

**Higher IGCSE (9 – 1) Revision Pack**

**Transformation of Graphs**

**Name --------------------------------**

**Transformation of graphs**

**Question 1**

Here is the graph of $y= sin x^{°}$ for $0\leq x\leq 360$



In $0\leq x\leq 360$, the graph of $y= sin \left(\frac{x}{2}\right)^{°}+3$ has a maximum at the point $A$.

Write down the coordinates of $A$.

 ..........................

 **(2 marks)**

**Question 2**

Here is the graph of $y=f\left(x\right)$

On the grid, draw the graph of $y=2f\left(x\right)$



 **(2 marks)**

**Question 3**

Here is the graph of $y=f\left(x\right)$

On the grid, draw the graph of $y=f\left(-x\right)$



 **(2 marks)**

**Question 4**



The diagram shows the curve with equation $y=f\left(x\right)$

The coordinates of the minimum point of the curve are $\left(-2,-1\right)$

Write down the coordinates of the minimum point of the curve with equation$y=f\left(x-5\right)$

 **..........................**

 **(1 mark)**

**Question 5**



The diagram shows the curve with equation $y=f\left(x\right)$

The coordinates of the minimum point of the curve are $\left(-2,-1\right)$

Write down the coordinates of the minimum point of the curve with equation $y=\frac{1}{2}f\left(x\right)$

 **..........................**

 **(1 mark)**

**Question 6**

The graph of $y=a sin \left(x-b\right)^{°}+c$ for $-90\leq x\leq 540$ is drawn on the grid below.



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

*Input note: find* $b$ and $c$ when $a=2$

 **..........................**

 **(3 marks)**

**Question 7**



The diagram shows part of the curve with equation $y=f\left(x\right)$

The minimum point of the curve is at (2,-1)

Write down the coordinates of the minimum point of the curve with equation $y=f\left(x+2\right)$

 **..........................**

 **(1 mark)**

**Question 8**

Write $x^{2}-8x+25$ in the form $\left(x-a\right)^{2}+b$.

 **..........................**

 **(3 marks)**

**Question 9**

It can be shown that $x^{2}-8x+25$ is identical to $\left(x-4\right)^{2}+9$.

Write down the coordinates of the turning point of the graph of $y=x^{2}-8x+25$.

 **..........................**

 **(2 marks)**

**Question 10**

The coordinates of the turning point of the graph of $y=x^{2}-8x+25$ is $\left(4,9\right)$.

Hence describe the single transformation which maps the graph of $y=x^{2}$ onto the graph of $y=x^{2}-8x+25$.

 **..........................**

 **(2 marks)**



**Question 11**

 The diagram shows a sketch of the curve $y=16-x^{2}$



The curve $y=16-x^{2}$ is reflected in the line $y=12$

$B\_{1}$ is the reflection of $B$. What are the coordinates of $B\_{1}$?

 **..........................**

**Question 12**

Here is the graph of $y= sin x^{°}$ for $-180\leq x\leq 180$



To sketch the graph of $y= sin x^{°}-2$, what would you do to each point on the graph?

You would  **..........................**

to the  **..........................** coordinates

 **(2 marks)**

**Question 13**



The diagram shows part of the curve with equation $y=f\left(x\right)$The coordinates of the maximum point of the curve are $\left(3,5\right)$

Write down the coordinates of the maximum point of the curve with equation $y=f\left(x+3\right)$

 **..........................**

 **(1 mark)**

**Question 14**



The diagram shows part of the curve with equation $y=f\left(x\right)$The coordinates of the maximum point of the curve are $\left(3,5\right)$

Write down the coordinates of the maximum point of the curve with equation $y=2f\left(x\right)$

 **..........................**

 **(1 mark)**

**Question 15**



The diagram shows part of the curve with equation $y=f\left(x\right)$The coordinates of the maximum point of the curve are $\left(3,5\right)$

Write down the coordinates of the maximum point of the curve with equation $y=f\left(3x\right)$

 **..........................**

 **(1 mark)**

**Question 16**



The diagram shows part of the curve with equation $y=f\left(x\right)$The coordinates of the maximum point of the curve are $\left(3,5\right)$

The curve with equation $y=f\left(x\right)$ is transformed to give the curve with equation $y=f\left(x\right)-4$

Describe the transformation.

 **..........................**

 **(1 mark)**

**Question 17**

 The diagram shows part of the curve with equation $y=f\left(x\right)$.
The coordinates of the minimum point of this curve are $\left(3,-4\right)$.

