

9 Solve the simultaneous equations.

$$\begin{aligned} 2x + y &= 7 & \textcircled{1} \\ 3x - y &= 8 & \textcircled{2} \end{aligned}$$

$$\begin{aligned} \textcircled{1} + \textcircled{2}: \quad 2x + 3x &= 7 + 8 \\ 5x &= 15 \\ \div 5 & \quad \div 5 \\ \underline{x} &= \underline{3} \end{aligned}$$

Sub. into  $\textcircled{1}$ :

$$\begin{aligned} 2(3) + y &= 7 \\ 6 + y &= 7 \\ -6 & \quad -6 \\ \underline{y} &= \underline{1} \\ x &= \underline{3} \\ y &= \underline{1} \quad [2] \end{aligned}$$

5 Solve the simultaneous equations.

$$\begin{aligned} 2p - 3q &= 7 & \textcircled{1} \\ p + 3q &= 2 & \textcircled{2} \end{aligned}$$

$$\begin{aligned} \textcircled{1} + \textcircled{2}: \quad 3p &= 9 \\ \div 3 & \quad \div 3 \\ \underline{p} &= \underline{3} \end{aligned}$$

$$\begin{aligned} \rightarrow \textcircled{2}: \quad 3 + 3q &= 2 \\ -3 & \quad -3 \\ 3q &= -1 \\ \div 3 & \quad \div 3 \\ q &= \underline{-\frac{1}{3}} \end{aligned}$$

$$\begin{aligned} p &= \underline{3} \\ q &= \underline{-\frac{1}{3}} \quad [2] \end{aligned}$$

9 Solve the simultaneous equations.

$$\begin{aligned} 3x - 2y &= 21 & \textcircled{1} \\ 5x + 2y &= 51 & \textcircled{2} \end{aligned}$$

$$\begin{aligned} \textcircled{1} + \textcircled{2}: \quad 8x &= 72 \\ \div 8 & \quad \div 8 \\ \underline{x} &= \underline{9} \end{aligned}$$

$$\begin{aligned} \rightarrow \textcircled{2}: \quad 5(9) + 2y &= 51 \\ 45 + 2y &= 51 \\ -45 & \quad -45 \\ 2y &= 6 \\ \div 2 & \quad \div 2 \\ \underline{y} &= \underline{3} \end{aligned}$$

$$\begin{aligned} x &= \underline{9} \\ y &= \underline{3} \quad [2] \end{aligned}$$

5 Solve the simultaneous equations.

(a)  $x + 2y = 13$  ①  
 $x + 5y = 22$  ②

② - ①:  $3y = 9$   
 $\div 3 \quad \div 3$   
 $y = 3$

→ ①:  $x + 2(3) = 13$   
 $x + 6 = 13$   
 $-6 \quad -6$   
 $x = 7$

$x = \dots\dots\dots 7 \dots\dots\dots$

$y = \dots\dots\dots 3 \dots\dots\dots$  [2]

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

$$3x - 2y = 19 \quad (1)$$

$$x + y = 3 \times 2: 2x + 2y = 6 \quad (2)$$

$$\begin{array}{r} (1) + (2): \\ 5x = 25 \\ \div 5 \qquad \div 5 \\ \hline x = 5 \end{array}$$

$$\begin{array}{r} \rightarrow x + y = 3: \\ 5 + y = 3 \\ -5 \qquad -5 \\ \hline y = -2 \end{array}$$

$$\begin{array}{l} x = \dots\dots\dots 5 \\ y = \dots\dots\dots -2 \end{array} \quad [3]$$

- 9 Solve the simultaneous equations.

$$5x + 2y = -12 \quad (1)$$

$$3x - y = -5 \times 2: 6x - 2y = -10 \quad (2)$$

$$\begin{array}{r} (1) + (2): \\ 11x = -22 \\ \div 11 \qquad \div 11 \\ \hline x = -2 \end{array}$$

$$\begin{array}{r} \rightarrow (1): \\ 5(-2) + 2y = -12 \\ -10 + 2y = -12 \\ +10 \qquad +10 \\ \hline 2y = -2 \\ \div 2 \qquad \div 2 \\ \hline y = -1 \end{array}$$

$$\begin{array}{l} x = \dots\dots\dots -2 \\ y = \dots\dots\dots -1 \end{array} \quad [3]$$

