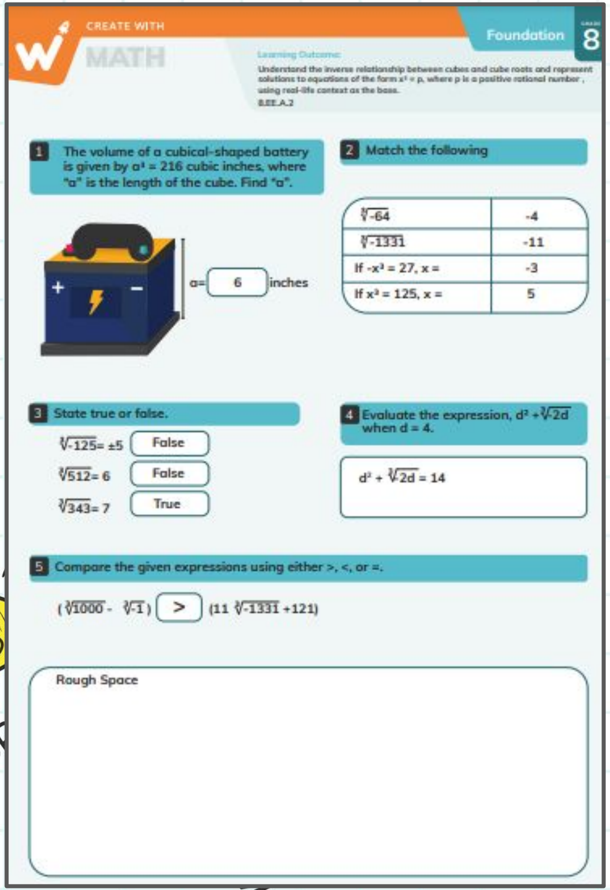
CREATE WITH MATH

Worksheet Solutions

Foundation


CREATE WITH MATH

Foundation

GRADE 8

Learning Outcome:

Understand the inverse relationship between cubes and cube roots and represent solutions to equations of the form $x^3 = p$, where p is a positive rational number, using real-life context as the base.

8.EE.A.2

1 The volume of a cubical-shaped battery is given by $a^3 = 216$ cubic inches, where "a" is the length of the cube. Find "a".

a= 6 inches

2 Match the following

$\sqrt[3]{-64}$	-4
$\sqrt[3]{-1331}$	-11
If $-x^3 = 27$, x =	-3
If $x^3 = 125$, x =	5

3 State true or false.

$\sqrt[3]{-125} = \pm 5$ False

$\sqrt[3]{512} = 6$ False

$\sqrt[3]{343} = 7$ True

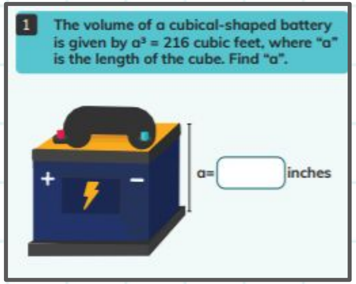
4 Evaluate the expression, $d^2 + \sqrt[3]{2d}$ when d = 4.

$d^2 + \sqrt[3]{2d} = 14$

5 Compare the given expressions using either >, <, or =.

$(\sqrt[3]{1000} - \sqrt[3]{-1})$ > $(11\ \sqrt[3]{-1331} + 121)$

Rough Space



a = 72 inches

Given:

Volume of the cubical shaped battery : 216 feet
Side of cube = a inches

Solution:

Volume = 216 cubic feet = a^3

$\Rightarrow a^3 = 216$

$\Rightarrow a = \sqrt[3]{216}$

$\Rightarrow a = 6$ feet

Also, 1 feet = 12 inches
a = 12 x 6 = 72 inches

Each side of the cuboid, a, measures 72 inches.

2 Match the following

$\sqrt[3]{-64}$	5
$\sqrt[3]{-1331}$	-3
If $-x^3 = 27$, x =	-11
If $x^3 = 125$, x =	-4

$\sqrt[3]{-64}$	5
$\sqrt[3]{-1331}$	-3
If $-x^3 = 27$, x =	-11
If $x^3 = 125$, x =	-4

Solution:

1. $\sqrt[3]{-64} = -4$

2. $\sqrt[3]{-1331} = -11$

3. If $-x^3 = 27$, $-x = \sqrt[3]{27}$
   $\Rightarrow x = -3$

4. If $x^3 = 125$, $x = \sqrt[3]{125}$
   $\Rightarrow x = 5$

3 State true or false.

$\sqrt[3]{-125} = \pm 5$ ☐

$\sqrt[3]{512} = 6$ ☐

$\sqrt[3]{343} = 7$ ☐

Solution:

