# EXERCISE 1.2

**1. Let x and y be rational and irrational numbers, respectively. Is x + y necessarily an irrational number? Give an example in support of your answer.**

**Solution:**

Yes, if x and y are rational and irrational numbers, respectively, then x+ y is an irrational number.

For example,

Let $x = 5$ and $y = \sqrt{2}$.

Then, $x+y = 5 + \sqrt{2} = 5 + 1.414\ldots = 6.414...$

Here, 6.414 is a non-terminating and non-recurring decimal and therefore is an irrational number.

Hence, x + y is an irrational number.

**2. Let x be rational and y be irrational. Is xy necessarily irrational? Justify your answer by an example.**

**Solution:**

No, if x is rational number and y is irrational number, then, xy is not necessarily an irrational number. It can be rational if $x = 0$, which is a rational number.

For Example:

Let $y = \sqrt{2}$, which is irrational.

Consider $x = 2$, which is rational.

Then, $x \times y = 2 \times \sqrt{2} = 2\sqrt{2}$, which is irrational.

Consider $x = 0$, which is rational.

Then $xy = 0 \times \sqrt{2} = 0$, which is rational.

∴, we can conclude that, the product of a rational and an irrational number is always irrational, only if the rational number is not zero.