



Linear and graphical inequalities

About 50 minutes Calculator allowed 44 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks] **A2** Last lesson [2 marks]
- Solve $\frac{x+9}{2} + \frac{x-4}{3} = 4$. Solve $4x - 2y = -8$ and $x - y = -5$.

Answer

Answer

- A3** From chapter 5 [2 marks] **A4** From chapter 10 [2 marks]
- A force of 7350 N acts on a square face and makes a pressure of 150 N/m^2 . Find the length of a side of the square. Find the equation of the line that is parallel to $3y + 3x = -4$ and passes through $(-4, 1)$.

Answer

Answer

B Examples, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Solve $4x + 9 \leq 2x + 21$.**Hint** Take $2x$ from both sides, as in an equation.

- B1** Solve $7x - 4 > 3x + 18$. [2 marks]

Answer

EXAMPLE 2

Solve $5 - 4x > 17$.**Hint** Dividing by a negative number turns the sign round.

- B2** Solve $2(7 - 3x) < 2$. [3 marks]

Answer

EXAMPLE 3

Solve $-13 < 3x - 4 \leq 8$. List the integers that satisfy it.

Hint Do the same to all three parts.

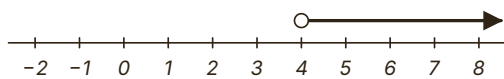
B3 x is an integer and [3 marks]

$-5 \leq \frac{x+1}{2} < 3$. How many possible values of x are there?

Answer

C Practice

C1 The number line shows the solution of $3x - 2 > k$. Work out k . [2 marks]



Answer

C2 Solve $\frac{2x+5}{3} < x-1$. [3 marks]

Answer

C3 Find the largest integer n such that $4n + 3 > 7n - 20$. [2 marks]

Answer

C4 Ali thinks of a whole number. Three times it, take away 5, is more than 20. Twice it is less than 22. What could it be? [3 marks]

Answer

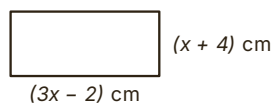
C5 R is the region where $y > 2x + 1$ and $x + y < 8$. Is the point $(2, 5)$ in R ? Give a reason. [2 marks]

D Exam-style questions

D1 Priya says, "No integer satisfies $-3 \leq 4 - x < 2$. When I take 4 off every part I get $-7 \leq -x < -2$, so $7 \leq x < 2$, and no number can be both." [3 marks]

Explain her mistake. Then list all the integers that do satisfy the inequality.

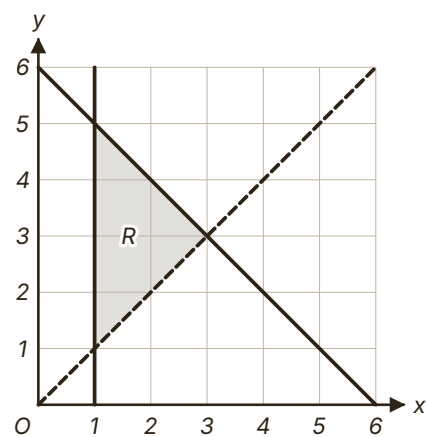
D2 The length of this rectangle is greater than its width, and its perimeter is at most 50 [4 marks]
cm. x is a whole number. Find all the possible values of x .



Not drawn accurately

Answer

D3 The region R is shaded on the grid. One of its three boundary lines is dashed.



(a) Write down the three inequalities that define R . [3 marks]

Answer

(b) The point $(k, 4)$ is in R . Find the range of possible values of k . [2 marks]

Answer

Total for D3: 5 marks

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 k is a positive whole number. The region $x \geq 0, y \geq 0, x + 2y \leq k$ contains exactly 25 points with whole-number coordinates (on its edges included). Find k . [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Count the points row by row: first $y = 0$, then $y = 1$, and so on.
- Hint 2** For $k = 6$ the rows hold 7, 5, 3 and 1 points.
- Hint 3** Try a larger even k and add the rows again.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can solve an inequality, turning the sign round for a negative. ☐ ☐ ☐

I can list the integers a double inequality allows. ☐ ☐ ☐

I can describe a region with inequalities. ☐ ☐ ☐