SIMULTANEOUS EQUATIONS

(ATNEAS) UTIONS: 15/05/2018 MAXIMUM MARK: 77

SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

1. [Edexcel, 2013]

Simultaneous Equations (Linear) [3 Marks]

Solve the simultaneous equations

$$y - 2x = 6$$
$$y + 2x = 0$$

$$73$$
 SUBTINTO $y=3$ IN TO ①
$$73-2x=6$$

$$-2x=3$$

$$x=-\frac{3}{2}$$
 (-1.5)

$$x = -1.5 \text{ (Al)}$$

$$y = 3 \text{ (Al)}$$

Showing clear algebraic working, solve the simultaneous equations

SUBTRACT
$$2a = -4$$
 (MI)

 $a = -\frac{4}{2}$
 $= -2$

Substitute $a = -2$ (NTO (I)

 $3 \times (-2) + 2b = 1$
 $-6 + 2b = 1$
 $2b = 7$
 $b = 3.5$
 $b = 3.5$

$$3x + y = 4$$

$$5x - y = 8$$

You must show sufficient working.

ADD (1) AND (2)

$$8x = 12 \text{ mi}$$
 $x = \frac{12}{8}$
 $= 1.5$

SUBSTITUTE
$$x = 1.5$$
 IMTO (1)

 $3 \times 1.5 + y = 4$
 $y = 4 - 3 \times 1.5$
 $= -0.5$
 $x = 1.5$
 $y = -0.5$

All

$$5x + y = 17 \qquad \text{D}$$

$$x + y = 3 \qquad \text{D}$$

$$5087RAC$$

SUBSTITUTE INTO (1)
$$S(3.5) + y = 17$$

$$y = 17 - S(3.5)$$

$$= -0.5 \text{ Al}$$

$$c + 5d = -13$$
 AD)

Show clear algebraic working.

$$C = \frac{35}{5}$$

SUBSTITUTE INTO 1

$$7 + 5d = -13$$

 $5d = -20$
 $d = -4$

$$d = -4$$
 AD

$$x + 2y = 3$$

$$x - y = 6$$

Show clear algebraic working.

$$2e + 2y = 3 - 0$$

$$y = -\frac{3}{3}$$

SUBSTITUTE INTO (1)

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

$$y = x + 3$$

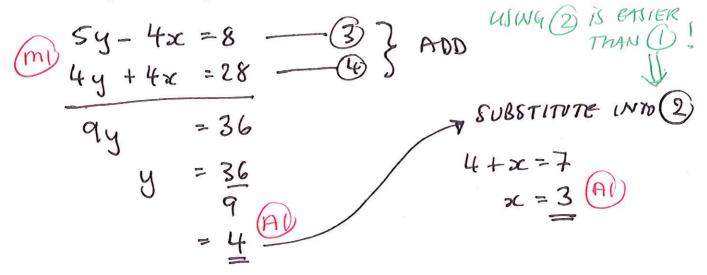
$$y = 7x$$

$$y = 0.5 + 3$$

$$5y - 4x = 8$$

$$y + x = 7$$

$$2$$



$$5x + 4y = 3$$

$$x - 2y = 2$$

$$(2)$$

$$\times$$
2

You must show sufficient working.

$$5x + 4y = 3$$
 $2x - 4y = 4$
 3
 3
 $4DDM$
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 $4DDM$
 $4DDM$
 $4DDM$
 $5x + 4y = 3$
 $4y = 3 - 5$
 $4y = -\frac{1}{2}AD$
 $4y = -\frac{1}{2}AD$
 $4DDM$
 $5x + 4y = 3$
 $4y = 3 - 5$
 $4y = -\frac{1}{2}AD$
 $4y = -\frac{1}{2}AD$

$$6x + 5y = 5 \qquad \text{(i)} \times 2$$

$$3x - 10y = 15 \qquad \text{(i)}$$

$$x = \frac{1 \cdot 6}{41}$$

$$8x - 4y = 7 \longrightarrow 12x - 8y = 6 \longrightarrow 2$$
x2

Show clear algebraic working.

SUBSTITUTE 20= 2 INTO EQU (1)

$$8 \times 2 - 4y = 7$$
 $\Rightarrow 16 - 4y = 7$
 $\Rightarrow -4y = 7 - 16$
 $-4y = -9$
 $y = -9$
 $y = -9$
 $= 2.25$

$$x = \frac{2}{y} = \frac{2 \cdot 25}{y}$$

$$\frac{2x - 5y = 13}{6x + 3y = 3} = \frac{1}{2} - x = 3$$

$$\frac{30 = 2x + 15y = 15}{36x} = \frac{3}{2} = \frac{3}{4}$$

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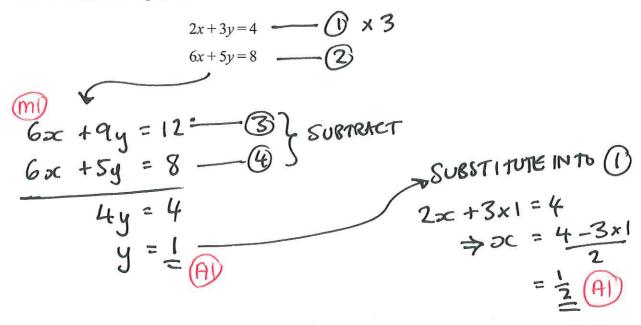
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$$\frac{30$$

