$$y=a\left[b^{k(x-d)}\right]+c$$

1. Sketch the graph of $f\left(x\right)=2^{x},$ then sketch$ g\left(x\right)=2^{x}+4$, and$ h\left(x\right)=2^{x}-3$ by applying the transformations.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Domain | Range | *y­*-intercept | Asymptote |
| $$f\left(x\right)= 2^{x}$$ |  |  |  |  |
| $$g\left(x\right)= 2^{x}+4$$ |  |  |  |  |
| $$h\left(x\right)= 2^{x}-3$$ |  |  |  |  |

**2.** Sketch the graph of$ f\left(x\right)=2^{x}$, g$\left(x\right)=2^{x-2}$ and $h\left(x\right)=2^{x+3}.$



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Domain | Range | *y­*-intercept | Asymptote |
| $$f\left(x\right)= 2^{x}$$ |  |  |  |  |
| $$g\left(x\right)=2^{x-2}$$ |  |  |  |  |
| $$h\left(x\right)=2^{x+3}.$$ |  |  |  |  |

**3.** Sketch the graph of $f\left(x\right)=2^{x}, g\left(x\right)=3\left(2^{x}\right), and h\left(x\right)=\frac{1}{2}\left(2^{x}\right).$



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Domain | Range | *y­*-intercept | Asymptote |
| $$f\left(x\right)= 2^{x}$$ |  |  |  |  |
| $$g\left(x\right)=3\left(2^{x}\right)$$ |  |  |  |  |
| $$h\left(x\right)=\frac{1}{2}\left(2^{x}\right)$$ |  |  |  |  |

**4. S**ketch the graph of $f\left(x\right)=2^{x}, g\left(x\right)= 2^{2x}, and h\left(x\right)=2^{\frac{1}{2}x}.$



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Domain | Range | *y­*-intercept | Asymptote |
| $$f\left(x\right)= 2^{x}$$ |  |  |  |  |
| $$g\left(x\right)= 2^{2x}$$ |  |  |  |  |
| $$h\left(x\right)=2^{\frac{1}{2}x}$$ |  |  |  |  |

Use the graph of $f\left(x\right)= 3^{x} to sketch the graph of g\left(x\right)=3^{2x}.$



5. **a.** Use the graph of $f\left(x\right)=2^{x} to sketch the graph of g\left(x\right)=2^{-x} and h\left(x\right)=-2^{x}$

**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Domain | Range | *y­*-intercept | Asymptote |
| $$f\left(x\right)= 2^{x}$$ |  |  |  |  |
| $$g\left(x\right)= 2^{-x}$$ |  |  |  |  |
| $$h\left(x\right)=-2^{x}$$ |  |  |  |  |
| $$f\left(x\right)= b^{-x}$$ |  |  |  |  |
| $$f\left(x\right)= -b^{x}$$ |  |  |  |  |

**6. State** the MAPPING NOTATION, and then **describe** the transformations:

**a.** $f\left(x\right)=3\left(2^{-x+2}\right)-1$

**b.** $f\left(x\right)=-4^{-2x+2}+7$

|  |
| --- |
| **General form of transformed exponential function:**$$y=a\left[b^{k(x-d)}\right]+c$$**Effect of :**  ***a: when* i)**$a>1$***, it is a vertical stretch by a factor of*** $ |a|$ ***ex:*** y = 2[3x]**ii)**$0<a<1$***, it is a vertical compression by a factor of*** $ |a|$ ***ex:*** y = 0.5[3x]y coordinate**iii)** $a<0$***, it is a vertical reflection ex:*** y = -2[3x]***c: when*** $c>0$***, vertical shift “c” units up ex:*** y = 2[3x] + 1$c<0$***, vertical shift “c” units down ex:*** y = 2[3x] - 1 ***k: when*** $k>1$***, it is a horizontal compression by a factor of*** $|\frac{1}{k}|$ ***ex:*** y = 32x x coordinate$0<k<1$***, it is a horizontal stretch by a factor of*** $|\frac{1}{k}|$ ***ex:*** y = 31/2x ***d: when*** $d>0$***, horizontal shift “d” units right ex:*** y = 32(x - 2)REMEMBER TO FACTOR$d<0$***, horizontal shift “d” units left ex:*** y = 32(x + 2)   ***b: when*** $b>0$***, it is an exponential GROWTH ex:*** y = 2[3x]$b<0$***, it is an exponential DECAY ex:*** y = (1/3)x |