Curriculum Outcome

(N5) Determine the square root of positive rational numbers that are perfect squares.

(N6) Determine an approximate square root of positive rational numbers that are non-perfect squares.

(SS2) Determine the surface area of composite 3-D objects to solve problems

(N4) **Explain and apply the order of operations, including exponents, with and without technology.**

1.1 Square Roots of Perfect Squares

A new parking lot is a square with an area of 900 m^2. What is the side length of the square?

Think Area of a Sqaure

Write the area as a product

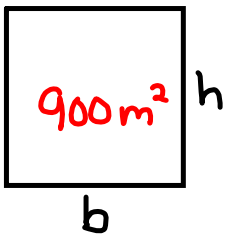
"Square" THEN...
Base = Height

Area = base x height

$900 = b \times b$

$\sqrt{900} = \sqrt{b^2}$

$30 = b$



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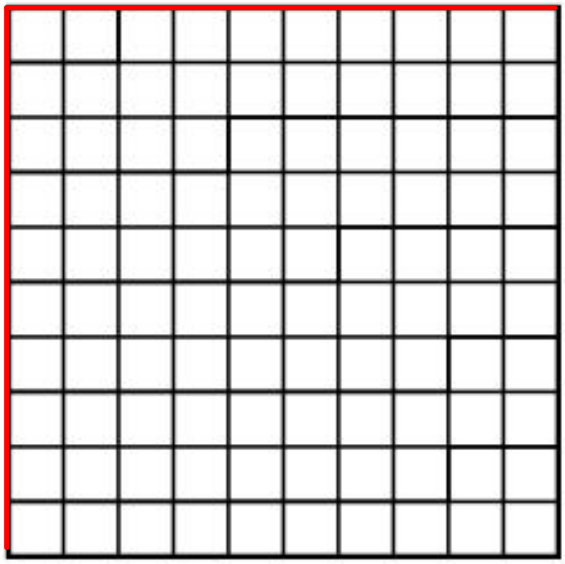

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Area????

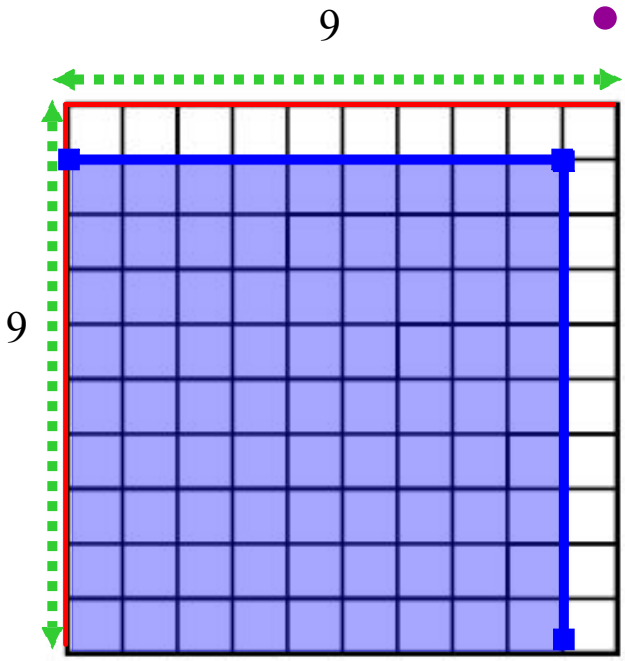
$A = b \times h$

$A = b \times b$

$A = b^2$

$A = 10^2$

$A = 100$

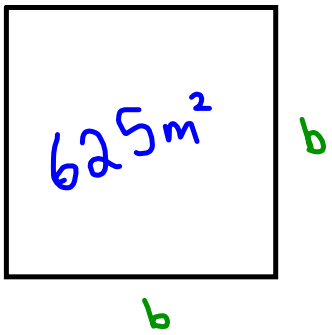


This sqaure is divided into 100 equal parts.

What is the area of the blue square?

Area of square

The Area of a square is 625 m^2, what is the length of the side?



$A = b \times h$

$A = b^2$

$\sqrt{625} = \sqrt{b^2}$

$25 = b$

Area of a Square	Side length as a Sqaure Root
9	3
16	4
81	9
49	7
169	13
100	10
400	20

Perfect Squares

$1^2 = 1 \times 1 = 1$

$2^2 = 2 \times 2 = 4$

$3^2 = 3 \times 3 = 9$

$4^2 = 4 \times 4 = 16$

$\vdots$

$20^2 = 20 \times 20 = 400$

To determine the side length of a square we, calculate the "square root" of its area

This is the symbol to represent "Square Root"

