HIGHER

8.6 Quadratic Inequalities: 2-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 120 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Solve the inequality $4x^2 - 1 \leq 0$.

(Total for Question 1 is 3 marks)

2 Solve $x^2 < 196$

(Total for Question 2 is 2 marks)

3 Solve $x^2 + 6x - 16 < 0$

(Total for Question 3 is 3 marks)

4 Solve $x^2 > 81$

(Total for Question 4 is 2 marks)

© Revision Library | revisionlibrary.co.uk

5 Solve $-x^2 + 2x + 15 > 0$

(Total for Question 5 is 4 marks)

---

6 Solve $x^2 - 2x - 8 < 0$

(Total for Question 6 is 3 marks)

---

7 Solve $x^2 \leq 100$

(Total for Question 7 is 2 marks)

---

8 Solve $x^2 \geq -6x - 8$

(Total for Question 8 is 4 marks)

---

9 Solve $x^2 < 9$

(Total for Question 9 is 2 marks)

© Revision Library | revisionlibrary.co.uk

10 Solve $x^2 - 4 < 0$

(Total for Question 10 is 3 marks)

11 Solve $4x^2 + 4x - 35 > 0$

(Total for Question 11 is 3 marks)

12 Write down all the integer values of x that satisfy $x^2 - x - 6 \leq 0$

(Total for Question 12 is 3 marks)

13 Solve $x^2 + x - 20 \leq 0$

(Total for Question 13 is 3 marks)

14 Solve $-x^2 - 2x < 0$

(Total for Question 14 is 4 marks)

© Revision Library | revisionlibrary.co.uk

15 Solve $x^2 + 7x + 6 < 0$

(Total for Question 15 is 3 marks)

16 Solve $x^2 - 3x + 2 < 0$

(Total for Question 16 is 3 marks)

17 Solve $3x^2 - 14x + 15 < 0$

(Total for Question 17 is 3 marks)

18 Solve $-x^2 - 7x - 6 < 0$

(Total for Question 18 is 4 marks)

19 Solve $x^2 > -12x - 35$

(Total for Question 19 is 4 marks)

© Revision Library | revisionlibrary.co.uk

20 Solve $4x^2 - 49 > 0$

(Total for Question 20 is 3 marks)

---

21 Solve $-x^2 - 5x + 6 < 0$

(Total for Question 21 is 4 marks)

---

22 Solve $x^2 < 4x + 21$

(Total for Question 22 is 4 marks)

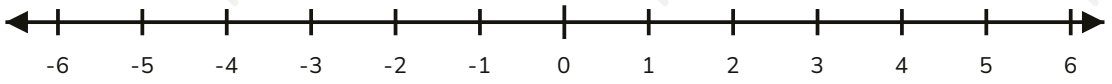
---

23 Solve $-x^2 - 11x - 30 < 0$

(Total for Question 23 is 4 marks)

© Revision Library | revisionlibrary.co.uk

24 Solve the inequality $x^2 - 4x - 5 < 0$. Represent your solution set on the number line below, using open circles to show the boundary values and shading (or hatching) the region that satisfies the inequality.



(Total for Question 24 is 4 marks)

---

25 Solve the inequality $2x^2 - 7x - 4 \geq 0$.

(Total for Question 25 is 4 marks)

© Revision Library | revisionlibrary.co.uk

26 Solve the inequality $3x^2 + x - 2 < 0$.

(Total for Question 26 is 4 marks)

---

27 Solve the inequality $x^2 - 4x - 7 > 0$, using the quadratic formula. Give your answer correct to 2 decimal places.

(Total for Question 27 is 5 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 8.6 Quadratic Inequalities: 2-hour Pack

Question 1

factorises as a difference of two squares (2x-1)(2x+1) or finds critical values x = 1/2, x = -1/2	**M1**
critical values x = -1/2 and x = 1/2 stated	**A1**
-1/2 ≤ x ≤ 1/2 oe (accept -0.5 ≤ x ≤ 0.5)	**A1**

Answer: -1/2 ≤ x ≤ 1/2

Question 2

critical values x = 14 and x = -14	**M1**
-14 < x < 14	**A1**

Answer: -14 < x < 14

Question 3

factorises or solves to find critical values -8 and 2	**M1**
sketch or sign analysis for a quadratic with a positive x^2 term	**M1**
-8 < x < 2	**A1**

Answer: -8 < x < 2

Question 4

critical values x = 9 and x = -9	**M1**
x < -9 or x > 9	**A1**

Answer: x < -9 or x > 9

Question 5

multiplies by -1 and reverses the inequality or factorises as -(x + 3)(x - 5)	**M1**
finds critical values	**M1**
uses an n-shaped sketch	**M1**
-3 < x < 5	**A1**

Answer: -3 < x < 5

Question 6

factorises or solves to find critical values -2 and 4	**M1**
sketch or sign analysis for a quadratic with a positive x^2 term	**M1**
-2 < x < 4	**A1**

