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(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1955.

MATHEMATICS (Algebra).

TUESDAY, 14th JUNE.—MORNING, 10 TO 12.30.

All questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

1. Solve the equations :

(i) $\frac{x}{6}(x+2) - \frac{2}{3}(x-1) = 3$;

(ii) $3x^2 + 2x - 8 = 0$.

[28 marks.]

2. Factorise :

(i) $ab - bc + 2cd - 2ad$;

(ii) $p^2 - q^2 - (p+q+1)^2 + (p+q-1)^2$.

Find the values of a and b such that

$$x^3 + ax^2 + bx + 2 = (x-1)(x-2)(x+1)$$

for all values of x .

[28 marks.]

3. The cost of three apples and five oranges is 1s. 10½d., while the cost of two apples and seven oranges is the same as the cost of eight apples and two oranges. Find the cost of an apple and the cost of an orange.

[28 marks.]

4. If $x = \frac{2ab}{a+b}$, prove that $\frac{x+a}{x-a} + \frac{x+b}{x-b} = 2$.

[28 marks.]

5. (i) Find the value of the expression $x^2 - 19x + 80$ when $x = 14$.
For what other value of x has the expression the same value ?

(ii) Find the values of x which satisfy the equation

$$x - 19\sqrt{x} + 80 = 10.$$

[28 marks.]

6. Prove that $\log_e mn = \log_e m + \log_e n$.

If $a^2 + b^2 = 3ab$, prove that

$$\log_5(a^2 + b^2) = 2\log(a+b) + \log 3.$$

[30 marks.]

7. Draw the graph of $3x^2 - 2x - 10$ for values of x from $x = -2$ to $x = 3$.

Find from your graph, as accurately as you can, the roots of the equations (i) $3x^2 - 2x - 10 = 0$, (ii) $3x^2 - 2x - 6 = 0$.

[30 marks.]