2.2 Algebra: Equations: 2-hour Pack

Calculator allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Solve the equation 3x - 7 = 11.

(2)

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2 Solve each equation. There are brackets on both sides.

(a) 3(x + 4) = 2(x + 9) **(3)**

(b) 5(2x - 3) = 3(3x + 1) **(3)**

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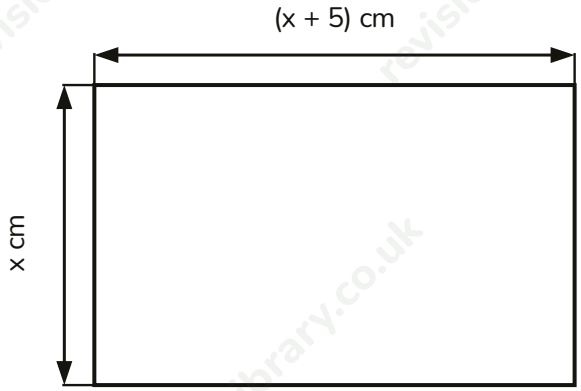
3 Solve the equation 5x - 4 = 2x + 11.

(3)

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4 A rectangle has length (x + 5) cm and width x cm. The perimeter of the rectangle is 46 cm.

Diagram NOT accurately drawn



(a) Write an equation in x for the perimeter of the rectangle. **(1)**

(b) Solve your equation to find x. **(2)**

(c) Hence find the length of the rectangle. **(1)**

5 Three consecutive integers have a sum of 72. Let the smallest integer be n.

(a) Write an equation in n for the sum of the three integers. **(1)**

(b) Solve your equation to find n. **(2)**

(c) State the three consecutive integers. **(1)**

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6 Solve the equation $5x + 8 = -7$.

(2)

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7 Solve the equation $x / 3 + 2 = 9$.

(2)

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8 Three consecutive integers have a sum of 84. Let the smallest integer be n. Form an equation and solve it to find the three integers.

(3)

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9 Solve the equation $(x + 1)/2 = (x - 3)/3$.

(3)

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10 Solve the equation $x^2 - 5 = 44$, giving both solutions.

(3)

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11 Solve the equation 6 - 2(x - 3) = 3x + 1.

(3)

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12 Solve m/7 - 5 = -10

(2)

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13 Solve b/4 + 9 = 9

(2)

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14 Solve n - 11 = -11

(1)

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15 Solve 7t + 3 = 5t + 9

(3)

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16 Solve 3(m + 8) - 2 = 25

(3)

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17 Solve 9t = -108

(1)

18 Solve p + 18 = 12

(1)

19 Solve (b + 2)/5 = 3

(3)

20 Solve 7(b - 8) + 2 = -61

(3)

21 Solve t/2 = 10

(1)

22 Solve 6 - 9b = -48

(2)

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23 Solve (b + 8)/5 = 1

(3)

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24 Solve 4(p + 6) + 2 = 14

(3)

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25 Solve t/2 = 14

(1)

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26 Solve 6m + 14 = -10

(2)

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27 A rectangle has length (x + 8) cm and width 2 cm. Its area is 32 cm². Form an equation and find x.

Diagram NOT accurately drawn



32 cm²

(3)

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28 Solve m - 15 = -13

(1)

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29 Solve 6a - 10 = -28

(2)

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30 I think of a number, multiply it by 2 and add 6. The answer is 30. Form an equation and solve it to find my number.

(3)

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31 Solve 8p = 104

(1)

32 Solve 4(m - 8) + 7 = -33

(3)

33 Solve x/8 = -11

(1)

34 Solve 6m - 4 = 4m + 8

(3)

35 Solve 7(m - 6) - 4 = 10

(3)

36 Solve 13 - 6p = -41

(2)

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37 Solve 3(m + 2) - 2 = 31

(3)

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38 I think of a number, multiply it by 4 and add 8. The answer is 36. Form an equation and solve it to find my number.

(3)

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Mark scheme · 2.2 Algebra: Equations: 2-hour Pack

Question 1

correct rearrangement, e.g. 3x = 18	M1
x = 6 cao	A1

Answer: **x = 6**

Question 2

(a) expands both brackets correctly, 3x + 12 = 2x + 18	M1
(a) collects terms correctly, x = 6 route, e.g. x + 12 = 18	dM1
(a) x = 6 (cao)	A1

(a) Answer: **x = 6**

(b) expands both brackets correctly, 10x - 15 = 9x + 3	M1
(b) collects terms correctly, x = 18 route, e.g. x - 15 = 3	dM1
(b) x = 18 (cao)	A1

