2.12 Writing and Using Formulae: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The cost, C pounds, of hiring a ladder for h days is given by C = 15 + 7h.
Work out the cost of hiring the ladder for 5 days.

(2)

2 Use the formula $E = mc^2$
to work out the value of E when m = 3, c = 4.

(2)

3 Tickets cost £9 each and there is a booking fee of £4 for the whole order. Write a formula for the total cost, C pounds, of h tickets.

(2)

4 The cost, C pounds, of hiring a ladder for h days is given by C = 39 + 9h.
Work out the cost of hiring the ladder for 9 days.

(2)

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5 Make r the subject of the formula A = 6r + 11.

(3)

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6 Tickets cost £5 each and there is a booking fee of £6 for the whole order. Write a formula for the total cost, C pounds, of t tickets.

(2)

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7 A rectangle has length d cm and its width is 7 cm shorter than its length. Write a formula for the perimeter, P cm.

Diagram NOT accurately drawn



(2)

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8 Make x the subject of the formula y = 5x - 9.

(3)

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9 Use the formula P = 2(l + w)
to work out the value of P when l = 2, w = 7.

(2)

10 A gym charges £15 to join and £4 per month. Write a formula for the total cost, C pounds, after d months.

(2)

11 Make q the subject of the formula p = 2q.

(2)

12 A plumber charges a call-out fee of £32 plus £2 for every hour of work. Write a formula for the total cost, C pounds, of a job that takes t hours.

(2)

13 A gym charges £34 to join and £5 per month. Write a formula for the total cost, C pounds, after h months.

(2)

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14 The cost, C pounds, of hiring a ladder for h days is given by C = 18 + 4h.
The total cost is £26. Work out the number of days.

(3)

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15 The cost, C pounds, of hiring a ladder for h days is given by C = 37 + 6h.
The total cost is £61. Work out the number of days.

(3)

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16 Tickets cost £7 each and there is a booking fee of £12 for the whole order. Write a formula for the total cost, C pounds, of t tickets.

(2)

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17 Make x the subject of the formula y = 2x - 3.

(3)

---

18 A gym charges £24 to join and £6 per month. Write a formula for the total cost, C pounds, after n months.

(2)

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19 Use the formula v = u + at
to work out the value of v when u = 6, a = 6, t = 6.

(2)

20 Make x the subject of the formula y = 3x + 2.

(3)

21 A rectangle has length d cm and its width is 6 cm shorter than its length. Write a formula for the perimeter, P cm.

Diagram NOT accurately drawn

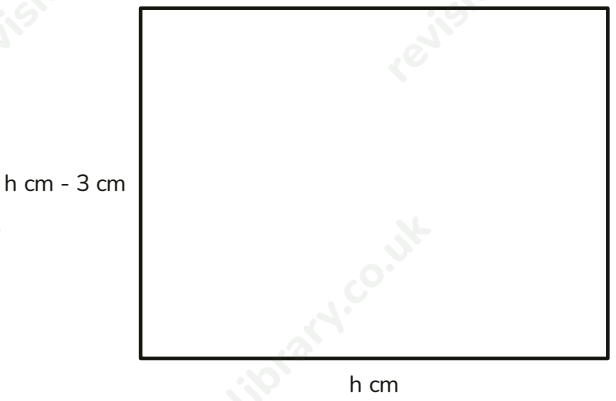


(2)

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22 A rectangle has length h cm and its width is 3 cm shorter than its length. Write a formula for the perimeter, P cm.

Diagram NOT accurately drawn



(2)

23 Tickets cost £4 each and there is a booking fee of £11 for the whole order. Write a formula for the total cost, C pounds, of t tickets.

(2)

24 A plumber charges a call-out fee of £48 plus £2 for every hour of work. Write a formula for the total cost, C pounds, of a job that takes h hours.

(2)

25 Make t the subject of the formula v = u + 6t.

(3)

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26 A gym charges £19 to join and £4 per month. Write a formula for the total cost, C pounds, after t months.

(2)

27 The cost, C pounds, of hiring a ladder for h days is given by C = 46 + 2h.
The total cost is £58. Work out the number of days.

