CREATE WITH MATH

Worksheet Solutions

Foundation

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Foundation

GRADE 8

Learning Outcome:
Understand the inverse relationship between squares and square roots and represent solutions to equations of the form $x^2 = p$ where p is a positive rational number, using real-life context as the base.
(8.EE.A.2)

1 Surface area of a cubical display case is given as $6a^2 = 24$ square feet. Find its side length, a.

a = ☐ feet

Answer: ☐

2 $x^2 = 49$, mark the value(s) of x on the given number line.

Answer: ☐

3 $13 - (\sqrt{4})^2 = \sqrt{81}$, state true or false.

Answer: ☐

4 Compare the following with <, >, or =.

$\sqrt{\frac{25}{4}}$ ☐ $\frac{3}{2}$

5 Your assistant made a few mistakes while trying to solve some clues. Spot them. (Use ✓ or ✗)

Step 1: $4x^2 = 64$ ☐

Step 3: $x = \sqrt{4}$ ☐

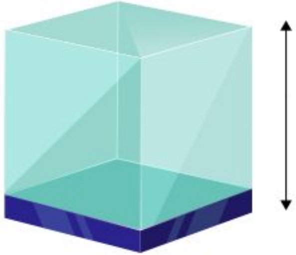
Step 2: $x^2 = 16$ ☐

Step 4: $x = -2$ ☐

6 If $\sqrt{9p^6} = 3p^x$, then x = ___.

Answer: ☐

1 Surface area of a cubical display case is given as $6a^2 = 24$ square feet. Find its side length, a.



a = [ ] feet

Answer: [ ]

a = 2 feet

Given:

Surface area of the case: 24 square feet

Side of cube = *a* feet

A cube has 6 equal faces of the same area. Hence its surface area is 6 x (area of one face)

$6a^2 = 24$ square feet

Solution:

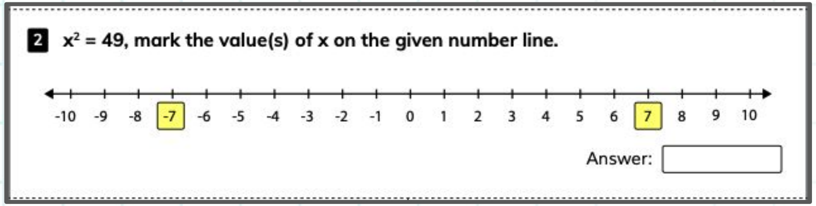
$\Rightarrow 6a^2 = 24$

$\Rightarrow a^2 = 24 \div 6$

$\Rightarrow a^2 = 4$

Or, $a = \sqrt{4} = 2$

Each side of the cuboid, a, measures 2 feet.



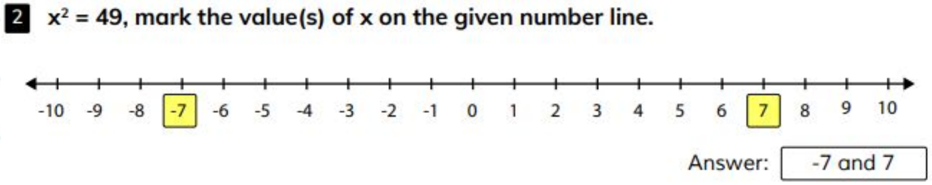
2 $x^2 = 49$, mark the value(s) of x on the given number line.

Given:
$x^2 = 49$

Solution:
A quadratic equation has two roots.

The two roots of $x^2 = 49$ are +7 and -7.

Plotting these on the number line would be:



2 $x^2 = 49$, mark the value(s) of x on the given number line.

x = 7 or -7

3 $13 - (\sqrt{4})^2 = \sqrt{81}$, state true or false.

