

Name _____

Date _____

2.6 Inequalities — worked answers

Understand and use inequalities, and show them on a number line. · 56 questions

A · Fluency — Read inequalities and find the extreme integers.

- 1 Write in words what $x < 10$ means.

Answer: x is less than 10

The symbol $<$ means “is less than” and $>$ means “is greater than”, so $x < 10$ reads “x is less than 10”.

- 2 Write in words what $x > 10$ means.

Answer: x is greater than 10

The symbol $<$ means “is less than” and $>$ means “is greater than”, so $x > 10$ reads “x is greater than 10”.

- 3 Write in words what $x < -4$ means.

Answer: x is less than -4

The symbol $<$ means “is less than” and $>$ means “is greater than”, so $x < -4$ reads “x is less than -4”.

- 4 Write in words what $x > -4$ means.

Answer: x is greater than -4

The symbol $<$ means “is less than” and $>$ means “is greater than”, so $x > -4$ reads “x is greater than -4”.

- 5 Write in words what $y > 0$ means.

Answer: y is greater than 0

The symbol $<$ means “is less than” and $>$ means “is greater than”, so $y > 0$ reads “y is greater than 0”.

- 6 Write in words what $n < 1$ means.

Answer: n is less than 1

The symbol $<$ means “is less than” and $>$ means “is greater than”, so $n < 1$ reads “n is less than 1”.

- 7 What is the smallest integer that satisfies $x > 5$?

Answer: 6

The inequality is strict, so x cannot equal the number itself. The next integer up is 6.

- 8 What is the smallest integer that satisfies $x > 12$?

Answer: 13

The inequality is strict, so x cannot equal the number itself. The next integer up is 13.

- 9 What is the smallest integer that satisfies $x > -3$?

Answer: -2

The inequality is strict, so x cannot equal the number itself. The next integer up is -2.

- 10 What is the smallest integer that satisfies $x > -1$?

Answer: 0

The inequality is strict, so x cannot equal the number itself. The next integer up is 0.

- 11 What is the smallest integer that satisfies $x > 0$?

Answer: 1

The inequality is strict, so x cannot equal the number itself. The next integer up is 1.

- 12 What is the smallest integer that satisfies $x > 99$?

Answer: 100

The inequality is strict, so x cannot equal the number itself. The next integer up is 100.

- 13 What is the largest integer that satisfies $y < 2$?

Answer: 1

The inequality is strict, so y cannot equal the number itself. The next integer down is 1.

- 14 What is the largest integer that satisfies $y < 10$?

Answer: 9

The inequality is strict, so y cannot equal the number itself. The next integer down is 9.

- 15 What is the largest integer that satisfies $y < -4$?

Answer: -5

The inequality is strict, so y cannot equal the number itself. The next integer down is -5.

- 16 What is the largest integer that satisfies $y < 0$?

Answer: -1

The inequality is strict, so y cannot equal the number itself. The next integer down is -1.

- 17 What is the largest integer that satisfies $y < -9$?

Answer: -10

The inequality is strict, so y cannot equal the number itself. The next integer down is -10.

- 18 What is the largest integer that satisfies $y < 100$?

Answer: 99

The inequality is strict, so y cannot equal the number itself. The next integer down is 99.

- 19 List the first five integer values that satisfy $x > 5$, starting from the closest one.

Answer: 6, 7, 8, 9, 10

Start at the closest integer and keep going: 6, 7, 8, 9, 10, ... The list never ends, which is why you write the three dots.

- 20 List the first five integer values that satisfy $y < 2$, starting from the closest one.

Answer: 1, 0, -1, -2, -3

Start at the closest integer and keep going: 1, 0, -1, -2, -3, ... The list never ends, which is why you write the three dots.

- 21 List the first five integer values that satisfy $x > -2$, starting from the closest one.

Answer: -1, 0, 1, 2, 3

Start at the closest integer and keep going: -1, 0, 1, 2, 3, ... The list never ends, which is why you write the three dots.

- 22 List the first five integer values that satisfy $n < 4$, starting from the closest one.

Answer: 3, 2, 1, 0, -1

Start at the closest integer and keep going: 3, 2, 1, 0, -1, ... The list never ends, which is why you write the three dots.

- 23** List the first five integer values that satisfy $m > 0$, starting from the closest one.

Answer: 1, 2, 3, 4, 5

Start at the closest integer and keep going: 1, 2, 3, 4, 5, ... The list never ends, which is why you write the three dots.

- 24** List the first five integer values that satisfy $k < -5$, starting from the closest one.

Answer: -6, -7, -8, -9, -10

Start at the closest integer and keep going: -6, -7, -8, -9, -10, ... The list never ends, which is why you write the three dots.

B · Reasoning — Number lines, testing values and counting.

- 25** On a number line, what does an **open circle** show?

- ☐ The value is included
- ☐ The value is not included
- ☐ The line stops there
- ☐ The value is zero

Answer: The value is not included

An open (unfilled) circle is used for $<$ and $>$, because the number itself is not part of the solution.

- 26** To show $x > 5$ on a number line, which way does the arrow point?

- ☐ Left
- ☐ Right

Answer: Right

Greater than means larger numbers, which lie to the right.

