2.4 Quadratic Inequalities: Test Pack

AQA 8365 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Which of the following is the correct solution to the inequality $x^2 - 16 \leq 0$?

- ☐ A) $x \leq -4$
- ☐ B) $x \geq 4$
- ☐ C) $-4 \leq x \leq 4$
- ☐ D) $x \leq -4$ or $x \geq 4$

(Total for Question 1 is 1 mark)

---

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

(Total for Question 2 is 3 marks)

---

3 Solve the inequality $x^2 \geq 49$. Give your answer using set notation with the union symbol.

(Total for Question 3 is 3 marks)

---

4 Solve $x^2 > 7$. Give any surds in their simplest form.

(Total for Question 4 is 2 marks)

© Revision Library | revisionlibrary.co.uk

5 Solve $x^2 + 7x + 12 < 0$.

(Total for Question 5 is 3 marks)

---

6 Solve $x^2 + 4x - 5 < 0$.

(Total for Question 6 is 3 marks)

---

7 Solve $x^2 + 7x \geq 8$.

(Total for Question 7 is 3 marks)

---

8 n is an integer. Write down all the values of n for which $n^2 - 8n + 12 < 0$.

(Total for Question 8 is 3 marks)

---

9 Solve $2x^2 + 19x + 42 < 0$.

(Total for Question 9 is 3 marks)

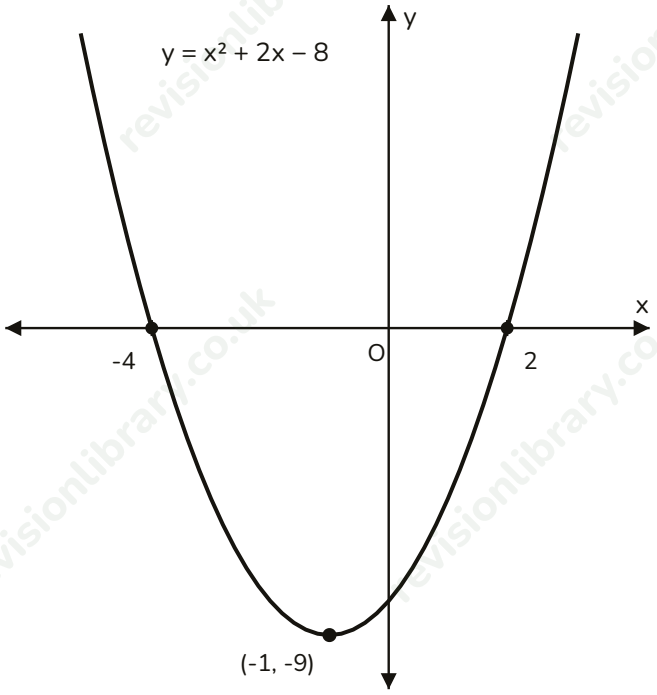
© Revision Library | revisionlibrary.co.uk

10 Find the values of x that satisfy both $x^2 - 16 < 0$ and $x < -3$.

(Total for Question 10 is 4 marks)

---

11 The graph of $y = x^2 + 2x - 8$ is sketched below. Use the sketch to write down the solution to $x^2 + 2x - 8 \geq 0$.



(Total for Question 11 is 2 marks)

© Revision Library | revisionlibrary.co.uk

12 Solve the inequality $x^2 - x - 6 \leq 0$. Hence write down all the integer values of x that satisfy the inequality.

(Total for Question 12 is 4 marks)

---

13 Find the set of values of x that satisfy both $x^2 - 9 < 0$ and $x + 1 > 0$.

(Total for Question 13 is 4 marks)

---

14 Show that $x^2 - 6x + 10 > 0$ for all real values of x.

(Total for Question 14 is 3 marks)

---

15 Solve the inequality $x^2 + 2x + 5 < 0$. Explain what your answer tells you about the graph of $y = x^2 + 2x + 5$.

(Total for Question 15 is 3 marks)

© Revision Library | revisionlibrary.co.uk

16 Solve the inequality $x^2 - 4x - 3 < 0$, giving your answer in surd form.

(Total for Question 16 is 2 marks)

---

17 The height, h metres, of a ball t seconds after being thrown is given by $h = 2 + 18t - 6t^2$. Find the values of t for which the ball is more than 14 metres above the ground.

