

# AN ROINN OIDEACHAIS.

(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1957.

## MATHEMATICS (Algebra).

TUESDAY, 11th JUNE.—MORNING, 10 TO 12.30.

All questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

1. (i) Solve the equation  $\frac{1}{2}(x+3) - \frac{1}{3}(2x-1) = 2\frac{1}{2}$ .

(ii) £50 is divided between three people A, B, C in such a way that B receives £2 more than A, and C receives three times as much as B. How much does each receive?

[28 marks.]

2. (i) Simplify the fraction  $\frac{x^2-10x-24}{x^2-15x+36}$  and find its value when  $x=1\frac{3}{4}$ .

(ii) Solve the simultaneous equations:

$$\left. \begin{array}{l} 4x-3y=12 \\ 6x+7y=-5 \end{array} \right\}$$

[28 marks.]

3. Factorise fully:

(i)  $(a+b)^2 - 4c^2$ ;

(ii)  $3a - 3b + ab - 9$ ;

(iii)  $x^3 - 4x^2 - 11x + 30$ .

If  $x=3t + \frac{2}{t}$  and  $xy=9t^2 - \frac{4}{t^2}$ , find the value of  $x^2 - y^2$ .

[28 marks.]

4. (i) If  $a = \frac{9}{5}b + 32$ , express  $b$  in terms of  $a$ .

(ii) The total surface area of a closed cylinder is given by the formula  $2\pi r(r+h)$ , where  $r$  is the radius of the base and  $h$  is the height. If a closed cylinder of height 4 inches has a total surface area of 44 square inches, find the radius of its base in inches, correct to one decimal place. [Take  $\pi=3\frac{1}{7}$ ].

[28 marks.]

5. A prize of £350 was shared equally by a certain number of prizewinners. If the number of prizewinners had been less by 9, each share would have been £5 greater. How many prizewinners were there?

[28 marks.]

6. (i) If  $x = \sqrt{3} + 1$ , show that  $x - \frac{1}{x} = \frac{1}{3}x(x-1)$ .

(ii) Prove that  $\log_a MN = \log_a M + \log_a N$ .

If  $\log_2 x = \log_3 y$  and  $\log_{10} x + \log_{10} y = 1\frac{1}{2}$ , find the values of  $x$  and  $y$ .

[30 marks.]

7. Draw a graph of  $(25 + 10x - \frac{1}{2}x^3)$  for values of  $x$  from  $x=0$  to  $x=4$ . When a car is driven at a speed of  $(25 + 5x)$  m.p.h. it travels  $(25 + 10x - \frac{1}{2}x^3)$  miles on a gallon of petrol. Using your graph find, as accurately as you can,

(i) the speeds at which the car would travel 36 miles on a gallon,

(ii) the greatest distance which the car would travel on a gallon.

[30 marks.]