

NOTES

5.2 Application and Extension

1. Use long division. $(a^3 + 15a^2 + a + 2) \div (a + 1)$
 $= a^2 + 14a - 13 + \frac{15}{a+1}$

$$\begin{array}{r} a^2 + 14a - 13 + \frac{15}{a+1} \\ a+1 \overline{) a^3 + 15a^2 + a + 2} \\ \underline{+(-a^3 + -a^2)} \\ 14a^2 + a + 2 \\ \underline{+(-14a^2 + 14a)} \\ -13a + 2 \\ \underline{+ (+13a + 13)} \\ 15 \end{array}$$

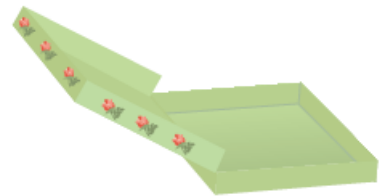
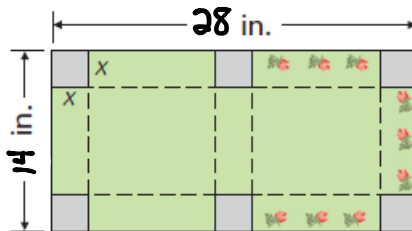
2. Is $(k+2)$ a factor of $(k^4 - 10k^2 - 6k + 1)$?
 $(k - (-2))$

$$\begin{aligned} f(-2) &= (-2)^4 - 10(-2)^2 - 6(-2) + 1 \\ &= 16 - 10(4) + 12 + 1 \\ &= 16 - 40 + 13 \\ &= 29 - 40 \\ f(-2) &= -11 \end{aligned}$$

$(k+2)$ is NOT a factor of $k^4 - 10k^2 - 6k + 1$ because $f(-2) \neq 0$

3. During Mr. Brust's annual visit to the scrapbooking convention, he took a 14 by 28 inch piece of cardboard and put pretty flowers on it. He then realized it was possible to make a box with a hinged lid by cutting out six squares, x inches on a side, from each corner and the middle, and then the ends and sides will be folded up to form the box and its lid (see figure). We want the box to have a volume of 192 cubic inches. One possible solution would be if the cutout was 4 inches. What other value of x would result in a box with a volume of 192 cubic inches. (Hint: you will need to use the quadratic formula at some point.)

$$\begin{aligned} V &= A_{\text{box}} h \\ 192 &= x(14 - 1.5x)(14 - 2x) \\ 192 &= x(196 - 28x - 21x + 3x^2) \\ 192 &= x(3x^2 - 49x + 196) \\ 192 &= 3x^3 - 49x^2 + 196x \\ 0 &= 3x^3 - 49x^2 + 196x - 192 \end{aligned}$$



CANT FACTOR
 Since "4" is a factor

$$\begin{array}{r} 4 \overline{) 3 \quad -49 \quad 196 \quad -192} \\ \underline{12 \quad -148 \quad 192} \\ 3 \quad -37 \quad 48 \quad 120 \end{array}$$

$$(x-4)(3x^2 - 37x + 48) = 0$$

$$\begin{aligned} x-4=0 & \left\{ \begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ x &= \frac{-(-37) \pm \sqrt{(-37)^2 - 4(3)(48)}}{2(3)} \\ x &= \frac{37 \pm \sqrt{1369 - 576}}{6} \\ x &= \frac{37 \pm \sqrt{793}}{6} \end{aligned} \right. \end{aligned}$$

$\rightarrow x = 1.473, 10.860$
 $x \neq 10.860$ because it would cut paper in two
 so $x = 1.473$ inches