(Total for Question 17 is 4 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 2.4 Quadratic Inequalities: Test Pack

Question 1

correct option identified (C)	**B1**

Answer: C) $-4 \leq x \leq 4$

Question 2

factorise to $(2x+1)(x-4)$	**M1**
correct critical values $x = -1/2$ and $x = 4$	**A1**
correct inequality $x \leq -1/2$ or $x \geq 4$ (oe)	**A1**

Answer: $x \leq -1/2$ or $x \geq 4$

Question 3

identify critical values $x = -7$ and $x = 7$	**M1**
correct inequality $x \leq -7$ or $x \geq 7$ (oe)	**A1**
correct set notation $\{x : x \leq -7\} \cup \{x : x \geq 7\}$ (oe)	**B1**

Answer: $\{x : x \leq -7\} \cup \{x : x \geq 7\}$

Question 4

critical values $x = \pm \sqrt{7}$ found and simplified	**M1**
$x < -\sqrt{7}$ or $x > \sqrt{7}$ cao	**A1**

Answer: $x < -\sqrt{7}$ or $x > \sqrt{7}$

Question 5

factorises or solves the equation correctly	**M1**
critical values -4 and -3	**A1**
$-4 < x < -3$ cao	**A1**

Answer: $-4 < x < -3$

Question 6

factorises or solves the equation correctly	**M1**
critical values -5 and 1	**A1**
$-5 < x < 1$ cao	**A1**

Answer: $-5 < x < 1$

Question 7

rearranges to $x^2 + 7x - 8 \geq 0$	**M1**
finds the critical values	**M1**
$x \leq -8$ or $x \geq 1$ cao	**A1**

Answer: $x \leq -8$ or $x \geq 1$

Question 8

finds the critical values	**M1**
$2 < n < 6$ seen	**A1**
integers 3, 4, 5 listed cao	**A1**

Answer: 3, 4, 5

Question 9

factorises or solves the related equation	**M1**
critical values -6 and -7/2	**A1**
$-6 < x < -7/2$ cao	**A1**

Answer: $-6 < x < -7/2$

Question 10

solves the quadratic inequality	**M1**
$-4 < x < 4$	**A1**
combines with the linear inequality (number line)	**M1**
$-4 < x < -3$ cao	**A1**

Answer: $-4 < x < -3$

Question 11

correctly reads roots $x = -4$ and $x = 2$ from the sketch	**B1**
correct inequality $x \leq -4$ or $x \geq 2$ (oe)	**B1**

Answer: $x \leq -4$ or $x \geq 2$

Question 12

factorise to $(x-3)(x+2)$	**M1**
correct critical values $x = -2$ and $x = 3$	**A1**
correct inequality $-2 \leq x \leq 3$ (oe)	**A1**
correct list of integers -2, -1, 0, 1, 2, 3 (ft from their inequality)	**B1**

Answer: $-2 \leq x \leq 3$; integers -2, -1, 0, 1, 2, 3

Question 13

solve $x^2-9<0$ to obtain $-3<x<3$	**M1**
correct $-3 < x < 3$	**A1**
solve $x+1>0$ to obtain $x>-1$	**M1**
correct combined interval $-1 < x < 3$ (ft)	**A1**

Answer: $-1 < x < 3$

Question 14

attempt to complete the square	**M1**
correct form $(x-3)^2 + 1$	**A1**
cso: since $(x-3)^2 \geq 0$ for all real x, $(x-3)^2+1 \geq 1 > 0$ for all real x	**A1**

Answer: $x^2 - 6x + 10 = (x-3)^2 + 1 > 0$ for all real x

Question 15

attempt discriminant $b^2-4ac = 4-20 = -16$, or complete the square to $(x+1)^2+4$	**M1**
correct conclusion: no real solutions (discriminant negative / minimum value $4 > 0$)	**A1**
correct interpretation: the graph of $y=x^2+2x+5$ never crosses or touches the x-axis (lies entirely above it)	**B1**

Answer: No real solutions; the graph lies entirely above the x-axis

Question 16

apply the quadratic formula with $a=1$, $b=-4$, $c=-3$ to find roots $x = 2 - \sqrt{7}$ and $x = 2 + \sqrt{7}$	**M1**
$2 - \sqrt{7} < x < 2 + \sqrt{7}$ (oe)	**A1**

Answer: $2 - \sqrt{7} < x < 2 + \sqrt{7}$

© Revision Library | revisionlibrary.co.uk

Question 17

form inequality $2+18t-6t^2>14$	**M1**
rearrange and simplify (e.g. divide by -6, reversing) to $t^2-3t+2<0$	**M1**
factorise to (t-1)(t-2)	**M1**
correct final answer $1 < t < 2$ (seconds) (oe)	**A1**

Answer: $1 < t < 2$ (seconds)

© Revision Library | revisionlibrary.co.uk