11 Solve the simultaneous equations.

$$5x - 2y = 12 \quad \times 2: \quad 10x - 4y = 24 \quad (1)$$
$$3x + 4y = 2 \quad (2)$$

$$(1) + (2): \quad 13x = 26$$
$$\quad \quad \quad \div 13 \quad \quad \div 13$$
$$\quad \quad \quad \underline{x = 2}$$

$$\rightarrow (2): \quad 3(2) + 4y = 2$$
$$\quad \quad \quad 6 + 4y = 2$$
$$\quad \quad \quad -6 \quad \quad \quad -6$$
$$\quad \quad \quad 4y = -4$$
$$\quad \quad \quad \div 4 \quad \quad \quad \div 4$$
$$\quad \quad \quad \underline{y = -1}$$

$$x = \frac{2}{\dots\dots\dots}$$
$$y = \frac{-1}{\dots\dots\dots} \quad [3]$$

8 Solve the simultaneous equations.

$$3x + 2y = -1 \quad (1)$$
$$7x - y = 26 \quad \times 2: \quad 14x - 2y = 52 \quad (2)$$

$$(1) + (2): \quad 17x = 51$$
$$\quad \quad \quad \div 17 \quad \quad \div 17$$
$$\quad \quad \quad \underline{x = 3}$$

$$\rightarrow (1): \quad 3(3) + 2y = -1$$
$$\quad \quad \quad 9 + 2y = -1$$
$$\quad \quad \quad -9 \quad \quad \quad -9$$
$$\quad \quad \quad 2y = -10$$
$$\quad \quad \quad \div 2 \quad \quad \quad \div 2$$
$$\quad \quad \quad \underline{y = -5}$$

$$x = \frac{3}{\dots\dots\dots}$$
$$y = \frac{-5}{\dots\dots\dots} \quad [3]$$

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

$$2x + y = 3 \quad \times 5: \quad 10x + 5y = 15 \quad \textcircled{1}$$

$$x - 5y = 40 \quad \textcircled{2}$$

$$\textcircled{1} + \textcircled{2}: \quad 11x = 55$$

$$\quad \quad \quad \div 11 \quad \quad \div 11$$

$$\quad \quad \quad \underline{x = 5}$$

$\rightarrow 2x + y = 3:$

$$2(5) + y = 3$$

$$10 + y = 3$$

$$\quad \quad \quad -10 \quad \quad \quad -10$$

$$\underline{y = -7}$$

$$x = \dots\dots\dots 5$$

$$y = \dots\dots\dots -7 \dots\dots\dots [3]$$

- 8 Solve the simultaneous equations.

$$3x - 2y = 12 \quad \textcircled{1}$$

$$5x + y = 7 \quad \times 2: \quad 10x + 2y = 14 \quad \textcircled{2}$$

$$\textcircled{1} + \textcircled{2}: \quad 13x = 26$$

$$\quad \quad \quad \div 13 \quad \quad \quad \div 13$$

$$\quad \quad \quad \underline{x = 2}$$

$\rightarrow 5x + y = 7:$

$$5(2) + y = 7$$

$$10 + y = 7$$

$$\quad \quad \quad -10 \quad \quad \quad -10$$

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

$$x = \dots\dots\dots 2$$

$$y = \dots\dots\dots -3 \dots\dots\dots [3]$$

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

$$\begin{aligned} 3x - 8y &= 22 \quad (1) \\ x + 4y &= 4 \quad \times 2: 2x + 8y = 8 \quad (2) \end{aligned}$$

$$\begin{aligned} (1) + (2): \quad 5x &= 30 \\ \div 5 \quad \quad \quad \div 5 \\ \underline{x} &= 6 \end{aligned}$$

→  $x + 4y = 4$ :

$$\begin{array}{r} 6 + 4y = 4 \\ -6 \quad \quad -6 \end{array}$$

$$\begin{array}{r} 4y = -2 \\ \div 4 \quad \quad \div 4 \end{array}$$

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

$$\begin{aligned} x &= \underline{6} \\ y &= \underline{-\frac{1}{2}} \end{aligned} \quad [3]$$