- 27** To show $y < 2$ on a number line, which way does the arrow point?

- ☐ Left
- ☐ Right

Answer: Left

Less than means smaller numbers, which lie to the left.

- 28** Which inequality means “n is greater than -3”?

- ☐ $n < -3$
- ☐ $n > -3$
- ☐ $-3 > n$
- ☐ $n = -3$

Answer: $n > -3$

The wide end of the symbol faces the larger quantity.

- 29** Does $x = -2$ satisfy $x > -5$?

- ☐ Yes
- ☐ No

Answer: Yes

-2 is to the right of -5 on the number line, so it is greater.

- 30** Does $x = -7$ satisfy $x > -5$?

- ☐ Yes
- ☐ No

Answer: No

-7 is to the left of -5, so it is smaller, not greater.

- 31 Does $x = 5$ satisfy $x > 5$?

☐ Yes
☐ No

Answer: No

The symbol $>$ is strict — 5 is not greater than 5.

- 32 How many integers satisfy both $x > 2$ and $x < 7$?

Answer: 4

The integers strictly between 2 and 7 are 3, 4, 5 and 6 — four of them.

- 33 How many integers satisfy both $x > -3$ and $x < 3$?

Answer: 5

They are $-2, -1, 0, 1$ and 2 — five of them.

- 34 List all the integers that satisfy both $x > -2$ and $x < 4$.

Answer: $-1, 0, 1, 2, 3$

Start just above -2 and stop just below 4.

- 35 Why can you not list every integer that satisfies $x > 5$?

☐ Because there are none
☐ Because the list goes on forever
☐ Because x must be positive
☐ Because 5 is included

Answer: Because the list goes on forever

There are infinitely many, so you write the first few and then "...".

- 36 x is an integer and $x > 7$. What is the smallest possible value of $2x$?

Answer: 16

The smallest integer x can be is 8, so the smallest $2x$ is 16.

C · Challenge — Solving inequalities and combining them.

- 37 x is an integer, $x > 3$ and $x < 9$. What is the largest possible value of x ?

Answer: 8

x must be strictly less than 9, so the largest integer is 8.

- 38 n is an integer with $n > -4$ and $n < 1$. What is the sum of all the possible values of n ?

Answer: -6

The values are $-3, -2, -1$ and 0 , which add to -6 .

- 39 Solve the inequality $2x > 10$ and write the smallest integer value of x .

Answer: 6

Divide both sides by 2: $x > 5$, so the smallest integer is 6.

- 40 Solve $3x + 1 > 16$ and write the smallest integer value of x .

Answer: 6

$3x > 15$, so $x > 5$ and the smallest integer is 6.

- 41 Solve $x - 4 < 2$ and write the largest integer value of x .

Answer: 5

$x < 6$, so the largest integer is 5.

- 42 x is an integer with $x > -10$ and $x < -5$. How many values are possible?

Answer: 4

They are -9 , -8 , -7 and -6 — four values.

- 43 A number x satisfies $x > 2$. What is the smallest possible value of x^2 if x is an integer?

Answer: 9

The smallest integer is 3, and $3^2 = 9$.

- 44 Write an inequality for: “ y is greater than -1 ”. Use the $>$ symbol.

Answer: $y > -1$

The wide end faces the larger quantity, so $y > -1$.

D · Word problems — Limits and conditions in real situations.

- 45 A lift can carry fewer than 12 people. Write an inequality for the number of people p .

Answer: $p < 12$

“Fewer than 12” means strictly less than 12, so $p < 12$.

- 46 You must be more than 140 cm tall to ride. Write an inequality for the height h , in cm.

Answer: $h > 140$

“More than 140” means strictly greater, so $h > 140$.

- 47 A lift can carry fewer than 12 people. What is the greatest number of people allowed?

Answer: 11

Fewer than 12 means at most 11 people.

- 48 You must be more than 140 cm tall to ride. What is the shortest whole number of centimetres that is allowed?

Answer: 141

More than 140 means 141 cm or taller.

- 49 A freezer must stay below -18°C . What is the highest whole number of degrees allowed?

Answer: -19

Below -18 means -19°C or colder.

- 50 A game needs more than 4 players. What is the smallest number of players?

Answer: 5

More than 4 means at least 5 players.

- 51 A parcel must weigh less than 30 kg. What is the greatest whole number of kilograms allowed?

Answer: 29

Less than 30 means at most 29 kg.

- 52 A car park has spaces for fewer than 250 cars. What is the greatest number of cars?

Answer: 249

Fewer than 250 means at most 249.

- 53 A shop gives a discount when you spend more than \$80. What is the smallest whole number of dollars that earns the discount?

Answer: 81

More than \$80 means \$81 or more.

- 54** A pool is deeper than 1 m everywhere. The depth d is a whole number of centimetres. What is the smallest possible depth, in cm?

Answer: 101

Deeper than 100 cm means at least 101 cm.

- 55** A bus route takes fewer than 45 minutes. What is the longest whole number of minutes it could take?

Answer: 44

Fewer than 45 means at most 44 minutes.

- 56** A rollercoaster requires riders to be more than 12 years old. What is the youngest whole number of years allowed?

Answer: 13

More than 12 means 13 or older.