Answer:

True

Given:
LHS: $13 - (\sqrt{4})^2$
RHS: $\sqrt{81}$

Solution:
<u>Solving LHS: $13 - (\sqrt{4})^2$</u>
We know that $\sqrt{4} = 2$
$\Rightarrow 13 - (\sqrt{4})^2 = 13 - (2)^2$
$\Rightarrow 13 - 4 = 9$

LHS = 9

<u>Solving RHS: $\sqrt{81}$</u>
We know that $\sqrt{81}$ is 9

RHS = 9

Since LHS = RHS, the equation is True

4 Compare the following with <, >, or =.

$$\sqrt{\frac{25}{4}} \ \square \ \frac{3}{2}$$

$$\sqrt{\frac{25}{4}} \ \boxed{>} \ \frac{3}{2}$$

Given:
LHS: $\sqrt{(25/4)}$
RHS: $3/2$

Solution:
LHS: $\sqrt{(25/4)}$
We know that $\sqrt{25} = 5$ and $\sqrt{4} = 2$
Hence, LHS = $5/2$

Solving RHS:
RHS = $3/2$

Since they're like fractions, we can compare the numerators to identify which fraction is greater.

$5 > 3$, hence LHS > RHS $\sqrt{\frac{25}{4}} \ \boxed{>} \ \frac{3}{2}$

5 Your assistant made a few mistakes while trying to solve some clues. Spot them. (Use ✓ or ✗)

Step 1: $4x^2 = 64$	☐	Step 3: $x = \sqrt{4}$	☐
Step 2: $x^2 = 16$	☐	Step 4: $x = -2$	☐

Given:

$4x^2 = 64$

Solution:

Step 1: $4x^2 = 64$

Step 2: $x^2 = 64 \div 4 \Rightarrow x^2 = 16$.

Step 3: $x^2 = 16 \Rightarrow x = \sqrt{16}$.

This step is not written correctly.

Step 4: $x = \sqrt{16} \Rightarrow x = +4$ or -4.

This step is not written correctly.

Hence, Steps 1 and 2 are correct (✓) and Steps 3 and 4 are wrong (✗)

Step 1: $4x^2 = 64$	✓	Step 3: $x = \sqrt{4}$	✗
Step 2: $x^2 = 16$	✓	Step 4: $x = -2$	✗

Step 1: $4x^2 = 64$	✓	Step 3: $x = \sqrt{4}$	✗
Step 2: $x^2 = 16$	✓	Step 4: $x = -2$	✗

6 If $\sqrt{9p^6} = 3p^x$, then x = ____.

x = 3

Given:
$\sqrt{(9p^6)} = 3p^x$

Solution:
Solving LHS:
$\sqrt{9} = 3$ and $\sqrt{(p^6)} = p^3$
Hence, $\sqrt{(9p^6)} = 3p^3$

Comparing with the RHS
$3p^x = 3p^3$

Hence x = 3.

Application

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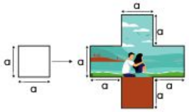
Application GRADE 8

Learning Outcome:
Understand the inverse relationship between squares and square roots and represent solutions to equations of the form $x^2 = p$ where p is a positive rational number, using real-life context as the base.
(8.EE.A.2)

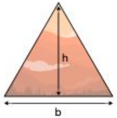
Mandarin was obsessed with squares, but he did briefly experiment with other geometric shapes and ideas. The museum has received some of these experimental works for display. It's up to you to help them set up the paintings, and have the Mandarin display in the museum catch eyes.

1 One of Mandarins more unique paintings is made up of 5 squares covering a total area of 125 sq. feet. They can be folded into a box. Calculate the side lengths of each square so you know the lengths of tape to use to hold it in the box shape.



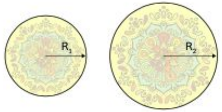
a = ☐ feet

2 You need to frame a triangle-shaped painting of area $40\frac{1}{2}$ square feet. If the base and height of the painting are equal, what is its height?



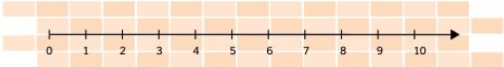
h = ☐ feet

3 The ratio of areas of two circular paintings is 16:25. You need to figure out the space that'll be left if they're displayed next to each other. If the radius of the smaller painting is 4 feet, what will be the radius of the larger one? [Hint: Area = π (radius)^2].



