HIGHER

2.9 Quadratic Inequalities: Solving and Graphing Regions: 1-hour Pack

Total Marks

EDEXCEL 4MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Find all the integer values of x that satisfy $x^2 - 2x - 63 < 0$

(Total for Question 1 is 4 marks)

---

2 The region R is defined by the inequalities

$y \geq (x - 2)^2 - 2$ and $y < 1$

Find the number of points with integer coordinates that lie in R (including points on the boundary where the inequality allows it).

(Total for Question 2 is 4 marks)

---

3 Solve $x^2 > -x + 2$

(Total for Question 3 is 4 marks)

© Revision Library | revisionlibrary.co.uk

4 x satisfies both $x^2 - 12x + 27 \leq 0$ and $x + 2 < 8$.
Find the set of possible values of x.

(Total for Question 4 is 4 marks)

---

5 The quadratic equation $3x^2 - 6x + k = 0$ has equal roots.
Find the value of k.

(Total for Question 5 is 3 marks)

---

6 Find all the integer values of x that satisfy $x^2 - 11x + 18 \leq 0$

(Total for Question 6 is 4 marks)

---

7 Solve $-x^2 < x - 2$

(Total for Question 7 is 4 marks)

© Revision Library | revisionlibrary.co.uk

8 On the real number line, solve $2x^2 - 8x < 0$ by factorising and state the solution set.

(Total for Question 8 is 2 marks)

---

9 Solve $x^2 \geq 16$

(Total for Question 9 is 2 marks)

---

10 The quadratic equation $2x^2 + 3x + k = 0$ has two distinct real roots.
Find the range of values of k.

(Total for Question 10 is 3 marks)

---

11 Find all the integer values of x that satisfy $-x^2 - 15x - 56 > 0$

(Total for Question 11 is 4 marks)

---

12 The region R is defined by the inequalities
$y \geq x^2 - 1$ and $y \leq 3$
Find the number of points with integer coordinates that lie in R (including points on the boundary where the inequality allows it).

(Total for Question 12 is 4 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 2.9 Quadratic Inequalities: Solving and Graphing Regions: 1-hour Pack

Question 1

factorises to find the critical values	**M1**
critical values x = -7 and x = 9	**A1**
writes the solution set -7 < x < 9	**M1**
integers: -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8	**A1**

Answer: -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8

Question 2

finds where the curve meets the line y = 1: $(x - 2)^2 = 3$	**M1**
finds the possible integer x values, from the largest and smallest x with the curve not above the line	**M1**
counts the integer y values for each x: x = 1: 2, x = 2: 3, x = 3: 2	**M1**
total = 7	**A1**

Answer: 7

Question 3

rearranges to $x^2 + x - 2 > 0$	**M1**
factorises (or uses the formula) to find the critical values	**M1**
critical values x = -2 and x = 1	**A1**
x < -2 or x > 1	**A1**

Answer: x < -2 or x > 1

Question 4

factorises and finds the critical values of the quadratic inequality	**M1**
3 ≤ x ≤ 9	**A1**
solves the linear inequality to get x < 6	**M1**
overlap of the two solution sets: 3 ≤ x < 6	**A1**

Answer: 3 ≤ x < 6

Question 5

uses the discriminant $b^2 - 4ac = -6^2 - 4 \times 3 \times k = 36 - 12k$	**M1**
sets $b^2 - 4ac = 0$ for equal roots: 36 - 12k = 0	**M1**
k = 3	**A1**

Answer: k = 3

Question 6

factorises to find the critical values	**M1**
critical values x = 2 and x = 9	**A1**
writes the solution set 2 ≤ x ≤ 9	**M1**
integers: 2, 3, 4, 5, 6, 7, 8, 9	**A1**

Answer: 2, 3, 4, 5, 6, 7, 8, 9

Question 7

rearranges to $-x^2 - x + 2 < 0$	**M1**
factorises (or uses the formula) to find the critical values	**M1**
critical values x = -2 and x = 1	**A1**
x < -2 or x > 1	**A1**

Answer: x < -2 or x > 1

Question 8

factorises to 2x(x - 4) and identifies roots x = 0 and x = 4	**M1**
0 < x < 4, correct inequality notation	**A1**

Answer: 0 < x < 4

Question 9

critical values x = 4 and x = -4	**M1**
x ≤ -4 or x ≥ 4	**A1**

Answer: x ≤ -4 or x ≥ 4

Question 10

uses the discriminant $b^2 - 4ac = 3^2 - 4 \times 2 \times k = 9 - 8k$	**M1**
sets $b^2 - 4ac > 0$ for two distinct real roots: 9 - 8k > 0	**M1**
k < 9/8	**A1**

Answer: k < 9/8

Question 11

factorises to find the critical values	**M1**
critical values x = -8 and x = -7	**A1**
writes the solution set -8 < x < -7	**M1**
integers: none	**A1**

Answer: none

Question 12

finds where the curve meets the line y = 3: $(x)^2 = 4$	**M1**
finds the possible integer x values, from the largest and smallest x with the curve not above the line	**M1**
counts the integer y values for each x: x = -2: 1, x = -1: 4, x = 0: 5, x = 1: 4, x = 2: 1	**M1**
total = 15	**A1**

Answer: 15

© Revision Library | revisionlibrary.co.uk