ROYAL AGRICULTURAL COLLEGE.

SESSIONAL EXAMINATION, JUNE 24, 1851.

Morning—Mathematics & Arithmetic.

1. If the two sides of a right angled triangle are respectively 30 feet and 60 feet; What is the length of the third side?

2. If the radius of a circle be 60 feet, what are its circumference and area; and show how you obtain the value of $\pi = 3.14159$?

3. What is remarkable about the regular hexagon inscribed in a circle? And how has the sexigesimal division of the circle been obtained from this relation, also point out the advantages of the decimal division, and convert 6° ,, 3′ ,, 3″ into decimal seconds?

4. What is the difference between ·25 and $\frac{1}{3}$, and express ·111′ as a vulgar fraction?

5. Extract the square root of 9876·543 and the 7th root of the same by logarithms.

6. Given one side of a triangle = 60 feet and two angles respectively 45° and 75° to find the other sides and angles? And also the area?

7. If in a triangle two sides are given, 50 feet and 100 feet respectively and the included angle 30°, what is the 3rd side and the other angles? And the area?

8. The sides of a triangle are respectively 36, 48, and 60 feet, find the angles and area?

9. Prove Ptolemy's theorem, and deduce from it the following relation, expressed in Trigonometrical language.

When η and ϵ represent any two arcs, and r the radius

$$r.\ \text{Sine}\ (\eta \pm \epsilon) = \text{Sine}\ \eta.\ \text{Cos}\ \epsilon \pm \text{Cos}\ \eta\ .\ \text{Sine}\ \epsilon$$

and from this prove that in trigonometrical language

$$r\ \text{Sine}\ \eta = 2\ \text{Sine}\ \tfrac{1}{2}\ \eta\ .\ \text{Cos}\ \tfrac{1}{2}\ \eta;$$

show also how this is used in finding *the rule* or formula for the area of a triangle in terms of the sides.

10. Solve the equation $2x + \frac{1}{2}x + 3 - 5x = 1 - 2x$.

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