HIGHER

8.6D Quadratic Inequalities: Fluency and Exam Drill

Total Marks

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Solve the inequality $x^2 - 5x + 6 < 0$. Give your answer in inequality form.

(Total for Question 1 is 2 marks)

2 Solve the inequality $x^2 - 9 \leq 0$. Give your answer in inequality form.

(Total for Question 2 is 2 marks)

3 Solve the inequality $2x^2 - 8x \geq 0$. Give your answer in inequality form.

(Total for Question 3 is 2 marks)

4 Solve the inequality $-x^2 + 4x < 0$. Give your answer in inequality form.

(Total for Question 4 is 2 marks)

5 Solve the inequality $x^2 + 2x - 15 > 0$. Give your answer in inequality form.

(Total for Question 5 is 2 marks)

6 Solve the inequality $(x-1)(x+2) \geq 0$. Give your answer both in inequality form and in set notation.

(Total for Question 6 is 3 marks)

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7 Solve the inequality $x^2 - 4x + 4 \leq 0$. Give your answer in inequality form.

(Total for Question 7 is 2 marks)

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8 Solve the inequality $(1/2)x^2 - (3/2)x < 0$. Give your answer in inequality form.

(Total for Question 8 is 2 marks)

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9 Solve the inequality $3x^2 + x - 4 \leq 0$. Give your answer in inequality form.

(Total for Question 9 is 3 marks)

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10 Solve the inequality $-(2x^2 - 5x - 3) > 0$. Give your answer in inequality form.

(Total for Question 10 is 3 marks)

11 Solve the inequality $x^2 - x - 6 \geq 0$. Give your answer both in inequality form and in set notation.

(Total for Question 11 is 3 marks)

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12 a) Solve the inequality $x^2 - 6x + 5 < 0$.

b) Express the solution from part (a) in set notation.

(a) Solve the inequality $x^2 - 6x + 5 < 0$. **(2)**

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(b) Express the solution from part (a) in set notation. **(2)**

(Total for Question 12 is 4 marks)

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13 Solve the inequality $(x-2)(2x+3) > 0$. Give your answer in inequality form.

(Total for Question 13 is 2 marks)

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14 Solve the inequality $x^2 + 4x + 3 < 0$. Give your answer in inequality form.

(Total for Question 14 is 2 marks)

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15 Solve the inequality $x^2 - 2x - 1 > 0$. Give your answer in exact form.

(Total for Question 15 is 3 marks)

16 Solve the inequality $-x^2 + 6x - 8 \geq 0$. Give your answer in inequality form.

(Total for Question 16 is 3 marks)

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17 Solve the inequality $x^2 - 5x + 6 < x - 1$. Give your answer in inequality form.

(Total for Question 17 is 3 marks)

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18 For which integer values of n is $n^2 - 7n + 10 < 0$? Give your answer as a list of integers.

(Total for Question 18 is 2 marks)

Mark scheme · 8.6D Quadratic Inequalities: Fluency and Exam Drill

Question 1

- **M1** factorise to (x-2)(x-3) or identify roots x=2,3
- **A1** 2 < x < 3 cao
- **Answer: 2 < x < 3 (inequality form: 2 < x < 3)**

Question 2

- **M1** factorise to (x-3)(x+3) or identify roots x=-3,3
- **A1** -3 ≤ x ≤ 3 cao
- **Answer: -3 ≤ x ≤ 3**

Question 3

- **M1** factorise to 2x(x-4) and identify roots x=0 and x=4
- **A1** x ≤ 0 or x ≥ 4 cao
- **Answer: x ≤ 0 or x ≥ 4**

Question 4

- **M1** rearrange or factorise, e.g. -x(x-4) < 0 or multiply by -1 giving x^2 -4x > 0
- **A1** x < 0 or x > 4 cao
- **Answer: x < 0 or x > 4**

Question 5

- **M1** factorise to (x+5)(x-3) or identify roots x=-5,3
- **A1** x < -5 or x > 3 cao
- **Answer: x < -5 or x > 3**

Question 6

- **M1** identify roots x = 1 and x = -2 and sign on intervals
- **M1** state inequality form x ≤ -2 or x ≥ 1
- **A1** set notation: (-infty, -2] U [1, +infty) cao
- **Answer: Inequality form: x ≤ -2 or x ≥ 1. Set notation: (-infty, -2] U [1, +infty)**

Question 7

- **M1** recognise $(x-2)^2 \leq 0$ so repeated root x=2
- **A1** x = 2 cao
- **Answer: x = 2**

Question 8

- **M1** multiply by 2 to get x^2 - 3x < 0 and factor to x(x-3)<0
- **A1** 0 < x < 3 cao
- **Answer: 0 < x < 3**

Question 9

- **M1** use quadratic formula or factorisation to find roots x = 1 and x = -4/3
- **M1** order the roots and decide region where quadratic ≤ 0 (parabola up)
- **A1** -4/3 ≤ x ≤ 1 cao
- **Answer: -4/3 ≤ x ≤ 1**

Question 10

- **M1** multiply by -1 (flip inequality) to get $2x^2 - 5x - 3 < 0$ and find roots
- **M1** calculate roots x = -1/2 and x = 3
- **A1** -1/2 < x < 3 cao
- **Answer: -1/2 < x < 3**

Question 11

- **M1** factorise to (x-3)(x+2) and identify roots -2 and 3
- **M1** decide sign: $x \leq -2$ or $x \geq 3$
- **A1** set notation: (-infty, -2] U [3, +infty) cao
- **Answer: Inequality form: $x \leq -2$ or $x \geq 3$. Set notation: (-infty, -2] U [3, +infty)**

Question 12

- (a) **M1** factorise to (x-1)(x-5) or identify roots 1 and 5
- (a) **A1** 1 < x < 5 cao
- **(a) Answer: 1 < x < 5**
- (b) **M1** convert interval to set notation
- (b) **A1** (1, 5) cao
- **(b) Answer: (1, 5)**

Question 13

- **M1** find roots x = 2 and x = -3/2 and test sign regions
- **A1** x < -3/2 or x > 2 cao
- **Answer: x < -3/2 or x > 2**

Question 14

- **M1** factorise to (x+1)(x+3) or complete the square to find roots -3 and -1
- **A1** -3 < x < -1 cao
- **Answer: -3 < x < -1**

Question 15

- **M1** use quadratic formula to find roots $x = 1 \pm \sqrt{2}$
- **M1** state sign regions for parabola opening up
- **A1** $x < 1 - \sqrt{2}$ or $x > 1 + \sqrt{2}$ cao
- **Answer: $x < 1 - \sqrt{2}$ or $x > 1 + \sqrt{2}$**

Question 16

- **M1** multiply by -1 (flip inequality) to get $x^2 - 6x + 8 \leq 0$ and factor to (x-2)(x-4)
- **M1** identify interval between roots
- **A1** $2 \leq x \leq 4$ cao
- **Answer: $2 \leq x \leq 4$**

Question 17

- **M1** bring all terms to LHS to form $x^2 - 6x + 7 < 0$ and use quadratic formula to find roots
- **M1** compute roots $x = 3 \pm \sqrt{2}$ and identify interval between roots
- **A1** $3 - \sqrt{2} < x < 3 + \sqrt{2}$ cao
- **Answer: $3 - \sqrt{2} < x < 3 + \sqrt{2}$**

Question 18

- **M1** factorise to (n-5)(n-2) and identify range 2 < n < 5
- **A1** n = 3, 4 cao
- **Answer: n = 3, 4**