LINEAR INEQUALITIES

Task 1 – State all the integer values of x that satisfy the following inequalities.

1) $1 < x < 6$
$x: \mathbf{2, 3, 4, 5}$

2) $-3 \le x < 2$
$x: \mathbf{-3, -2, -1, 0, 1}$

3) $4 < x \le 9$
$x: \mathbf{5, 6, 7, 8, 9}$

4) $-5 < x \le 1$
$x: \mathbf{-4, -3, -2, -1, 0, 1}$

5) $2 \le x < 7$
$x: \mathbf{2, 3, 4, 5, 6}$

6) $10 < 2x \le 12$
$\div 2 \quad \div 2 \quad \div 2$
$5 < x \le 6$
$x: \mathbf{6}$

7) $5 < 2x + 1 \le 13$
$-1 \quad\quad -1 \quad -1$
$4 < 2x \le 12$
$\div 2 \quad \div 2 \quad \div 2$
$2 < x \le 6$
$x: \mathbf{3, 4, 5, 6}$

8) $-4 \le 3x - 1 < 8$
$+1 \quad\quad +1 \quad +1$
$-3 \le 3x < 9$
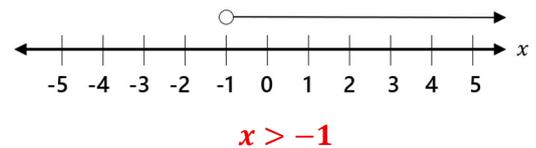$\div 3 \quad \div 3 \quad \div 3$
$-1 \le x < 3$
$x: \mathbf{-1, 0, 1, 2}$

9) $7 < 2 + x \le 12$
$-2 \quad -2 \quad\quad -2$
$5 < x \le 10$
$x: \mathbf{6, 7, 8, 9, 10}$

10) $-12 \le 5x - 3 < 12$
$+3 \quad\quad +3 \quad\quad +3$
$-9 \le 5x < 15$
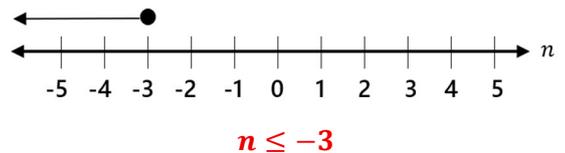$\div 5 \quad\quad \div 5 \quad \div 5$
$-1.8 \le x < 3$
$x: \mathbf{-1, 0, 1, 2}$

11) $-8 < 2x - 3 \le 6$
$+3 \quad\quad +3 \quad\quad +3$
$-5 < 2x \le 9$
$\div 2 \quad \div 2 \quad \div 2$
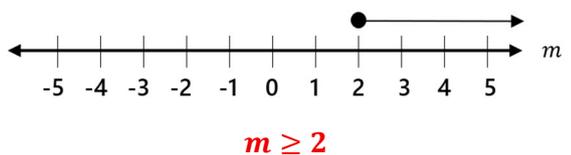$-2.5 < x \le 4.5$
$x: \mathbf{-2, -1, 0, 1, 2, 3, 4}$

Task 2

12) Write down the inequality shown on the number line.

$\mathbf{x > -1}$

13) Write down the inequality shown on the number line.

$\mathbf{n \le -3}$

14) Write down the inequality shown on the number line.

$\mathbf{m \ge 2}$

15) Write down the inequality shown on the number line.

