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(Department of Education.)

LEAVING CERTIFICATE EXAMINATION, 1942.

MATHEMATICS—Algebra—Pass.

MONDAY, 15th JUNE.—AFTERNOON, 3 TO 5.30.

Six questions may be answered.

Mathematical Tables may be obtained from the Superintendent.

1. Solve the equations :

$$\left.\begin{aligned} 3x-5y-3z &= 6 \\ 6x+4y-z &= -5 \\ 5x+9y+7z &= 18 \end{aligned}\right\}$$

[30 marks.]

2. Factorise as fully as possible :—

(i) $a^3+2b^3-3ab^2$;

(ii) $x^2(y+z)+y^2(z+x)+z^2(x+y)+2xyz$.

[30 marks.]

3. Solve the equations :—

(i) $abx^2+b^2x=a^2x+ab$;

(ii) $\left.\begin{aligned} 5x^2-7xy-2y^2 &= 4 \\ 2x^2-3xy+3y^2 &= 5 \end{aligned}\right\}$

[30 marks.]

4. (*a*) Express $\sqrt{11+4\sqrt{6}}$ in the form $\sqrt{x}+\sqrt{y}$.

(*b*) Simplify $\dfrac{1}{\sqrt{11-4\sqrt{6}}}-\dfrac{1}{\sqrt{11+4\sqrt{6}}}$.

[30 marks.]

5. In a motor race on a course $8\frac{1}{4}$ miles in circuit A overtook B at 4.20 p.m. and again at 5.26 p.m. Assuming that their speeds were uniform and in the ratio 10 : 9, calculate the speed of A

30 marks.]

6. Find the sum of n terms of the series :

1, (1·05), $(1{\cdot}05)^2$, $(1{\cdot}05)^3$, $(1{\cdot}05)^4$, etc.

If the sum of x terms of that series exceeds 100, what is the least value x can have ?

[35 marks.]

7. 100 fruit trees are equally spaced in a row at 10 feet apart. For the purpose of spraying each tree a man has to walk from a shed to the tree and back again. The shed is in the same straight line as the trees and is 50 yards from the nearest one: find the total distance walked by the man in spraying all the trees.

[35 marks.]

8. (*a*) Prove that the arithmetic mean of two positive unequal numbers is greater than their geometric mean.

(*b*) If the numbers a, b, c, d are in G.P., prove that

$$(a-d)^2=(b-c)^2+(c-a)^2+(d-b)^2.$$

[35 marks.]

9. Draw a rough graph of the function $(x-1)(x-2)(x-3)$.

Write a short account of how the function varies in sign and in magnitude as the value of x changes from 0 to 4.

[35 marks.]