm of 2,240 to base 10 ?

(b) Using logarithms, find the value of $\sqrt{\dfrac{2{\cdot}71 \times 3{\cdot}05}{0{\cdot}172 \times 10^5}}$.

(c) If $\log x$ is greater than 0 and less than 2, what can you say about the value of x ?

(12 marks.)

5. (a) State the Theorem of Pythagoras with regard to the right-angled triangle.

(b) In any right-angled triangle ABC, AN is the perpendicular from A on BC: prove that $AB^2 - AC^2 = BN^2 - CN^2$.

(12 marks.)

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6. Solve the equations:-

(i) $\frac{3p-5}{3} - \frac{4p-7}{2} + \frac{1}{6} = 0.$

(ii) $\begin{cases} \frac{9x}{4} - \frac{2y}{3} = \frac{5}{2} \\ 2y = 3x \end{cases}$

(iii) $14 + 17x = 6x^2.$

(12 marks.)

7. (a) From the formula $A = P + \frac{PRT}{100}$, find an expression for P in terms of the other letters.
If $A = 836{\cdot}5$, $R = 6\frac{1}{2}$ and $T = 3$, find the value of P.

(b) Make l the subject of the formula $T = 2\pi\sqrt{\frac{l}{g}}$ and find its value when $T = 2$ and $g = 32{\cdot}2$.

(14 marks.)

8. Two pumps deliver gas to a balloon. One pump can fill it in 12 hours and the other in 15 hours. How long would it take to fill the balloon, if the two pumps were working together ?
Due to a leak in the system, the actual time taken by the two pumps working together was one hour longer than the calculated time. How long would it take the leak to empty the balloon after it had been filled ?
(Answer to nearest hour.)

(14 marks.)

9. (a) Use suitable right-angled triangles to find values for sin30°, tan60° and cos45°.

(b) For the triangle shown in Fig. 2, calculate (i) the length of AN, (ii) the length of the perpendicular CN, (iii) the angle B and (iv) the length of the side BC.

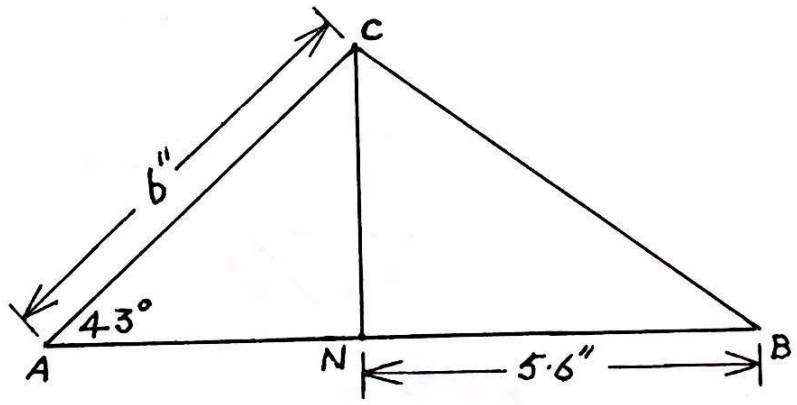

Fig. 2.

(14 marks.)

10. The following table gives the results of an experiment on a particular machine to find the relation between Effort and Load:-

Load in lbs. (L)	20	50	100	150	200
Effort in lbs. (E)	6·8	16·2	18·2	25·3	34·5

Plot the graph of Effort against Load and read from it the probable effort required to operate the machine when no load is applied. Find the law of the machine in the form $E = mL + c$.
Does any one of the readings call for comment ?

(14 marks.)