5.12 Solving Simultaneous Equations Graphically: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

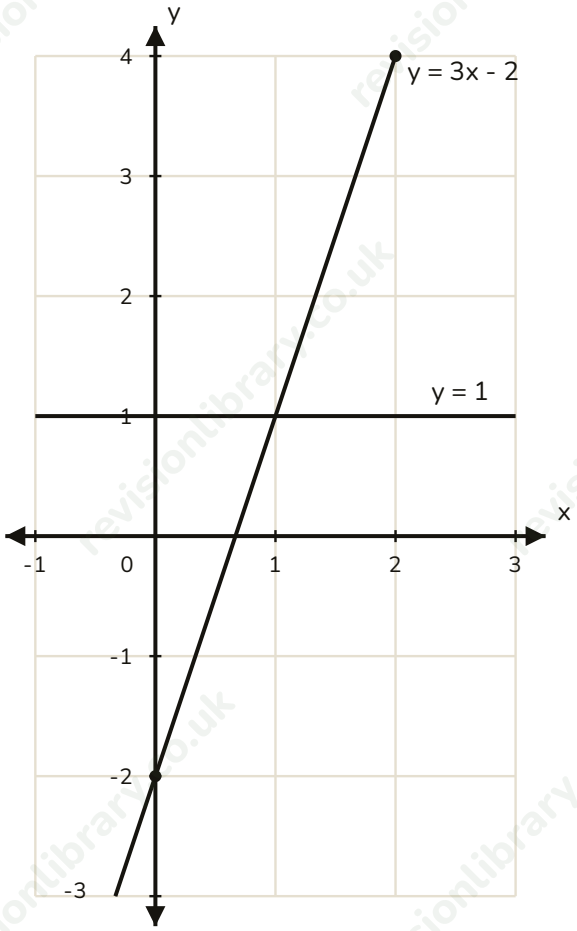
Answer ALL questions. Show all your working.

1 The lines y = 3x - 2 and y = x + 4 intersect. Work out the coordinates of the point of intersection.

(Total for Question 1 is 2 marks)

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2 The lines y = 3x - 2 and y = 1 are already drawn on the grid. Write down the solution to the simultaneous equations shown by the two lines.



(Total for Question 2 is 1 mark)

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3 The graphs of two straight lines intersect at the point (-2, 5). Which of the following is the solution to the pair of simultaneous equations represented by the lines?

- ☐ A) x = 5, y = -2
- ☐ B) x = -2, y = 5
- ☐ C) x = 2, y = -5
- ☐ D) x = -5, y = 2

(Total for Question 3 is 1 mark)

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4 Rearrange $3x + y = 9$ to make y the subject, ready for plotting.

(Total for Question 4 is 1 mark)

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5 A student draws two lines on graph paper: $y = x + 2$ and $y = -2x + 8$. They think the intersection is at $x = 3$. Use substitution to check whether $x = 3$ is correct and state the correct intersection coordinates.

(a) Substitute $x = 3$ into both equations and show whether the y-values are equal. **(2)**

(b) Solve algebraically to find the correct intersection coordinates. **(2)**

(Total for Question 5 is 4 marks)

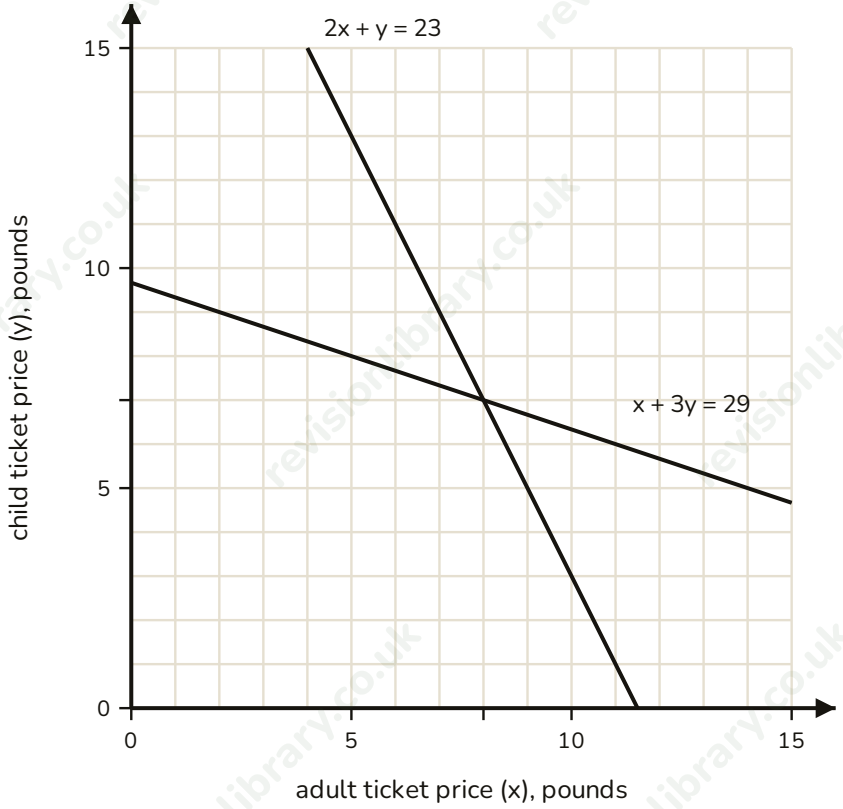
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6 Two straight lines are given by $y = 2x - 3$ and $y = -x + 4$. Work out the coordinates of their intersection point.