$\mathbf{-5 < p \le -1}$
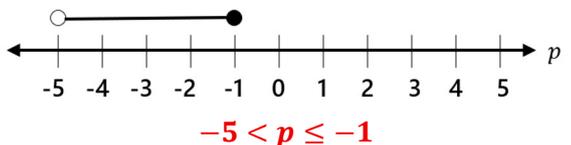
16) Write down the inequality shown on the number line.
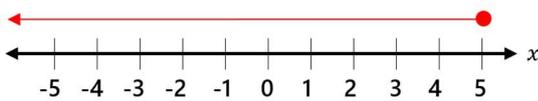

$-2 \leq x \leq 3$
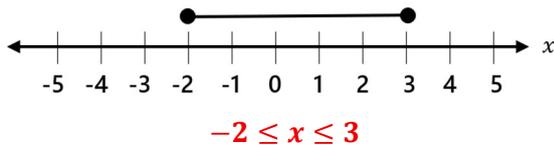
17) On the number line, show the inequality
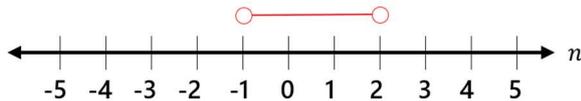$$x > 3$$
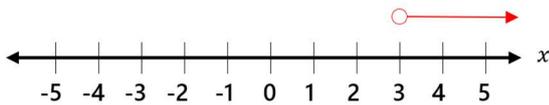
18) On the number line, show the inequality
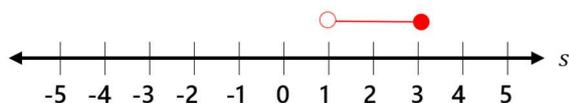$$x \leq 3$$
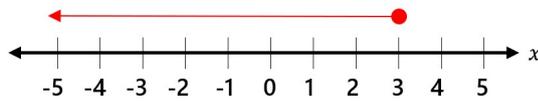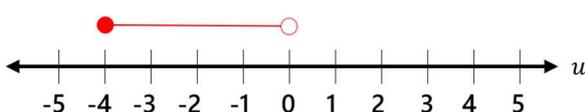

19) On the number line, show the inequality
$$x \leq 5$$

20) On the number line, show the inequality
$$-1 < n < 2$$

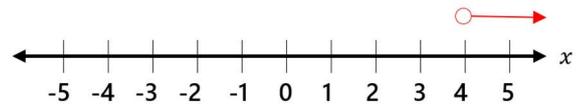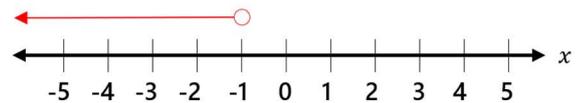**21)** On the number line, show the inequality
$$1 < s \leq 3$$

22) On the number line, show the inequality
$$-4 \leq u < 0$$

23) On the number line, show the inequality
$$2x > 8$$
$$\div 2 \quad \div 2$$
$$x > 4$$

24) On the number line, show the inequality
$$x - 7 < -8$$
$$+7 \quad +7$$
$$x < -1$$

25) On the number line, show the inequality
$$3m + 8 \leq -m$$
$$-8 \quad -8$$
$$3m \leq -m - 8$$
$$+m \quad +m$$
$$4m \leq -8$$
$$\div 4 \quad \div 4$$
$$m \leq -2$$
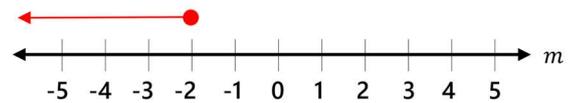
26) On the number line, show the inequality
$$4 < 3n + 1 < 10$$
$$-1 \quad -1 \quad -1$$
$$3 < 3n < 9$$
$$\div 3 \quad \div 3 \quad \div 3$$
$$1 < n < 3$$
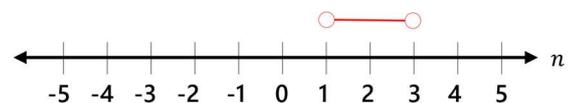
Task 3 – Solve each of the following linear inequalities.