Write down the coordinates of the minimum point of the curve with equation $y=f\left(x\right)+3$

 **..........................**

 **(3 marks)**

**Question 18**

 The diagram shows part of the curve with equation $y=f\left(x\right)$.
The coordinates of the minimum point of this curve are $\left(3,-4\right)$.

Write down the coordinates of the minimum point of the curve with equation $y=f\left(2x\right)$

 **..........................**

 **(1 mark)**

**Question 19**

 The diagram shows part of the curve with equation $y=f\left(x\right)$.
The coordinates of the minimum point of this curve are $\left(3,-4\right)$.

Write down the coordinates of the minimum point of the curve with equation $y=f\left(-x\right)$

 **..........................**

 **(1 mark)**

**Question 20**

This is a sketch of the curve with the equation $y=f\left(x\right)$.
The only minimum point of the curve is at $P\left(3,-4\right)$.



Write down the coordinates of the minimum point of the curve with the equation $y=f\left(x-2\right)$.

 **..........................**

 **(2 marks)**

**Question 21**

This is a sketch of the curve with the equation $y=f\left(x\right)$.
The only minimum point of the curve is at $P\left(3,-4\right)$.



Write down the coordinates of the minimum point of the curve with the equation $y=f\left(x+5\right)+6$

 **..........................**

 **(2 marks)**

**Question 22**

Here is the graph of $y= sin x$, where $0^{°}\leq x\leq 360^{°}$





|  |  |
| --- | --- |
| Equation  | Graph  |
| $$y=2 sin x$$ | .................. |
| $$y=- sin x$$ | .................. |
| $$y= sin 2x$$ | .................. |
| $$y= sin x+2$$ | .................. |
| $$y= sin \frac{1}{2}x$$ | .................. |
| $$y=-2 sin x$$ | .................. |

 **(4 marks)**

**Question 23**

The diagram shows part of the curve with equation $y=f\left(x\right)$.
The coordinates of the maximum point of the curve are $\left(3,5\right)$.



Write down the coordinates of the maximum point of the curve with equation $y=f\left(x+3\right)$

 **..........................**

 **(3 marks)**

**Question 24**

The diagram shows part of the curve with equation $y=f\left(x\right)$.
The coordinates of the maximum point of the curve are $\left(3,5\right)$.



Write down the coordinates of the maximum point of the curve with equation $y=2f\left(x\right)$

 **..........................**

 **(1 mark)**

**Question 25**

The diagram shows part of the curve with equation $y=f\left(x\right)$.
The coordinates of the maximum point of the curve are $\left(3,5\right)$.



Write down the coordinates of the maximum point of the curve with equation $y=f\left(3x\right)$

 **..........................**

 **(1 mark)**

**Question 26**

The curve with equation $y=f\left(x\right)$ is transformed to give the curve with equation $y=f\left(x\right)-4$

Describe the transformation.

 **..........................**

 **(1 mark)**

**Question 27**

The diagram shows part of a sketch of the curve $y= sin x^{°}$.



Write down the coordinates of the point $P$.

 **..........................**

 **(1 mark)**

**Question 28**

The diagram shows part of a sketch of the curve *y* = sin *x*°.



Write down the coordinates of the point *Q*.

 **..........................**

 **(1 mark)**

**Question 29**

Here is a sketch of the curve *y* = *a* cos *bx*° + *c*, 0 < *x <* 360



Find the values of *a*, *b* and *c*.

 **..........................**

 **(3 marks)**

**Question 30**

The graph of $y=f\left(x\right)$ is shown on the grid.



The graph **G** is a translation of the graph of $y=f\left(x\right)$.
Write down, in terms of $f$, the equation of graph **G**.

$y=$ **..........................**

 **(1 mark)**

**Question 31**

The graph of $y=f\left(x\right)$ is shown on the grid.



The graph of $y=f\left(x\right)$ has a maximum point at $\left(-4,3\right)$.

Write down the coordinates of the maximum point of the graph of $y=f\left(-x\right)$.

 **..........................**

 **(2 marks)**

**Question 32**

The curve with equation $y=f\left(x\right)$ is translated so that the point at (0, 0) is mapped onto the point (4, 0).

Find an equation of the translated curve.

$y=$ **..........................**

 **(2 marks)**

**Question 33**



The diagram shows part of the curve with equation $y=f\left(x\right)$.