(Total for Question 6 is 2 marks)

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7 A cinema sells adult tickets for x pounds and child tickets for y pounds. The graphs of $2x + y = 23$ and $x + 3y = 29$ are drawn on the grid, where the axes show ticket price in pounds.



(a) Use the graph to find the price of an adult ticket and the price of a child ticket. **(2)**

.....

(b) Find the total cost for a family of 2 adults and 2 children. **(2)**

.....

(Total for Question 7 is 4 marks)

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8 The lines $y = 2x - 2$ and $-2x + y = 2$ are drawn on the same grid. Explain what the graph shows about the solutions of the simultaneous equations.

(Total for Question 8 is 2 marks)

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9 Two taxi firms charge as follows. Firm A: a fixed charge of £3 plus £9 per mile. Firm B: a fixed charge of £35 plus £5 per mile. Draw a graph of the cost against the number of miles for each firm on the same axes, and use it to find the number of miles for which the two firms charge the same, and what that charge is.

(Total for Question 9 is 3 marks)

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10 On a grid, draw the graphs of $y = 3x + 3$ and $y = -x + 3$ for values of x from -5 to 7. Use your graphs to solve the simultaneous equations. (State the values of x and y where the lines cross.)

(Total for Question 10 is 3 marks)

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Mark scheme · 5.12 Solving Simultaneous Equations Graphically: 30-minute Pack

Question 1

equate 3x - 2 = x + 4 or equivalent method **M1**

(3, 7) cao **A1**

Answer: (3, 7)

Question 2

x = 1, y = 1 (oe) **B1**

Answer: x = 1, y = 1

Question 3

B **B1**

Answer: B) x = -2, y = 5

Question 4

y = 9 - 3x (oe) **B1**

Answer: y = 9 - 3x

Question 5

(a) y1 = 3 + 2 = 5 and y2 = -2*3 + 8 = 2 shown **M1**

(a) conclusion: not equal so x = 3 is incorrect **A1**

(a) Answer: Not equal; y1 = 5, y2 = 2, so x = 3 is incorrect.

(b) equate x + 2 = -2x + 8 and solve to get 3x = 6 **M1**

(b) (2, 4) cao **A1**

(b) Answer: (2, 4)

Question 6

substitute or set 2x - 3 = -x + 4 and solve for x **M1**

x = 7/3, y = 5/3 cao **A1**

Answer:(7/3, 5/3)

(Approximately (2.333, 1.667))

Question 7

(a) adult ticket = £8 (x = 8) **B1**

(a) child ticket = £7 (y = 7) **B1**

(a) Answer: Adult ticket = £8, child ticket = £7

(b) 2(8) + 2(7) **M1**

(b) £30 cao **A1**

(b) Answer: £30

Question 8

lines have the same gradient **B1**

lines never meet so there is no solution **B1**

Answer: No solution because the lines are parallel

Question 9

line for Firm A drawn or equation C = 9x + 3 **M1**

line for Firm B drawn or equation C = 5x + 35 **M1**

8 miles, £75 cao **A1**

Answer: 8 miles, £75

Question 10

plots at least two correct points or a table for one line **M1**

both lines drawn correctly **M1**

x = 0, y = 3 cao **A1**

Answer: x = 0, y = 3

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