SUBSTITUTE
$$x=1$$
 IN TO EQUATION (1)
 $2x1-3y=3$
 $-3y=3-2$
 $-3y=1$
 $y=-\frac{1}{3}$



(b) Write down the coordinates of the point of intersection of the two lines whose equations are

ear algebraic working.

$$200c + 15y = 30$$

$$90c + 15y = -3$$

$$110c = 33$$

$$0c = 3$$

$$A$$

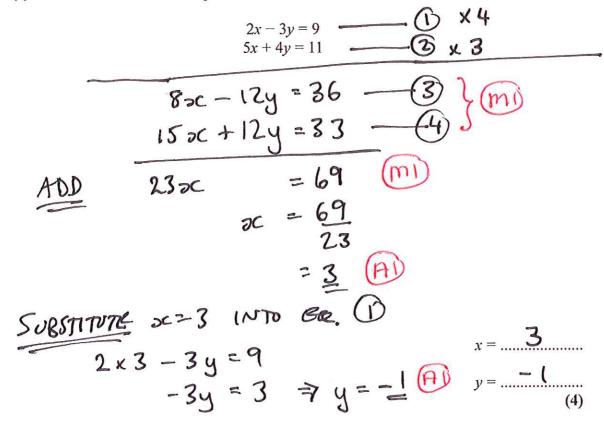
$$4(3) + 3y = 6$$
 m
 $y = 6 - 4(3)$
 $3 = -2$ A

$$x = \frac{3}{y} = \frac{-2}{2}$$

$$6x-5y=13 \longrightarrow 0 \times 3$$

$$4x-3y=8 \longrightarrow 2 \times 5$$

$$m$$
 $18x - 15y = 39 - 3$



(b) Write down the coordinates of the point of intersection of the two lines whose equations are 2x - 3y = 9 and 5x + 4y = 11

$$4x + 5y = 13$$
$$3x - 2y = 27$$

$$8x + 10y = 26 - 3$$
 ADD
 $15x - 10y = 135 - 4$ ADD
 $23x = 161$
 $x = 161$
 $x = 161$
 $x = 23$

BSTITUTE (NTO (1)

$$4(7) + 5y = 13$$
 (m) [SUBSTITUTING]

 $5y = 13 - 4(7)$
 $x = 7$

$$x = \frac{7}{7}$$

$$y = \frac{3}{7}$$

(m)
$$\left\{ \begin{array}{ll} 9x + 12y^{2} & 18 \\ 10x + 12y & = 22 \\ \hline -2 & = -4 \\ \hline +2c & = 4 \end{array} \right.$$

$$3x4 + 4y = 6$$
 mi
 $4y = 6 - 12$
 $4y = -6$
 $y = -64$
 $= -1.5$ AI

$$x = \frac{4}{y}$$

$$y = -1.5$$

Show clear algebraic working.

$$\frac{10x + 6y = 18 - 3}{21x - 6y = 75 - 4}$$

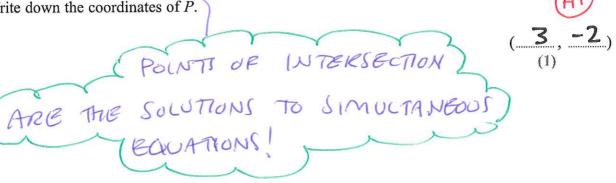
$$\frac{31x}{x} = \frac{93}{x}$$

$$\frac{31x}{x} = \frac{3}{x}$$

$$\frac{31x}$$

(b) P is the point of intersection of the lines with equations 5x + 3y = 9 and 7x - 2y = 25

Write down the coordinates of P.



(a) Solve the simultaneous equations 3x + 5y = 14

$$3x + 5y = 14$$

$$4x + 3y = 4$$

$$2$$

$$x = 5$$

Show clear algebraic working.

$$9x + 15y = 42 - 3$$
 $20x + 15y = 20 - 4$

$$=\frac{22}{-11}$$
 $=-2$

SUBSTITUTE INTO
$$\bigcirc$$

$$3 \times (-2) + 5y = 14$$

$$5 = 20$$

$$x = -2$$

$$y = 4$$

$$y = 4$$

(b) Write down the coordinates of the point of intersection of the two lines whose equations are 3x + 5y = 14 and 4x + 3y = 4

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- B1 This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of 'follow through').
- M1 This is a method mark. Method marks have been shown in places where they might be awarded for the method that is shown. If You use a different method to get a correct answer, then the same number of method marks would be awarded but it is not practical to show all possible methods, and the way in which marks might be awarded for their use, within these particular solutions. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board's web site.
- A1 These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words 'show that', 'show your working out', or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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