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(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1958.

MATHEMATICS (Algebra).

MONDAY, 16*th JUNE.*—Morning, 10 to 12.30.

All questions to be answered.

Mathematical Tables may be obtained from the Superintendent.

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1. Represent the following statement algebraically: "When a certain number is multiplied by four and then seven is subtracted, the result is eleven."

Write down a statement of that kind which would be represented by the equation $3x-5=14$.

Solve the following equations :—

(i) $3(2x+4)-2(x-3)=32$;

$\frac{2}{3}$(ii) $(x+4)=\frac{1}{2}(x+9)-1$.

[28 marks.]

2. Six gallons of petrol and one pint of oil cost 33s. Two gallons of petrol and two pints of oil cost 6s. more than five pints of oil. Find the cost of a gallon of petrol and the cost of a pint of oil.

[28 marks.]

3. Factorise :

(i) $2x^2+7x-15$;

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

(iii) $(a+b+c)^2-(a+b-c)^2$.

Show that $(a-c)$ is a factor of $(a-b)^5+(b-c)^5$.

[28 marks.]

4. Solve each of the two following equations, correct to one place of decimals :—

(i) $x^2-6x-4=0$;

(ii) $(x-3)^2-6(x-3)-4=0$.

If $3a^2+8a=5$, find the value of $(3a+4)^2$.

[28 marks.]

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5. Simplify $(a+b)^3-(a-b)^3$, and find the value of $(1002)^3-(998)^3$.

If $x+\dfrac{1}{x}=y$, show that $x^3+\dfrac{1}{x^3}=y^3-3y$.

[28 marks.]

6. (i) Simplify $\dfrac{2+\sqrt{2}}{3+\sqrt{2}}$ by rationalising the denominator.

(ii) Show that the square root of 2 is numerically less than the cube root of 3, without using the Tables.

(iii) Write down the values of $\log_2 8$, $\log_4 32$.

If $x=\log_{10}2$, express the following in terms of x:
$\log_{10}8$, $\log_{10}5$, $\log_8 5$.

[30 marks.]

7. Draw a graph of $x^2(4-x)$ for values of x from -1 to $+4$. (The values for $x=2\frac{1}{2}$ and $x=3\frac{1}{2}$ should be included.)

Find from your graph, as accurately as you can, the values of x for which $x^2(4-x)=2$.

The base of a rectangular box is a square of width x ft., and each of the four sides of the box has a perimeter of 8 ft. Show that the volume of the box is $x^2(4-x)$ cub. ft., and use your graph to find the greatest volume the box can have.

[30 marks.]