- 4 (a) Solve the simultaneous equations.  
You must show all your working.

$$\begin{aligned} 2p - q &= 7 \quad \times 2: 4p - 2q = 14 \quad (1) \\ 3p + 2q &= 7 \quad (2) \end{aligned}$$

$$\begin{aligned} (1) + (2): \quad 7p &= 21 \\ \div 7 \quad \quad \quad \div 7 \\ \underline{p} &= 3 \end{aligned}$$

$$\begin{aligned} \rightarrow (2): \quad 3(3) + 2q &= 7 \\ 9 + 2q &= 7 \\ -9 \quad \quad \quad -9 \\ 2q &= -2 \\ \div 2 \quad \quad \quad \div 2 \\ \underline{q} &= -1 \end{aligned}$$

$$\begin{aligned} p &= \underline{3} \\ q &= \underline{-1} \end{aligned} \quad [3]$$

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

$$4x - 2y = -13 \quad \times 2: \quad 8x - 4y = -26 \quad \textcircled{1}$$

$$-3x + 4y = 11 \quad \textcircled{2}$$

$$\textcircled{1} + \textcircled{2}: \quad \begin{array}{r} 5x = -15 \\ \div 5 \qquad \div 5 \\ \hline x = -3 \end{array}$$

$$\rightarrow \textcircled{2}: \quad \begin{array}{r} -3(-3) + 4y = 11 \\ 9 + 4y = 11 \\ -9 \qquad -9 \\ \hline 4y = 2 \\ \div 4 \qquad \div 4 \\ \hline y = \frac{1}{2} \end{array}$$

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

$$y = \frac{1}{2} \quad [3]$$

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

$$4x + 3y = -10 \quad \times 4: \quad 16x + 12y = -40 \quad \textcircled{1}$$

$$3x - 4y = 5 \quad \times 3: \quad 9x - 12y = 15 \quad \textcircled{2}$$

$$\textcircled{1} + \textcircled{2}: \quad \begin{array}{r} 25x = -25 \\ \div 25 \qquad \div 25 \\ \hline x = -1 \end{array}$$

$$\rightarrow 4x + 3y = -10:$$

$$4(-1) + 3y = -10$$

$$\begin{array}{r} -4 + 3y = -10 \\ +4 \qquad +4 \\ \hline 3y = -6 \\ \div 3 \qquad \div 3 \\ \hline y = -2 \end{array}$$

$$y = -2$$

$$y = -2$$

$$x = -1$$

$$y = -2 \quad [4]$$

11 Solve the simultaneous equations.

$$\begin{aligned}x - 3y &= 7 & \textcircled{1} \\2x - 3y &= 11 & \textcircled{2}\end{aligned}$$

$$\textcircled{2} - \textcircled{1}: \underline{x = 4}$$

$$\begin{aligned}\rightarrow \textcircled{1}: & \quad 4 - 3y = 7 \\ & \quad -4 \quad \quad -4 \\ & \quad -3y = 3 \\ & \quad \div -3 \quad \div -3 \\ & \quad \underline{y = -1}\end{aligned}$$

$$\begin{aligned}x &= \dots\dots\dots 4 \\ y &= \dots\dots\dots -1 \quad [2]\end{aligned}$$

10 Solve the simultaneous equations.

$$\begin{aligned}4x - 5y &= 13 & \times 2 &: 8x - 10y = 26 & \textcircled{1} \\3x - 2y &= 8 & \times 5 &: 15x - 10y = 40 & \textcircled{2}\end{aligned}$$

$$\begin{aligned}\textcircled{2} - \textcircled{1}: & \quad 7x = 14 \\ & \quad \div 7 \quad \quad \div 7 \\ & \quad \underline{x = 2}\end{aligned}$$

$$\begin{aligned}\rightarrow 3x - 2y &= 8 \\ 3(2) - 2y &= 8 \\ 6 - 2y &= 8 \\ -6 \quad \quad -6 \\ -2y &= 2 \\ \div -2 \quad \div -2 \\ \underline{y = -1}\end{aligned}$$

$$\begin{aligned}x &= \dots\dots\dots 2 \\ y &= \dots\dots\dots -1 \quad [4]\end{aligned}$$

