2.1 Algebraic Fractions: Simplifying, Multiplying and Dividing: 2-hour Pack

AQA 8365 · Calculator allowed · about 120 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Simplify fully $(x^2 - 1) / (x^2 + 4x + 3)$.

(Total for Question 1 is 3 marks)

2 Simplify fully $4(2x - 1) / (2(2x - 1)(2x - 7))$.

(Total for Question 2 is 3 marks)

3 Simplify fully $(x^2 + 9x + 20)/(x^2 + 8x + 15) \times (x^2 - 9)/(x^2 + x - 20)$.

(Total for Question 3 is 4 marks)

4 Simplify fully $(x^2 - 64) / (x^2 + 4x - 32)$.

(Total for Question 4 is 3 marks)

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5 Simplify fully $5(x^2 + 11x + 30) / (3x + 15)$.

(Total for Question 5 is 3 marks)

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6 Simplify fully $(20x^2 - 43x + 21) / (25x^2 - 20x - 21)$.

(Total for Question 6 is 3 marks)

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7 Simplify fully $(x^2 + 12x + 35) / (x + 7)$.

(Total for Question 7 is 3 marks)

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8 Simplify fully $(x^2 - 121) / (x^2 + 12x + 11)$.

(Total for Question 8 is 3 marks)

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9 Simplify fully $(x^2 + 5x + 4)/(x^2 + 5x - 24) \times (x^2 - 5x + 6)/(x^2 + 9x + 20)$.

(Total for Question 9 is 4 marks)

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10 Simplify fully $(x^2 - 4) / (x^2 - 4x - 12)$.

(Total for Question 10 is 3 marks)

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11 Simplify fully $3(x + 3) / (3(x + 3)(2x - 1))$.

(Total for Question 11 is 3 marks)

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12 Simplify fully $(x^2 - 36) / (x^2 - 3x - 54)$.

(Total for Question 12 is 3 marks)

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13 Simplify fully $4(x^2 - 25) / (5x - 25)$.

(Total for Question 13 is 3 marks)

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14 Simplify fully $(x^2 - 64) / (x^2 - x - 72)$.

(Total for Question 14 is 3 marks)

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15 Simplify fully $(x^2 - 4x - 5) / (x + 1)$.

(Total for Question 15 is 3 marks)

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16 Simplify fully $(x^2 - 121) / (x^2 + 18x + 77)$.

(Total for Question 16 is 3 marks)

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17 Simplify fully $(x^2 - 3x - 10)/(x^2 - 4x - 21) \times (x^2 - x - 42)/(x^2 + 10x + 16)$.

(Total for Question 17 is 4 marks)

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18 Simplify fully $(x^2 - 144) / (x^2 + 11x - 12)$.

(Total for Question 18 is 3 marks)

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19 Simplify fully $4(3x + 4) / (3(3x + 4)(3x - 2))$.

(Total for Question 19 is 3 marks)

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20 Simplify fully $(x^2 - 3x + 2)/(x + 3) / ((x - 2)/(x^2 - x - 12))$.

(Total for Question 20 is 4 marks)

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21 Simplify fully $(x^2 + 6x - 16) / (x - 2)$.

(Total for Question 21 is 3 marks)

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22 Simplify fully $(x^2 - 12x + 35)/(x^2 - 3x + 2) \times (x^2 - 4)/(x^2 + 2x - 35)$.

(Total for Question 22 is 4 marks)

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23 Simplify fully $2(x^2 + 8x + 12) / (5x + 30)$.

(Total for Question 23 is 3 marks)

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24 Simplify fully $(x^2 + 2x - 48)/(x + 5) / ((x - 6)/(x^2 + 7x + 10))$.

(Total for Question 24 is 4 marks)

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25 Simplify fully $(x^2 - 7x + 12) / (x - 3)$.

(Total for Question 25 is 3 marks)

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26 Simplify fully $(x^2 + x - 30)/(x^2 - 3x - 10) \times (x^2 - 6x + 5)/(x^2 + 2x - 24)$.

(Total for Question 26 is 4 marks)

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27 Simplify fully $(x^2 - 3x - 4)/(x^2 - 5x + 4) \times (x^2 + x - 2)/(x^2 - 11x + 28)$.

