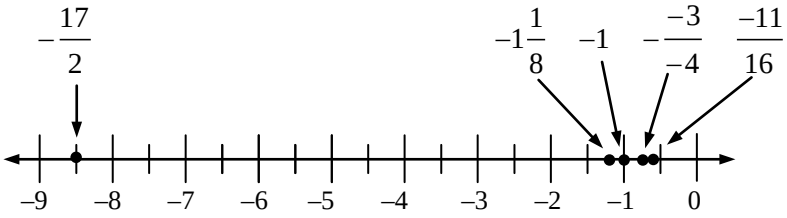
Grade 9

Number Sense and Numeration: Rationals

Answers:

1. $-\frac{13}{10}, -1\frac{1}{4}, \frac{-11}{10}, \frac{3}{5}$

2. 

   From left to right the values on the number line should be $-\frac{17}{2}, -1\frac{1}{8}, -1, -\frac{-3}{-4}, \frac{-11}{16}$

3. a. $<$ b. $>$ c. $<$ d. $>$

4. $\frac{7}{10}$

5. a. $\frac{1}{12}$ b. 14 c. –15 d. $\frac{27}{4}$
   e. $\frac{6}{5}$ f. –12 g. –27 h. $-\frac{14}{9}$
   i. $\frac{19}{12}$ j. $-\frac{22}{35}$ k. $-\frac{3}{2}$ l. $\frac{169}{40}$

6. The amount of space taken by the 12 letters and 11 gaps between the letters is $12 \times \frac{3}{5} + 11 \times \frac{1}{5} = \frac{36}{5} + \frac{11}{5} = \frac{47}{5}$ feet.

   The amount of space left for the two ends is $15 - \frac{47}{5} = \frac{75}{5} - \frac{47}{5} = \frac{28}{5}$ feet.

   Thus, the number of feet left at each of the two ends is $\frac{14}{5}$ feet.

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7.

$\frac{1}{6}$	$-\frac{5}{12}$	0
$-\frac{1}{4}$	$-\frac{1}{12}$	$\frac{1}{12}$
$-\frac{1}{6}$	$\frac{1}{4}$	$-\frac{1}{3}$

8. a. $\frac{44}{63}$ b. $\frac{27}{4}$ c. $\frac{11}{38}$

9. a. $\frac{13}{24}$ b. $\frac{39}{40}$ c. $-\frac{35}{36}$ d. $\frac{14}{3}$ e. $\frac{6}{7}$

10. Let x represent the investment club's earnings.

After the President takes half the earnings, there is $\frac{1}{2}x$ remaining.

The vice-president takes $\frac{1}{4}\left(\frac{1}{2}x\right)=\frac{1}{8}x$.

The amount remaining is now $1-\left(\frac{1}{2}x+\frac{1}{8}x\right)=\frac{3}{8}x$.

The secretary takes $\frac{1}{3}\left(\frac{3}{8}x\right)=\frac{1}{8}x$. The amount now remaining is $\frac{2}{8}x=\frac{1}{4}x$.

Since you receive half of this your share is $\frac{1}{8}x$.

Since $\frac{1}{8}x=300$, then the investment club's total earnings are \$2400.

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11. If $a \wp b = \frac{a}{b} + \frac{b-a}{a}$

then $5 \wp 3 = \frac{5}{3} + \frac{3-5}{5}$

$= \frac{25-6}{15}$

$= \frac{19}{15}$

12. $$\frac{\frac{4}{3} - \frac{5}{4} + \frac{\frac{5}{6} - \frac{3}{4}}{\frac{1}{2}}}{\frac{3}{\frac{1}{2} + \frac{1}{4}} - 2} = \frac{\frac{4}{3} - \frac{5}{4} + \frac{\frac{1}{12}}{\frac{1}{2}}}{\frac{3}{\frac{3}{4}} - 2}$$

$$= \frac{\frac{4}{3} - \frac{5}{4} + \frac{1}{6}}{4-2}$$

$$= \frac{\frac{16-15+2}{12}}{\frac{2}{1}}$$

$$= \frac{3}{24}$$

$$= \frac{1}{8}$$

13. The integers from 1 to 1000 that have 4 as the sum of their digits are: 4, <u>13</u>, 22, <u>31</u>, 40, <u>103</u>, 112, 121, 130, 202, <u>211</u>, 220, 301, 310, 400. The prime numbers are underlined.

This gives a fraction $\frac{4}{15}$, which represents the fraction of these numbers that are prime divided by the number of integers that have a sum of digits equal to 4.

Therefore, $\frac{a}{b}$ is equal to $\frac{4}{15}$.

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14. $\frac{37}{13} = 2 + \frac{11}{13}$

$\frac{37}{13} = 2 + \frac{1}{\frac{13}{11}}$

$\frac{37}{13} = 2 + \frac{1}{1 + \frac{2}{11}}$

$\frac{37}{13} = 2 + \frac{1}{1 + \frac{1}{\frac{11}{2}}}$

$\frac{37}{13} = 2 + \frac{1}{1 + \frac{1}{5 + \frac{1}{2}}}$

Therefore, $x + y + z$

$= 2 + 1 + 5$

$= 8$