Square Root is the opposite to Squaring a number

Area of a square = (length of the side)^2

Perfect Squares

$(1)^2 = 1 \times 1 = \mathbf{1}$

$(2)^2 = 2 \times 2 = \mathbf{4}$

$(3)^2 = 3 \times 3 = \mathbf{9}$

$(4)^2 = 4 \times 4 = \mathbf{16}$

$(5)^2 = 5 \times 5 = \mathbf{25}$

$(6)^2 = 6 \times 6 = \mathbf{36}$

$(7)^2 = 7 \times 7 = \mathbf{49}$

$(8)^2 = 8 \times 8 = \mathbf{64}$

$(9)^2 = 9 \times 9 = \mathbf{81}$

$(10)^2 = 10 \times 10 = \mathbf{100}$

$(11)^2 = 11 \times 11 = \mathbf{121}$

$(12)^2 = 12 \times 12 = \mathbf{144}$

$(13)^2 = 13 \times 13 = \mathbf{169}$

$(14)^2 = 14 \times 14 = \mathbf{196}$

$(15)^2 = 15 \times 15 = \mathbf{225}$

$(16)^2 = 16 \times 16 = \mathbf{256}$

$(17)^2 = 17 \times 17 = \mathbf{289}$

$(18)^2 = 18 \times 18 = \mathbf{324}$

$(19)^2 = 19 \times 19 = \mathbf{361}$

$(20)^2 = 20 \times 20 = \mathbf{400}$

$(21)^2 = 21 \times 21 = \mathbf{441}$

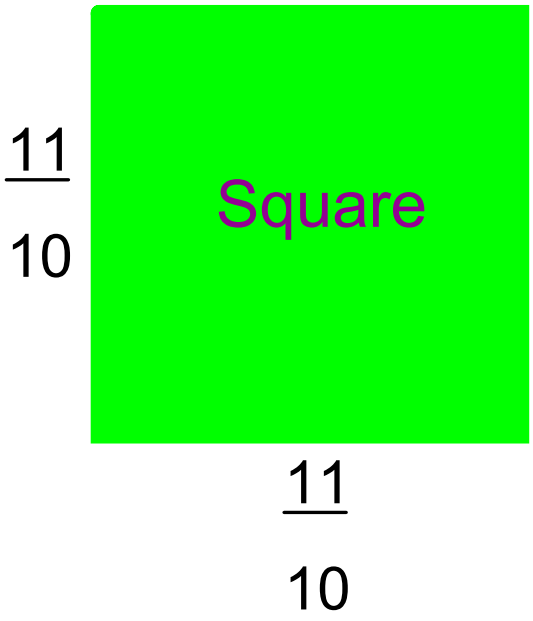
$(22)^2 = 22 \times 22 = \mathbf{484}$

$(23)^2 = 23 \times 23 = \mathbf{529}$

$(24)^2 = 24 \times 24 = \mathbf{576}$

$(25)^2 = 25 \times 25 = \mathbf{625}$

What is the area of the following



What is the area?

$A = b \times h$

$A = \left(\frac{11}{10}\right)\left(\frac{11}{10}\right)$

$A = \frac{121}{100}$

What is the perimeter?

$P = \text{side} + \text{side} + \text{side} + \text{side}$

$= \frac{11}{10} + \frac{11}{10} + \frac{11}{10} + \frac{11}{10}$

$= \frac{44}{10}$

Area of square = $\frac{49}{81}$ cm^2

What is the length of the sides?

side = $\sqrt{\frac{49}{81}} = \frac{\sqrt{49}}{\sqrt{81}} = \frac{7}{9}$

What it the perimeter of the square

P = side + side + side + side

$P = \frac{7}{9} + \frac{7}{9} + \frac{7}{9} + \frac{7}{9}$

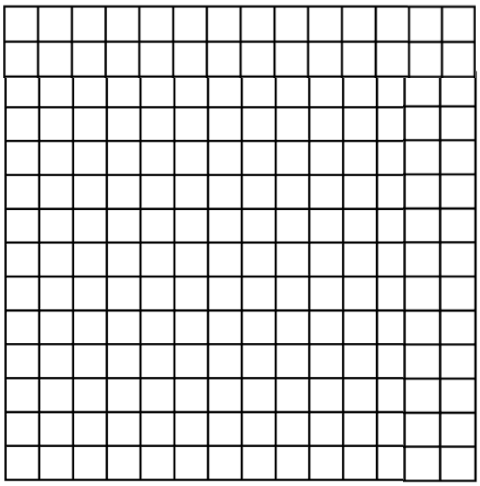
$P = \frac{28}{9}$

Area of a square is $\frac{196}{100}$

****

Then the length of a side is determined by taking the square root of the its area. ***

$$A = b \times h$$



$$\text{Side Length} = \sqrt{\frac{196}{100}}$$

$$= \sqrt{\frac{14 \times 14}{10 \times 10}}$$

$$= \frac{14}{10}$$

The side lengthe is $\frac{14}{10}$ units

How do we know if a number is a perfect Square using a calculator?

