Polynomial long division – Stages 1 to 10

$$x+2\overline{)\quad x^3\ +x^2\qquad\quad -1}$$

Polynomial long division – Stages 1 to 10

$$
\begin{array}{r}
 x^2 \\
\hline
x+2) \quad x^3 \ +x^2 \quad -1
\end{array}
$$

Polynomial long division – Stages 1 to 10

$$
\begin{array}{r|l}
 & x^2 \\
\hline
x+2 & x^3 + x^2 - 1 \\
 & \underline{-x^3 - 2x^2} \\
 &
\end{array}
$$

Polynomial long division – Stages 1 to 10

$$
\begin{array}{r}
\multicolumn{4}{r}{x^2} \\
\cline{2-4}
x+2) & x^3 & +x^2 & -1 \\
 & -x^3 & -2x^2 & \\
\cline{2-3}
 & & -x^2 &
\end{array}
$$

Polynomial long division – Stages 1 to 10

$$
\begin{array}{r}
 \\
x+2) \\
 \\
 \\
\end{array}
\begin{array}{r}
 \; x^2 \; - x \\
\hline
x^3 \; + x^2 \; \; - 1 \\
- x^3 - 2x^2 \\
\hline
 \; - x^2
\end{array}
$$

Polynomial long division – Stages 1 to 10

$$
\begin{array}{r}
x^2 - x \\
\hline
x+2 \,\big)\; x^3 + x^2 - 1 \\
\underline{-x^3 - 2x^2} \\
-x^2 \\
\underline{x^2 + 2x} \\
\end{array}
$$

Polynomial long division – Stages 1 to 10

$$
\begin{array}{r|l}
 & x^2 - x \\
\hline
x+2 & x^3 + x^2 - 1 \\
 & -x^3 - 2x^2 \\
\hline
 & -x^2 \\
 & x^2 + 2x \\
\hline
 & 2x - 1
\end{array}
$$

Polynomial long division – Stages 1 to 10

$$
\begin{array}{r|l}
 & x^2 - x + 2 \\
\hline
x + 2 & x^3 + x^2 - 1 \\
 & -x^3 - 2x^2 \\
\hline
 & -x^2 \\
 & x^2 + 2x \\
\hline
 & 2x - 1
\end{array}
$$

Polynomial long division – Stages 1 to 10

$$
\begin{array}{r|l}
 & x^2 - x + 2 \\
\hline
x + 2 & x^3 + x^2 - 1 \\
 & -x^3 - 2x^2 \\
\hline
 & -x^2 \\
 & x^2 + 2x \\
\hline
 & 2x - 1 \\
 & -2x - 4 \\
\hline
\end{array}
$$

Polynomial long division – Stages 1 to 10

$$
\begin{array}{r|l}
 & x^2 - x + 2 \\
\hline
x + 2 & x^3 + x^2 - 1 \\
 & -x^3 - 2x^2 \\
\hline
 & -x^2 \\
 & x^2 + 2x \\
\hline
 & 2x - 1 \\
 & -2x - 4 \\
\hline
 & -5
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=B`

$$x^3 \quad + x^2 \qquad\qquad - 1 = (x+2)\,(\qquad\qquad\qquad)$$

Polynomial long division – Stages 1 to 11

`style=B`

$$x^3 \quad + x^2 \qquad\qquad - 1 = \big(x + 2\big)\big(x^2 \qquad\qquad\big)$$

Polynomial long division – Stages 1 to 11

`style=B`

$$\begin{array}{rll} x^3 & +x^2 & -1 = (x+2)(x^2 \qquad\quad) \\ -x^3 & -2x^2 & \\ \hline \end{array}$$

Polynomial long division – Stages 1 to 11

`style=B`

$$\begin{array}{rl} x^3 \;+x^2 & \qquad -1 = \big(x+2\big)\big(x^2 \qquad\quad\big) \\ -x^3 - 2x^2 & \\ \hline -x^2 & \end{array}$$

Polynomial long division – Stages 1 to 11

`style=B`

$$\begin{array}{rl} x^3 \;+x^2 & \qquad -1 = (x+2)(x^2 - x \quad) \\ -x^3 - 2x^2 & \\ \hline -x^2 & \end{array}$$

