

Exercises of Real numbers







1) Express the following intervals as inequality (set notation) and geometric form:

- | | |
|--------------------|--------------------|
| a) $(-2, 8]$ | b) $[7, 9]$ |
| c) $(-\infty, 5)$ | d) $(-\infty, 10]$ |
| e) $(-4, +\infty)$ | f) $[5, 11)$ |

2) Express the following inequalities (set notation) as interval and geometric form:

- | | |
|---|---|
| a) $\{x \in \mathbb{R} / 11 \leq x < 15\}$ | b) $\{x \in \mathbb{R} / 11 \leq x \leq 14\}$ |
| c) $\{x \in \mathbb{R} / -8 \leq x < -6\}$ | d) $\{x \in \mathbb{R} / x \leq 12\}$ |
| e) $\{x \in \mathbb{R} / -7 \leq x \leq -4\}$ | f) $\{x \in \mathbb{R} / x < -1\}$ |

3) Express the following graphic intervals as inequality (set notation) and interval:

- | | |
|--|---|
| a)  | b)  |
| c)  | d)  |
| e)  | f)  |

4) Express the following intervals as inequality (set notation), interval and geometric form:

- | | |
|------------------------------------|---|
| a) $(7, +\infty)$ | b) $[-5, -4]$ |
| c) $\{x \in \mathbb{R} / x < -5\}$ | d)  |
| e) $\{x \in \mathbb{R} / x > 3\}$ | f) $\{x \in \mathbb{R} / x \geq -4\}$ |

5) Place the following numbers on the number line using the Pythagorean theorem:

- | | | | | | |
|----------------|----------------|---------------|----------------|----------------|---------------|
| a) $\sqrt{10}$ | b) $\sqrt{17}$ | c) $\sqrt{8}$ | d) $\sqrt{18}$ | e) $\sqrt{26}$ | f) $\sqrt{5}$ |
|----------------|----------------|---------------|----------------|----------------|---------------|

6) Round the following numbers:

- 55.9818 to the nearest hundredths.
- 0.000 000 324 6 to the nearest ten-millionths.
- 0.069 498 3 to the nearest ten-thousandths.
- 0.000 047 5 to the nearest millionths.
- 0.000 199 2 to the nearest hundred-thousandths.
- 0.008 261 to the nearest ten-thousandths.

7) Convert to scientific notation the following numbers:

- | | |
|------------------|----------------------------|
| a) 0.024 39 | b) 0.000 000 921 8 |
| c) 0.007 367 7 | d) 0.000 000 000 002 759 5 |
| e) 0.000 080 256 | f) -0.035 73 |

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8) Convert to standard notation the following numbers:

a) -5.455×10^{-12}

b) 4.373×10^{-10}

c) -3.7622×10^{-7}

d) -5.0884596×10^1

e) -4.5371×10^{-12}

f) 6.8041×10^{-3}

9) Find out the following calculations and give the answer in scientific notation:

a) $3.361 \times 10^{32} - 8.4 \times 10^{31} - 2.1 \times 10^{30}$

b) $1.3 \times 10^{-16} + 8.9 \times 10^{-17} + 6.4 \times 10^{-15}$

c) $1.394 \times 10^{22} - 5.4 \times 10^{20} - 1.4 \times 10^{21}$

d) $9.2 \times 10^{39} + 3.8 \times 10^{38} + 6.4 \times 10^{40}$

e) $9.074 \times 10^{19} - 9.4 \times 10^{17} - 3.8 \times 10^{18}$

f) $7.7 \times 10^{-8} + 4.4 \times 10^{-9} + 1.5 \times 10^{-7}$

10) Find out the following calculations and give the answer in scientific notation:

a) $\frac{1.21 \times 10^{36}}{5.5 \times 10^{16}}$

b) $2.8 \times 10^6 \times 3.5 \times 10^{-12} \times 3.2 \times 10^{-18}$

c) $\frac{4.788 \times 10^{14}}{3.6 \times 10^{25} \times 9.5 \times 10^6}$

d) $8.1 \times 10^{17} \times 5.1 \times 10^{-12}$

e) $\frac{1.368 \times 10^{-33}}{7.2 \times 10^{-14}}$

f) $5.6 \times 10^{19} \times 7.5 \times 10^{21} \times 7.2 \times 10^{17}$

Answers:

