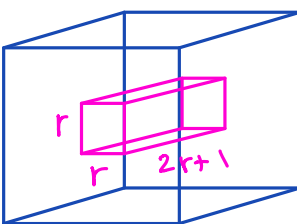


Name: _____

Date: _____

Learning Goal 3.1	Perform combined operations with polynomials.
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Example A cube has edge length $2r + 1$. A right square prism with dimensions r by r by $2r + 1$ is removed from the cube. Write an expression for the volume that remains. Simplify the expression.

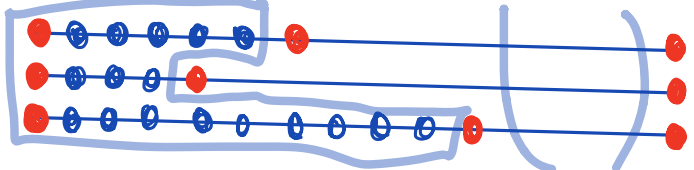


$$\begin{aligned}
 V &= l \times w \times h \\
 &= (2r+1)^3 \\
 &= (2r+1)(2r+1)(2r+1) \\
 &= (4r^2 + 2r + 2r + 1)(2r+1) \\
 &= (4r^2 + 4r + 1)(2r+1) \\
 &= 8r^3 + 8r^2 + 2r + 4r^2 + 4r + 1 \\
 &= 8r^3 + 12r^2 + 6r + 1
 \end{aligned}$$

$$\begin{aligned}
 V &= l \times w \times h \\
 &= r \times r \times (2r+1) \\
 &= r^2(2r+1) \\
 &= 2r^3 + r^2 \\
 V &= V_{\text{cube}} - V_{\text{prism}} \\
 &= 8r^3 + 12r^2 + 6r + 1 - (2r^3 + r^2) \\
 &= 8r^3 + 12r^2 + 6r + 1 - 2r^3 - r^2 \\
 &= 6r^3 + 11r^2 + 6r + 1 \text{ units}^3
 \end{aligned}$$

Learning Goal 3.2	Given a number, a set of numbers or a polynomial expression, identify the prime factorization of each element and use it to find the GCF, LCM, perfect squares or cubes and/or factored form.
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Example A necklace has 3 strands of beads. Each strand begins and ends with a red bead. If a red bead occurs every 6th bead on one strand, every 4th bead on the second strand and every 10th bead on the third strand, what is the least number of beads each strand can have?

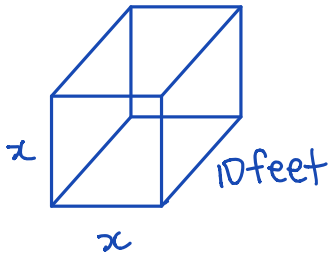


LCM problem

$$\begin{aligned}
 \text{LCM}(4, 6, 10) &= 2^2 \times 3 \times 5 \\
 &= 4 \times 3 \times 5 \\
 &= 60 \text{ beads will complete the pattern} \\
 \Rightarrow & 60 \text{ beads on each strand.}
 \end{aligned}$$

$$\begin{aligned}
 4 &= 2^2 \\
 6 &= 2 \times 3 \\
 10 &= 2 \times 5
 \end{aligned}$$

Example During the Festival du Voyageur in Winnipeg, Manitoba, teams compete in a snow sculpture competition. Each team begins with a 1440 – cubic foot rectangular prism of snow. The prism has a square cross-section and a height of 10 feet. What are its length and width?



$$V = l \times w \times h = 1440 \text{ ft}^3$$

$$x \times x \times 10 = 1440$$

$$\frac{10x^2}{10} = \frac{1440}{10}$$

$$\sqrt{x^2} = \sqrt{144}$$

$$x = \sqrt{144}$$

$$= \sqrt{2^4 \times 3^2}$$

$$= 2^2 \times 3$$

$$= 12 \text{ feet}$$

The base of the prism is 10ft x 10ft.

$$144 = 2^4 \times 3^2$$

$$\begin{array}{r} \wedge \\ 2 \quad 72 \\ \hline \wedge \\ 2 \quad 36 \\ \hline \wedge \\ 2 \quad 18 \\ \hline \wedge \\ 2 \quad 9 = 3 \\ \hline \end{array}$$

Example A cylindrical bar has base radius r and height h . Only the curved surface of a cylindrical bar is to be painted. Write an expression for the fraction of the total surface area that will be painted. Simplify if possible.



$$A_{\circ} = \pi r^2$$

$$A_{\square} = l \times w$$

$$= \pi d$$

$$= 2\pi r \times h$$

The fraction of the surface area is represented by $2\pi r h$ units².