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INTERMEDIATE CERTIFICATE EXAMINATION, 1927.

MATHEMATICS (I).

FRIDAY, 17*th JUNE*.—MORNING, 10 A.M. TO 12.30 P.M.

Seven questions may be answered. Somewhat higher marks will be awarded to the questions at the end of the paper.

Logarithmic Tables may be obtained from the Superintendent.

1. (*a*) Write down an expression for all integers divisible by 4, 5 and 6.

(*b*) Divide £x between two persons so that one receives £y more than the other.

(*c*) A horse is bought for £c and sold for £s : find the gain or loss per cent.

2. Factorise :

   (i) $x\,(x+1) - 3y\,(3y+1).$

   (ii) $x^4 + x^2\,y^2 + y^4.$

Show that $a+b$ is a factor of $a^2(b+c) + b^2(c+a) + c^2(a+b) + 2abc$ and find the other factors.

3. Find a value of x satisfying the equation :

$$\frac{5-3x}{x-1} + \frac{3x-7}{x+1} = \frac{4}{x-1} - \frac{12}{x},$$

and verify the solution.

4. If $2s = a+b+c$, prove that

$$s^2 + (s-a)^2 + (s-b)^2 + (s-c)^2 = a^2 + b^2 + c^2.$$

Hence express $47^2 + 48^2 + 49^2$ as the sum of *four* squares.

5. The sum of the two digits of a number is 8. If the order of the digits is changed the resulting number multiplied by the original number gives 1612 : find the number.

6. Distinguish clearly by a numerical example between an " index " and " a power."

Evaluate $\dfrac{3204}{\sqrt[3]{3\cdot789}} \div \sqrt{\cdot02671}$ by logarithms or otherwise.

(Marks will be deducted for each false statement in the work even if the result is correct).

7. The hypotenuse of a right-angled triangle is 4 inches longer than one side and 18 inches longer than the other. Find the length of each of the three sides.

8. Find a quadratic expression in x which has the values -1, 1, 2 when x has the values 2, 1, -1.

For what other values of x has the expression the given values ?

9. The sum of the diameter and the height of a cylinder is 10 inches, what is its volume when the number of cubic inches in the volume is equal to the number of square inches in the curved surface ?

Show graphically how the volume of the cylinder varies as the diameter increases from its least to its greatest value and determine the diameter for which the volume is greatest.