

1. The teacher picked 1 student out of 32 and wrote his name on a card. The students have to guess the name written on the card. The teacher gives only Yes or No answers. What is the lowest number of questions the students have to ask the teacher so that to define the chosen student? (2)
2. Express $(2-\sqrt{3})^2 - \frac{6}{1-\sqrt{3}}$ in the form $p+q\sqrt{3}$, where p and q are integers. (3)
3. Two sportsmen are running in the same closed circle of a stadium at a steady speed. The 1st sportsman covers the whole distance 10 s faster than the 2nd. If they started running from the same point and ran towards the same direction, they would meet once again after 720 s. Which part of the whole track each sportsman covers in 1 second? (5)
4. Solve the simultaneous equations:
$$\begin{cases} |x| + |y| = 5, \\ xy = -6. \end{cases}$$
 (5)
5. The diagram shows a sector of a circle, center O and radius r. Angle AOB is α degree. The tangent to the circle at A meets the line through O and C at B. Obtain an expressions in terms of r and α for square ABC. (5)