The coordinates of the maximum point of this curve are (2, 3).

(a) Write down the coordinates of the maximum point of the curve with equation $y=f\left(x-2\right)$

 **..........................**

 **(1 mark)**

**Question 34**



The diagram shows part of the curve with equation $y=f\left(x\right)$.

The coordinates of the maximum point of this curve are (2, 3).

(b) Write down the coordinates of the maximum point of the curve with equation $y=2f\left(x\right)$

 **..........................**

 **(1 mark)**

**Question 35**



The diagram shows part of the curve with equation $y=f\left(x\right)$

The minimum point of the curve is at (2,-1)

The curve with equation $y=f\left(x\right)$ has been transformed to give the curve with equation $y=f\left(x\right)+2$

Describe the transformation.

It is a  **..........................**

 **(1 mark)**

**Question 36**



The diagram shows part of the curve with equation $y=f\left(x\right)$

The minimum point of the curve is at (2,-1)

The curve $y=f\left(x\right)$ is reflected in the $y$ axis.

Find the equation of the curve following this transformation.

$y=$ **..........................**

 **(1 mark)**

**Question 37**



The diagram shows part of the curve with equation $y=f\left(x\right)$

The minimum point of the curve is at (2,-1)

Write down the coordinates of the minimum point of the curve with equation $y=f\left(2x\right)$

 **..........................**

 **(1 mark)**

**Question 38**



The diagram shows part of the curve with equation $y=f\left(x\right)$

The minimum point of the curve is at (2,-1)

Write down the coordinates of the minimum point of the curve with equation $y=3f\left(x\right)$

 **..........................**

 **(1 mark)**

**Question 39**

This is a sketch of the curve with equation $y=f\left(x\right)$.
It passes through the origin $O$.



The only vertex of the curve is at $A\left(2,-4\right)$.

The curve with equation $y=x^{2}$ has been translated to give the curve $y=f\left(x\right)$.

Find $f\left(x\right)$ in terms of $x$.

$f\left(x\right)=$ **..........................**

 **(4 marks)**

**Question 40**

This is a sketch of the curve with equation $y=f\left(x\right)$.
It passes through the origin $O$.



The only vertex of the curve is at $A\left(2,-4\right)$.

Write down the coordinates of the vertex of the curve with equation $y=f\left(2x\right)$.

 **..........................**

 **(1 mark)**

**Question 41**

This is a sketch of the curve with equation $y=f\left(x\right)$.
It passes through the origin $O$.



The only vertex of the curve is at $A\left(2,-4\right)$.

Write down the coordinates of the vertex of the curve with equation $y=-f\left(x\right)$.

 **..........................**

 **(1 mark)**

**Question 42**

This is a sketch of the curve with equation $y=f\left(x\right)$.
It passes through the origin $O$.



The only vertex of the curve is at $A\left(2,-4\right)$.

Write down the coordinates of the vertex of the curve with equation $y=f\left(x\right)-5$.

 **..........................**

 **(1 mark)**

**Question 43**

This is a sketch of the curve with equation $y=f\left(x\right)$.
It passes through the origin $O$.



The only vertex of the curve is at $A\left(2,-4\right)$.

Write down the coordinates of the vertex of the curve with equation $y=f\left(x-3\right)$.

 **..........................**

 **(1 mark)**

**Question 44**

The axes below show the graph of $y=x^{2}$ and a translation of this graph, G.



Write down the equation of graph G.

$y=$ **..........................**

 **(1 mark)**

**Question 45**

Write down the coordinates of the maximum point of $y= sin x$ for $0^{°}\leq x\leq 360^{°}$.

 **..........................**

 **(1 mark)**

**Question 46**

Write down the coordinates of the maximum point of $y=3+ sin x$ for $0^{°}\leq x\leq 360^{°}$.

 **..........................**

 **(1 mark)**

**Question 47**

One solution to the equation $4 sin x=k$ is $x=60^{°}$.

Find the value of $k$.

 **..........................**

 **(2 marks)**

**Question 48**

One solution to the equation $4 sin x=2\sqrt{3}$ is $x=60^{°}$.

Find another solution for $x$ in the range $0^{°}\leq x\leq 360^{°}$

$x=$ **..........................** $ ^{°}$

 **(1 mark)**

**Question 49**

The graph of $y=f\left(x\right)$ is shown on the grid.



