AN ROINN OIDEACHAIS.

BRAINSE AN GHAIRMOIDEACHAIS

CERTIFICATE EXAMINATIONS

for

DAY VOCATIONAL COURSES, 1960

MATHEMATICS.

Wednesday, 15th June—10 *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 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*) Find the values of

(i) $\frac{2}{3}$ of $\frac{7}{11}+\frac{1}{2}\div\frac{5}{6}-\frac{6\frac{1}{2}-4\frac{7}{22}}{1\frac{1}{6}+1\frac{1}{66}}$,

(ii) $2\frac{1}{2}\%$ of 11s. 8d.$+\frac{3}{176}$ of £4 17s. 4d.$+0{\cdot}075$ of 13s. 4d.,

(iii) $\dfrac{\sqrt{23{\cdot}04}}{(1{\cdot}98)^2-(1{\cdot}02)^2}$.

(*b*) Taking 8 kilometres as equal to 5 miles, express a speed of 45 miles per hour in metres per second.

(*c*) A concrete block measures x ft. long, y ins. wide and z ins. thick. Write down expressions for (i) the volume in cubic feet of 100 blocks, (ii) the number of blocks which would weigh half a ton, if 1 cubic foot of concrete weighs 140 lbs.

[20 marks.]

2. A cylindrical oil-tank closed at both ends is 16 ins. in diameter and $3\frac{1}{2}$ ft. long. How many gallons of oil will it hold ?

Find the total weight of the tank when full if the oil weighs 50 lb. per cubic foot and the material of the tank weighs $3\frac{1}{2}$ lb. per square foot.

(1 cu. ft.$=6\frac{1}{4}$ galls.)

[10 marks.]

3. The weight of the rough unplaned wood bought to make a table was reduced by $4\frac{1}{3}\%$ in the planing. In the making of the table $6\frac{1}{4}\%$ of the planed wood was cut off as waste. If the finished table weighed 35 lb., what weight of rough wood was bought ?

[10 marks.]

4. Find the weight of the concrete gate-pier shown in Fig. 1. One cubic foot of concrete weighs 140 lbs.

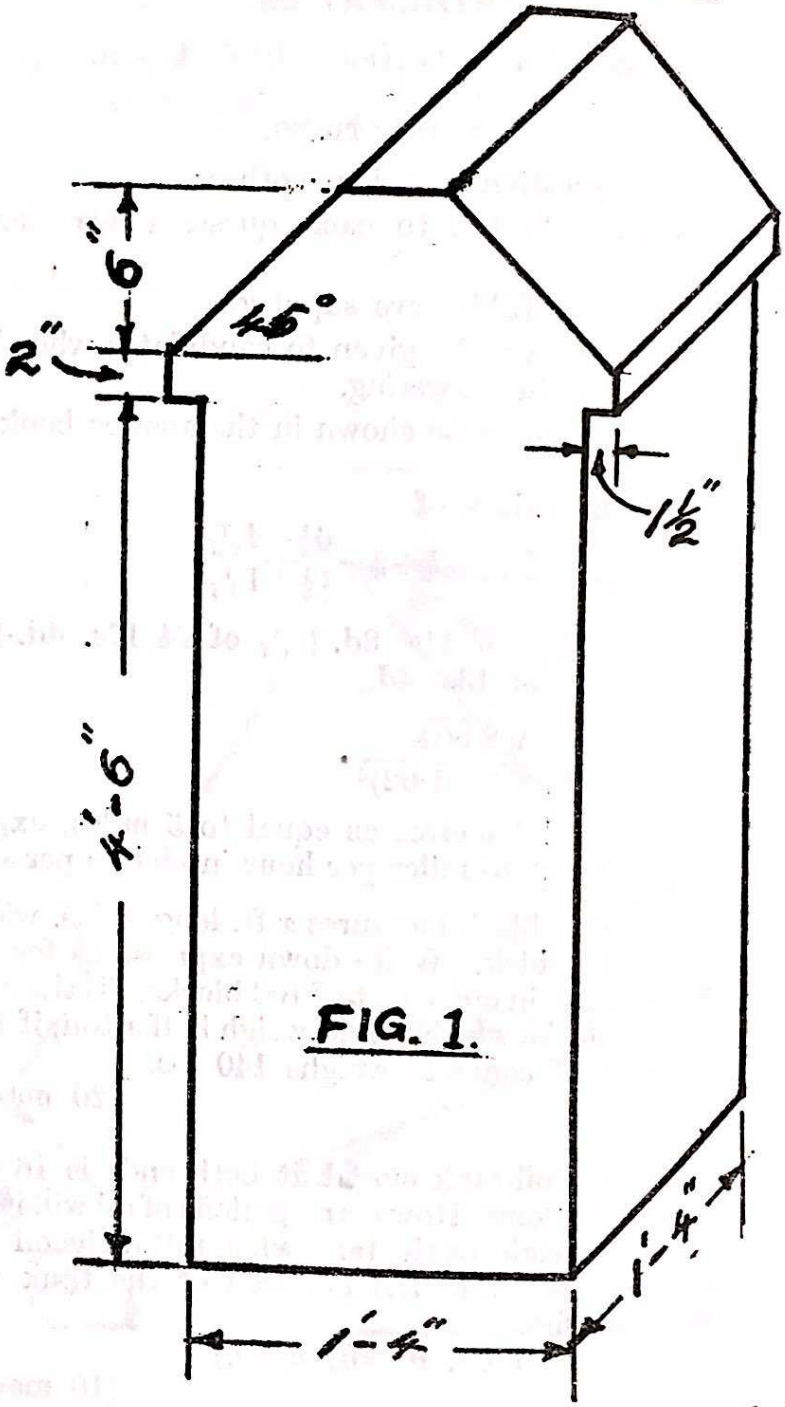

FIG. 1.