We know that,

$\sqrt[3]{-125} = -5 \Rightarrow$ False

$\sqrt[3]{512} = 8 \Rightarrow$ False

$\sqrt[3]{343} = 7 \Rightarrow$ True

1. False
2. False
3. True

4 Evaluate the expression, $d^2 + \sqrt[3]{-2d}$ when d = 4.

14

Given:

Expression: $d^2 + \sqrt[3]{-2d}$
d = 4

Solution:

$d^2 + \sqrt[3]{-2d}$
substitute d = 4 in the expression

$\Rightarrow 4^2 + \sqrt[3]{-2 \times 4}$

$\Rightarrow 16 + \sqrt[3]{-8}$

$\Rightarrow 16 + (-2)$

$\Rightarrow 14$

5 **Compare the given expressions using either >, <, or =.**

$(\sqrt[3]{1000} - \sqrt[3]{-1})$ $\square$ $(11\sqrt[3]{-1331} + 121)$

$\sqrt[3]{1000} - \sqrt[3]{-1} > 11\sqrt[3]{-1331} + 121$

Given:

Expression 1 : $\sqrt[3]{1000} - \sqrt[3]{-1}$
Expression 2 : $11\sqrt[3]{-1331} + 121$

Solution:

$\sqrt[3]{1000} - \sqrt[3]{-1} = 10 - (-1)$
$\Rightarrow 11$

$11\sqrt[3]{-1331} + 121 = 11 \times (-11) + 121$
$= -121 + 121 = 0$

Hence,

$\sqrt[3]{1000} - \sqrt[3]{-1} > 11\sqrt[3]{-1331} + 121$

Application

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Application

GRADE 8

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Understand the inverse relationship between cubes and cube roots and represent solutions to equations of the form $x^3 = p$, where p is a positive rational number , using real-life context as the base.

8.EE.A.2

As a motorsport manager you are preparing your team to get ready for the upcoming car race. You help your team to fix critical equipment, to get painting work done, to check fuel mileage, and to plan track topography.

1. Find the length of the cubical boxes in the dashboard, to fit critical equipment.

$\sqrt[3]{27} =$ ☐

$\sqrt[3]{125} =$ ☐

$\sqrt[3]{1000} =$ ☐

2. The trunk of the car has a length of 6 meters. If you wanted to keep the cubical fuel tins of volume 8 cu. meters each along the length of the trunk, how many tins can you keep inside the trunk? Draw the correct number of boxes inside the trunk.

3. The paint required (c) (in gallons) to paint the cars is given by the expression, $45c - 12\sqrt[3]{625/5} = 75$. Find c.

4. While racing, the driver needs to speed up at the elevation. Solve the expression to find the velocity (v) that should be maintained by the racer. Velocity is given by the expression, $\sqrt[3]{1331} \times 12 + 22$. Find v.

5. The fuel in the car is low and you need to cover 10 miles more before you can reach the refueling station. The total distance d that your car can travel is given by the expression, $3d = \sqrt[3]{216} \times 4\sqrt[3]{8}$. Check whether you can reach the refueling station.

As a motorsport manager you are preparing your team to get ready for the upcoming car race. You help your team to fix critical equipment, to get painting work done, to check fuel mileage, and to plan track topography.

1 Find the length of the cubical boxes in the dashboard, to fit critical equipment.

$\sqrt[3]{27} = \square$

$\sqrt[3]{125} = \square$

$\sqrt[3]{1000} = \square$

Solution:

The length of the cubical boxes will be the cube root of following numbers-

$\sqrt[3]{27} = \sqrt[3]{(3 \times 3 \times 3)} \Rightarrow 3$

$\sqrt[3]{125} = \sqrt[3]{(5 \times 5 \times 5)} \Rightarrow 5$

$\sqrt[3]{1000} = \sqrt[3]{(10 \times 10 \times 10)} \Rightarrow 10$

$\sqrt[3]{27} = \boxed{3}$

$\sqrt[3]{125} = \boxed{5}$

$\sqrt[3]{1000} = \boxed{10}$

2 The trunk of the car has a length of 6 meters. If you wanted to keep the cubical fuel tins of volume 8 cu. meters each along the length of the trunk, how many tins can you keep inside the trunk? Draw the correct number of boxes inside the trunk.

3 tins

Given:

Length of trunk = 6 meters
Volume of fuel tins = 8 cubic meters

Solution:

To find the number of tins that will be able to fit the trunk, we need to find the length of the sides of the tin.

