Objective: Model situations with factors of polynomials and use them to solve problems.

Ex) The area of a rectangular wheat field can be modeled by $15x^2 - 2x - 24$ square meters.

a) Find the expressions of x that could represent the dimensions of the field.

length & width

Area = length · width

$15x \cdot x$
$3x \cdot 5x$

$m^2 = m \cdot m$

$15x^2 - 2x - 24 = (3x - 4)(5x + 6)$

$(3x - 4)(5x + 6)$

conclusion: The dimensions of the field can be represented by $(3x-4)$ meters and $(5x+6)$ meters.

b) If the value of x is 20, what are the dimensions of the field?

$(3x - 4)$ meters
$3(20) - 4$
$60 - 4$
56 meters

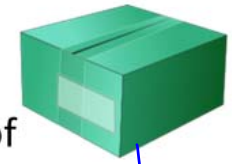
$(5x+6)$ meters
$5(20) + 6$
$100 + 6$
106 meters

The dimensions of the field, if $x = 20$, are 56 meters and 106 meters.

Objective: Model situations with factors of polynomials and use them to solve problems.

Ex) The volume of a shipping box is modeled by $2x^3 - 7x^2 - 4x$ cubic inches.

a) Find the expressions of x that could represent the length, width, and height of the box.



rectangular prism

$in^3 = in \cdot in \cdot in$

volume = length · width · height

$2x^3 - 7x^2 - 4x = x(2x+1)(x-4)$

$x(2x^2 - 7x - 4)$

$x(2x+1)(x-4)$

conclusion

The length, width, and height of the shipping box can be represented by x inches, $(2x+1)$ inches, and $(x-4)$ inches.

b) If the value of x is 15, what are the dimensions of the box?

x in → 15 in

$(2x+1)$ in → 31 in

$2 \cdot 15 + 1$

$(x-4)$ in → 11 in

$15 - 4$

The dimensions of the shipping box, if $x = 15$, are 15 in, 31 in, and 11 in.

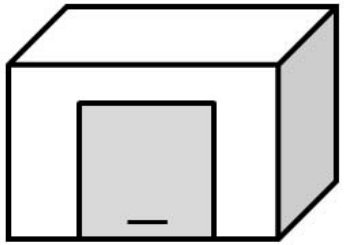
Objective: Model situations with factors of polynomials and use them to solve problems.

Practice) The volume of a rectangular storage shed is modeled by the polynomial $2x^3 + 9x^2 - 35x$ cubic feet.

a) Write expressions of x that could be used to represent the dimensions of the shed.

$V = l \cdot w \cdot h$

The dimensions of the shed can be represented by x feet, $(2x-5)$ feet, and $(x+7)$ feet.



$$V = 2x^3 + 9x^2 - 35x$$
$$= x(2x^2 + 9x - 35)$$
$$= x(2x-5)(x+7)$$

b) If $x = 10$, what are the dimensions of the shed?

$x = 10$

$10\,ft$

$(2(10)-5) = 20-5 = 15\,ft$

$((10)+7) = 17\,ft$

If $x = 10$, the dimensions of the shed are 10 ft, 15 ft, and 17 ft.

c) Penny is planning on renting a storage shed. She's determined that she needs a storage volume of 2000 cubic feet. Is this storage shed large enough to meet Penny's needs? Explain your reasoning.

$V = l \cdot w \cdot h = 10\,ft \cdot 15\,ft \cdot 17\,ft = 2550\,ft^3$

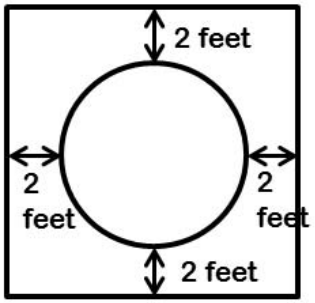
Yes, the storage shed is large enough because its volume is 2550 cubic feet, which is 550 cubic feet larger than Penny needs.

Objective: Model situations with factors of polynomials and use them to solve problems.

Practice) A circular fountain is set within a square flower garden as shown.

The area of the flower garden is $16x^2+24x+9$ square feet.

a) Write expressions of x to model the sides of the flower garden.



$A = l \cdot w$

$A = 16x^2+24x+9$

$= (4x+3)(4x+3)$

The sides of the flower garden can be modeled by $(4x+3)$ feet and $(4x+3)$ feet.

b) What is the diameter of the fountain as an expression of x?

diameter = side length − garden on edges

$(4x+3)\,ft - 4\,ft = (4x-1)\,ft$

The diameter of the fountain is $(4x-1)$ feet.

c) If $x=3$, what is the diameter of the fountain?

$diameter = 4(3)-1\ ft = 12-1 = 11\ ft$

If $x=3$, the diameter of the fountain is 11 feet.

d) If $x=3$, what is the perimeter of the flower garden?

$one\ side = 4x+3\,ft$

$one\ side = 4(3)+3 = 12+3 = 15\,ft$

A square has four equal sides. Perimeter $= 4 \cdot 15\,ft = 60\,ft$

If $x=3$, the perimeter of the flower garden is 60 feet.