The Maths Society

$x + 3y = 6$

$X - y = 2$

$3x + 2y = 9$

$x - 2y = -5$

$x + 3y = 7$

$x + 7y = 19$

Simultaneous

$3x + 7y = 34$

$3x - y = 2$

$x + 4y = 14$

$x + y = 5$

$3x - 2y = 16$

$2x + 2y = 14$

Question 1

Solve the simultaneous equations.
You must show all your working.

$$2x + 3y = 13$$
$$x + 2y = 9$$

[3]

$x = 9 - 2y$

$18 - 4y + 3y = 13$

$-y = -5$

$y = 5$

$x = 9 - 10$

$= -1$

Question 2

Solve the simultaneous equations.
You must show all your working.

$$\tfrac{1}{2}x - 8y = 1$$
$$x + 2y = 6\tfrac{1}{2}$$

[3]

$x - 16y = 2$

$x + 2y = 6.5$

$-18y = -4.5$

$y = \frac{4.5}{18} = \frac{1}{4}$

$x + 2y = 6.5$

$x + \frac{1}{2} = 6.5$

$x = 6$

Question 3

Solve the simultaneous equations.

$2x - y = 7$
$3x + y = 3$

[2]

$5x = 10$

$x = 2$

$6 + y = 3$

$y = -3$

Question 4

Find the co-ordinates of the point of intersection of the two lines.

$2x - 7y = 2$ x 2
$4x + 5y = 42$

[3]

$4x - 14y = 4$

$19y = 38$

$y = 2$

$2x - 14 = 2$

$2x = 16$

$x = 8$

Question 5

Solve the simultaneous equations.

$3x + 5y = 24$
$x + 7y = 56$ × 3

[3]

$3x + 21y = 168$
$-3x + 5y = 24$

$16y = 144$

$y = \frac{72}{8} = 9$

$x = 56 - 63$
$= -7$

56 × 3 = 168

168 − 24 = 144

$5\overline{)68}^{13}$ -56 $\overline{7}$

Question 6

Solve the simultaneous equations.

$x + 5y = 22$
$x + 3y = 12$

[2]

$2y = 10$
$y = 5$

$x = 12 - 15$
$x = -3$

Question 7

Solve the simultaneous equations.

$3x + y = 30$ ×3
$2x - 3y = 53$ [3]

$9x + 3y = 90$

$11x = 143$

$x = 13$

$39 + y = 30$

$y = -9$

Question 8

Solve the simultaneous equations.

$x - 5y = 0$ ×2
$15x + 10y = 17$ [3]

$2x - 10y = 0$

$17y = 17$

$y = 1$

$x - 5 = 0$

$x = 5$

Question 9

Solve the simultaneous equations.

$x + 2y = 3$ $\times 2$

$2x - 3y = 13$ [3]

$2x + 4y = 6$

$-7y = 7$

$y = -1$

$x - 2 = 3$

$x = 5$

Question 1

Solve the simultaneous equations $2x + y = 5$ and $2y = x - 10$. [3]

$y = 5 - 2x$

$2(5 - 2x) = x - 10$

$10 - 4x = x - 10$

$-5x = -20$

$x = 4$

$y = 5 - 8$

$= -3$

Question 2

Solve the simultaneous equations. [3]

$5x - y = -10$ ×2

$x + 2y = 9$

$10x - 2y = -20$

$11x = -11$

$x = -1$

$-1 + 2y = 9$

$2y = 10$

$y = 5$

Question 3

Solve the simultaneous equations

$6x + 18y = 57,$

$2x - 3y = -8.$ ×3 [3]

$6x - 9y = -24$

$6x = -24 + 9y$

$\therefore -24 + 9y + 18y = 57$

$27y = 81$

$y = 3$

$\therefore 2x - 3(3) = -8$

$2x = 1$ $x = \frac{1}{2}$

Question 4

Solve the simultaneous equations

$$2y + 3x = 6,$$
$$x = 4y + 16.$$

[3]

$2y + 3(4y + 16) = 6$

$2y + 12y + 48 = 6$

$14y = -42$

$y = -3$

$x = 4(-3) + 16$

$= 4$

Question 5

Solve these simultaneous equations.

$$x + 2y - 18 = 0$$
$$3x - 4y - 4 = 0$$

[3]

$x = 18 - 2y$

$3(18 - 2y) - 4y - 4 = 0$

$54 - 6y - 4y - 4 = 0$

$10y = 50$

$y = 5$

$x = 18 - 2(5)$

$= 8$

Question 6

Solve the simultaneous equations

$$2x + \frac{1}{2}y = 1, \quad \times 3$$

$$6x - \frac{3}{2}y = 21.$$

[3]

$6x + \frac{3}{2}y = 3$

$6x - \frac{3}{2}y = 21$

$12x = 24$

$x = 2$

$4 + \frac{1}{2}y = 1$

$\frac{1}{2}y = -3$

$y = -6$

Question 7

Solve the simultaneous equations

$$\frac{1}{2}x + 2y = 16,$$

$$2x + \frac{1}{2}y = 19.$$

[3]