R_2 = ☐ feet

4 The width of a painting is represented by w in the equation $2w(w - 5) = 128 - 10w$. How much space will it occupy on the wall? Represent the width on the number line.

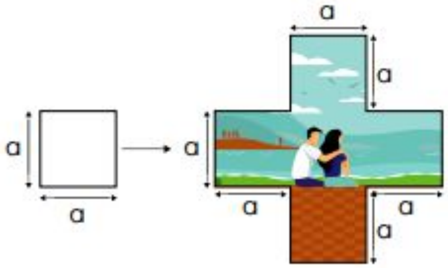


w = ☐ feet

5 The walls need to be painted a suitable color to display these paintings. The amount of paint (x, in ounces) required to paint a certain area (y, in sq. inch) is given by $y = \sqrt{49x^4} + \sqrt{9}$. If you have 3 ounces of paint, how much area will you be able to paint?

Answer: ☐

1 One of Mandarins more unique paintings is made up of 5 squares covering a total area of 125 sq. feet. They can be folded into a box. Calculate the side lengths of each square so you know the lengths of tape to use to hold it in the box shape.



a = ☐ feet

a = 5 feet

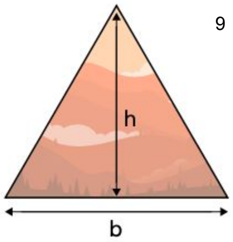
Given:
Total area covered by the painting = 125 sq. ft
There are 5 squares with each side measuring *a* ft.

Solution:
Total area covered by the painting = sum of area covered by 5 squares
Hence, area of each square = 125 ÷ 5 = 25 sq. ft

Side of square = a ft.
Area of a square = a ft x a ft
$\Rightarrow a^2 = 25$ sq ft.
$\Rightarrow a = \sqrt{25} = 5$ ft
$\Rightarrow a = 5$ ft

2 You need to frame a triangle-shaped painting of area $40\frac{1}{2}$ square feet. If the base and height of the painting are equal, what is its height?

9



h = ☐ feet

h = 9 feet

Given:
Area of triangle-shaped painting = 40 ½ sq. ft
Base and height of the painting are equal i.e. b = h.

Solution:
Area of a triangle = ½ × base × height
$= \frac{1}{2} \times b \times h$

We know that b = h,

$\Rightarrow$ area = $\frac{1}{2} \times h \times h$

$= \frac{1}{2} \times h^2$

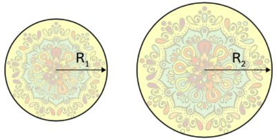
$\Rightarrow \frac{1}{2} \times h^2 = 40\frac{1}{2}$ sq. ft

$\Rightarrow h^2 = 2 \times (40\frac{1}{2}) = 81$ sq. ft

$\Rightarrow h = \sqrt{81} = 9$ ft.

Height = 9 ft.
Base = 9 ft.

3 The ratio of areas of two circular paintings is 16:25. You need to figure out the space that'll be left if they're displayed next to each other. If the radius of the smaller painting is 4 feet, what will be the radius of the larger one? [Hint: Area = π (radius)^2].



R_2 = ☐ feet

Given:

Ratio of area of the two circular paintings: 16:25

R_1 is the radius of the smaller painting = 4 ft

R_2 is the radius of the larger painting

Solution:

Area of a circle is πr^2 where r is the radius of the circle.