Polynomial long division – Stages 1 to 11

`style=B`

$$
\begin{array}{rl}
x^3 + x^2 & -1 = (x+2)(x^2 - x \quad) \\
-x^3 - 2x^2 & \\
\hline
-x^2 & \\
x^2 + 2x & \\
\hline
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=B`

$$
\begin{array}{rl}
x^3 + x^2 & -1 = (x+2)(x^2 - x \quad) \\
-x^3 - 2x^2 & \\
\hline
-x^2 & \\
x^2 + 2x & \\
\hline
2x - 1 &
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=B`

$$
\begin{array}{rl}
x^3 + x^2 & -1 = \big(x+2\big)\big(x^2 - x + 2\big) \\
-x^3 - 2x^2 & \\
\hline
-x^2 & \\
x^2 + 2x & \\
\hline
2x - 1 &
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=B`

$$
\begin{array}{rl}
x^3 + x^2 & -1 = \big(x+2\big)\big(x^2 - x + 2\big) \\
-x^3 - 2x^2 & \\
\hline
-x^2 & \\
x^2 + 2x & \\
\hline
2x - 1 & \\
-2x - 4 & \\
\hline
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=B`

$$
\begin{array}{rl}
x^3 + x^2 & -1 = (x+2)(x^2 - x + 2) \\
-x^3 - 2x^2 & \\
\hline
-x^2 & \\
x^2 + 2x & \\
\hline
2x - 1 & \\
-2x - 4 & \\
\hline
-5 &
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=B`

$$
\begin{array}{rrrr}
x^3 & +x^2 & & -1 = \big(x+2\big)\big(x^2-x+2\big) - 5 \\
-x^3 & -2x^2 & & \\
\hline
 & -x^2 & & \\
 & x^2 & +2x & \\
\hline
 & & 2x & -1 \\
 & & -2x & -4 \\
\hline
 & & & -5
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=C`

$$\big(\quad x^3 \;+x^2 \qquad -1\big) \div \big(x+2\big) = \qquad\qquad + \frac{\qquad}{x+2}$$

Polynomial long division – Stages 1 to 11

`style=C`

$$\begin{array}{l} \big(\quad x^3 \ + x^2 \qquad\quad - 1 \big) \div \big(x + 2 \big) = x^2 \qquad\quad + \dfrac{\qquad}{x+2} \end{array}$$

Polynomial long division – Stages 1 to 11

`style=C`

$$\begin{array}{l} \big(\quad x^3 \ + x^2 \qquad\quad - 1 \big) \div \big(x + 2 \big) = x^2 \qquad\quad + \dfrac{\qquad}{x+2} \\ \underline{\ - x^3 - 2x^2 \ } \end{array}$$

Polynomial long division – Stages 1 to 11

`style=C`

$$\begin{array}{l} \big(\quad x^3 \ + x^2 \qquad\quad - 1 \big) \div \big(x + 2 \big) = x^2 \qquad\quad + \dfrac{\qquad}{x+2} \\ \underline{\ - x^3 - 2x^2 \qquad\quad\ \ } \\ \qquad\qquad - x^2 \end{array}$$

Polynomial long division – Stages 1 to 11

`style=C`

$$\begin{array}{l} \big(\quad x^3 \ + x^2 \qquad\quad - 1 \big) \div \big(x + 2 \big) = x^2 - x \qquad + \dfrac{\qquad}{x+2} \\ \underline{\ - x^3 - 2x^2 \qquad\qquad\quad\ } \\ \qquad\qquad - x^2 \end{array}$$

Polynomial long division – Stages 1 to 11

`style=C`

$$\begin{array}{l} \big(\quad x^3 \;+x^2 \qquad\quad -1\big) \div \big(x+2\big) = x^2 - x \qquad + \dfrac{\qquad}{x+2} \\ \underline{-\,x^3 - 2x^2} \\ \qquad\qquad -\,x^2 \\ \qquad\qquad\quad \underline{x^2 + 2x} \end{array}$$