→ When you take the square root
The answer has to have a

a) Decimal terminates

$\sqrt{1.25} = 1.118033989$

$\sqrt{\frac{125}{100}} =$

$\frac{\sqrt{125}}{\sqrt{100}} = \frac{\text{No}}{\text{P.S.}}$

$\sqrt{0.81} = 0.9$

$\sqrt{\frac{81}{100}}$

$\frac{\sqrt{81}}{\sqrt{100}} = \frac{9}{10}$

$= 0.9$

Without Calculator

Example:

Determine if the decimal is a perfect square?

a) 0.25

$\sqrt{\frac{25}{100}}$

$\frac{\sqrt{25}}{\sqrt{100}}$

$= \frac{5}{10}$

PS

b) 2.5

$\sqrt{\frac{25}{10}}$

$\frac{\sqrt{25}}{\sqrt{10}}$

$= \frac{5}{?}$

Not PS

c) 1.69

$\sqrt{\frac{169}{100}}$

$\frac{\sqrt{169}}{\sqrt{100}}$

$= \frac{13}{10}$

P.S

Class/Homework

Page 11

3 (a, b, c)

#5 (without calculator)

7 (without calculator)

Class/Homework

Page 11-12

$\sqrt{\frac{36}{81}} = \frac{\sqrt{36}}{\sqrt{81}} = \frac{6}{9}$

5 (a, c, e, g)
7 (a, c, e, g, i)
8 (a, c, d, f, g, i, , l)
9 (a, b, g, h)
10(a, b)
11 (a)
14
16

Page 11 & 12

Solutions

5a) $\sqrt{0.36} = \sqrt{\frac{36}{100}} = \sqrt{\frac{6\times6}{10\times10}} = \frac{6}{10} = 0.6$

5c) $\sqrt{0.81} = \sqrt{\frac{81}{100}} = \sqrt{\frac{9\times9}{10\times10}} = \frac{9}{10} = 0.9$

5e) $\sqrt{\frac{1}{36}} = \sqrt{\frac{1\times1}{6\times6}} = \frac{1}{6} = 0.1\overline{6}$

5g) $\sqrt{\frac{64}{100}} = \sqrt{\frac{8\times8}{10\times10}} = \frac{8}{10} = 0.8$

7a) $\sqrt{\frac{169}{16}} = \sqrt{\frac{13\times13}{4\times4}} = \frac{13}{4} = 3.25$

7c) $\sqrt{\frac{256}{361}} = \sqrt{\frac{16\times16}{19\times19}} = \frac{16}{19}$

7e) $\sqrt{144} = \sqrt{12\times12} = 12$

7g) $\sqrt{0.0121} = \sqrt{\frac{121}{10000}} = \sqrt{\frac{11\times11}{100\times100}} = \frac{11}{100} = 0.11$

7i) $\sqrt{0.0324} = \sqrt{\frac{324}{10000}} = \sqrt{\frac{18\times18}{100\times100}} = \frac{18}{100} = 0.18$

8a) $0.12 \rightarrow \frac{12}{100} = \frac{3}{25}$ NO since numerator is not a perfect square OR "Decimal does not terminate when you take the square root".

c) $0.25 \rightarrow \frac{25}{100} =$ YES

d) $1.69 \rightarrow \frac{169}{100} = \frac{13}{10} \times \frac{13}{10}$ YES

f) $\frac{36}{81} = \frac{6}{9} \times \frac{6}{9}$ YES

g) $\frac{81}{49} = \frac{9}{7} \times \frac{9}{7}$ YES

L) $\frac{8}{50} = \frac{4}{25} = \frac{2}{5} \times \frac{2}{5}$ YES

10) a) $\sqrt{12.25} = \sqrt{\frac{1225}{100}} = \sqrt{\frac{49}{4}} = \sqrt{\frac{7}{2} \times \frac{7}{2}} = \frac{7}{2} = 3.5$

b) $\sqrt{30.25} = \sqrt{\frac{3025}{100}} = \sqrt{\frac{121}{4}} = \sqrt{\frac{11}{2} \times \frac{11}{2}} = \frac{11}{2} = 5.5$

9) a) $0.3 \times 0.3 = 0.09$ c) $1.9 \times 1.9 = 0.0361$ e) $\frac{2}{3} \times \frac{2}{3} = \frac{4}{9}$

g) $\frac{1}{7} \times \frac{1}{7} = \frac{1}{49}$

11)a) i) yes ii) $\frac{36}{10}$ *no botton is not perfect* iii) $\frac{36}{100} = \frac{9}{25} = \frac{3}{5} \times \frac{3}{5}$

iv) $\frac{36}{1000} = \frac{9}{250}$ *no botton is not perfect* v) $\frac{36}{10000} = \frac{9}{2500} = \frac{3}{50} \times \frac{3}{50}$

vi) $\frac{36}{100000} = \frac{9}{25000}$ *no botton is not perfect*

*****NOTICE odd number of decimal places then not perfect****

14) a) $\sqrt{5.76} = \sqrt{\frac{576}{100}} = \sqrt{\frac{144}{25}} = \sqrt{\frac{12}{5} \times \frac{12}{5}} = \frac{12}{5} = 2.4$

Could have done this on the calculator

b) Perimeter = side + side + side + side

= 2.4cm + 2.4cm + 2.4cm +2.4 cm

= 9.6 cm

16)NO

$\sqrt{0.04} = \sqrt{\frac{4}{100}} = \sqrt{\frac{1}{25}} = \sqrt{\frac{1}{5} \times \frac{1}{5}} = \frac{1}{5} = 0.2$

Page 11 & 12

Solutions

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