11 Solve the simultaneous equations.

$$\frac{1}{2}x - \frac{1}{3}y = 7 \quad \times 3: \quad \frac{3}{2}x - y = 21 \quad \textcircled{1}$$

$$3x + y = 6 \quad \textcircled{2}$$

$$\textcircled{1} + \textcircled{2}: \quad 3x + \frac{3}{2}x = 27$$

$$\frac{6}{2}x + \frac{3}{2}x = 27$$

$$\frac{9}{2}x = 27$$

$$\begin{array}{r} \times 2 \\ \times 2 \end{array}$$

$$9x = 54$$

$$\begin{array}{r} \div 9 \\ \div 9 \end{array}$$

$$\underline{x = 6}$$

$$\rightarrow \textcircled{2}: \quad 3(6) + y = 6$$

$$18 + y = 6$$

$$\begin{array}{r} -18 \\ -18 \end{array}$$

$$\underline{y = -12}$$

$$x = \underline{\quad 6 \quad}$$

$$y = \underline{\quad -12 \quad} \quad [3]$$

8 Solve the simultaneous equations.

$$\frac{1}{2}x + \frac{2}{3}y = 8 \quad \times 3: \quad \frac{3}{2}x + 2y = 24 \quad \textcircled{1}$$

$$3x - y = 18 \quad \times 2: \quad 6x - 2y = 36 \quad \textcircled{2}$$

$$\textcircled{1} + \textcircled{2}: \quad \frac{3}{2}x + 6x = 60$$

$$\frac{3}{2}x + \frac{12}{2}x = 60$$

$$\frac{15}{2}x = 60$$

$$\begin{array}{r} \times 2 \\ \times 2 \end{array}$$

$$15x = 120$$

$$\begin{array}{r} \div 15 \\ \div 15 \end{array}$$

$$\underline{x = 8}$$

$$\rightarrow 3x - y = 18:$$

$$3(8) - y = 18$$

$$24 - y = 18$$

$$\begin{array}{r} -24 \\ -24 \end{array}$$

$$-y = -6$$

$$\underline{y = 6}$$

$$x = \underline{\quad 8 \quad}$$

$$y = \underline{\quad 6 \quad} \quad [3]$$

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

$$\frac{3x}{2} + 5y = 5 \quad \times 3: \quad \frac{9x}{2} + 15y = 15 \quad \textcircled{1}$$

$$4x - 3y = 46 \quad \times 5: \quad 20x - 15y = 230 \quad \textcircled{2}$$

$$\textcircled{1} + \textcircled{2}: \quad \frac{9}{2}x + 20x = 245$$

$$\frac{9}{2}x + \frac{40}{2}x = 245$$

$$\frac{49}{2}x = 245$$

$$49x = 490$$

$$x = 10$$

$$\rightarrow 4x - 3y = 46:$$

$$4(10) - 3y = 46$$

$$40 - 3y = 46$$

$$-40 \quad -40$$

$$-3y = 6$$

$$\div -3 \quad \div -3$$

$$y = -2$$

$$x = 10$$

$$y = -2 \quad [4]$$

10 Solve the simultaneous equations.

$$2x + 3y = 5 \quad (1)$$

$$y = 3x + 9 \quad (2)$$

Sub. (2) into (1):

$$2x + 3(3x + 9) = 5$$

$$2x + 9x + 27 = 5$$

$$11x + 27 = 5$$

$$\begin{array}{r} -27 \\ -27 \end{array}$$

$$11x = -22$$

$$\begin{array}{r} \div 11 \\ \div 11 \end{array}$$

$$\underline{x = -2}$$

$$\begin{aligned} \rightarrow (2): \quad y &= 3(-2) + 9 \\ &= -6 + 9 \\ &= 3 \end{aligned}$$

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

$$y = \frac{3}{\dots\dots\dots} \quad [3]$$

21 The  $n$ th term of a sequence is  $an^2 + bn - 4$ .

The first term is  $-3$  and the second term is  $2$ .

Find the value of  $a$  and the value of  $b$ .