$\frac{1}{2}x = 16 - 2y$

$x = 32 - 4y$

$2(32 - 4y) + \frac{1}{2}y = 19$

$64 - 8y + \frac{1}{2}y = 19$

$-\frac{15}{2}y = -45$

$y = 6$

$\frac{1}{2}x + 12 = 16$

$\frac{1}{2}x = 4$

$x = 8$

Question 8

Solve the simultaneous equations

$$4x + 5y = 0,$$
$$8x - 15y = 5.$$

[4]

$4x = -5y$

$x = -\frac{5}{4}y$

$2\left(-\frac{5}{4}y\right) - 15y = 5$

$-\frac{25}{2}y - 15y = 5$

$y = -\frac{1}{5}$ | $x = \frac{1}{4}$

$x = -\frac{5}{4}\left(-\frac{1}{5}\right)$

Question 1

Solve the simultaneous equations.
You must show all your working.

$$y = \frac{x}{2}$$
$$2x - y = 1$$

[3]

$2x - \frac{x}{2} = 1$

$-\frac{3}{2}x = 1$

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

$y = -\frac{2}{3} \times \frac{1}{2}$

$y = -\frac{1}{3}$

Question 2

Solve the simultaneous equations.
You must show all your working. [3]

$\frac{1}{2}x + y = 8$
$x - 2y = 2$

$x = 2 + 2y$

$\frac{1}{2}(2 + 2y) + y = 8$

$1 + y + y = 8$

$2y = 7$

$y = \frac{7}{2}$

$x - 2(\frac{7}{2}) = 2$

$x = 9$

Question 3

Solve the simultaneous equations.
Show all your working.

$3x + 4y = 14$
$5x + 2y = 21$ $\times 2$ [3]

$3x + 4y = 14$

$10x + 4y = 42$

$-7x = -28$

$x = 4$

$12 + 4y = 14$

$4y = 2$

$y = \frac{1}{2}$

Question 4

Solve the simultaneous equations.
You must show all your working. [4]

$5x + 2y = -2$ ×3
$3x - 5y = 17.4$ ×5

$15x + 6y = -6$
$15x - 25y = 87$
$+ \quad - \quad -$

$31y = -93$
$y = -3$

$5x - 6 = -2$
$5x = 4$
$x = \frac{4}{5}$

Question 5

Solve the simultaneous equations.

$0.4x - 5y = 27$ ×5
$2x + 0.2y = 9$ [3]

$2x - 25y = 135$
$2x + 0.2y = 9$
$- \quad - \quad -$

$-25.2y = 126$
$y = \frac{-126}{25.2}$
$y = -5$

$0.4x = 2$
$x = \frac{2 \times 10}{4}$
$x = 5$

Question 6

Robbie pays \$10.80 when he buys 3 notebooks and 4 pencils.

Paniz pays \$14.50 when she buys 5 notebooks and 2 pencils.

Write down simultaneous equations and use them to find the cost of a notebook and the cost of a pencil.

[5]

Let 1 notebook be a
1 pencil be b

$3a+4b=10.8$

$5a+2b=14.5$

$3a+4b=10.8$

$10a+4b=29$

$-7a=-18.2$

$a=2.6$

$3(2.6)+4b=10.8$

$4b=3$

$b=\frac{3}{4}=0.75$

∴ notebook = \$2.60

pencil = \$0.75

Question 7

Find the value of $2x + y$ for the simultaneous equations.

$$3x + 5y = 48$$
$$2x - y = 19$$

[4]

$y=2x-19$

$3x+10x-95=48$

$13x=143$

$x=11$

$y=22-19$

$=3$

$2x+y$

$=2(11)+3$

$=25$

Question 8

Solve the simultaneous equations.

$$\frac{2x + y}{2} = 7$$

$$\frac{2x - y}{2} = 17$$

[3]

$2x + y = 14$

$2x - y = 34$

$4x = 48$

$x = 12$

$y = 14 - 24$

$= -10$

Question 9

Find the co-ordinates of the point of intersection of the straight lines

$2x + 3y = 11$, $\times 3$

$3x - 5y = -12$. $\times 2$

[3]

$6x + 9y = 33$

$- \quad + \quad +$

$6x - 10y = -24$

$19y = 57$

$y = 3$

$2x + 9 = 11$ | $x = 1$

$2x = 2$

Question 10

Solve the simultaneous equations

$0.4x + 2y = 10,$ ×5
$0.3x + 5y = 18.$ ×2

[3]

$2x + 10y = 50$
$0.6x + 10y = 36$
$1.4x = 14$

$4 + 2y = 10$
$2y = 6$
$y = 3$

Question 11

Solve the simultaneous equations

$\frac{1}{2}x + y = 5,$ ×2
$x - 2y = 6.$

[3]

$x + 2y = 10$
$2x = 16$
$x = 8$

$8 - 2y = 6$
$-2y = -2$
$y = 1$