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(Department of Education)

INTERMEDIATE CERTIFICATE EXAMINATION, 1960.

MATHEMATICS (Algebra).

TUESDAY, 14th 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

$$\tfrac{1}{3}(x+4)-\tfrac{1}{2}(x-2)=1.$$

(ii) John has three times as much money as Mary. If she were to give him three shillings, he would then have four times as much as she would have. How much money has each of them at present ?

[28 marks.]

2. If $ax+by=c$ and $bx+ay=d$, show that

$$x+y=\frac{c+d}{a+b}\ .$$

At a football match the spectators in the stands paid 7s. each and the rest of the spectators paid 3s. each, the total proceeds being £2,000. If, instead, those in the stands had paid 3s. each and the rest had paid 7s. each, the total proceeds would have been £3,000. How many spectators were there at the match ?

[28 marks.]

3. Find the values of a and b if

$$x^2-8x+5=(x-a)^2-b$$

for all values of x.

Find, correct to two places of decimals, the values of y which satisfy the equation $y^2-8y+5=0$.

[28 marks.]

4. Simplify the fraction $\dfrac{x^2-2x-15}{3x^2+5x-12}$.

Factorise fully :—

(i) $(x-7)^2-2(x-7)-15$,

(ii) $2x^3+5x^2-4x-3$,

(iii) $(x+a+b)(x+a-b)-(y-a+b)(y-a-b)$.

[28 marks.]

5. (i) Given that $x=\frac{2z-1}{z-1}$ and $y=\frac{3z-2}{z+1}$, express z in terms of x and hence express y in terms of x.

(ii) If $x=3+\sqrt{5}$, find the value of $x^2+\frac{24}{x}$ in simplest form.

[28 marks.]

6. (i) Without using the Tables, find the value of

$$(15)^{\frac{1}{2}}\times(108)^{\frac{1}{6}}\times(20\sqrt{5})^{\frac{1}{3}}$$

in simplest form.

(ii) Prove that $\log_a xy=\log_a x+\log_a y$ and that $\log_a b=\log_c b\div\log_c a$.

Prove that $\log_5 x\log_2 y-\log_{10} x\log_5 y=\log_2 x\log_{10} y$.

[30 marks.]

7. Draw a graph of x^3-3x^2-5x+8 for values of x from -2 to $+4$. If the graph of $ax+b$ (a straight line, where a, b are constants) cuts the above graph where $x=1$ and where $x=-1$, find graphically, (i) the value of x at the third point where the two graphs intersect, (ii) the value of b, (iii) the value of $a+b$, and hence the value of a.

[30 marks.]