Polynomial long division – Stages 1 to 11

`style=C`

$$\begin{array}{rl}
\big(& x^3 + x^2 \qquad\quad - 1 \big) \div \big(x+2\big) = x^2 - x \qquad + \dfrac{\qquad}{x+2} \\
 & \underline{-\,x^3 - 2x^2} \\
 & \qquad\quad -\,x^2 \\
 & \qquad\quad \underline{\qquad\quad x^2 + 2x} \\
 & \qquad\qquad\quad\; 2x - 1
\end{array}$$

Polynomial long division – Stages 1 to 11

`style=C`

$$\begin{array}{r} \left(\quad x^3 \;+x^2 \qquad\quad -1\right) \div \left(x+2\right) = x^2 - x + 2 + \dfrac{\qquad}{x+2} \\ \underline{-\,x^3 - 2x^2 \qquad\qquad\quad} \\ -\,x^2 \\ \underline{\qquad\quad x^2 + 2x \qquad} \\ 2x - 1 \end{array}$$

Polynomial long division – Stages 1 to 11

`style=C`

$$
\begin{array}{rrrrr}
\big(& x^3 & +x^2 & & -1\big) \div \big(x+2\big) = x^2 - x + 2 + \dfrac{\qquad}{x+2} \\
 & -x^3 & -2x^2 & & \\
\cline{2-3}
 & & -x^2 & & \\
 & & x^2 & +2x & \\
\cline{3-4}
 & & & 2x & -1 \\
 & & & -2x & -4 \\
\cline{4-5}
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=C`

$$\begin{array}{rrrrrrrr}
\multicolumn{8}{l}{\big(\quad x^3 \;+x^2 \qquad\quad -1\big) \div \big(x+2\big) = x^2 - x + 2 + \dfrac{\qquad}{x+2}} \\
 & -x^3 & -2x^2 & & & & & \\
\cline{2-3}
 & & -x^2 & & & & & \\
 & & x^2 & +2x & & & & \\
\cline{3-4}
 & & & & 2x & -1 & & \\
 & & & & -2x & -4 & & \\
\cline{5-6}
 & & & & & -5 & &
\end{array}$$

Polynomial long division – Stages 1 to 11

`style=C`

$$
\begin{array}{rrrrr}
\left(\quad x^3 \right. & +x^2 & & & -1\left. \right) \div \left(x+2 \right) = x^2 - x + 2 + \dfrac{-5}{x+2} \\
-x^3 & -2x^2 & & & \\
\hline
 & -x^2 & & & \\
 & x^2 & +2x & & \\
\hline
 & & 2x & -1 & \\
 & & -2x & -4 & \\
\hline
 & & & -5 &
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=D`

$$\begin{array}{rl} x^3 + x^2 \qquad\quad - 1 & \big| \; x + 2 \\ \cline{2-2} & \end{array}$$

Polynomial long division – Stages 1 to 11

`style=D`

$$\begin{array}{rl|l} x^3 & +x^2 \qquad\quad -1 & x+2 \\ \cline{3-3} & & x^2 \end{array}$$

Polynomial long division – Stages 1 to 11

`style=D`

$$\begin{array}{rr|l} x^3 + x^2 & -1 & x+2 \\ \cline{3-3} -x^3 - 2x^2 & & x^2 \end{array}$$

Polynomial long division – Stages 1 to 11

`style=D`

$$\begin{array}{rr|l} x^3 + x^2 & -1 & x+2 \\ \cline{3-3} -x^3 - 2x^2 & & x^2 \\ \cline{1-1} -x^2 & & \end{array}$$

Polynomial long division – Stages 1 to 11

`style=D`

$$\begin{array}{rr|l} x^3 + x^2 & -1 & x+2 \\ \cline{3-3} -x^3 - 2x^2 & & x^2 - x \\ \cline{1-1} -x^2 & & \end{array}$$