[10 marks.]

5. (i) Evaluate using logarithms :

$$\sqrt{\frac{0{\cdot}56(13{\cdot}13)^3}{50{\cdot}08}}.$$

(ii) The volume V of a sphere of radius R is given by $V=\frac{4}{3}\pi R^3$. Find the radius of a sphere whose volume is 120 cu. ins.

[12 marks.]

6. (*a*) Solve the equations :

(i) $\dfrac{x-1}{0{\cdot}25}-\dfrac{x-2}{0{\cdot}125}=4{\cdot}2.$

(ii) $\begin{cases} \dfrac{x}{4}-\dfrac{y}{2}=-1 \\ \dfrac{x}{5}-\dfrac{y}{3}=0 \end{cases}$.

(*b*) Twice the square of a certain number diminished by the number itself is equal to twenty-five times the number. Find the number.

[12 marks.]

7. A cyclist leaves his home (A) at 9 a.m. and rides to a town (B) 30 miles away. He rides the first 12 miles at 8 miles per hour and the remainder at 12 miles per hour.

Draw a graph to illustrate his journey and from it find the time at which he is exactly half-way.

At 10·30 a.m. a car travelling at a steady speed of 30 miles per hour passes the cyclist's home on its way to B also. Find the distance from B at which the car overtakes the cyclist.

[14 marks.]

8. Show (without drawing to scale) that the triangle ABC, in which AB=18 in., AC=7·5 in. and BC=19·5 in., is right-angled. Find the area of this triangle and calculate the length of the perpendicular from A on to BC.

Find also the length of the equal sides of an isosceles triangle drawn with AB as base and having an area equal to the triangle ABC.

[14 marks.]

[P.T.O.

9. The perimeter of a rectangle is 22 feet and one side is x feet long. Show that the area $A = 11x - x^2$ sq. ft.
Make a table showing the values of A when $x = 1, 2, 4, 5, 6, 8, 10$ and draw the graph connecting A and x.
Find, from your graph :

(i) the sides of the rectangle whose area is 26 sq. ft.,

(ii) the greatest value which the area can have and the length of the sides in this case.

[14 marks.]

10. In the diagram shown in Fig. 2, calculate :

(i) the distance OC,

(ii) the height of C above the horizontal OX.

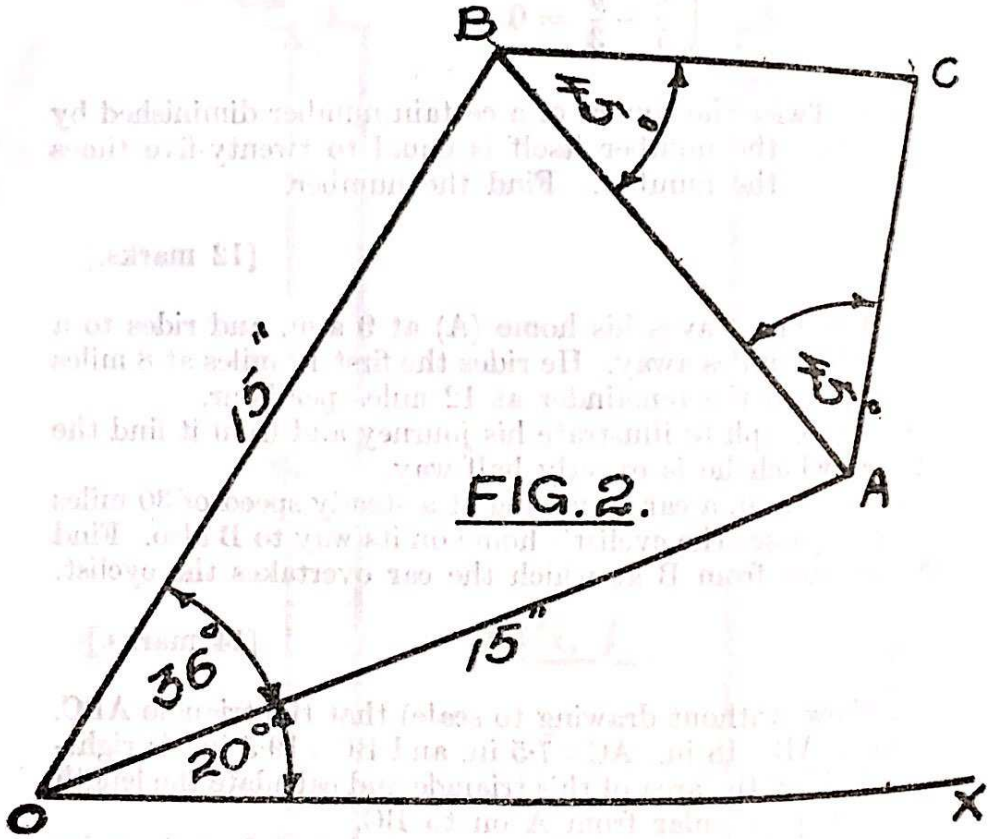

FIG. 2.

[14 marks.]