1<sup>st</sup> term: when  $n=1$ :

$$a(1)^2 + b(1) - 4 = -3$$

$$a + b - 4 = -3$$

$$\begin{array}{r} +4 \\ +4 \end{array}$$

$$a + b = 1 \quad (1)$$

2<sup>nd</sup> term: when  $n=2$ :

$$a(2)^2 + b(2) - 4 = 2$$

$$4a + 2b - 4 = 2$$

$$\begin{array}{r} +4 \\ +4 \end{array}$$

$$4a + 2b = 6$$

$$\begin{array}{r} \div 2 \\ \div 2 \\ \div 2 \end{array}$$

$$2a + b = 3 \quad (2)$$

(2) - (1):

$$\underline{a = 2}$$

$\rightarrow$  (1):

$$2 + b = 1$$

$$\begin{array}{r} -2 \\ -2 \end{array}$$

$$\underline{b = -1}$$

$$a = \frac{2}{\dots\dots\dots}$$

$$b = \frac{-1}{\dots\dots\dots} \quad [5]$$

22 These are the first four terms of a sequence.

2.75

6

11.25

20

The  $n$ th term of this sequence is  $\frac{1}{4}n^3 + an^2 + bn$ .

Calculate the value of  $a$  and the value of  $b$ .

1<sup>st</sup> term:  $n=1$ :

$$\frac{1}{4}(1)^3 + a(1)^2 + b(1) = 2.75$$

$$0.25 + a + b = 2.75$$

$-0.25$

$-0.25$

$$a + b = 2.5 \quad (1)$$

2<sup>nd</sup> term:  $n=2$ :

$$\frac{1}{4}(2)^3 + a(2)^2 + b(2) = 6$$

$$\frac{1}{4} \times 8 + 4a + 2b = 6$$

$$2 + 4a + 2b = 6$$

$-2$

$-2$

$$4a + 2b = 4$$

$\div 2$

$\div 2$

$\div 2$

$$2a + b = 2 \quad (2)$$

$$(2) - (1):$$

$$a = -0.5$$

$$\rightarrow (1):$$

$$-0.5 + b = 2.5$$

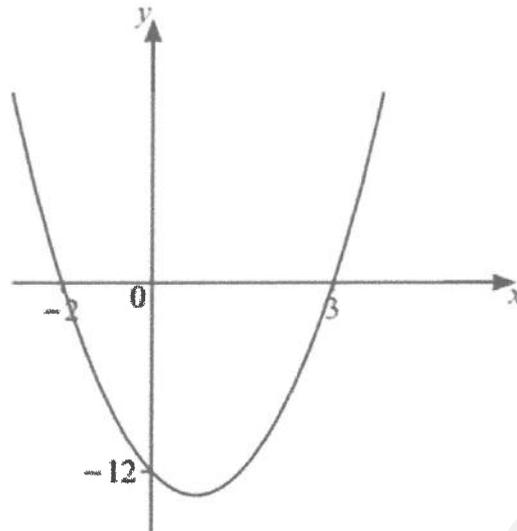
$+0.5$

$+0.5$

$$b = 3$$

$$a = \dots -0.5 \dots$$

$$b = \dots 3 \dots [5]$$



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The equation of the curve is  $y = ax^2 + bx - 12$ .

Find the value of  $a$  and the value of  $b$ .

At  $(3, 0)$ ,  $x = 3$  and  $y = 0$ :

$$0 = a(3)^2 + b(3) - 12$$

$$0 = 9a + 3b - 12$$

$$9a + 3b = 12 \quad \div 3$$

$$3a + b = 4 \quad \textcircled{1}$$

At  $(-2, 0)$ ,  $x = -2$  and  $y = 0$ :

$$0 = a(-2)^2 + b(-2) - 12$$

$$0 = 4a - 2b - 12$$

$$4a - 2b = 12 \quad \div 2$$

$$2a - b = 6 \quad \textcircled{2}$$

$\rightarrow \textcircled{1} + \textcircled{2}$ :

$$5a = 10$$

$$\div 5 \quad \div 5$$

$$\underline{a = 2}$$

$\rightarrow \textcircled{1}$ :  $3(2) + b = 4$

$$6 + b = 4$$

$$\underline{-6 \quad -6}$$

$$\underline{b = -2}$$

$$a = \underline{\quad 2 \quad}$$

$$b = \underline{\quad -2 \quad} \quad [3]$$