27) $x + 3 > 7$
$$-3 \quad -3$$
$$x > 4$$

28) $x - 5 \leq 9$
$$+5 \quad +5$$
$$x \leq 14$$

29) $4x > 20$
$\div 4 \quad \div 4$
$\boldsymbol{x > 5}$

30) $\frac{x}{3} < 6$
$\times 3 \qquad \times 3$
$\boldsymbol{x < 18}$

31) $2n + 1 > 9$
$\quad -1 \quad -1$
$2n > 8$
$\div 2 \quad \div 2$
$\boldsymbol{n > 4}$

32) $3b - 4 \leq 11$
$\quad +4 \quad +4$
$3b \leq 15$
$\div 3 \quad \div 3$
$\boldsymbol{b \leq 5}$

33) $5n - 7 > 2$
$\quad +7 \quad +7$
$5n > 9$
$\div 5 \quad \div 5$
$\boldsymbol{n > 1.8}$

34) $6x - 3 < 15$
$\quad +3 \quad +3$
$6x < 18$
$\div 6 \quad \div 6$
$\boldsymbol{x < 3}$

35) $-4x + 5 \geq 21$
$\quad -5 \quad -5$
$-4x \geq 16$
$\div (-4) \quad \div (-4) \qquad$ ***flip inequality**
$\boldsymbol{x \leq -4}$

36) $7 - 2x < 1$
$-7 \quad -7$
$-2x < -6$
$\div (-2) \quad \div (-2) \qquad$ ***flip inequality**
$\boldsymbol{x > 3}$

37) $3(x + 2) > 19$
$3x + 6 > 19$
$\quad -6 \quad -6$
$3x > 13$
$\div 3 \quad \div 3$
$\boldsymbol{x > \dfrac{13}{3}}$

38) $5(2x - 1) \leq 29$
$10x - 5 \leq 29$
$\quad +5 \quad +5$
$10x \leq 34$
$\div 10 \quad \div 10$
$\boldsymbol{x \leq 3.4}$

39) $8 - 3u \geq 2$
$-8 \quad -8$
$-3u \geq -6$
$\div (-3) \div (-3) \qquad$ ***flip inequality**
$\boldsymbol{u \leq 2}$

40) $\frac{2x-3}{4} < 5$
$\times 4 \quad \times 4$
$2x - 3 < 20$
$\quad +3 \quad +3$
$2x < 23$
$\div 2 \quad \div 2$
$\boldsymbol{x < 11.5}$

41) $4(1 - x) > 2x + 6$
$4 - 4x > 2x + 6$
$\quad +4x \quad +4x$
$4 > 6x + 6$
$-6 \quad -6$
$-2 > 6x$
$\div 6 \quad \div 6$
$-\dfrac{2}{6} > x$
$\boldsymbol{x < -\dfrac{1}{3}}$

Challenge – Work out the set of values of x for which:

42) $2x - 5 < x + 9 \quad$ **and** $\quad 4x < x - 6$

Solve both inequalities
$2x - 5 < x + 9$
$-x \qquad -x$
$x - 5 < 9$
$\quad +5 \quad +5$
$x < 14$

$4x < x - 6$
$-x \quad -x$
$3x < -6$
$\div 3 \quad \div 3$
$x < -2$

Form inequality that works for both:
$\boldsymbol{x < -2}$

43) $x + 4 > 2 - x$ **and** $16 + 4x > 6 + 3x$

Solve both inequalities

$x + 4 > 2 - x$

$+x \qquad + x$

$2x + 4 > 2$

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

$2x > -2$

$\div 2 \quad \div 2$

$x > -1$

$16 + 4x > 6 + 3x$

$\quad -3x \qquad - 3x$

$16 + x > 6$

$-16 \quad\; - 16$

$x > -10$

Form inequality that works for both:

$x > -1$

44) $-8 < 2x \leq 12$ **and** $-12 \leq 2x + 1 < 8$

Solve both inequalities

$-8 < 2x \leq 12$

$\div 2 \quad \div 2 \quad\; \div 2$

$-4 < x \leq 6$

$-12 \leq 2x + 1 < 8$

$-1 \qquad\;\; - 1 \quad - 1$

$-13 \leq 2x < 7$

$\div 2 \quad\; \div 2 \quad \div 2$

$-6.5 \leq x < 3.5$

Form inequality that works for both:

$-4 < x < 3.5$