



KS3.M-A11 Equations with Brackets and Unknowns on Both Sides

AQA KS3.M-A11 · Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 Solve $2(x + 3) = 14$

(2)

2 Solve $3(x - 2) = 9$

(2)

3 Solve $4x + 5 = 21$

(2)

4 Solve $5(x + 1) = 3x + 11$

(3)

5 Solve $2(x - 4) + 3 = 7$

(3)

6 Solve $3(x + 2) = 2x + 9$

(2)

7 Priya has x boxes of postcards. Each box contains 4 postcards and she also has 5 loose postcards. Altogether she has 29 postcards. Form an equation and solve it for x .

(3)

8 Solve $x/2 + 3 = 11$

(2)

9 Solve $2(2x - 3) = 3x + 1$

(3)

10 Solve $-2(x - 4) = 10$

(3)

11 Solve $2(x + 3) = 3(x - 1) + 1$

(3)

12 Five boxes each contain $(x + 2)$ stickers. Altogether there are 65 stickers. Form an equation and solve for x .

(3)

13 Solve $(\frac{3}{4})x + 2 = 11$

(3)

14 Solve $2(x + 4) - 3 = x + 9$

(3)

15 Solve $3(x - 2) = 2(x + 4) + 1$

(3)

- 16** Kwame is 3 less than twice Erin. Their ages add to 33. Write equations to represent this and find their ages.

(4)

- 17** Solve $4(x + 1) - (x - 2) = 2x + 9$

(3)

- 18** Solve $2(x + 3) = 2x + 6$. State whether there is a unique solution, no solution or infinitely many solutions and explain briefly.

(3)

Mark scheme · KS3.M-A11 Equations with Brackets and Unknowns on Both Sides

Question 1

- **M1** expand the bracket or divide both sides by 2 after simplifying: $2x + 6 = 14$ or $x + 3 = 7$
- **A1** $x = 4$ cao
- **Answer: 4**

Question 2

- **M1** divide both sides by 3 or expand then divide: $x - 2 = 3$ or $3x - 6 = 9$
- **A1** $x = 5$ cao
- **Answer: 5**

Question 3

- **M1** subtract 5 then divide by 4: $4x = 16$
- **A1** $x = 4$ cao
- **Answer: 4**

Question 4

- **M1** expand the bracket: $5x + 5 = 3x + 11$
- **M1** collect like terms to isolate x : $2x = 6$
- **A1** $x = 3$ cao
- **Answer: 3**

Question 5

- **M1** expand and simplify: $2x - 8 + 3 = 7$ giving $2x - 5 = 7$
- **M1** add 5 then divide by 2: $2x = 12$
- **A1** $x = 6$ cao
- **Answer: 6**

Question 6

- **M1** expand the bracket or rearrange: $3x + 6 = 2x + 9$
- **A1** $x = 3$ cao
- **Answer: 3**

Question 7

- **M1** correct formation: $4x + 5 = 29$ or equivalent equation
- **M1** subtract 5 then divide by 4 to find x
- **A1** $x = 6$ cao
- **Answer: 6**

Question 8

- **M1** subtract 3 then multiply by 2: $x/2 = 8$
- **A1** $x = 16$ cao
- **Answer: 16**

Question 9

- **M1** expand left side: $4x - 6 = 3x + 1$
- **M1** collect x terms: $x = 7$
- **A1** $x = 7$ cao
- **Answer: 7**

Question 10

- **M1** expand the bracket: $-2x + 8 = 10$
- **M1** rearrange and divide: $-2x = 2$ so $x = -1$
- **A1** $x = -1$ cao
- **Answer: -1**

Question 11

- **M1** expand both brackets and simplify: $2x + 6 = 3x - 3 + 1$
- **M1** collect like terms: $2x + 6 = 3x - 2$ so $x = 8$
- **A1** $x = 8$ cao
- **Answer: 8**

Question 12

- **M1** correct formation: $5(x + 2) = 65$
- **M1** expand or divide then solve: $x + 2 = 13$ or $5x + 10 = 65$
- **A1** $x = 11$ cao
- **Answer: 11**

Question 13

- **M1** subtract 2 then multiply by $\frac{4}{3}$: $(\frac{3}{4})x = 9$
- **M1** $x = 9 \times (\frac{4}{3})$ or $x = 12$
- **A1** $x = 12$ cao
- **Answer: 12**

Question 14

- **M1** expand and simplify left side: $2x + 8 - 3 = x + 9$ giving $2x + 5 = x + 9$
- **M1** collect x terms then subtract: $x = 4$
- **A1** $x = 4$ cao
- **Answer: 4**

Question 15

- **M1** expand both sides: $3x - 6 = 2x + 8 + 1$
- **M1** collect like terms to isolate x : $x = 15$
- **A1** $x = 15$ cao
- **Answer: 15**

Question 16

- **M1** correct first equation: $K = 2E - 3$ or equivalent
- **M1** correct sum equation substituting K : $(2E - 3) + E = 33$ or $3E - 3 = 33$
- **A1** $E = 12$ cao
- **A1** $K = 21$ cao
- **Answer: Erin = 12, Kwame = 21**

Question 17

- **M1** expand and remove brackets: $4x + 4 - x + 2 = 2x + 9$ giving $3x + 6 = 2x + 9$
- **M1** collect x terms to give $x = 3$
- **A1** $x = 3$ cao
- **Answer: 3**

Question 18

- **M1** expand both sides or simplify to show $2x + 6 = 2x + 6$
- **M1** recognise that the variable terms cancel giving a true statement $6 = 6$
- **A1** infinitely many solutions (any x satisfies the equation)
- Answer: **Infinitely many solutions**