2.17 Introduction to Simultaneous Equations: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Solve the simultaneous equations by substitution.

$y = 5x + 4$

$3x + y = 20$

(3)

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2 Is $x = 7, y = 7$ a solution of both of these equations? Show your working.

$2x + 3y = 35$

$2x - y = 8$

(2)

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3 Is $x = 8, y = 7$ a solution of both of these equations? Show your working.

$2x + 4y = 44$

$4x - y = 26$

(2)

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4 $x + 4y = 11$ and $3x - 2y = 1$. Use elimination to find x and y.

(a) Multiply the first equation so you can eliminate x or y, then solve. **(3)**

.....

5 Is $x = 2$, $y = 5$ a solution of both of these equations? Show your working.

$3x + 4y = 26$

$x - y = -2$

(2)

6 3 adult tickets and 3 child tickets cost £18.

1 adult ticket and 2 child tickets cost £7.

Work out the cost of one adult ticket and the cost of one child ticket.

(4)

7 Solve the simultaneous equations by substitution.

$y = x + 4$

$x + 2y = 23$

(3)

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8 Is x = 2, y = 1 a solution of both of these equations? Show your working.

$3x + 4y = 10$

$2x - y = 3$

(2)

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9 Solve the simultaneous equations by substitution.

$y = 4x - 2$

$3x + y = 19$

(3)

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10 Solve the simultaneous equations.

$3x + 4y = 3$

$x + 2y = -1$

(4)

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11 Solve the simultaneous equations by substitution.

$y = 5x + 3$

$2x + y = 38$

(3)

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12 Solve the simultaneous equations by substitution.

$y = 3x + 1$

$x + 2y = -19$

(3)

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13 Amina and Yusuf share stamps. Amina has k stamps and Yusuf has 3 more than Amina. Together they have 31 stamps. Find how many stamps each has.

(a) Write equations, substitute and find k and Yusuf's number. **(4)**

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14 Solve the simultaneous equations.

$5x + 4y = -12$

$2x + y = -6$

(4)

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15 2 notebooks and 2 rulers cost £10.

2 notebooks and 1 ruler cost £9.

Work out the cost of one notebook and the cost of one ruler.

(4)

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16 Solve the simultaneous equations by substitution.

$y = 4x + 3$

$3x + 2y = 83$

(3)

---

17 Solve the simultaneous equations.

$5x + 4y = 2$

$x + 3y = 7$

(4)

---

18 Solve the simultaneous equations by substitution.

$y = 3x + 4$

$3x + 3y = 36$

(3)

---

19 1 pen and 2 pencils cost 14p.

1 pen and 1 pencil cost 11p.

Work out the cost of one pen and the cost of one pencil.

(4)

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20 Solve the simultaneous equations by substitution.

$y = 2x - 2$

$2x + 2y = -10$

(3)

---

21 Solve the simultaneous equations by substitution.

$y = 5x + 2$

$x + y = 14$

(3)

---

22 Solve the simultaneous equations.

$3x + 3y = 27$

$2x + y = 10$

(4)

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23 $4x + 5y = 2$ and $3x - 2y = 11$. Find x and y.

(a) Use elimination by making coefficients of x or y equal and solve both values. **(4)**

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24 Is x = 8, y = 6 a solution of both of these equations? Show your working.

$2x + 4y = 40$

$2x - y = 10$

(2)

---

25 Solve the simultaneous equations.

$3x + 4y = 52$

$2x + 3y = 37$

(4)

---

26 Solve the pair of equations by substitution.

$y = 2x - 1$ and $3x + y = 14$. Find x and y.

(2)

---

27 Solve the pair of equations by elimination.

$x + y = 4$ and $x - y = 10$. Find x and y.

(2)

---

28 Solve the pair of equations.

$x + y = 5$ and $x - y = 2$. Find x and y.

(2)

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29 Solve the pair of equations by elimination, multiplying both equations first.
$3x + 2y = 16$ and $2x + 3y = 19$. Find x and y.

(4)

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30 Given $x - y = 3$ and $y = 5$, work out x.

(1)

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31 Solve the pair of equations by elimination.
$x + y = 11$ and $x - y = 3$. Find x and y.

(2)

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Mark scheme · 2.17 Introduction to Simultaneous Equations: 2-hour Pack

Question 1

substitutes 5x + 4 for y in the second equation	M1
solves the resulting linear equation for x	M1
x = 2, y = 14 cao	A1

Answer: **x = 2, y = 14**

Question 2

substitutes both values into one equation	M1
No, with both equations checked	A1

Answer: **No**

Question 3

substitutes both values into one equation	M1
No, with both equations checked	A1

Answer: **No**

Question 4

(a) multiply first equation by 3 to give 3x + 12y = 33 or equivalent	M1
(a) subtract the second equation correctly to find 14y = 32	M1
(a) y = 16/7 and x = 13/7 cao	A1

(a) Answer: **x = 13/7, y = 16/7**

Question 5

substitutes both values into one equation	M1
No, with both equations checked	A1

Answer: **No**

Question 6

forms one equation, eg 3x + 3y = 18	M1
forms the second equation and attempts to eliminate	M1
one correct cost	A1
adult ticket = £5, child ticket = £1 cao	A1

