

Synthetic Division

Divide using **SYNTHETIC DIVISION**.

1) $(x^3 + x^2 - 31x - 12) \div (x + 6)$

$$\begin{array}{r|rrrr} -6 & 1 & 1 & -31 & -12 \\ & \downarrow & -6 & 30 & 6 \\ \hline & 1 & -5 & -1 & -6 \end{array}$$

$$\boxed{x^2 - 5x - 1 - \frac{6}{x+6}}$$

3) $(a^3 - 9a^2 - 14a + 48) \div (a - 10)$

$$\begin{array}{r|rrrr} 10 & 1 & -9 & -14 & 48 \\ & \downarrow & 10 & 10 & -40 \\ \hline & 1 & 1 & -4 & 8 \end{array}$$

$$\boxed{x^2 + x - 4 + \frac{8}{x-10}}$$

5) $(a^4 + 16a^3 + 68a^2 + 25a - 63) \div (a + 8)$

$$\begin{array}{r|rrrrr} -8 & 1 & 16 & 68 & 25 & -63 \\ & \downarrow & -8 & -64 & -32 & 56 \\ \hline & 1 & 8 & 4 & -7 & -7 \end{array}$$

$$\boxed{a^3 + 8a^2 + 4a - 7 - \frac{7}{a+8}}$$

7) $(b^4 + 3b^3 - 27b^2 + 3b - 34) \div (b - 4)$

$$\begin{array}{r|rrrr} 4 & 1 & 3 & -27 & 3 & -34 \\ & \downarrow & 4 & 28 & 4 & 28 \\ \hline & 1 & 7 & 1 & 7 & -6 \end{array}$$

$$\boxed{b^3 + 7b^2 + b + 7 - \frac{6}{b-4}}$$

9) $(9n^3 - 80n^2 - 10n + 4) \div (n - 9)$

$$\begin{array}{r|rrrr} 9 & 9 & -80 & -10 & 4 \\ & \downarrow & 81 & 9 & -9 \\ \hline & 9 & 1 & -1 & -5 \end{array}$$

$$\boxed{9n^2 + n - 1 - \frac{5}{n-9}}$$

2) $(b^4 + 5b^3 - 5b - 33) \div (b + 5)$

$$\begin{array}{r|rrrr} -5 & 1 & 5 & 0 & -5 & -33 \\ & \downarrow & -5 & 0 & 0 & 25 \\ \hline & 1 & 0 & 0 & -5 & -8 \end{array}$$

$$\boxed{b^3 - 5 - \frac{8}{b+5}}$$

4) $(6r^3 - 47r^2 + 30r + 45) \div (r - 7)$

$$\begin{array}{r|rrrr} 7 & 6 & -47 & 30 & 45 \\ & \downarrow & 42 & -35 & -35 \\ \hline & 6 & -5 & -5 & 10 \end{array}$$

$$\boxed{6r^2 - 5r - 5 + \frac{10}{r-7}}$$

6) $(m^3 + 3m^2 - 44m + 92) \div (m + 9)$

$$\begin{array}{r|rrrr} -9 & 1 & 3 & -44 & 92 \\ & \downarrow & -9 & 54 & -90 \\ \hline & 1 & -6 & 10 & 2 \end{array}$$

$$\boxed{m^2 - 6m + 10 + \frac{2}{m+9}}$$

8) $(5m^4 + 41m^3 - 32m^2 + 39m + 37) \div (m + 9)$

$$\begin{array}{r|rrrr} -9 & 5 & 41 & -32 & 39 & 37 \\ & \downarrow & -45 & 36 & -36 & -27 \\ \hline & 5 & -4 & 4 & 3 & 10 \end{array}$$

$$\boxed{5m^3 - 4m^2 + 4m + 3 + \frac{10}{m+9}}$$

10) $(v^3 - v^2 - 2v) \div (v - 1)$

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

$$\boxed{v^2 - 2 - \frac{2}{v-1}}$$

$$11) (8k^3 + 62k^2 - 97k - 73) \div (k+9)$$

$$\begin{array}{r|rrrr} -9 & 8 & 62 & -97 & -73 \\ & \downarrow & & & \\ & & -72 & 90 & 63 \\ \hline & 8 & -10 & -7 & -10 \end{array}$$

$$\boxed{8k^2 - 10k - 7 - \frac{10}{k+9}}$$

$$13) (8n^3 + 48n^2 - n) \div (n+6)$$

$$\begin{array}{r|rrrr} -6 & 8 & 48 & -1 & 0 \\ & \downarrow & & & \\ & & -48 & 0 & 6 \\ \hline & 8 & 0 & -1 & 6 \end{array}$$

$$\boxed{8n^2 - 1 + \frac{6}{n+6}}$$

$$15) (3a^3 + 19a^2 - 68a + 45) \div (a+9)$$

$$\begin{array}{r|rrrr} -9 & 3 & 19 & -68 & 45 \\ & \downarrow & & & \\ & & -27 & 72 & -36 \\ \hline & 3 & -8 & 4 & 9 \end{array}$$

$$\boxed{3a^2 - 8a + 4 + \frac{9}{a+9}}$$

$$17) (a^4 + 7a^3 + a + 5) \div (a+7)$$

$$\begin{array}{r|rrrrr} -7 & 1 & 7 & 0 & 1 & 5 \\ & \downarrow & & & & \\ & & -7 & 0 & 0 & -7 \\ \hline & 1 & 0 & 0 & 1 & -2 \end{array}$$

