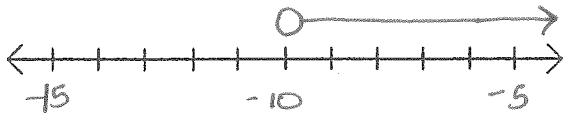
Solve the inequality. Express the solution in set notation. Graph the solution set on a labeled number line.

1. $-7 < a+3$

$-3 \quad -3$

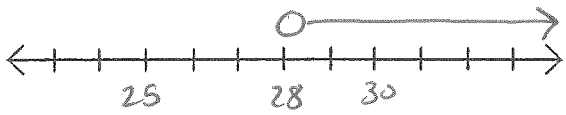
$-10 < a$



Solution in set notation: { $a \mid a > -10$ }

2. $\frac{1}{4}x > 7$ ·4

$x > 28$

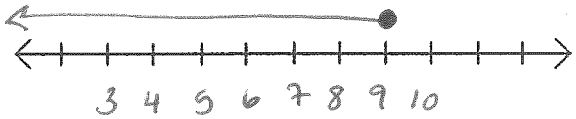


Solution in set notation: { $x \mid x > 28$ }

3. $-54 \leq -6w$

$\frac{-54}{-6} \geq \frac{-6w}{-6}$

$9 \geq w$



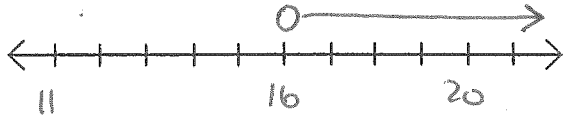
Solution in set notation: { $w \mid w \leq 9$ }

4. $\frac{x}{4} - 9 > -5$

$+9 \quad +9$

$4 \cdot \frac{x}{4} > 4 \cdot 4$

$x > 16$



Solution in set notation: { $x \mid x > 16$ }

5. $-3(x-4) > 5x-4$

$-3x+12 > 5x-4$

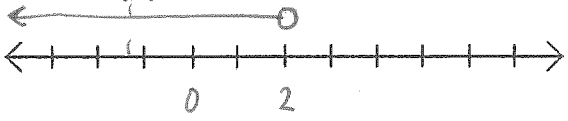
$+3x \quad +3x$

$12 > 8x-4$

$+4 \quad +4$

$\frac{16}{8} > \frac{8x}{8}$

$2 > x$



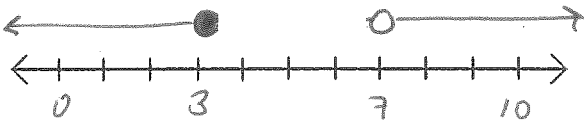
Solution in set notation: { $x \mid x < 2$ }

6. $5x+1 \leq 16$ *or* $3x-7 > 14$

$-1 \quad -1 \qquad +7 \quad +7$

$\frac{5x}{5} \leq \frac{15}{5} \qquad \frac{3x}{3} > \frac{21}{3}$

$x \leq 3 \qquad x > 7$



Solution in set notation: { $x \mid$ }

7. $-2 \leq 3w+4 < 19$

$-4 \quad -4 \quad -4$

$\frac{-6}{3} \leq \frac{3w}{3} < \frac{15}{3}$

$-2 \leq w < 5$

Solution in set notation: { $w \mid -2 \leq w < 5$ } or $\{w \mid w \geq -2 \text{ and } w < 5\}$

8. $|2x-7| \leq 9$

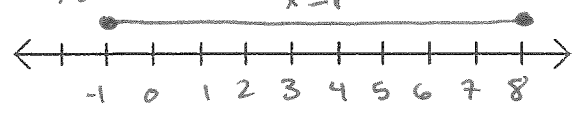
$2x-7 \leq 9 \qquad -(2x-7) \leq 9$

$+7 \quad +7 \qquad -2x+7 \leq 9$

$\frac{2x}{2} \leq \frac{16}{2} \qquad -7 \quad -7$

$x \leq 8 \qquad \frac{-2x}{-2} \leq \frac{2}{-2}$

$x \geq -1$



Solution in set notation: { $x \mid x \leq 8$ AND $x \geq -1$ } or $\{x \mid -1 \leq x \leq 8\}$