1) a) $\{x \in \mathbb{R} / -2 < x \leq 8\}$



b) $\{x \in \mathbb{R} / 7 \leq x \leq 9\}$



c) $\{x \in \mathbb{R} / x < 5\}$



d) $\{x \in \mathbb{R} / x \leq 10\}$



e) $\{x \in \mathbb{R} / x > -4\}$



f) $\{x \in \mathbb{R} / 5 \leq x < 11\}$



2) a) $[11, 15)$



b) $[11, 14]$



c) $[-8, -6)$



d) $(-\infty, 12]$



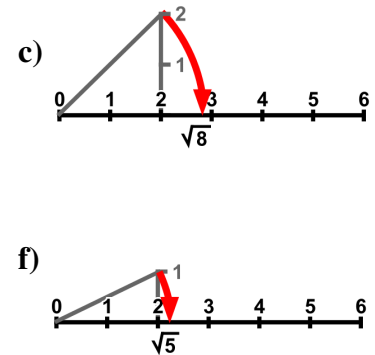
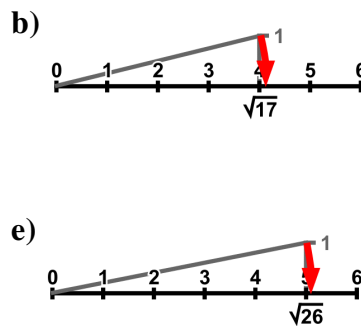
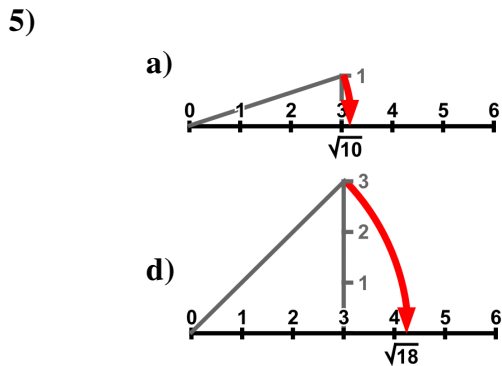
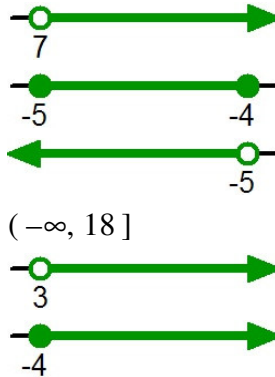
e) $[-7, -4]$



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- 3) a) $\{x \in \mathbb{R} / x < -7\}$ $(-\infty, -7)$
 b) $\{x \in \mathbb{R} / x \leq 7\}$ $(-\infty, 7]$
 c) $\{x \in \mathbb{R} / x \geq 5\}$ $[5, +\infty)$
 d) $\{x \in \mathbb{R} / x \geq 9\}$ $[9, +\infty)$
 e) $\{x \in \mathbb{R} / -4 < x < 6\}$ $(-4, 6)$
 f) $\{x \in \mathbb{R} / -6 \leq x < 3\}$ $[-6, 3)$

- 4) a) $\{x \in \mathbb{R} / x > 7\}$
 b) $\{x \in \mathbb{R} / -5 \leq x \leq -4\}$
 c) $(-\infty, -5)$
 d) $\{x \in \mathbb{R} / x \leq 18\}$
 e) $(3, +\infty)$
 f) $[-4, +\infty)$



- 6) a) 55.98 b) 0.000 000 3 c) 0.0695 d) 0.000 048
 e) 0.000 20 f) 0.0083

- 7) a) 2.439×10^{-2} b) 9.218×10^{-7}
 c) 7.3677×10^{-3} d) 2.7595×10^{-12}
 e) 8.0256×10^{-5} f) -3.573×10^{-2}

- 8) a) $-0.000\ 000\ 000\ 005\ 455$ b) $0.000\ 000\ 000\ 437\ 3$
 c) $-0.000\ 000\ 376\ 22$ d) $-50.884\ 596$
 e) $-0.000\ 000\ 000\ 004\ 537\ 1$ f) $0.006\ 804\ 1$

- 9) a) 2.5×10^{32} b) 6.619×10^{-15} c) 1.2×10^{22} d) 7.358×10^{40}
 e) 8.6×10^{19} f) 2.314×10^{-7}
- 10) a) 2.2×10^{19} b) 3.136×10^{-23} c) 1.4×10^{-18} d) 4.131×10^6
 e) 1.9×10^{-20} f) 3.024×10^{59}