2.4 Quadratic Inequalities: 1-hour Pack

AQA 8365 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Solve $x^2 + 8x - 9 > 0$.

(Total for Question 1 is 3 marks)

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2 Solve $2x^2 - 17x + 35 \leq 0$.

(Total for Question 2 is 3 marks)

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3 Solve $x^2 - 4x - 45 \geq 0$.

(Total for Question 3 is 3 marks)

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4 Solve $x^2 + 3x \leq 40$.

(Total for Question 4 is 3 marks)

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5 Solve $x^2 - 7x - 18 \leq 0$.

(Total for Question 5 is 3 marks)

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6 Find the range of values of k for which $4x^2 + kx + 1 = 0$ has no real roots.

(Total for Question 6 is 3 marks)

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7 Solve $-4x^2 + 16x - 7 \leq 0$.

(Total for Question 7 is 3 marks)

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8 Find the values of x that satisfy both $x^2 - 25 < 0$ and $x < -3$.

(Total for Question 8 is 4 marks)

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9 Solve $x^2 - 6x > -5$.

(Total for Question 9 is 3 marks)

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10 Solve $2x^2 < 10$. Give any surds in their simplest form.

(Total for Question 10 is 3 marks)

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11 Find the range of values of k for which $5x^2 + kx + 5 = 0$ has real roots.

(Total for Question 11 is 3 marks)

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12 Solve $x^2 + 11x + 28 > 0$.

(Total for Question 12 is 3 marks)

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13 n is an integer. Write down all the values of n for which $n^2 + 6n + 5 \leq 0$.

(Total for Question 13 is 3 marks)

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14 Solve $x^2 - 10x + 16 > 0$.

(Total for Question 14 is 3 marks)

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15 Find the set of values of x that satisfy both $x^2 - 9 \leq 0$ and $2x + 3 > 0$.

(Total for Question 15 is 3 marks)

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16 A rectangular lawn has length $(x + 7)$ metres and width $(x - 2)$ metres, where $x > 2$. The area of the lawn is greater than 70 m². Form and solve an inequality to find the range of possible values of x.

(Total for Question 16 is 3 marks)

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17 Solve the inequality $x^4 - 29x^2 + 100 < 0$.

(Total for Question 17 is 5 marks)

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Mark scheme · 2.4 Quadratic Inequalities: 1-hour Pack

Question 1

factorises or solves the equation correctly	**M1**
critical values -9 and 1	**A1**
$x < -9$ or $x > 1$ cao	**A1**

Answer: $x < -9$ or $x > 1$

Question 2

factorises or solves the related equation	**M1**
critical values 7/2 and 5	**A1**
$7/2 \leq x \leq 5$ cao	**A1**

Answer: $7/2 \leq x \leq 5$

Question 3

factorises or solves the equation correctly	**M1**
critical values -5 and 9	**A1**
$x \leq -5$ or $x \geq 9$ cao	**A1**

Answer: $x \leq -5$ or $x \geq 9$

Question 4

rearranges to $x^2 + 3x - 40 \leq 0$	**M1**
finds the critical values	**M1**
$-8 \leq x \leq 5$ cao	**A1**

Answer: $-8 \leq x \leq 5$

Question 5

factorises or solves the equation correctly	**M1**
critical values -2 and 9	**A1**
$-2 \leq x \leq 9$ cao	**A1**

Answer: $-2 \leq x \leq 9$

Question 6

$k^2 - 4(4)(1) < 0$	**M1**
critical values $k = \pm 4$	**M1**
$-4 < k < 4$ cao	**A1**

Answer: $-4 < k < 4$

Question 7

factorises or solves the related equation after dividing by -1	**M1**
critical values 1/2 and 7/2	**A1**
$x \leq 1/2$ or $x \geq 7/2$ cao	**A1**

Answer: $x \leq 1/2$ or $x \geq 7/2$

Question 8

solves the quadratic inequality	**M1**
$-5 < x < 5$	**A1**
combines with the linear inequality (number line)	**M1**
$-5 < x < -3$ cao	**A1**

Answer: $-5 < x < -3$

Question 9

rearranges to $x^2 - 6x + 5 > 0$	**M1**
finds the critical values	**M1**
$x < 1$ or $x > 5$ cao	**A1**

Answer: $x < 1$ or $x > 5$

Question 10

divides by 2: $x^2 < 5$	**M1**
critical values $x = \pm \sqrt{5}$ found and simplified	**M1**
$-\sqrt{5} < x < \sqrt{5}$ cao	**A1**

Answer: $-\sqrt{5} < x < \sqrt{5}$

Question 11

$k^2 - 4(5)(5) \geq 0$	**M1**
critical values $k = \pm 10$	**M1**
$k \leq -10$ or $k \geq 10$ cao	**A1**

Answer: $k \leq -10$ or $k \geq 10$

Question 12

factorises or solves the equation correctly	**M1**
critical values -7 and -4	**A1**
$x < -7$ or $x > -4$ cao	**A1**

Answer: $x < -7$ or $x > -4$

Question 13

finds the critical values	**M1**
$-5 \leq n \leq -1$ seen	**A1**
integers -5, -4, -3, -2, -1 listed cao	**A1**

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

Question 14

factorises or solves the equation correctly	**M1**
critical values 2 and 8	**A1**
$x < 2$ or $x > 8$ cao	**A1**

Answer: $x < 2$ or $x > 8$

Question 15

solve $x^2-9 \leq 0$ to obtain $-3 \leq x \leq 3$	**M1**
solve $2x+3>0$ to obtain $x>-1.5$	**M1**
correct combined interval $-1.5 < x \leq 3$ (ft)	**A1**

Answer: $-1.5 < x \leq 3$

Question 16

form inequality $(x+7)(x-2)>70$, i.e. $x^2+5x-84>0$	**M1**
factorise to $(x+12)(x-7)$	**M1**
correct final answer $x > 7$, rejecting $x < -12$ as it contradicts $x > 2$ (cao)	**A1**

Answer: $x > 7$

Question 17

substitute $u=x^2$ to obtain $u^2-29u+100<0$	**M1**
factorise to $(u-25)(u-4)<0$	**M1**
correct critical values $u = 4$ and $u = 25$, giving $4 < u < 25$	**A1**
convert to $4 < x^2 < 25$, splitting into $x^2>4$ and $x^2<25$	**M1**
fully correct final answer $-5 < x < -2$ or $2 < x < 5$ (oe)	**A1**

Answer: $-5 < x < -2$ or $2 < x < 5$

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