Polynomial long division – Stages 1 to 11

`style=D`

$$
\begin{array}{rrr|l}
x^3 & +x^2 & -1 & x+2 \\
\cline{4-4}
-x^3 & -2x^2 & & x^2-x \\
\cline{1-2}
 & -x^2 & & \\
 & x^2 & +2x & \\
 & \cline{2-3} &
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=D`

$$
\begin{array}{rrrr|l}
 & x^3 & +x^2 & -1 & x+2 \\
\cline{5-5}
-(x^3 & +2x^2) & & & x^2-x \\
\cline{1-2}
 & -x^2 & & & \\
 & -(x^2 & +2x) & & \\
\cline{2-3}
 & & 2x & -1 &
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=D`

$$
\begin{array}{rrrr|l}
x^3 & +x^2 & & -1 & x+2 \\
\cline{5-5}
-x^3 & -2x^2 & & & x^2-x+2 \\
\cline{1-2}
 & -x^2 & & & \\
 & x^2 & +2x & & \\
\cline{2-3}
 & & 2x & -1 &
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=D`

$$
\begin{array}{rrr|l}
x^3 & +x^2 & -1 & x+2 \\
\cline{4-4}
-x^3 & -2x^2 & & x^2-x+2 \\
\cline{1-2}
 & -x^2 & & \\
 & x^2 & +2x & \\
\cline{2-3}
 & & 2x & -1 \\
 & & -2x & -4 \\
\cline{3-4}
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=D`

$$
\begin{array}{rrrr|l}
x^3 & +x^2 & & -1 & x+2 \\
\cline{5-5}
-x^3 & -2x^2 & & & x^2-x+2 \\
\cline{1-2}
 & -x^2 & & & \\
 & x^2 & +2x & & \\
\cline{2-3}
 & & 2x & -1 & \\
 & & -2x & -4 & \\
\cline{3-4}
 & & & -5 &
\end{array}
$$

Polynomial long division – Stages 1 to 11

`style=D`

$$
\begin{array}{rrrr|l}
x^3 & +x^2 & & -1 & x+2 \\
\cline{5-5}
-x^3 & -2x^2 & & & x^2-x+2 \\
\cline{1-2}
 & -x^2 & & & \\
 & x^2 & +2x & & \\
\cline{2-3}
 & & 2x & -1 & \\
 & & -2x & -4 & \\
\cline{3-4}
 & & & -5 &
\end{array}
$$

Horner's scheme – Stages 1 to 8

$$\begin{array}{r|cccc} & 1 & 1 & 0 & -1 \\ -2 & & & & \\ \hline & & & & \end{array}$$

Horner's scheme – Stages 1 to 8

	1	1	0	-1
-2				
	1			

Horner's scheme – Stages 1 to 8

	1	1	0	−1
−2		−2		
	1			

Horner's scheme – Stages 1 to 8

	1	1	0	−1
−2		−2		
	1	−1		

Horner's scheme – Stages 1 to 8

	1	1	0	−1
−2		−2	2	
	1	−1		

Horner's scheme – Stages 1 to 8

	1	1	0	−1
−2		−2	2	
	1	−1	2	

Horner's scheme – Stages 1 to 8

$$\begin{array}{r|cccc} & 1 & 1 & 0 & -1 \\ -2 & & -2 & 2 & -4 \\ \hline & 1 & -1 & 2 & \end{array}$$

Horner's scheme – Stages 1 to 8

		1	1	0	-1
-2			-2	2	-4
		1	-1	2	-5

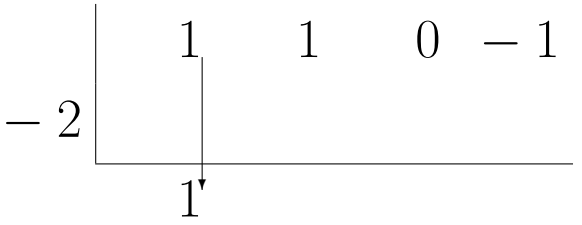
Horner's scheme – Stages 1 to 8

`tutor=true,resultstyle=\color{blue}`

$$\begin{array}{r|cccc} & 1 & 1 & 0 & -1 \\ -2 & & & & \\ \hline & & & & \end{array}$$