Answer: **adult ticket = £5, child ticket = £1**

Question 7

substitutes x + 4 for y in the second equation	M1
solves the resulting linear equation for x	M1
x = 5, y = 9 cao	A1

Answer: **x = 5, y = 9**

Question 8

substitutes both values into one equation	M1
Yes, with both equations checked	A1

Answer: **Yes**

Question 9

substitutes 4x - 2 for y in the second equation	M1
solves the resulting linear equation for x	M1
x = 3, y = 10 cao	A1

Answer: **x = 3, y = 10**

Question 10

multiplies one or both equations so that one letter has matching coefficients	M1
eliminates a letter correctly	M1
one correct value	A1
x = 5, y = -3 cao	A1

Answer: **x = 5, y = -3**

Question 11

substitutes 5x + 3 for y in the second equation	M1
solves the resulting linear equation for x	M1
x = 5, y = 28 cao	A1

Answer: **x = 5, y = 28**

Question 12

substitutes 3x + 1 for y in the second equation	M1
solves the resulting linear equation for x	M1
x = -3, y = -8 cao	A1

Answer: **x = -3, y = -8**

Question 13

(a) correct equations: Yusuf = k + 3 and k + (k + 3) = 31 or equivalent	M1
(a) attempt to solve: 2k + 3 = 31 leading to 2k = 28	M1
(a) k = 14 found	M1
(a) Yusuf has 17 stamps cao	A1

(a) Answer: **Amina has 14 stamps, Yusuf has 17 stamps**

Question 14

multiplies one or both equations so that one letter has matching coefficients	M1
eliminates a letter correctly	M1
one correct value	A1
x = -4, y = 2 cao	A1

Answer: **x = -4, y = 2**

Question 15

forms one equation, eg 2x + 2y = 10	M1
forms the second equation and attempts to eliminate	M1
one correct cost	A1
notebook = £4, ruler = £1 cao	A1

Answer: **notebook = £4, ruler = £1**

Question 16

substitutes 4x + 3 for y in the second equation	M1
solves the resulting linear equation for x	M1
x = 7, y = 31 cao	A1

Answer: **x = 7, y = 31**

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Question 17

multiplies one or both equations so that one letter has matching coefficients	M1
eliminates a letter correctly	M1
one correct value	A1
x = -2, y = 3 cao	A1

Answer: **x = -2, y = 3**

Question 18

substitutes 3x + 4 for y in the second equation	M1
solves the resulting linear equation for x	M1
x = 2, y = 10 cao	A1

Answer: **x = 2, y = 10**

Question 19

forms one equation, eg x + 2y = 14	M1
forms the second equation and attempts to eliminate	M1
one correct cost	A1
pen = 8p, pencil = 3p cao	A1

Answer: **pen = 8p, pencil = 3p**

Question 20

substitutes 2x - 2 for y in the second equation	M1
solves the resulting linear equation for x	M1
x = -1, y = -4 cao	A1

Answer: **x = -1, y = -4**

Question 21

substitutes 5x + 2 for y in the second equation	M1
solves the resulting linear equation for x	M1
x = 2, y = 12 cao	A1

Answer: **x = 2, y = 12**

Question 22

multiplies one or both equations so that one letter has matching coefficients	M1
eliminates a letter correctly	M1
one correct value	A1
x = 1, y = 8 cao	A1

Answer: **x = 1, y = 8**

Question 23

(a) correct multiplication to make a coefficient equal, e.g. multiply first by 3 and second by 4 to eliminate x producing 12x + 15y = 6 and 12x - 8y = 44	M1
(a) correct elimination to find 23y = -38 or equivalent	M1
(a) correct value for y, y = -38/23	M1
(a) substitute to find x = 59/23 cao	A1

(a) Answer: **x = 59/23, y = -38/23**

Question 24

substitutes both values into one equation	M1
Yes, with both equations checked	A1

Answer: **Yes**

Question 25

multiplies one or both equations so that one letter has matching coefficients	M1
eliminates a letter correctly	M1
one correct value	A1
x = 8, y = 7 cao	A1

Answer: **x = 8, y = 7**

Question 26

substitute y = 2x - 1 into 3x + y = 14 to get 3x + 2x - 1 = 14, so 5x = 15	M1
x = 3, y = 5 cao	A1

Answer: **x = 3, y = 5**

Question 27

add the equations to eliminate y, e.g. 2x = 14	M1
x = 7, y = -3 cao	A1

Answer: **x = 7, y = -3**

Question 28

add the equations to eliminate y, e.g. 2x = 7	M1
x = 3.5, y = 1.5 cao	A1

Answer: **x = 3.5, y = 1.5**

Question 29

multiply the first equation by 3 and the second by 2, e.g. 9x + 6y = 48 and 4x + 6y = 38	M1
subtract to eliminate y, e.g. 5x = 10	M1
x = 2 found and substituted back correctly	M1
x = 2, y = 5 cao	A1

Answer: **x = 2, y = 5**

Question 30

x = 8 cao	B1

Answer: **x = 8**

Question 31

add the equations to eliminate y, e.g. 2x = 14	M1
x = 7, y = 4 cao	A1

Answer: **x = 7, y = 4**

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