

Due date: \_\_\_\_\_

Name: \_\_\_\_\_

## Tools for the Definition of Limits

Notesex: Solve  $\left| \frac{4x+5}{3} - \frac{1}{2} \right| < \frac{7}{6}$ .

$$\frac{-7}{6} < \frac{4x+5}{3} - \frac{1}{2} < \frac{7}{6}$$

$+ \frac{1}{2} \qquad \qquad \qquad + \frac{1}{2} \qquad \qquad \qquad + \frac{1}{2}$

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$$-\frac{1}{6} < \frac{4x+5}{3} < \frac{13}{6}$$

$$-\frac{1}{2} < 4x+5 < \frac{13}{2}$$

$-5 \qquad \qquad \qquad -5 \qquad \qquad \qquad -5$

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$$-\frac{11}{2} < 4x < \frac{3}{2}$$

$$\boxed{-\frac{11}{8} < x < \frac{3}{8}}$$

1. Solve the following inequalities.

a)  $|2x - 3| < 6$

$$-6 < 2x - 3 < 6$$

$$-3 < 2x < 9$$

$$\boxed{-\frac{3}{2} < x < \frac{9}{2}}$$

b)  $|\sqrt{x-7} - 4| < 1$

$$-1 < \sqrt{x-7} - 4 < 1$$

$$3 < \sqrt{x-7} < 5$$

$$9 < x-7 < 25$$

$$\boxed{16 < x < 32}$$

c)  $\left| \frac{1}{x} - \frac{1}{4} \right| < 0.05$

$$-0.05 < \frac{1}{x} - \frac{1}{4} < 0.05$$

$$0.2 < \frac{1}{x} < 0.3$$

$$\frac{2}{10} < \frac{1}{x} < \frac{3}{10}$$

$$5 > x > \frac{10}{3}$$

$$5 > x > \frac{10}{3}$$

$$\boxed{\frac{10}{3} < x < 5}$$

**Practice at home**

2. Solve the following inequalities.

a)  $|3x + 1| < 2$

$$-2 < 3x + 1 < 2$$

$$-3 < 3x < 1$$

$$\boxed{-1 < x < \frac{1}{3}}$$

b)  $|\sqrt{x-2} - 3| < 1$

$$-1 < \sqrt{x-2} - 3 < 1$$

$$2 < \sqrt{x-2} < 4$$

$$4 < x-2 < 16$$

$$\boxed{6 < x < 18}$$

c)  $|x^3 - 8| < 0.001$

$$-0.001 < x^3 - 8 < 0.001$$

$$7.999 < x^3 < 8.001$$

$$\boxed{\sqrt[3]{7.999} < x < \sqrt[3]{8.001}}$$

d)  $\left| \frac{5x+3}{2} - \frac{1}{3} \right| < \frac{2}{3}$

$$-\frac{2}{3} < \frac{5x+3}{2} - \frac{1}{3} < \frac{2}{3}$$

$$-\frac{1}{3} < \frac{5x+3}{2} < 1$$

$$-\frac{2}{3} < 5x+3 < 2$$

$$-\frac{11}{3} < 5x < -1$$

$$\boxed{-\frac{11}{15} < x < -\frac{1}{5}}$$

e)  $\left| \frac{2}{x} - \frac{1}{2} \right| < \frac{1}{5}$

$$-\frac{1}{5} < \frac{2}{x} - \frac{1}{2} < \frac{1}{5}$$

$$\frac{3}{10} < \frac{2}{x} < \frac{7}{10}$$

$$\frac{10}{3} > \frac{x}{2} > \frac{10}{7}$$

$$\frac{10}{7} < \frac{x}{2} < \frac{10}{3}$$

$$\boxed{\frac{20}{7} < x < \frac{20}{3}}$$