(3)

28 Use the formula $E = mc^2$
to work out the value of E when m = 8, c = 4.

(2)

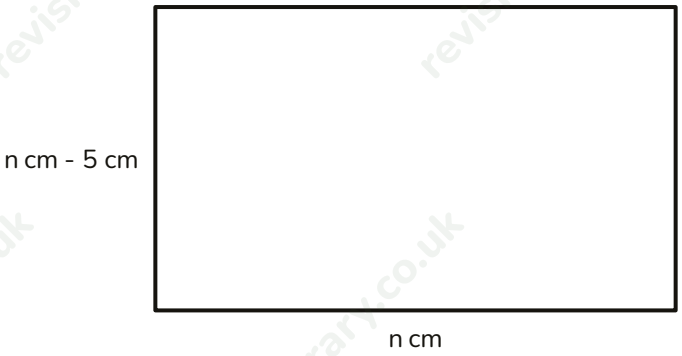
29 Make q the subject of the formula p = 6q.

(2)

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30 A rectangle has length n cm and its width is 5 cm shorter than its length. Write a formula for the perimeter, P cm.

Diagram NOT accurately drawn



.....

.....

(2)

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31 Substitute negative and fractional values into formulae. Use C = 5t - 3.

(a) Find C when t = -1. **(1)**

.....

(b) Find C when t = 1/2. **(2)**

.....

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32 The volume of a prism is given by V = (1/2) b h l. Rearrange the formula to make l the subject.

(2)

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33 Write a formula for this rule, using the same letter throughout: multiply a number n by 7, then add 5. Call the result R.

.....

(1)

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34 Write a formula for this rule: add 6 to a number p, then divide the result by 2. Call the result S.

(1)

35 Substitute negative and fractional values into formulae. Use C = 4t - 5.

(a) Find C when t = -2. **(1)**

(b) Find C when t = 1/2. **(1)**

36 Using C = 200 + 8m, a customer pays 560p in total to park. Work out how many minutes they parked for.

(3)

37 Write a formula for the total cost C, in pounds, of buying n rulers at £0.65 each.

(1)

38 A gym charges a joining fee of £30 plus a monthly fee of m pounds, giving total cost after n months as T = 30 + mn.

(a) Given m = 22, find the total cost after 6 months. **(2)**

(b) A member has paid £250 in total after 10 months. Find m. **(2)**

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39 Write a formula for the area A of a triangle with base b and height h.

.....

(1)

40 Use the formula S = 3h + 2. Find S when h = 5.

(1)

41 A train travels at a constant speed. Distance d in kilometres is given by d = 80t, where t is time in hours. How far does the train travel in 2.5 hours?

(2)

42 Using d = 80t, how long does it take the train to travel 360 km? Give your answer in hours.

(2)

43 The formula for average speed v in m/s is v = s / t. A cyclist covers 300 m in 40 s. Find the average speed in m/s.

(2)

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Mark scheme · 2.12 Writing and Using Formulae: 2-hour Pack

Question 1

substitutes h = 5: 15 + 7 x 5	M1
£50 cao	A1

Answer: **£50**

Question 2

correct substitution into the formula	M1
48 cao	A1

Answer: **48**

Question 3

one correct term or a correct structure	M1
C = 9h + 4 oe cao	A1

Answer: **C = 9h + 4**

Question 4

substitutes h = 9: 39 + 9 x 9	M1
£120 cao	A1

Answer: **£120**

Question 5

correct first step (e.g. undo the addition or subtraction)	M1
correct second step (divide by the coefficient)	M1
(A - 11)/6 oe cao	A1

Answer: **r = (A - 11)/6**

Question 6

one correct term or a correct structure	M1
C = 5t + 6 oe cao	A1

Answer: **C = 5t + 6**

Question 7

one correct term or a correct structure	M1
P = 4d - 14 oe cao	A1

Answer: **P = 4d - 14**

Question 8

correct first step (e.g. undo the addition or subtraction)	M1
correct second step (divide by the coefficient)	M1
(y + 9)/5 oe cao	A1

