S.5 HOLIDAY WORK PURE MATHEMATICS PAPER 1

1.

Prove by induction that $\sum_{r=1}^{n} r^2 = \dfrac{n(n+1)(2n+1)}{6}$.

2.

If a line $y = mx + c$ is a tangent to the curve $4x^2 + 3y^2 = 12$, show that

$c^2 = 4 + 3m^2$.

3.

Express $2\sin\theta + 3\cos\theta$ in the form $R \sin (\theta + \alpha)$.

4.

Four different Mathematics books and six other different books are to be arranged on a shelf. In how many ways can the Mathematics books be arranged on the shelf?

5.

On a certain day, Fatuma drunk 6 bottles of the 9 bottles of soda available. On the next day she drunk 5 bottles of the 7 bottles of soda available. In how many ways could she have chosen the bottles of soda to drink in the two days?

6.

Given that $^{20}C_r = {}^{20}C_{r-2}$, find the value of r.

7.

A curve is given by the parametric equations $x = t^2 - 3$, $y = t(t^2 - 3)$.

Find the Cartesian equation of the curve.

8.

Show that $\tan 3\theta = \dfrac{\tan \theta \left(3 - \tan^2 \theta\right)}{\left(1 - 3\tan^2 \theta\right)}$.

Solve the equation $\cos 4x + \cos 6x + \cos 2x = 0$ for $0° \le x \le 180°$. **END**