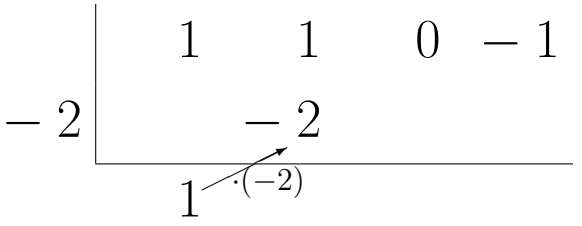
Horner's scheme – Stages 1 to 8

```
tutor=true,resultstyle=\color{blue}
```



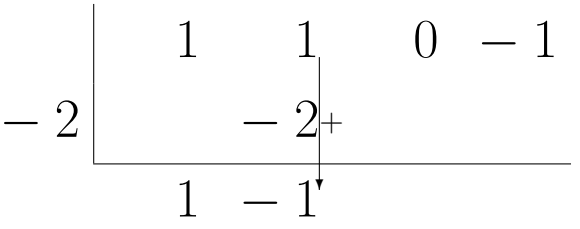
Horner's scheme – Stages 1 to 8

```
tutor=true,resultstyle=\color{blue}
```



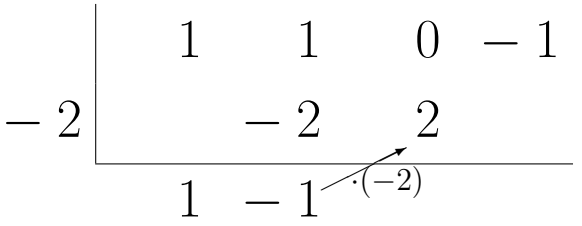
Horner's scheme – Stages 1 to 8

```
tutor=true,resultstyle=\color{blue}
```



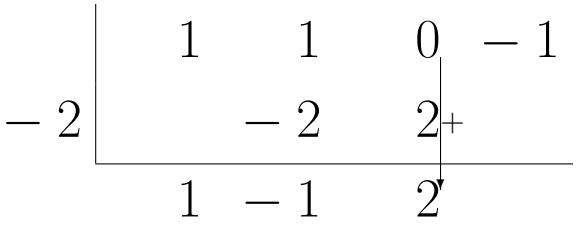
Horner's scheme – Stages 1 to 8

```
tutor=true,resultstyle=\color{blue}
```



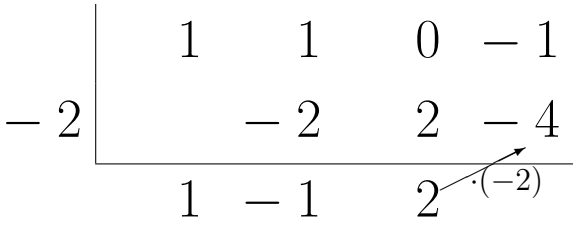
Horner's scheme – Stages 1 to 8

```
tutor=true,resultstyle=\color{blue}
```



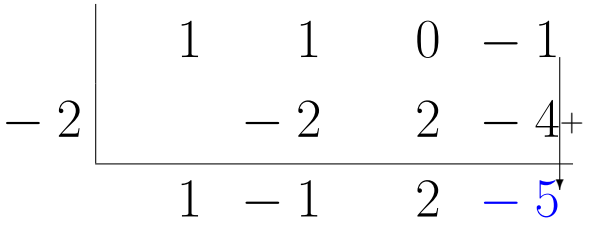
Horner's scheme – Stages 1 to 8

```
tutor=true,resultstyle=\color{blue}
```



Horner's scheme – Stages 1 to 8

`tutor=true,resultstyle=\color{blue}`



Horner's scheme – Rule the result

`resultbottomrule,resultleftrule,resultrightrule`

$$
\begin{array}{r|rrrr}
 & 1 & 1 & 0 & -1 \\
-2 & & -2 & 2 & -4 \\
\hline
 & 1 & -1 & 2 & \boxed{-5}
\end{array}
$$

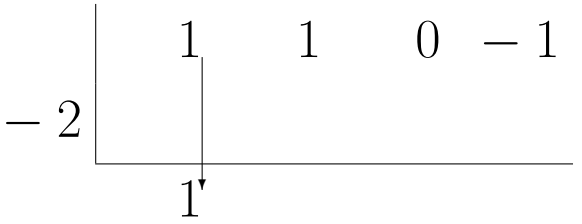
Horner's scheme – Stages 1 to 8

`tutor=true,tutorlimit=3`

$$\begin{array}{r|cccc} & 1 & 1 & 0 & -1 \\ -2 & & & & \\ \hline & & & & \end{array}$$