$$\boxed{a^3 + 1 - \frac{2}{a+7}}$$

$$19) (a^3 + 3a^2 - 4a) \div (a-1)$$

$$\begin{array}{r|rrrr} 1 & 1 & 3 & -4 & 0 \\ & \downarrow & & & \\ & & 1 & 4 & 0 \\ \hline & 1 & 4 & 0 & 0 \end{array}$$

$$\boxed{x^2 + 4x}$$

$$12) (r^4 - 10r^3 + 21r^2 + 21r - 26) \div (r-6)$$

$$\begin{array}{r|rrrrr} 6 & 1 & -10 & 21 & 21 & -26 \\ & \downarrow & & & & \\ & & 6 & -24 & -18 & 18 \\ \hline & 1 & -4 & -3 & 3 & -8 \end{array}$$

$$\boxed{r^3 - 4r^2 - 3r + 3 - \frac{8}{r-6}}$$

$$14) (p^4 - 14p^3 + 41p^2 + 49p + 64) \div (p-8)$$

$$\begin{array}{r|rrrrr} 8 & 1 & -14 & 41 & 49 & 64 \\ & \downarrow & & & & \\ & & 8 & -48 & -56 & -56 \\ \hline & 1 & -6 & -7 & -7 & 8 \end{array}$$

$$\boxed{p^3 - 6p^2 - 7p - 7 + \frac{8}{p-8}}$$

$$16) (r^3 + r^2 + 6r) \div (r+1)$$

$$\begin{array}{r|rrrr} -1 & 1 & 1 & 6 & 0 \\ & \downarrow & & & \\ & & -1 & 0 & -6 \\ \hline & 1 & 0 & 6 & -6 \end{array}$$

$$\boxed{r^2 + 6 - \frac{6}{r+1}}$$

$$18) (x^3 - 2x^2 - 79x + 7) \div (x+8)$$

$$\begin{array}{r|rrrr} -8 & 1 & -2 & -79 & 7 \\ & \downarrow & & & \\ & & -8 & 80 & -8 \\ \hline & 1 & -10 & 1 & -1 \end{array}$$

$$\boxed{x^2 - 10x + 1 - \frac{1}{x+8}}$$

$$20) (m^4 - 11m^3 + 14m^2 + 11m - 6) \div (m-2)$$

$$\begin{array}{r|rrrrr} 2 & 1 & -11 & 14 & 11 & -6 \\ & \downarrow & & & & \\ & & 2 & -18 & -8 & 6 \\ \hline & 1 & -9 & -4 & 3 & 0 \end{array}$$

$$\boxed{x^3 - 9x^2 - 4x + 3}$$

$$13) (8n^3 + 48n^2 - n) \div (n + 6)$$

$$14) (p^4 - 14p^3 + 41p^2 + 49p + 64) \div (p - 8)$$

$$15) (3a^3 + 19a^2 - 68a + 45) \div (a + 9)$$

$$16) (r^3 + r^2 + 6r) \div (r + 1)$$

$$17) (a^4 + 7a^3 + a + 5) \div (a + 7)$$

$$18) (x^3 - 2x^2 - 79x + 7) \div (x + 8)$$

$$19) (x^3 - 11x^2 + 34x - 20) \div (x - 5)$$

$$20) (m^4 - 11m^3 + 14m^2 + 11m - 6) \div (m - 2)$$

Sketch the graph of each function.

$$21) y = x^2 + 2x - 3$$

$$x = \frac{-2}{2(1)} = \frac{-2}{2}$$

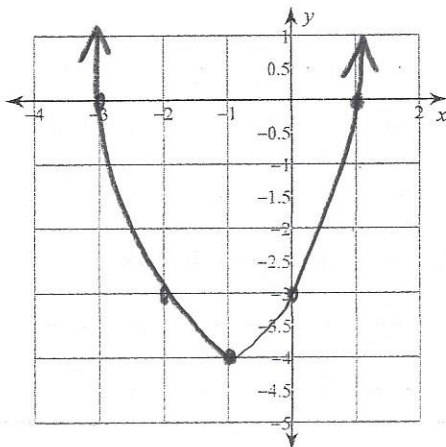
$$x = -1$$

$$(-1)^2 + 2(-1) - 3$$

$$1 - 2 - 3$$

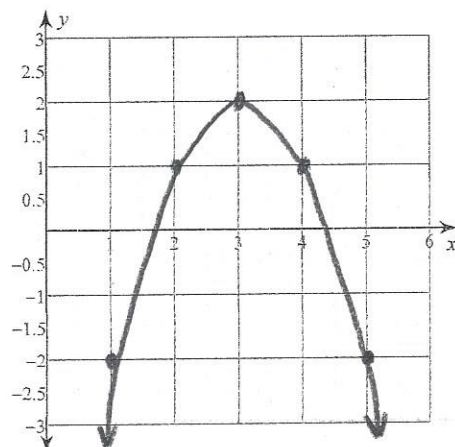
$$y = -4$$

$$(-1, -4)$$



$$22) y = -(x - 3)^2 + 2$$

$$(3, 2)$$



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10) $(v^3 - v^2 - 2v) \div (v - 1)$

11) $(8k^3 + 62k^2 - 97k - 73) \div (k + 9)$

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