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(Department of Education)

INTERMEDIATE CERTIFICATE EXAMINATION, 1959.

MATHEMATICS (Algebra).

MONDAY, 8th JUNE.—Morning, 10 to 12.30.

All questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

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1. (i) Solve the equation
$$\tfrac{1}{2}(x+5)-\tfrac{1}{3}(2x-1)=1.$$

   (ii) Solve the simultaneous equations
$$\left.\begin{array}{l} 3x+2y=7 \\ 4x-3y=32 \end{array}\right\}$$

   [28 marks.]

2. Express each of the following statements in the form of an algebraic equation, denoting John's present age by x years and Patrick's present age by y years:—

   (i) John is thirty years older than Patrick ;

   (ii) John's age is three times Patrick's age ;

   (iii) Five years ago the sum of their ages was fifty years ;

   (iv) In z years' time John's age will be n times Patrick's age.

   [28 marks.]

3. From the formula $s=60t-3t^2$ find

   (i) the values of t for which $s=108$;

   (ii) the values of t, correct to one decimal place, for which $s=240$.

   [28 marks.]

4. Factorise fully :—

   (i) $ab-bc+ac-b^2$;

   (ii) $2x^2-xy-6y^2$;

   (iii) x^3-3x^2-6x+8.

Find the values of p and q such that the equation
$$x^3-6x^2+px+q=(x-1)(x-2)(x-3)$$
will be an identity.

   [28 marks.]

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5. One cyclist sets out from A to travel to B and at the same time another cyclist sets out from B to travel to A. Each of them travels at a uniform speed, the second cyclist travelling 4 miles per hour faster than the first, and they meet after 3 hours. Denoting the speed of the first cyclist by x miles per hour, express the distance AB in terms of x.

If the second cyclist reaches A $2\frac{1}{2}$ hours before the first cyclist reaches B, find the speed of each of them.

[28 marks.]

6. (i) Show that $x=5+\sqrt{2}$ satisfies the equation
$$x^3-11x^2+33x-23=0.$$

(ii) Solve each of the following equations :
$$9^x=3 ; \quad \log_2 x=4 ; \quad \log_x 8=1\frac{1}{2}.$$

If $\log_2 y + \log_5 y = k$, prove that $\log_2 y = k \log_{10} 5$.

[30 marks.]

7. Draw a graph of x^3-4x^2+2x+2 $[=y]$ for values of x from -1 to $+4$.

Find from your graph, as accurately as you can, the roots of the equation $x^3-4x^2+2x+2=0$.

Using your graph find the values of x for which y is equal to x.

[30 marks.]