

1) To make this easier, write the decimals out

① $.45$

④ $.454545\dots$

⑦ $.455555\dots$

② $.454454445\dots$

⑤ $.455455455\dots$

⑥ $.45545554\dots$

③ $.45445444555\dots$

In increasing order:

(a) $.45$

(d) $.454454445\dots$

(g) $.454455444555\dots$

(b) $.4\overline{5}$

(e) $.45\overline{5}$

(f) $.45545554\dots$

(c) $.4\overline{55}$ (same as $.4\overline{5}$)

2) Find a rational number between $\frac{3}{8}$ and $\frac{5}{9}$

$\frac{3}{8} = \frac{27}{72}$ ← you can give $\frac{28}{72}, \frac{29}{72}, \dots, \frac{39}{72}$

$\frac{5}{9} = \frac{40}{72}$

Find a rational number between $\frac{4}{13}$ and $\frac{5}{13}$

$\frac{4}{13} = \frac{8}{26}$ ← so $\frac{9}{26}$ fits in between

$\frac{5}{13} = \frac{10}{26}$

Find a rational number between 1.729999 and 1.73

(means TERM or REPEATING dec) You can give 1.7299991
(this is one answer of infinitely many)

4) Find an irrational number between $\frac{1}{2}$ and $\frac{5}{9}$

(means NONTERM and NONREPEATING dec)

$\frac{1}{2} = .5$

$\frac{5}{9} = .\overline{5} = .5555\dots$

You can give

$.54554555455554\dots$

(this is one answer of infinitely many)

here's another! $.525522555222\dots$

5) Find two irrational numbers whose sum is rational
 $\sqrt{2}, -\sqrt{2}$ are irrational, but $\sqrt{2} + (-\sqrt{2}) = 0$ is rational

Similarly for

difference $\sqrt{2}$ is irrat'l, but $\sqrt{2} - \sqrt{2} = 0$ is rational

product $\sqrt{2} \cdot \sqrt{2} = 2$ is rational

quotient $\sqrt{2} \div \sqrt{2} = 1$ is rational

note:

Irrational numbers are NOT CLOSED under $+, -, \times, \div$