

C2.6 Inequalities

Name: _____ Class: _____ Date: _____

Total: 20 marks

KEY WORDS inequality 不等式 • number line 数轴 • range 值域

Objective

Use inequalities to solve Core IGCSE Mathematics problems.

You must be able to:

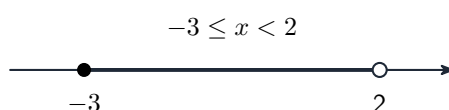
- Interpret strict and inclusive inequality symbols
- List integer values in a given interval
- Represent intervals with open or filled endpoints

1 Key knowledge and worked examples

■ Key knowledge: Inequalities

An inequality describes a range. $<$ and $>$ exclude the boundary; $\leq$ and $\geq$ include it. On a number line use an open circle for exclusion and a filled circle for inclusion. Shade the values that satisfy the statement. Read a combined interval as two conditions that must both be true. Core requires representing and interpreting inequalities.

■ Worked example: Inequalities

Represent $-3 \leq x < 2$.

- Use a filled circle at -3 , an open circle at 2 and the segment between them.
- Integer values are $-3, -2, -1, 0, 1$.
- A weight of at least 5 kg means $w \geq 5$; exactly 5 is allowed. Less than 8 kg means $w < 8$.

■ Method check

Core questions here interpret a given inequality; they do not require solving an algebraic inequality. Open endpoints exclude the boundary.

2 Practice

2.1 Write an inequality for a temperature T below 4°C . [2]

2.2 Write an inequality for a mass m of at least 12 kg. [2]

2.3 List the integers satisfying $-1 < x \leq 3$. [2]

2.4 Draw a number line for $1 \leq x < 4$, labelling the endpoints. [2]

3 Exam-style questions

3.1 Apply the inequalities methods below. Show working and include units where appropriate.

(a) A parcel accepts masses $2 \leq m < 5$ kg. State whether 2 kg and 5 kg are accepted. [2]

(b) List all whole-number masses that are accepted. [2]

(c) Draw a number line for the allowed interval. [2]

3.2 A ride accepts heights $120 \leq h < 150$ cm. A sports group accepts ages $11 < a \leq 15$ years.

(a) Decide whether heights 120, 149.9 and 150 cm qualify, giving the reason for the two boundary heights. [3]

(b) List the accepted whole-number ages and draw their interval on a number line. [3]

Solutions

Award method and answer marks as indicated; accept equivalent correct methods.

2.1

- Below excludes equality: $T < 4$ (in degrees Celsius).

2.2

- At least includes the endpoint: $m \geq 12$ (in kg).

2.3

- Exclude -1 and include 3 : $0, 1, 2, 3$.

2.4

- **Filled circle at 1, open circle at 4, segment between.** These show which endpoints belong.

3.1

(a)

- **2 kg is accepted; 5 kg is not** because the upper inequality is strict.

(b)

- **2, 3 and 4 kg** are the whole-number values inside the interval.

(c)

- **Filled circle at 2, open at 5, shade between.**

3.2

(a)

- **120 and 149.9 cm qualify.**
- **150 cm does not.**
- The $\leq$ includes 120, while $<$ excludes 150.

(b)

- The integer ages are **12, 13, 14, 15.**
- Use an **open point at 11 and filled point at 15**, shading the segment between them.