Answer: **x = (y + 9)/5**

Question 9

correct substitution into the formula	M1
18 cao	A1

Answer: **18**

Question 10

one correct term or a correct structure	M1
C = 15 + 4d oe cao	A1

Answer: **C = 15 + 4d**

Question 11

correct first step (e.g. undo the addition or subtraction)	M1
p/2 oe cao	A1

Answer: **q = p/2**

Question 12

one correct term or a correct structure	M1
C = 32 + 2t oe cao	A1

Answer: **C = 32 + 2t**

Question 13

one correct term or a correct structure	M1
C = 34 + 5h oe cao	A1

Answer: **C = 34 + 5h**

Question 14

18 + 4h = 26	M1
4h = 8 or equivalent	M1
2 (days) cao	A1

Answer: **2 days**

Question 15

37 + 6h = 61	M1
6h = 24 or equivalent	M1
4 (days) cao	A1

Answer: **4 days**

Question 16

one correct term or a correct structure	M1
C = 7t + 12 oe cao	A1

Answer: **C = 7t + 12**

Question 17

correct first step (e.g. undo the addition or subtraction)	M1
correct second step (divide by the coefficient)	M1
(y + 3)/2 oe cao	A1

Answer: **x = (y + 3)/2**

Question 18

one correct term or a correct structure	M1
C = 24 + 6n oe cao	A1

Answer: **C = 24 + 6n**

Question 19

correct substitution into the formula	M1
42 cao	A1

Answer: **42**

Question 20

correct first step (e.g. undo the addition or subtraction)	M1
correct second step (divide by the coefficient)	M1
(y - 2)/3 oe cao	A1

Answer: **x = (y - 2)/3**

Question 21

one correct term or a correct structure	M1
P = 4d - 12 oe cao	A1

Answer: **P = 4d - 12**

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Question 22

one correct term or a correct structure	M1
P = 4h - 6 oe cao	A1

Answer: **P = 4h - 6**

Question 23

one correct term or a correct structure	M1
C = 4t + 11 oe cao	A1

Answer: **C = 4t + 11**

Question 24

one correct term or a correct structure	M1
C = 48 + 2h oe cao	A1

Answer: **C = 48 + 2h**

Question 25

correct first step (e.g. undo the addition or subtraction)	M1
correct second step (divide by the coefficient)	M1
(v - u)/6 oe cao	A1

Answer: **t = (v - u)/6**

Question 26

one correct term or a correct structure	M1
C = 19 + 4t oe cao	A1

Answer: **C = 19 + 4t**

Question 27

46 + 2h = 58	M1
2h = 12 or equivalent	M1
6 (days) cao	A1

Answer: **6 days**

Question 28

correct substitution into the formula	M1
128 cao	A1

Answer: **128**

Question 29

correct first step (e.g. undo the addition or subtraction)	M1
p/6 oe cao	A1

Answer: **q = p/6**

Question 30

one correct term or a correct structure	M1
P = 4n - 10 oe cao	A1

Answer: **P = 4n - 10**

Question 31

(a) C = -8 cao	B1

(a) Answer: **-8**

(b) substitution 5 x 1/2 - 3 or equivalent	M1
(b) -0.5 or -1/2 cao	A1

(b) Answer: **-0.5**

Question 32

multiplies both sides by 2, 2V = bhl	M1
l = 2V / (bh) cao	A1

Answer: **l = 2V / (bh)**

Question 33

R = 7n + 5 oe	B1

Answer: **R = 7n + 5**

Question 34

S = (p + 6) / 2 oe	B1

Answer: **S = (p + 6) / 2**

Question 35

(a) -13 cao	B1

(a) Answer: **-13**

(b) -3 cao	B1

(b) Answer: **-3**

Question 36

sets up 560 = 200 + 8m	M1
correct rearrangement, e.g. 8m = 360	M1
45 cao	A1

Answer: **45 minutes**

Question 37

C = 0.65n oe	B1

Answer: **C = 0.65n**

Question 38

(a) substitutes m = 22, n = 6	M1
(a) 162 cao	A1

(a) Answer: **£162**

(b) sets up 250 = 30 + 10m and subtracts 30	M1
(b) 22 cao	A1

(b) Answer: **£22**

Question 39

A = (1/2)bh oe	B1

Answer: **A = (1/2)bh**

Question 40

17 cao	B1

Answer: **17**

Question 41

substitutes t = 2.5	M1
200 cao	A1

Answer: **200 km**

Question 42

sets up 360 = 80t	M1
4.5 cao	A1

Answer: **4.5 hours**

Question 43

substitutes s = 300, t = 40	M1
7.5 cao	A1

Answer: **7.5 m/s**

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