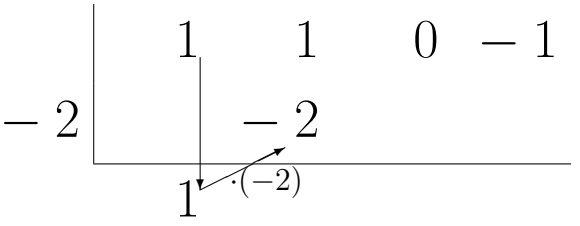
Horner's scheme – Stages 1 to 8

`tutor=true,tutorlimit=3`



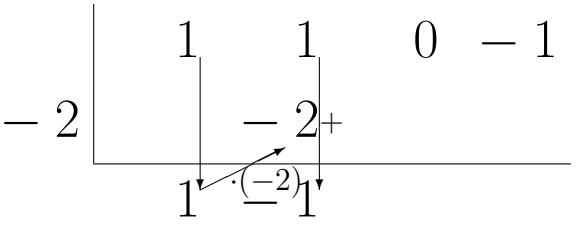
Horner's scheme – Stages 1 to 8

`tutor=true,tutorlimit=3`



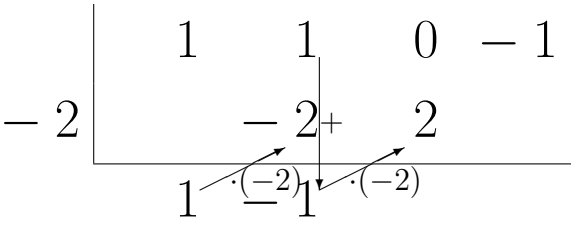
Horner's scheme – Stages 1 to 8

`tutor=true,tutorlimit=3`



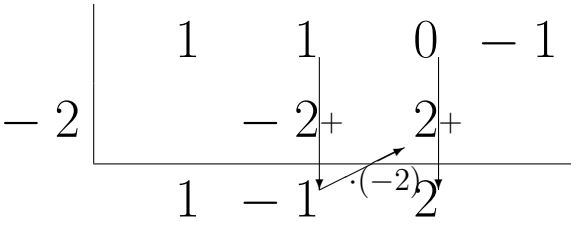
Horner's scheme – Stages 1 to 8

`tutor=true,tutorlimit=3`



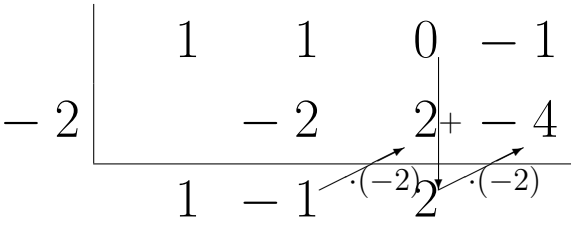
Horner's scheme – Stages 1 to 8

`tutor=true,tutorlimit=3`



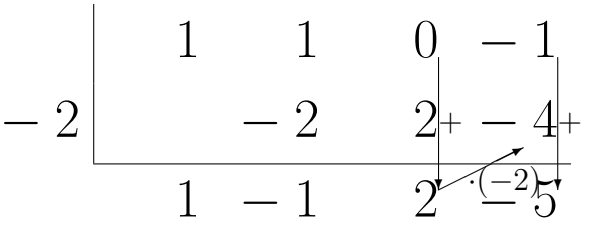
Horner's scheme – Stages 1 to 8

`tutor=true,tutorlimit=3`



Horner's scheme – Stages 1 to 8

`tutor=true,tutorlimit=3`



Horner's scheme: Some more options

`showbase=top,showbasesep=false`

$$\begin{array}{rrrrr} -2 & 1 & 1 & 0 & -1 \\ & & -2 & 2 & -4 \\ \hline & 1 & -1 & 2 & -5 \end{array}$$