Area of the smaller circle = πR_1^2

Area of the smaller circle = πR_2^2

$\pi R_1^2 : \pi R_2^2 = 16:25$

$\Rightarrow \pi R_1^2 / \pi R_2^2 = 16/25$

$\Rightarrow R_1^2 / R_2^2 = 16/25$

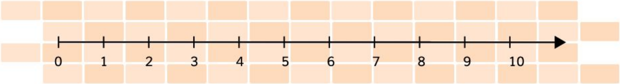
$\Rightarrow R_1 / R_2 = \sqrt{(16/25)}$

$\Rightarrow R_1 / R_2 = 4/5$

$\Rightarrow R_2 = R_1 \times 5/4 = 4 \times 5/4 = 5$ ft

R_2 = 5 feet

4 The width of a painting is represented by w in the equation 2w(w - 5) = 128 - 10w. How much space will it occupy on the wall? Represent the width on the number line.



w = ☐ feet

Given:

$2w(w - 5) = 128 - 10w$

Solution:

Expanding the equation

$2w^2 - 10w = 128 - 10w$

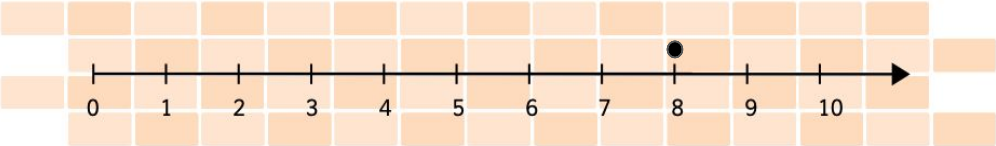
Hence, $2w^2 = 128$

$\Rightarrow w^2 = 128 \div 2$

$\Rightarrow w^2 = 64$

$\Rightarrow w = \sqrt{64} = 8$

Width = 8 ft



w = 8 feet

5 The walls need to be painted a suitable color to display these paintings. The amount of paint (x, in ounces) required to paint a certain area (y, in sq. inch) is given by $y = \sqrt{49x^4} + \sqrt{9}$. If you have 3 ounces of paint, how much area will you be able to paint?

Answer: ____________

Given:

Amount of paint = x ounces = 3 ounces

Area painted = y sq. inch

$y = \sqrt{(49x^4)} + \sqrt{9}$

Solution:

$y = \sqrt{(49x^4)} + \sqrt{9}$

We know that $\sqrt{49} = 7$, $\sqrt{x^4} = x^2$, and $\sqrt{9} = 3$

Therefore, $y = 7x^2 + 3$

Substituting 3 in place of x,

$y = 7 \times 3^2 + 3$

Applying PEMDAS,

$y = 7 \times 9 + 3 = 63 + 3 = 66$ sq. inch

$y = 66$ sq. inch

Create

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Create

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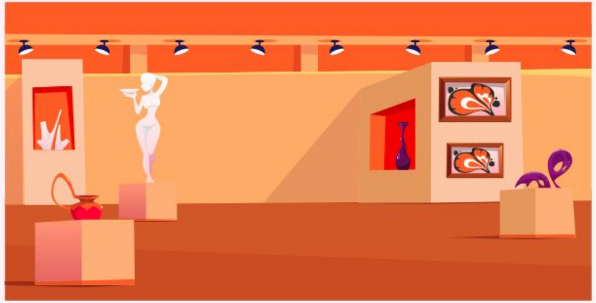

To complement the other paintings, you can make a painting with different geometric shapes:

Choose any 4 of the given shapes but make sure that you satisfy the condition next to it:

1) Square whose area is a perfect square, 3 sq. units < area < 100 sq. units.
2) Rectangle with length = 2 x width, has an area < 120 sq. units.
3) Rectangle with 3 x length = width, 200 sq. units < area < 300 sq. units.
4) Triangle with base = height, has an area > 50 sq. units.
5) Circle with area = (Perfect square) x π sq. units.

Draw the chosen shapes with the correct dimensions below.

Solutions:

Given:

1. Square whose area is a perfect square, 3 sq. units < area < 100 sq. units.
2. Rectangle with length = 2 x width, has an area < 120 sq. units.
3. Rectangle with 3 x length = width, 200 sq. units < area < 300 sq. units. 4)
4. Triangle with base = height, has an area > 50 sq. units.
5. Circle with area = (Perfect square) x π sq. units.