



Quadratic inequalities

About 55 minutes Calculator allowed 52 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** From chapter 16 [2 marks]

Find the largest integer x such that $4(x + 8) < x + 5$.

Answer

A runner covers 400 m, to the nearest 10 m, in 197 seconds, to the nearest second. Work out the lower bound of the runner's average speed.

Answer

A3 From chapter 17 [2 marks] **A4** Last lesson [2 marks]

The equation $16x^2 + kx + 81 = 0$ has exactly one solution. Find the positive value of k .

Answer

Find the coordinates of the points where $y = x^2 - 1$ meets $y = 6x - 6$.

Answer

B Example, then your turn

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

EXAMPLE 1

Solve $x^2 - 6x - 16 < 0$.

Hint Solve $x^2 - 6x - 16 = 0$ for the critical values. The curve is below the axis BETWEEN them.

B1 Solve $x^2 - 7x - 60 < 0$. [3 marks]

Answer $\dots < x < \dots$

EXAMPLE 2

Solve $x^2 - 8x - 65 \geq 0$.

Hint The critical values are -5 and 13 . The curve is above the axis OUTSIDE them, so there are two parts joined by "or".

B2 Solve $x^2 + 5x - 50 > 0$. [3 marks]

Answer $x < \dots$ or $x > \dots$

C Practice

C1 Solve $x^2 > 64$.

[2 marks]

Answer

C2 Solve $x^2 + 9x \geq 0$.

[2 marks]

Answer

C3 Solve $x^2 > 10x + 39$.

[3 marks]

Answer

C4 List the integers n for which $n^2 - 17n + 70 < 0$.

[3 marks]

Answer

C5 Solve $x^2 - 8x + 3 \leq 0$. Give the critical values correct to 2 decimal places.

[3 marks]

Answer

C6 Solve $3x^2 - 11x - 4 < 0$. Give your answer using set notation.

[3 marks]

Answer $\{x : \dots\}$

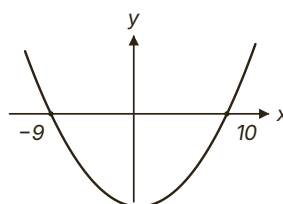
C7 The n th term of a sequence is $n^2 - 16n + 28$. How many terms of the sequence are negative?

[3 marks]

Answer

C8 The sketch shows the graph of $y = x^2 - x - 90$. It crosses the x -axis at -9 and 10 . Use the graph to solve $x^2 - x - 90 > 0$.

[2 marks]



Not drawn accurately

Answer

D Exam-style questions

D1 Mia solves $x^2 < 7x$. She divides both sides by x and writes " $x < 7$ ".

[3 marks]

Explain why Mia's answer is wrong, and solve $x^2 < 7x$ correctly.

Answer

D2 Here are two inequalities: $2x^2 - 11x + 5 \leq 0$ and $3x - 2 < 10$.

(a) Solve $2x^2 - 11x + 5 \leq 0$.

[3 marks]

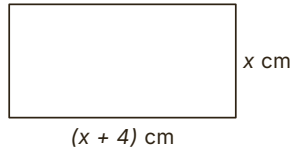
Answer

- (b) x is an integer that satisfies both inequalities. Find all the possible values of x . [2 marks]
You must show your working.

Answer

Total for D2: 5 marks

- D3** A rectangle is x cm wide and $(x + 4)$ cm long. Its area is more than 45 cm^2 and its perimeter is less than 40 cm.



Not drawn accurately

- (a) Show that $x^2 + 4x - 45 > 0$. [1 mark]

- (b) Find the range of possible values of x . [4 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** The equation $x^2 + kx + 2k = 0$ has no real roots. Find the range of possible values of k . [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** An equation has no real roots when $b^2 - 4ac < 0$.
Hint 2 Here $a = 1$, $b = k$ and $c = 2k$, so $k^2 - 8k < 0$.
Hint 3 $k(k - 8) < 0$: the critical values are 0 and 8, and the answer is between them.

How did it go?

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

I can find the critical values of a quadratic inequality. ☐ ☐ ☐

I can decide whether the answer is between the critical values or outside them. ☐ ☐ ☐

I can write the answer with the right signs, using "or" for two parts. ☐ ☐ ☐