

## CHEMISTRY ONLINE

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## PURE MATH

## ALGEBRA AND FUNCTION

## Level \& Board

EDEXCEL (A-LEVEL)

TOPIC:
SIMULTANEOUS

PAPER TYPE:
SOLUTION 18

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## Q. 1

As, given

$$
\begin{aligned}
& 7 x+4 y=51 \rightarrow(i) \\
& 3 x-2 y=11 \rightarrow(i i)
\end{aligned}
$$

Multiply, $(i) \times 3$ and (ii) $\times 7$

$$
\begin{aligned}
& \qquad \begin{array}{c}
21 x+12 y=51 \\
21 x-14 y=71 \\
26 y=-26
\end{array} \\
& \Rightarrow \quad y=-1
\end{aligned}
$$

$$
\begin{array}{ll} 
& 7 x+4(-1)=17 \\
& 7 x-4=17 \\
& 7 x=21 \\
\Rightarrow \quad & x=3
\end{array}
$$

Check in (ii)

$$
\begin{aligned}
& 3(3)-2(-1)=11 \\
& 9+2=11 \\
& 11=11
\end{aligned}
$$

So,

$$
\begin{aligned}
& x=3 \\
& y=-1
\end{aligned}
$$

## Q. 2

As,

$$
\begin{aligned}
& y=3 x+1 \rightarrow(i) \\
& y^{2}=4 x^{2}-x+7 \rightarrow(i i)
\end{aligned}
$$

Equation (i) put in (ii), we get

$$
\begin{aligned}
& (3 x+1)^{2}=4 x^{2}-x+7 \\
& 9 x^{2}+6 x+1=4 x^{2}-x+7 \\
& 9 x^{2}-4 x^{2}+6 x+x+1-7=0 \\
& 5 x^{2}+7 x-6=0 \\
& \text { Factorization } \\
& 5 x^{2}+10 x-3 x-6=0 \\
& 5 x(x+2)-3(x+2)=0 \\
& (5 x-3)(x+3)=0 \\
& 5 x-3=0 \quad \text { or } \quad x+3=0
\end{aligned}
$$

$$
x=\frac{3}{5} \quad \text { www.chemistryonlinetuition.cc } \quad x=-3
$$

Thus,

$$
\begin{aligned}
& x=\frac{3}{5} \\
& x=-3
\end{aligned}
$$

## Q. 3

$\therefore$ Use the elimination method to solve the given simultaneous equations.

$$
\begin{array}{rlr}
-3 x+4 y & =6 & (\times 2) \\
-2 x-3 y & =-13 \\
-6 x+8 y & =12 & (\times 3) \\
(-) \quad-6 x-9 y & =-39 \\
17 y & =51 \\
y=3
\end{array}
$$

Sub statute $\mathrm{y}=3$ into equation (i)

$$
\begin{aligned}
& -6 x+8(3)=12 \\
& -6 x+24=12 \\
& -6 x=12-24=-12 \\
& x=2
\end{aligned}
$$

Thus,

$$
\begin{aligned}
& x=2 \\
& y=3
\end{aligned}
$$

## Q. 4

Given equation

$$
\begin{aligned}
& \frac{2}{3} x+\frac{3}{4} y=\frac{17}{24} \rightarrow(i) \\
& \frac{4}{3} x+\frac{5}{3} y=\frac{3}{2} \rightarrow(i i)
\end{aligned}
$$

Multiply by " 2 " equation (i)

$$
\frac{4}{3} x+\frac{6}{4} y=\frac{34}{24}
$$

(-) $\quad \frac{4}{3} x+\frac{5}{3} y=\frac{3}{2}$
$0+\left(\frac{6}{4}-\frac{5}{3}\right) y=\frac{34}{24}-\frac{3}{2}$

$$
\begin{array}{ll}
\Rightarrow \quad & \left(\frac{3}{2}-\frac{5}{3}\right) y=\frac{17}{12}-\frac{3}{2} \\
& \left(\frac{9-10}{6}\right) y=\frac{17-18}{12} \\
& \left(\frac{-1}{6}\right) y=\frac{-1}{12} \\
& y=\frac{-1}{12} \times \frac{6}{-1} \\
\Rightarrow \quad y=\frac{1}{2} \quad \text { put in (i) } \\
\Rightarrow \quad & \frac{2}{3} x+\frac{3}{4}\left(\frac{1}{2}\right)=\frac{17}{24} \\
\frac{2}{3} x+\frac{3}{8}=\frac{17}{24} \\
\frac{2}{3} x=\frac{17}{24}-\frac{3}{8} \\
\frac{2}{3} x=\frac{17-9}{24} \\
\frac{2}{3} x=\frac{8}{24} \\
\frac{2}{3} x=\frac{1}{3} \\
x=\frac{1}{3} \times \frac{3}{2} \\
x=\frac{1}{2}
\end{array}
$$