9. $\left|\frac{2x+4}{3}\right| > 8$ → OR

$\frac{2x+4}{3} > 8 \cdot 3$

$2x+4 > 24$

$-4 \quad -4$

$\frac{2x}{2} > \frac{20}{2}$

$x > 10$

$-\left(\frac{2x+4}{3}\right) > 8$

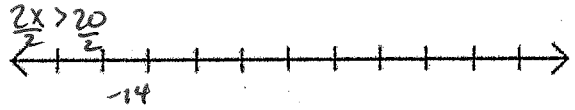
$3 \cdot -\frac{2x-4}{3} > 8 \cdot 3$

$-2x-4 > 24$

$+4 \quad +4$

$\frac{-2x}{-2} > \frac{28}{-2}$

$x < -14$



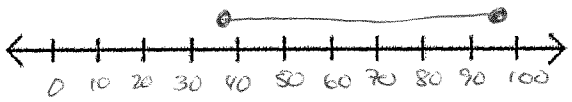
Solution in set notation: $\{x \mid x < -14 \text{ OR } x > 10\}$

10. A brownie contains 12 grams of fat. If you eat no fewer than 3 and no more than 8 brownies, how many grams of fat will you consume?

12B CALORIES IN

$3(12) \leq$ BROWNIES $\leq 8(12)$

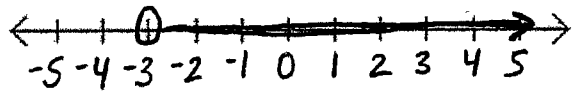
$36 \leq C \leq 96$



Solution in set notation: $\{C \mid 36 \leq C \leq 96\}$

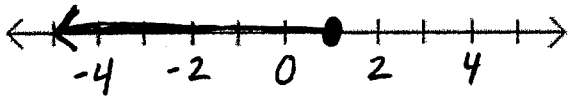
Write an inequality (or inequalities) for each graph.

11.



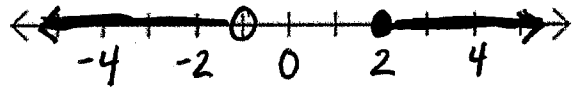
$\{x \mid x > -3\}$

12.



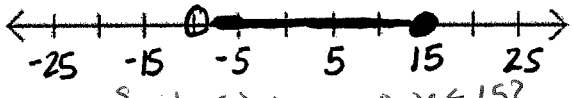
$\{x \mid x \leq 1\}$

13.



$\{x \mid x < -1 \text{ OR } x \geq 2\}$

14.



$\{x \mid x > -10 \text{ AND } x \leq 15\}$

$\{x \mid -10 < x \leq 15\}$

15. The sewage plant receives 300 to 450 tons of waste every month. How many tons of waste does the plant receive daily? (*Hint on average there are 30 days in a month)

$\frac{300}{30} \leq w \leq \frac{450}{30}$

$\{w \mid 10 \leq w \leq 15 \text{ TONS}\}$

16. Kevin is saving up for his vacation. During the summer he saved $1,600. His vacation costs at least $4,000. His job pays him $30 an hour. At least how many hours must he work to save up for his vacation?

$1600 + 30h \geq 4000$

$\frac{30h}{30} \geq \frac{2400}{30}$

$h \geq 80$ hours

**BONUS If he works 30 hours a week, at least how many weeks must he work?

3 weeks

17. Which number is a solution of the inequality: $x+8<-5$

A. -10

$x<-13$

B. -14

C. -3

D. 3

18. Which statement is equivalent to the inequality $|x-3|>8$?

A. $x-3>8$ or $x-3<8$

B. $x-3>8$ or $x-3<-8$

~~C.~~ $x-3>8$ and $x-3<8$

~~D.~~ $x-3>8$ and $x-3<-8$

19. Solve and graph

$$-15+3a\leq -9$$

$+15 \quad +15$

$$\frac{3a}{3}\leq\frac{6}{3}$$

$$a\leq 2$$

20. It costs \$7 to make a charm necklace with up to 5 charms and \$1.50 for each additional charm. Kimberly has a budget of \$16 maximum set aside for her necklace. **Write** and **Solve** an inequality for the number of additional charms that Kimberly can have added to her necklace.

$7+1.50c\leq 16$

$\frac{1.50c}{1.50}\leq\frac{9}{1.50}$

$\{c \mid c\leq 6\}$