

Inequalities

1. Solve each of the following inequations where x can only take values from the set of numbers $\dots \{-2, -1, 0, 1, 2, 3, 4, 5\}$.

(a) $6x + 2 \leq 3x + 5$

(b) $7x - 1 > 3x + 3$

(c) $3(2x + 1) \geq 5x + 8$

(d) $2(6 + 5x) < 8x + 12$

(e) $14 - 2(3 - x) \leq 8$

(f) $5 + 3(2 - x) \geq 14 - 6x$

(g) $2x - (4 - x) < x + 2$

(h) $3 - 4(2 + x) > 6(2 - x) - 17$

Example

$$3x - 2 \geq x + 4$$

$$3x - x \geq 4 + 2$$

$$2x \geq 6$$

$$\therefore x \geq 3$$

answer ... $\{3, 4, 5\}$

2. Solve each of the following inequations.

(a) $3a + 2 \leq 17 - 2a$

(b) $7(2x + 3) > 8x + 27$

(c) $2(5p - 12) \geq 7p - 18$

(d) $40 + 3k < 28 - k$

(e) $1 - 5(2 - m) \leq 2(m + 7)$

(f) $3(2y - 4) - 1 > 4(4 - y)$

(g) $2(3 - 4h) < 12 - 15h$

(h) $2 - 3(2 - x) > 2(1 - x) - 5$

Example

$$4(2a - 1) \leq 3(a + 1)$$

$$8a - 4 \leq 3a + 3$$

$$8a - 3a \leq 3 + 4$$

$$5a \leq 7$$

$$\therefore a \leq \frac{7}{5}$$

3. Solve each of the following inequations.

(a) $2a + 18 \leq 12 + 4a$

(b) $14 - 3x > x + 6$

(c) $3(p - 2) \geq 5p - 10$

(d) $16 - 3k < 20 - k$

(e) $7(2 - d) \leq 2(d - 12)$

(f) $2(2y - 1) - 8 > 10(1 + y)$

(g) $4(3 - 4h) < 12 + h$

(h) $3(2 - y) > 2(1 + 3y) - 7$

(i) $w(w - 3) > 5(w + 2) + w^2$

(j) $4d(1 + d) < 2d(2d + 3) - 20$

Example

$$3(4 - p) < 2(p - 1)$$

$$12 - 3p < 2p - 2$$

$$12 + 2 < 2p + 3p$$

$$14 < 5p$$

$$\frac{14}{5} < p$$

$$\therefore p > \frac{14}{5}$$

4. I think of a whole number, treble it and subtract 3. The answer must be less than or equal to 12. Form an inequation and solve it to find the possible starting whole numbers.

5. I subtract a whole number from 8 and double the answer. The result must be greater than 10. Form an inequation and solve it to find the possible starting whole numbers.

6. Fred and Jane are brother and sister. Fred is 3 years older than twice Jane's age. The sum of their ages is less than 36 years.

Taking Jane's age to be x years form an inequation. What can you say about Jane's age?



Inequations

1. (a) $\{-2, -1, 0, 1\}$ (b) $\{2, 3, 4, 5\}$
(c) $\{5\}$ (d) $\{-2, -1\}$
(e) $\{-2, -1, 0\}$ (f) $\{1, 2, 3, 4, 5\}$
(g) $\{-2, -1, 0, 1, 2\}$ (h) $\{1, 2, 3, 4, 5\}$

2. (a) $a \leq 3$ (b) $x > 1$
(c) $p \geq 2$ (d) $k < -3$
(e) $m \leq \frac{23}{3}$ ($7\frac{2}{3}$) (f) $y > -\frac{29}{10}$ ($-2\frac{9}{10}$)
(g) $h < \frac{6}{7}$ (h) $x > \frac{1}{5}$

3. (a) $a \geq 3$ (b) $x < 2$
(c) $p \leq 2$ (d) $k > -2$
(e) $d \geq \frac{38}{9}$ ($4\frac{2}{9}$) (f) $y < -\frac{10}{3}$ ($-3\frac{1}{3}$)
(g) $h > 0$ (h) $y < \frac{11}{9}$ ($1\frac{2}{9}$)
(i) $w < \frac{5}{4}$ ($-1\frac{1}{4}$) (j) $d > 10$

4. $\{0, 1, 2, 3, 4, 5\}$
5. $\{0, 1, 2\}$
6. Jane must be younger than 11 years.