Answer: -2 < x < 4

Question 7

critical values x = 10 and x = -10	**M1**
-10 ≤ x ≤ 10	**A1**

Answer: -10 ≤ x ≤ 10

Question 8

rearranges to $x^2 + 6x + 8 \geq 0$	**M1**
finds critical values	**M1**
correct region identified	**M1**
x ≤ -4 or x ≥ -2	**A1**

Answer: x ≤ -4 or x ≥ -2

Question 9

critical values x = 3 and x = -3	**M1**
-3 < x < 3	**A1**

Answer: -3 < x < 3

Question 10

factorises or solves to find critical values -2 and 2	**M1**
sketch or sign analysis for a quadratic with a positive x^2 term	**M1**
-2 < x < 2	**A1**

Answer: -2 < x < 2

Question 11

factorises or uses the quadratic formula	**M1**
critical values -7/2 and 5/2	**M1**
x < -7/2 or x > 5/2	**A1**

Answer: x < -7/2 or x > 5/2

Question 12

finds critical values	**M1**
correct range identified	**M1**
-2, -1, 0, 1, 2, 3	**A1**

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

Question 13

factorises or solves to find critical values -5 and 4	**M1**
sketch or sign analysis for a quadratic with a positive x^2 term	**M1**
-5 ≤ x ≤ 4	**A1**

Answer: -5 ≤ x ≤ 4

Question 14

multiplies by -1 and reverses the inequality or factorises as -x(x + 2)	**M1**
finds critical values	**M1**
uses an n-shaped sketch	**M1**
x < -2 or x > 0	**A1**

Answer: x < -2 or x > 0

Question 15

factorises or solves to find critical values -6 and -1	**M1**
sketch or sign analysis for a quadratic with a positive x^2 term	**M1**
-6 < x < -1	**A1**

Answer: -6 < x < -1

Question 16

factorises or solves to find critical values 1 and 2	**M1**
sketch or sign analysis for a quadratic with a positive x^2 term	**M1**
1 < x < 2	**A1**

Answer: 1 < x < 2

Question 17

factorises or uses the quadratic formula	**M1**
critical values 5/3 and 3	**M1**
5/3 < x < 3	**A1**

Answer: 5/3 < x < 3

© Revision Library | revisionlibrary.co.uk

Question 18

multiplies by -1 and reverses the inequality or factorises as -(x + 6)(x + 1)	**M1**
finds critical values	**M1**
uses an n-shaped sketch	**M1**
x < -6 or x > -1	**A1**

Answer: x < -6 or x > -1

Question 19

rearranges to $x^2 + 12x + 35 > 0$	**M1**
finds critical values	**M1**
correct region identified	**M1**
x < -7 or x > -5	**A1**

Answer: x < -7 or x > -5

Question 20

factorises or uses the quadratic formula	**M1**
critical values -7/2 and 7/2	**M1**
x < -7/2 or x > 7/2	**A1**

Answer: x < -7/2 or x > 7/2

Question 21

multiplies by -1 and reverses the inequality or factorises as -(x + 6)(x - 1)	**M1**
finds critical values	**M1**
uses an n-shaped sketch	**M1**
x < -6 or x > 1	**A1**

Answer: x < -6 or x > 1

Question 22

rearranges to $x^2 - 4x - 21 < 0$	**M1**
finds critical values	**M1**
correct region identified	**M1**
-3 < x < 7	**A1**

Answer: -3 < x < 7

Question 23

multiplies by -1 and reverses the inequality or factorises as -(x + 6)(x + 5)	**M1**
finds critical values	**M1**
uses an n-shaped sketch	**M1**
x < -6 or x > -5	**A1**

Answer: x < -6 or x > -5

Question 24

factorises (x-5)(x+1)	**M1**
critical values x = -1 and x = 5 stated	**A1**
open circles drawn at -1 and 5 on the number line (ft)	**B1**
correct region between -1 and 5 shaded or hatched (ft)	**B1**

Answer: -1 < x < 5, with open circles at -1 and 5 and the region between them shaded

Question 25

attempts to factorise $2x^2 - 7x - 4$	**M1**
(2x+1)(x-4) or critical values x = -1/2, x = 4	**A1**
identifies correct regions outside the roots (coefficient of x^2 positive, expression ≥ 0)	**M1**
x ≤ -1/2 or x ≥ 4 oe	**A1**

Answer: x ≤ -1/2 or x ≥ 4

Question 26

attempts to factorise $3x^2 + x - 2$	**M1**
(3x-2)(x+1) or critical values x = -1, x = 2/3	**A1**
identifies correct region between the roots (expression < 0)	**M1**
-1 < x < 2/3 oe	**A1**

Answer: -1 < x < 2/3

Question 27

substitutes a=1, b=-4, c=-7 into the quadratic formula correctly	**M1**
simplifies to $x = 2 \pm \sqrt{11}$ or decimal equivalents	**M1**
critical values awrt x = 5.32 and x = -1.32	**A1**
identifies correct regions outside the roots (coefficient of x^2 positive, expression > 0)	**M1**
x < -1.32 or x > 5.32 awrt 2dp	**A1**

Answer: x < -1.32 or x > 5.32 (2dp)

© Revision Library | revisionlibrary.co.uk