AN ROINN OIDEACHAIS.

AN BRAINSE GAIRM-OIDEACHAIS.

CERTIFICATE EXAMINATIONS
for
DAY VOCATIONAL COURSES, 1949.

MATHEMATICS.

Monday, June 27th—10 *to* 1 *p.m.*

INSTRUCTIONS.

(*a*) Not more than *eight* questions to be attempted.

(*b*) The marks allotted to each question are shown in brackets under.

(*c*) Mathematical Tables are supplied.

(*d*) Special credit will be given to candidates who display neatness and order in answering.

(*e*) All working must be shown in the answer book.

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1. (*a*) Simplify

$$\frac{5\frac{1}{2}-3\frac{3}{8}}{1\frac{1}{2}+1\frac{1}{3}}+\frac{1\frac{1}{8}+2\frac{5}{6}}{3\frac{1}{3}-1\frac{3}{4}}$$

(*b*) If 21·65 cubic inches of cast iron weigh 5·65 lb., find, without using logarithms, the weight of one cubic inch of cast iron correct to three decimal places.

[10 marks.]

2. (*a*) A metal bar 9 ft. 3 in. long weighs 126 lb. What length of the same bar would weigh 169 lb.

(*b*) Aluminium shrinks $\frac{1}{6}\frac{7}{4}$ inch per foot length in casting. Express this as a percentage correct to two decimal places.

[10 marks.]

3. Fifteen planks of red deal, each measuring 12 feet long, 9 inches wide and $\frac{3}{4}$ inch thick, cost £5 1s. 3d. Find the cost of 1 cubic foot of this material.

[10 marks.]

4. Transform the formula $y=x(1+at)$ so as to obtain a in terms of the other symbols. Then find a if $y=6{\cdot}01$, $x=4{\cdot}21$, and $t=100$.

[10 marks.]

5. A lump of alloy contains 4·55 lb. of copper, 1·29 lb. of zinc, 0·42 lb. of lead and 0·25 lb. of other material. Find the percentage weight of copper, zinc and lead in the alloy.

[10 marks.]

6. In Table below, W denotes the resistance in lb. per ton of a train travelling at V miles per hour.

V miles per hr.	0	11	23	29	38	45	54	62	70
W lb. per ton	8·0	8·8	11·3	13·0	15·5	20·0	25·0	30·5	36·2

Find graphically (*a*) W when V=32 mls. per hour, and (*b*) V when W=14·5 lb. per ton.

[12 marks.]

7. (*a*) Find x and y if $\frac{x}{2}+\frac{y}{3}=5$, and $4x-y=2$.

(*b*) One value of x which satisfies the equation $6x^2-9x-c=0$ is $\frac{5}{2}$. Find the value of c. What other value of x will satisfy it ?

[12 marks.]

8. Find, *by calculation*, the area of an equilateral triangle whose side is 0·5 inch.

Use your result to find the weight of a copper bar 12·5 ft. long, the section of which is a regular hexagon of side 0·5 inch. 1 cubic foot of copper weighs 550 lb.

[12 marks.]

9. What is a parallelogram ? Establish the rule for finding its area. Construct a parallelogram whose diagonals include an angle of 73° and are 5·6 inches and 3·7 inches long.

Find its area in sq. inches.

[12 marks.]

10. (*a*) If $t=2\pi\sqrt{\frac{l}{g}}$ find, using logarithms, the value of t if $\pi=3{\cdot}142$, $l=3{\cdot}06$ and $g=32{\cdot}2$.

(*b*) Evaluate, using logarithms : $(0{\cdot}3)^{0{\cdot}3}$ and $(0{\cdot}3)^{-0{\cdot}3}$.

[14 marks.]

11. Construct a triangle ABC having base BC=4·2 inches, angle ABC=56° and angle BCA=69°. Find, by construction, a point inside the triangle which is equally distant from the three sides and measure that distance. Prove, by geometrical reasoning, that your method for finding the point is correct.

[14 marks.]

12. Explain, with the help of a diagram, what you understand by sinA, cosA and tanA, and show that the relation $\sin^2 A + \cos^2 A = 1$ is true for all values of A.

The longest side of a 60° set square is 9 inches. Find by calculation, using the tables if necessary, the lengths of the other two sides.

[14 marks.]