(Total for Question 27 is 4 marks)

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28 Simplify fully $2(x^2 + 6x + 5) / (5x + 5)$.

(Total for Question 28 is 3 marks)

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29 Simplify fully $(x^2 - 8x + 12)/(x^2 - 8x + 15) \times (x^2 + x - 30)/(x^2 + 2x - 48)$.

(Total for Question 29 is 4 marks)

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30 Simplify fully $(x^4-81)/(x^2-9)$

(Total for Question 30 is 4 marks)

31 Simplify fully $(x^2-6x+9)/(x^2-9) \div (3-x)/(x+3)$

(Total for Question 31 is 5 marks)

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Mark scheme · 2.1 Algebraic Fractions: Simplifying, Multiplying and Dividing: 2-hour Pack

Question 1

$x^2 - 1 = (x + 1)(x - 1)$	**M1**
denominator = $(x + 1)(x + 3)$	**M1**
$(x - 1)/(x + 3)$ oe cao	**A1**

Answer: $(x - 1)/(x + 3)$

Question 2

identifies the common factor $(2x - 1)$	**M1**
cancels numerical factor	**M1**
$2/(2x - 7)$ oe cao	**A1**

Answer: $2/(2x - 7)$

Question 3

factorises at least two of the four quadratics	**M1**
factorises all four quadratics	**M1**
cancels common factors	**M1**
$(x + 4)(x - 3)/((x + 5)(x - 4))$ oe cao	**A1**

Answer: $(x + 4)(x - 3)/((x + 5)(x - 4))$

Question 4

$x^2 - 64 = (x + 8)(x - 8)$	**M1**
denominator = $(x + 8)(x - 4)$	**M1**
$(x - 8)/(x - 4)$ oe cao	**A1**

Answer: $(x - 8)/(x - 4)$

Question 5

factorises $x^2 + 11x + 30 = (x + 5)(x + 6)$	**M1**
factorises denominator = $3(x + 5)$	**M1**
$5(x + 6)/3$ oe cao	**A1**

Answer: $5(x + 6)/3$

Question 6

factorises numerator: $(5x - 7)(4x - 3)$	**M1**
factorises denominator: $(5x - 7)(5x + 3)$	**M1**
$(4x - 3)/(5x + 3)$ oe cao	**A1**

Answer: $(4x - 3)/(5x + 3)$

Question 7

factorises the numerator as $(x + 7)(x + 5)$	**M1**
cancels the common factor	**M1**
$x + 5$ cao	**A1**

Answer: $x + 5$

Question 8

$x^2 - 121 = (x + 11)(x - 11)$	**M1**
denominator = $(x + 11)(x + 1)$	**M1**
$(x - 11)/(x + 1)$ oe cao	**A1**

Answer: $(x - 11)/(x + 1)$

Question 9

factorises at least two of the four quadratics	**M1**
factorises all four quadratics	**M1**
cancels common factors	**M1**
$(x + 1)(x - 2)/((x + 8)(x + 5))$ oe cao	**A1**

Answer: $(x + 1)(x - 2)/((x + 8)(x + 5))$

Question 10

$x^2 - 4 = (x + 2)(x - 2)$	**M1**
denominator = $(x + 2)(x - 6)$	**M1**
$(x - 2)/(x - 6)$ oe cao	**A1**

Answer: $(x - 2)/(x - 6)$

Question 11

identifies the common factor $(x + 3)$	**M1**
cancels numerical factor	**M1**
$1/(2x - 1)$ oe cao	**A1**

Answer: $1/(2x - 1)$

Question 12

$x^2 - 36 = (x + 6)(x - 6)$	**M1**
denominator = $(x + 6)(x - 9)$	**M1**
$(x - 6)/(x - 9)$ oe cao	**A1**

Answer: $(x - 6)/(x - 9)$

Question 13

factorises $x^2 - 25 = (x - 5)(x + 5)$	**M1**
factorises denominator = $5(x - 5)$	**M1**
$4(x + 5)/5$ oe cao	**A1**

Answer: $4(x + 5)/5$

Question 14

$x^2 - 64 = (x + 8)(x - 8)$	**M1**
denominator = $(x + 8)(x - 9)$	**M1**
$(x - 8)/(x - 9)$ oe cao	**A1**

Answer: $(x - 8)/(x - 9)$

Question 15

factorises the numerator as $(x + 1)(x - 5)$	**M1**
cancels the common factor	**M1**
$x - 5$ cao	**A1**

Answer: $x - 5$

Question 16

$x^2 - 121 = (x + 11)(x - 11)$	**M1**
denominator = $(x + 11)(x + 7)$	**M1**
$(x - 11)/(x + 7)$ oe cao	**A1**

Answer: $(x - 11)/(x + 7)$

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Question 17

factorises at least two of the four quadratics	**M1**
factorises all four quadratics	**M1**
cancels common factors	**M1**
(x - 5)(x + 6)/((x + 3)(x + 8)) oe cao	**A1**

Answer: (x - 5)(x + 6)/((x + 3)(x + 8))

Question 18

x^2 - 144 = (x + 12)(x - 12)	**M1**
denominator = (x + 12)(x - 1)	**M1**
(x - 12)/(x - 1) oe cao	**A1**

Answer: (x - 12)/(x - 1)

Question 19

identifies the common factor (3x + 4)	**M1**
cancels numerical factor	**M1**
4/(3(3x - 2)) oe cao	**A1**

Answer: 4/(3(3x - 2))

Question 20

inverts the second fraction and multiplies	**M1**
factorises both quadratics	**M1**
cancels common factors	**M1**
(x - 1)(x - 4) oe cao	**A1**

Answer: (x - 1)(x - 4)

Question 21

factorises the numerator as (x - 2)(x + 8)	**M1**
cancels the common factor	**M1**
x + 8 cao	**A1**

Answer: x + 8

Question 22

factorises at least two of the four quadratics	**M1**
factorises all four quadratics	**M1**
cancels common factors	**M1**
(x - 7)(x + 2)/((x - 1)(x + 7)) oe cao	**A1**

Answer: (x - 7)(x + 2)/((x - 1)(x + 7))

Question 23

factorises x^2 + 8x + 12 = (x + 6)(x + 2)	**M1**
factorises denominator = 5(x + 6)	**M1**
2(x + 2)/5 oe cao	**A1**

Answer: 2(x + 2)/5

Question 24

inverts the second fraction and multiplies	**M1**
factorises both quadratics	**M1**
cancels common factors	**M1**
(x + 8)(x + 2) oe cao	**A1**

Answer: (x + 8)(x + 2)

Question 25

factorises the numerator as (x - 3)(x - 4)	**M1**
cancels the common factor	**M1**
x - 4 cao	**A1**

Answer: x - 4

Question 26

factorises at least two of the four quadratics	**M1**
factorises all four quadratics	**M1**
cancels common factors	**M1**
(x - 5)(x - 1)/((x + 2)(x - 4)) oe cao	**A1**

Answer: (x - 5)(x - 1)/((x + 2)(x - 4))

Question 27

factorises at least two of the four quadratics	**M1**
factorises all four quadratics	**M1**
cancels common factors	**M1**
(x + 1)(x + 2)/((x - 4)(x - 7)) oe cao	**A1**

Answer: (x + 1)(x + 2)/((x - 4)(x - 7))

Question 28

factorises x^2 + 6x + 5 = (x + 1)(x + 5)	**M1**
factorises denominator = 5(x + 1)	**M1**
2(x + 5)/5 oe cao	**A1**

Answer: 2(x + 5)/5

Question 29

factorises at least two of the four quadratics	**M1**
factorises all four quadratics	**M1**
cancels common factors	**M1**
(x - 2)(x + 6)/((x - 3)(x + 8)) oe cao	**A1**

Answer: (x - 2)(x + 6)/((x - 3)(x + 8))

Question 30

recognises x^4-81 as a difference of two squares $(x^2)^2 - 9^2$	**M1**
factorises to $(x^2-9)(x^2+9)$	**M1**
cancels (x^2-9) with the denominator	**M1**
x^2+9 cao	**A1**

Answer: x^2+9

Question 31

factorises x^2-6x+9 as $(x-3)^2$	**M1**
factorises x^2-9 as (x-3)(x+3)	**M1**
recognises 3-x = -(x-3)	**M1**
inverts the second fraction and multiplies, cancelling $(x-3)^2$ and (x+3) correctly	**M1**
-1 cao	**A1**

Answer: -1

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