**Factorising Polynomials**

|  |  |  |
| --- | --- | --- |
| $$\left(x+1\right)$$ | $$\left(x+2\right)$$ | $$\left(x+3\right)$$ |
| $$\left(x-1\right)$$ | $$\left(x-2\right)$$ | $$\left(x-3\right)$$ |

Use combinations of the factors above to make the polynomials below…

1. $x^{3}-x^{2}-4x+4$
2. $x^{3}+x^{2}-4x-4$
3. $x^{3}+2x^{2}-x-2$
4. $x^{3}-4x^{2}+5x-2$
5. $x^{3}+2x^{2}-5x-6$
6. $x^{3}+4x^{2}+x-6$
7. $x^{3}-7x^{2}+16x-12$
8. $x^{3}+5x^{2}-8x-12$
9. $x^{3}-3x^{2}+4$
10. $x^{3}+6x^{2}+12x+8$

PS – one of these polynomials is impossible to make with the factors given. Which one is it?

**Factorising Polynomials - Answers**

|  |  |  |
| --- | --- | --- |
| $$\left(x+1\right)$$ | $$\left(x+2\right)$$ | $$\left(x+3\right)$$ |
| $$\left(x-1\right)$$ | $$\left(x-2\right)$$ | $$\left(x-3\right)$$ |

Use combinations of the factors above to make the polynomials below…

1. $x^{3}-x^{2}-4x+4=\left(x-1\right)\left(x-2\right)\left(x+2\right)$
2. $x^{3}+x^{2}-4x-4=\left(x+1\right)\left(x-2\right)\left(x+2\right)$
3. $x^{3}+2x^{2}-x-2=\left(x+1\right)\left(x+2\right)\left(x-1\right)$
4. $x^{3}-4x^{2}+5x-2=\left(x-1\right)\left(x-1\right)\left(x-2\right)=\left(x-2\right)\left(x-1\right)^{2}$
5. $x^{3}+2x^{2}-5x-6=\left(x+3\right)\left(x-2\right)\left(x+1\right)$
6. $x^{3}+4x^{2}+x-6=\left(x+3\right)\left(x+2\right)\left(x-1\right)$
7. $x^{3}-7x^{2}+16x-12=\left(x-3\right)\left(x-2\right)\left(x-2\right)=\left(x-3\right)\left(x-2\right)^{2}$
8. $x^{3}+5x^{2}-8x-12=\left(x+6\right)\left(x-2\right)\left(x+1\right)$
9. $x^{3}-3x^{2}+4=\left(x+1\right)\left(x-2\right)\left(x-2\right)=\left(x+1\right)\left(x-2\right)^{2}$
10. $x^{3}+6x^{2}+12x+8=\left(x+2\right)\left(x+2\right)\left(x+2\right)=\left(x+2\right)^{3}$

PS – one of these polynomials is impossible to make with the factors given. Which one is it?

**Harder Factorising Polynomials**

|  |  |  |  |
| --- | --- | --- | --- |
| $$\left(x+1\right)$$ | $$\left(x+2\right)$$ | $$\left(3x+1\right)$$ | $$\left(3x+2\right)$$ |
| $$\left(x-1\right)$$ | $$\left(x-2\right)$$ | $$\left(3x-1\right)$$ | $$\left(3x-2\right)$$ |
| $$\left(x+3\right)$$ | $$\left(2x-1\right)$$ | $$\left(2x+3\right)$$ | $$\left(3x+4\right)$$ |

Use combinations of the factors above to make the polynomials below…

1. $3x^{3}-10x^{2}+9x-2$
2. $3x^{3}-8x^{2}+7x-2$
3. $3x^{3}+x^{2}-12x-4$
4. $3x^{3}-x^{2}-8x-4$
5. $3x^{3}+4x^{2}-3x-4$
6. $3x^{3}+10x^{2}-9x-4$
7. $2x^{3}+9x^{2}+7x-6$
8. $2x^{3}+5x^{2}-x-6$
9. $8x^{3}-12x^{2}+6x-1$

PS – one of these polynomials is impossible to make with the factors given. Which one is it?

**Harder Factorising Polynomials - Answers**

|  |  |  |  |
| --- | --- | --- | --- |
| $$\left(x+1\right)$$ | $$\left(x+2\right)$$ | $$\left(3x+1\right)$$ | $$\left(3x+2\right)$$ |
| $$\left(x-1\right)$$ | $$\left(x-2\right)$$ | $$\left(3x-1\right)$$ | $$\left(3x-2\right)$$ |
| $$\left(x+3\right)$$ | $$\left(2x-1\right)$$ | $$\left(2x+3\right)$$ | $$\left(3x+4\right)$$ |

Use combinations of the factors above to make the polynomials below…

1. $3x^{3}-10x^{2}+9x-2=\left(3x-1\right)\left(x-1\right)\left(x-2\right)$
2. $3x^{3}-8x^{2}+7x-2=\left(3x-2\right)\left(x-1\right)\left(x-1\right)=\left(x-1\right)^{2}\left(3x-2\right)$
3. $3x^{3}+x^{2}-12x-4=\left(3x+1\right)\left(x+2\right)\left(x-2\right)$
4. $3x^{3}-x^{2}-8x-4=\left(3x+2\right)\left(x-2\right)\left(x+1\right)$
5. $3x^{3}+4x^{2}-3x-4=\left(3x+4\right)\left(x-1\right)\left(x+1\right)$
6. $3x^{3}+10x^{2}-9x-4=\left(3x+1\right)\left(x+4\right)\left(x-1\right)$
7. $2x^{3}+9x^{2}+7x-6=\left(2x-1\right)\left(x+2\right)\left(x+3\right)$
8. $2x^{3}+5x^{2}-x-6=\left(2x+3\right)\left(x-1\right)\left(x+2\right)$
9. $8x^{3}-12x^{2}+6x-1=\left(2x-1\right)\left(2x-1\right)\left(2x-1\right)=\left(2x-1\right)^{3}$

PS – one of these polynomials is impossible to make with the factors given. Which one is it?