(b) Answer: **x = 18**

Question 3

3x - 4 = 11 oe	M1
3x = 15 oe	M1
x = 5 (cao)	A1

Answer: **x = 5**

Question 4

(a) 2(x + x + 5) = 46 oe, e.g. 4x + 10 = 46	B1

(a) Answer: **2(x + x + 5) = 46**

(b) 4x = 36 oe	M1
(b) x = 9 (cao)	A1

(b) Answer: **x = 9**

(c) 14 cm (ft their x + 5)	B1

(c) Answer: **14 cm**

Question 5

(a) n + (n + 1) + (n + 2) = 72 oe	B1

(a) Answer: **n + (n + 1) + (n + 2) = 72**

(b) 3n + 3 = 72 => 3n = 69 oe	M1
(b) n = 23 (cao)	A1

(b) Answer: **n = 23**

(c) 23, 24, 25 (ft their n)	B1

(c) Answer: **23, 24, 25**

Question 6

correct rearrangement, e.g. 5x = -15	M1
x = -3 cao	A1

Answer: **x = -3**

Question 7

correct rearrangement, e.g. x / 3 = 7	M1
x = 21 cao	A1

Answer: **x = 21**

Question 8

correct equation formed, e.g. n + (n + 1) + (n + 2) = 84	M1
correctly simplified and solved, e.g. 3n + 3 = 84 leading to n = 27	M1
27, 28, 29 cao	A1

Answer: **The integers are 27, 28 and 29**

Question 9

cross-multiplies correctly, 3(x + 1) = 2(x - 3)	M1
expands correctly, 3x + 3 = 2x - 6	M1
x = -9 (cao)	A1

Answer: **x = -9**

Question 10

$x^2 = 49$ oe	M1
x = 7	A1
x = -7 (both roots required, cao)	A1

Answer: **x = 7 or x = -7**

Question 11

expands bracket correctly, 6 - 2x + 6 = 3x + 1, i.e. 12 - 2x = 3x + 1	M1
rearranges correctly, 11 = 5x oe	dM1
x = 2.2 oe (awrt 2.2)	A1

Answer: **x = 2.2**

Question 12

correct first step (undoing the + or - or reordering)	M1
m = -35 cao	A1

Answer: **m = -35**

Question 13

correct first step (undoing the + or - or reordering)	M1
b = 0 cao	A1

Answer: **b = 0**

Question 14

n = 0 cao	B1

Answer: **n = 0**

Question 15

collects the letter terms on one side: 2t	M1
collects number terms on the other side	M1
t = 3 cao	A1

Answer: **t = 3**

Question 16

expands the bracket: 3m + 24	M1
collects number terms and isolates the term in the letter	M1
m = 1 cao	A1

Answer: **m = 1**

Question 17

t = -12 cao	B1

Answer: **t = -12**

Question 18

p = -6 cao	B1

Answer: **p = -6**

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Question 19

multiplies both sides by the denominator	M1
correct second step	M1
b = 13 cao	A1

Answer: **b = 13**

Question 20

expands the bracket: 7b - 56	M1
collects number terms and isolates the term in the letter	M1
b = -1 cao	A1

Answer: **b = -1**

Question 21

t = 20 cao	B1

Answer: **t = 20**

Question 22

correct first step (undoing the + or - or reordering)	M1
b = 6 cao	A1

Answer: **b = 6**

Question 23

multiplies both sides by the denominator	M1
correct second step	M1
b = -3 cao	A1

Answer: **b = -3**

Question 24

expands the bracket: 4p + 24	M1
collects number terms and isolates the term in the letter	M1
p = -3 cao	A1

Answer: **p = -3**

Question 25

t = 28 cao	B1

Answer: **t = 28**

Question 26

correct first step (undoing the + or - or reordering)	M1
m = -4 cao	A1

Answer: **m = -4**

Question 27

2(x + 8) = 32	M1
correct method to solve	M1
x = 8 cao	A1

Answer: **x = 8**

Question 28

m = 2 cao	B1

Answer: **m = 2**

Question 29

correct first step (undoing the + or - or reordering)	M1
a = -3 cao	A1

Answer: **a = -3**

Question 30

2n + 6 = 30 (or equivalent equation)	M1
correct method to solve	M1
12 cao	A1

Answer: **12**

Question 31

p = 13 cao	B1

Answer: **p = 13**

Question 32

expands the bracket: 4m - 32	M1
collects number terms and isolates the term in the letter	M1
m = -2 cao	A1

Answer: **m = -2**

Question 33

x = -88 cao	B1

Answer: **x = -88**

Question 34

collects the letter terms on one side: 2m	M1
collects number terms on the other side	M1
m = 6 cao	A1

Answer: **m = 6**

Question 35

expands the bracket: 7m - 42	M1
collects number terms and isolates the term in the letter	M1
m = 8 cao	A1

Answer: **m = 8**

Question 36

correct first step (undoing the + or - or reordering)	M1
p = 9 cao	A1

Answer: **p = 9**

Question 37

expands the bracket: 3m + 6	M1
collects number terms and isolates the term in the letter	M1
m = 9 cao	A1

Answer: **m = 9**

Question 38

4n + 8 = 36 (or equivalent equation)	M1
correct method to solve	M1
7 cao	A1

Answer: **7**

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