Side length = $\sqrt[3]{8} \Rightarrow \sqrt[3]{(2 \times 2 \times 2)} = 2$ meters
Length of trunk = 6 meters

$$\text{No. of tins that can fit the trunk} = \frac{\text{Length of trunk}}{\text{Length of the tin}}$$

$$= \frac{6}{2} = 3 \text{ tins}$$

3 The paint required (c) (in gallons) to paint the cars is given by the expression,
$45c - 12\sqrt[3]{625/5} = 75$. Find c.

c = 3 gallons

Given:

$45c - 12\sqrt[3]{(625 / 5)} = 75$

Where c is the paint required to paint the car (in gallons).

Solution:

$45c - 12\sqrt[3]{(625 / 5)} = 75$

$\Rightarrow 45c - 12\sqrt[3]{125} = 75$

$\Rightarrow 45c - 12 \times 5 = 75$

$\Rightarrow 45c = 75 + 60$

$\Rightarrow 45c = 135$

$\Rightarrow c = 135 / 45$

$\Rightarrow c = 3$ gallons

4 While racing, the driver needs to speed up at the elevation. Solve the expression to find the velocity (v) that should be maintained by the racer. Velocity is given by the expression, $\sqrt[3]{1331} \times 12 + 22$. Find v.

v = 154 mph

Given:

Velocity (v) = $\sqrt[3]{1331} \times 12 + 22$ mph

Solution:

v = $\sqrt[3]{1331} \times 12 + 22 \Rightarrow 11 \times 12 + 22$

v = 132 + 22

v = 154 mph

5 The fuel in the car is low and you need to cover 10 miles more before you can reach the refueling station. The total distance d that your car can travel is given by the expression, $3d = \sqrt[3]{216} \times 4\sqrt[3]{8}$. Check whether you can reach the refueling station.

Yes

Given:

Distance to empty = 10 miles

$3d = \sqrt[3]{216} \times 4\sqrt[3]{8}$, where, d is the distance car can travel.

Solution:

$3d = \sqrt[3]{216} \times 4\sqrt[3]{8}$

$3d = 6 \times 4(2)$

$3d = 48$

$d = 16$ miles

So, the car can travel 16 miles which is more than 10 miles.

Hence, we can reach the refueling station.

Create

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Grade 8

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8.EE.A.2

Motorsport Management

As a motorsport manager, you have a last-minute project to supervise.
Help your employees fix them.
You want to build a cubical designer building next to the race track to monitor the races. Coordinate with your employees and help them plan the design.

By using different sizes of cubes and following the given steps, let's design the front of the building.

1. Using the given condition, select five different volumes of cubes and enter their corresponding lengths in the given table.

   Condition: $1 \le x^3 \le 1000$
   (x: Length of the cube in inches)
   "x" must be an integer.

Volume (in cubic inches)	**Length "x"** (in inches)

2. Keeping in mind that the front view of a cube looks like a square, draw the front view of the chosen cubes on the given graph.

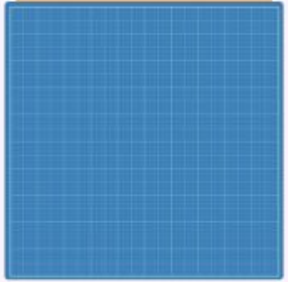
   Condition: The larger cubes should be placed at the bottom of the building, while the smaller cubes should be at the top.

3. Use a ruler to draw the exact length of the square on the sheet.
4. Be creative! Design and color each cube as you please.
5. Looks like your architect sent you some of the basic designs, use them for reference.

View of the building from the front

View of the building from the side

Use the grid sheet provided below to note down your front view plan!



1 Using the given condition, select five different volumes of cubes and enter their corresponding lengths in the given table.

Condition: $1 \le x^3 \le 1000$
(x: Length of the cube in inches)
"x" must be an integer.

Volume (in cubic inches)	**Length "x"** (in inches)

Given:

Condition: (1< x3 < 1000), where 'x' is the length of cube in inches and 'x' must be an integer

Solution:
Selecting 5 different cubes with volumes as 1, 8, 27, 64, and 125 cubic inches, respectively, and tabulating their lengths we have,

Volume (in cubic inches)	**Length "x"** (in inches)
1	1
8	2
27	3
64	4
125	5

2 Keeping in mind that the front view of a cube looks like a square, draw the front view of the chosen cubes on the given graph.

Condition: The larger cubes should be placed at the bottom of the building, while the smaller cubes should be at the top.

3 Use a ruler to draw the exact length of the square on the sheet.

4 Be creative! Design and color each cube as you please.

5 Looks like your architect sent you some of the basic designs, use them for reference.

Given:

The table with the volumes of 5 different cubes.

Solution:

Using the cubes we can draw the front view of the plan as shown: