**Graphs of Related Functions**

 Reflection in y axis

 Reflection in x axis

 ← 3

 → 3

 ↑ 3

 ↓ 3

 Stretch vertical scale factor 3

 Stretch horizontal scale factor **Graphs of Related Sin Functions**

 Reflection in y axis

 Reflection in x axis

 ← 45°

 → 45°

 ↑ 2

 ↓ 2

 Stretch vertical scale factor 3

 Stretch horizontal scale factor 

**Graphs of Related Functions**

Original Equation = $f(x)$

|  |  |  |
| --- | --- | --- |
|  | Vertical | Horizontal |
| Translation in +ve direction | $$f\left(x\right)+2$$ | $$f(x-2)$$ |
| Translation in –ve direction | $$f\left(x\right)-2$$ | $$f(x+2)$$ |
| Stretchto make larger | $$3f(x)$$ | $$f(\frac{1}{3}x)$$ |
| Stretchto make smaller (i.e. squash) | $$\frac{1}{3}f(x)$$ | $$f(3x)$$ |
| Reflection | $$-f(x)$$ | $$f(-x)$$ |

**Graphs of Related Sin Functions**

Original Equation = $sinx$

|  |  |  |
| --- | --- | --- |
|  | Vertical | Horizontal |
| Translation in +ve direction | $$sinx+2$$ | $$sin(x-2)$$ |
| Translation in –ve direction | $$sinx-2$$ | $$sin(x+2)$$ |
| Stretchto make larger | $$3sinx$$ | $$sin(\frac{1}{3}x)$$ |
| Stretchto make smaller (i.e. squash) | $$\frac{1}{3}sinx$$ | $$sin(3x)$$ |
| Reflection | $$-sinx$$ | $$sin(-x)$$ |

$y=f\left(x\right)$ $y=f\left(4x+8\right)$

Describe the geometrical transformation that maps the curve with equation $y=f\left(x\right)$ onto the curve with equation $y=f\left(4x+8\right)$.

Describe the geometrical transformation that maps the curve with equation $y=f\left(4x+8\right)$ onto the curve with equation $y=f\left(x\right)$.