

Mathematics

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(Chapter – 1) (Number Systems)(Exemplar Problems)

(Class – IX)

Exercise 1.2

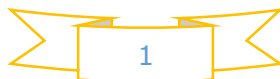
Question 4:

Classify the following numbers as rational or irrational with justification:

- (i) $\sqrt{196}$ (ii) $3\sqrt{18}$ (iii) $\sqrt{\frac{9}{27}}$ (iv) $\frac{\sqrt{28}}{\sqrt{343}}$
(v) $-\sqrt{0.4}$ (vi) $\frac{\sqrt{12}}{\sqrt{75}}$ (vii) 0.5918
(viii) $(1 + \sqrt{5}) - (4 + \sqrt{5})$ (ix) 10.124124 ... (x) 1.010010001 ...

Answer 4:

- (i) **Rational**. Because $\sqrt{196} = \sqrt{14^2} = 14$, which is a rational number.
- (ii) **Irrational**. Because $3\sqrt{18} = 9\sqrt{2}$ is product of a rational (9) and an irrational ($\sqrt{2}$). The product of a rational and an irrational numbers is an irrational number.
- (iii) **Irrational**. Because $\sqrt{\frac{9}{27}} = \sqrt{\frac{1}{3}} = \frac{1}{\sqrt{3}}$ is quotient of a rational (1) and an irrational ($\sqrt{3}$). The quotient of a rational and an irrational number is irrational number.
- (iv) **Rational**. Because $\frac{\sqrt{28}}{\sqrt{343}} = \frac{2\sqrt{7}}{7\sqrt{7}} = \frac{2}{7}$, which is a rational number.
- (v) **Irrational**. Because $-\sqrt{0.4} = \sqrt{\frac{4}{10}} = \frac{2}{\sqrt{10}}$ is quotient of a rational (2) and an irrational ($\sqrt{10}$). The quotient of a rational and an irrational number is irrational number.
- (vi) **Rational**. Because $\frac{\sqrt{12}}{\sqrt{75}} = \frac{2\sqrt{3}}{5\sqrt{3}} = \frac{2}{5}$, which is a rational number.
- (vii) **Rational**. Because 0.5918 is a decimal expansion which is terminating.
- (viii) **Rational**. Because $(1 + \sqrt{5}) - (4 + \sqrt{5}) = 1 - 4 = -3$, which is a rational number.



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(ix) Rational. Because 0.5918 is a decimal expansion which is non-terminating recurring.

(x) Irrational. Because 1.010010001 ... is a decimal expansion which is non-terminating non-recurring.