The graph of $y=f\left(x\right)$ has a turning point at the point $\left(-1,1\right)$

Write down the coordinates of the turning point of the graph of $y=f\left(-x\right)+2$

 **..........................**

 **(1 mark)**

**Question 50**

The graph of $y=f\left(x\right)$ is shown on the grid.



Graph $A$ is a reflection of the graph of $y=f\left(x\right)$.

(a) Write down the equation of graph $A$.

$y=$ **..........................**

 **(1 mark)**

**Question 51**

The graph of $y=g\left(x\right)$ is shown on the grid.



Graph $B$ is a translation of the graph of $y=g\left(x\right)$.

(a) Write down the equation of graph $B$.

$y=$ **..........................**

 **(1 mark)**

**Question 52**

The graph of $y= cos x^{°}$ is shown.



(c) Write down the coordinates of the point marked $C$.

 **..........................**

 **(1 mark)**

**Question 53**



The diagram shows a sketch of the graph of $y=x^{2}-x$.

Write down where the graph of $y=\left(x-1\right)^{2}-\left(x-1\right)$ crosses the $x$-axis and where it crosses the $y$-axis.

It crosses the $x$-axis first at $x=$ **..........................**

and at $x=$ **..........................**

It crosses the $y$-axis at $y=$ **..........................**

**Answers**

**Question 1**

$\left(180,4\right)$



**Question 2**





**Question 3**





**Question 4**

$\left(3,-1\right)$



**Question 5**

$\left(-2,-\frac{1}{2}\right)$



**Question 6**

$b=90$, $c=1$



**Question 7**

$\left(0,-1\right)$



**Question 8**

 $\left(x-4\right)^{2}+9$



**Question 9**

$\left(4,9\right)$



**Question 10**



**Question 11**

$\left(4,24\right)$



**Question 12**

"-2 OR - 2 OR minus 2 OR take 2 OR take away 2 OR subtract 2" and "y"



**Question 13**

$\left(0,5\right)$



**Question 14**

$\left(3,10\right)$



**Question 15**

$\left(1,5\right)$



**Question 16**



**Question 17**

$\left(3,-1\right)$



**Question 18**

$\left(1.5,-4\right)$



**Question 19**

$\left(-3,-4\right)$



**Question 20**

$\left(5,-4\right)$



**Question 21**

$\left(-2,2\right)$



**Question 22**

|  |  |
| --- | --- |
| Equation  | Graph  |
| $$y=2 sin x$$ | **C**  |
| $$y=- sin x$$ | **D**  |
| $$y= sin 2x$$ | **A**  |
| $$y= sin x+2$$ | **F**  |
| $$y= sin \frac{1}{2}x$$ | **B**  |
| $$y=-2 sin x$$ | **E**  |



**Question 23**

$\left(0,5\right)$



**Question 24**

$\left(3,10\right)$



**Question 25**

$\left(1,5\right)$



**Question 26**



**Question 27**

$\left(180,0\right)$



**Question 28**

$\left(270,-1\right)$



**Question 29**

$a=2$, $b=3$, $c=1$



**Question 30**

$y=f\left(x-5\right)$



**Question 31**

$\left(4,3\right)$



**Question 32**

$y=f\left(x-4\right)$



**Question 33**

$\left(4,3\right)$



**Question 34**

$\left(2,6\right)$



**Question 35**

"translation"



**Question 36**

$y=f\left(-x\right)$



**Question 37**

$\left(1,-1\right)$



**Question 38**

$\left(2,-3\right)$



**Question 39**

$f\left(x\right)=\left(x-2\right)^{2}-4$



**Question 40**

$\left(1,-4\right)$



**Question 41**

$\left(2,4\right)$



**Question 42**

$\left(2,-9\right)$



**Question 43**

$\left(5,-4\right)$



**Question 44**

$y=\left(x-2\right)^{2}$



**Question 45**

$\left(90,1\right)$



**Question 46**

$\left(90,4\right)$



**Question 47**

$$k=2\sqrt{3}$$



**Question 48**

$x=$ 120 $ ^{°}$



**Question 49**

$\left(1,3\right)$



**Question 50**

$y=f\left(-x\right)$



**Question 51**

$y=g\left(x\right)+1$



**Question 52**

$\left(180,-1\right)$



**Question 53**

It crosses the $x$-axis first at $x=$ 1 and and at $x=$ 2 and It crosses the $y$-axis at $y=$ 2