Hence,

$$
\begin{aligned}
& x=\frac{1}{2} \\
& y=\frac{1}{2}
\end{aligned}
$$

## Q. 5

As, given

$$
\begin{gathered}
2 x^{2}-y^{2}=17 \rightarrow(i) \\
x+2 y=1 \rightarrow(i i) \\
x=1-2 y \text { put in (i) } \\
2(1-2 y)^{2}-y^{2}=17 \\
2\left(1+4 y^{2}-4 y\right)-y^{2}=17 \\
2+8 y^{2}-8 y-y^{2}=17 \\
7 y^{2}-8 y+2-17=0 \\
7 y^{2}-8 y-15=0 \\
\Rightarrow \quad(7 y-15)(y+1) \\
7 y-15=0 \quad, y+1=0 \\
y=\frac{15}{7} \quad, y=-1
\end{gathered}
$$

Subtract y as $\frac{15}{7}$ and -1 into equation (ii)

$$
\begin{array}{ll}
x+2 y=1 & , \\
x+2\left(\frac{15}{7}\right)=1 & , \quad x+2(-1)=1 \\
x+\frac{30}{7}=1 & , x-2=1 \\
x=1-\frac{30}{7} & , \quad x=1+2 \\
x=\frac{-23}{7} & , \quad x=3
\end{array}
$$

Answers,

$$
\begin{array}{ll}
x=\frac{-23}{7} & , y=\frac{15}{7} \\
x=3 & , y=-1
\end{array}
$$

## Q. 6

As given

$$
\begin{aligned}
& 2 m-3 p=13 \rightarrow(i) \\
& 5 m+p=7 \rightarrow(i i) \\
& (3 \times(i i)) 15 m+3 p=21 \rightarrow(i i i)
\end{aligned}
$$

Add equation (i) and (iii)

$$
\begin{aligned}
& 15 m+3 p=21 \\
& 2 m-3 p=13 \\
& 17 m=34 \quad \Rightarrow m=2
\end{aligned}
$$

Subtract $\mathrm{m}=2$ into equation (ii)

$$
\begin{aligned}
& 5(2)+p=7 \\
& 10+p=7 \\
& p=7-10 \\
& p=-3
\end{aligned}
$$

Thus,

$$
\begin{aligned}
& m=2 \\
& p=-3
\end{aligned}
$$

Q. 7

Given

$$
\begin{array}{r}
-5 x+6 y=13 \rightarrow(i) \\
5 x+2 y=11 \rightarrow(i i)
\end{array}
$$

Add (i) + (ii)

$$
\begin{gathered}
-5 x+6 y=13 \\
5 x+2 y=11 \\
8 y=24 \\
y=3
\end{gathered}
$$

Subtract $\mathrm{y}=3$ into (ii)

$$
\begin{aligned}
& 5 x+2(3)=11 \\
& 5 x+6=11 \\
& 5 x=11-6 \\
& 5 x=5 \\
& x=1
\end{aligned}
$$

Answer

$$
\begin{aligned}
& x=1 \\
& y=3
\end{aligned}
$$

Q. 8

$$
\begin{array}{r}
4 x+2 y=6 \rightarrow(i) \\
5 x-2 y=12 \rightarrow(i i)
\end{array}
$$

Add (i) + (ii)

$$
\begin{aligned}
& 4 x+2 y=6 \\
& 5 x-2 y=12 \\
& 9 x=18 \\
& x=2
\end{aligned}
$$

Substitute $\mathrm{x}=2$ into equation (i)

$$
\begin{aligned}
& 2 x+y=3 \\
& 2(2)+y=3 \\
& 4+y=3 \\
& y=3-4 \\
& y=-1
\end{aligned}
$$

Thus,

$$
\begin{aligned}
& x=2 \\
& y=-1
\end{aligned}
$$



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