HIGHER

8.6 Quadratic Inequalities: 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

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

(Total for Question 1 is 2 marks)

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

(Total for Question 2 is 2 marks)

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3 Solve the inequality $x^2 \leq 25$.

(Total for Question 3 is 2 marks)

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4 Solve the inequality $x^2 - 9 > 0$.

(Total for Question 4 is 3 marks)

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5 Solve the inequality $x^2 - 16 \geq 0$.

(Total for Question 5 is 3 marks)

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6 Solve the inequality $x^2 + x - 6 \leq 0$.

(Total for Question 6 is 3 marks)

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

(Total for Question 7 is 3 marks)

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

(Total for Question 8 is 2 marks)

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

(Total for Question 9 is 3 marks)

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

(Total for Question 10 is 3 marks)

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11 Solve the inequality $x^2 - 2x - 15 > 0$, giving your answer in set notation.

(Total for Question 11 is 3 marks)

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12 Solve the inequality $x(x - 3) \leq 10$.

(Total for Question 12 is 4 marks)

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13 Given that $x > 0$, solve the inequality $4 < x^2 < 25$.

(Total for Question 13 is 4 marks)

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14 Write down all the integer values of x that satisfy $x^2 + 2x - 35 < 0$

(Total for Question 14 is 3 marks)

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

(Total for Question 15 is 3 marks)

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16 Find the set of values of x for which $x^2 - 5x + 6 > 0$ and $2x - 3 < 7$.

(Total for Question 16 is 5 marks)

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Mark scheme · 8.6 Quadratic Inequalities: 1-hour Pack

Question 1

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

Answer: x = 2

Question 2

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

Answer: 0 < x < 3

Question 3

identifies critical values x = 5 and x = -5	**M1**
-5 ≤ x ≤ 5 oe	**A1**

Answer: -5 ≤ x ≤ 5

Question 4

factorises (x-3)(x+3) or finds critical values x = 3, x = -3	**M1**
critical values x = 3 and x = -3 stated	**A1**
x < -3 or x > 3 oe	**A1**

Answer: x < -3 or x > 3

Question 5

factorises (x-4)(x+4) or finds critical values x = 4, x = -4	**M1**
critical values x = 4 and x = -4 stated	**A1**
x ≤ -4 or x ≥ 4 oe	**A1**

Answer: x ≤ -4 or x ≥ 4

Question 6

factorises (x+3)(x-2)	**M1**
critical values x = -3 and x = 2 stated	**A1**
-3 ≤ x ≤ 2 oe cao	**A1**

Answer: -3 ≤ x ≤ 2

Question 7

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

Answer: -1/2 < x < 3

Question 8

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

Answer: x < -3/2 or x > 2

Question 9

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	**M1**
2 ≤ x ≤ 4 cao	**A1**

Answer: 2 ≤ x ≤ 4

Question 10

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)	**M1**
-4/3 ≤ x ≤ 1 cao	**A1**

Answer: -4/3 ≤ x ≤ 1

Question 11

factorises (x-5)(x+3) or finds critical values x = -3, x = 5	**M1**
x < -3 or x > 5 oe	**A1**
correct set notation {x : x < -3} u {x : x > 5} (ft)	**B1**

Answer: {x : x < -3} u {x : x > 5}

Question 12

expands to $x^2 - 3x \leq 10$	**M1**
rearranges to $x^2 - 3x - 10 \leq 0$	**M1**
factorises (x-5)(x+2)	**M1**
-2 ≤ x ≤ 5 oe	**A1**

Answer: -2 ≤ x ≤ 5

Question 13

solves $x^2 > 4$ to find critical value x = 2	**M1**
x > 2, using x > 0 oe	**A1**
solves $x^2 < 25$ to find critical value x = 5	**M1**
2 < x < 5 (final answer, ft)	**A1**

Answer: 2 < x < 5

Question 14

finds critical values	**M1**
correct range identified	**M1**
-6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4	**A1**

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

Question 15

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	**M1**
$3 - \sqrt{2} < x < 3 + \sqrt{2}$ cao	**A1**

Answer: $3 - \sqrt{2} < x < 3 + \sqrt{2}$

Question 16

factorises (x-2)(x-3) or finds critical values 2, 3 for the quadratic inequality	**M1**
x < 2 or x > 3	**A1**
solves the linear inequality 2x - 3 < 7	**M1**
x < 5	**A1**
correctly combines both solution sets to give x < 2 or 3 < x < 5	**A1**

Answer: x < 2 or 3 < x < 5

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