



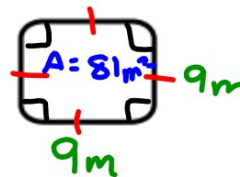
Warm Up
Date Nov 12

Grade 8

A square room has area of 81 m^2

a) Find the length of a side of the room

$$\text{Side} = 9\text{m}$$



b) How much base board is needed to go around the whole room?

$$\begin{aligned} P &= \text{Side} + \text{Side} + \text{Side} + \text{Side} \\ &= 9\text{m} + 9\text{m} + 9\text{m} + 9\text{m} \\ &= 36\text{m} \end{aligned}$$



c) Each piece of baseboard is 1.5 m long. How many pieces of baseboard are needed

$$36\text{m} \div 1.5\text{m} = 24 \text{ pieces}$$



Solution

Warm Up

Grade 8

A square room has area of 81 m^2

a) Find the length of a side of the room

$$\begin{aligned} \text{Area} &= 81 \text{ m}^2 \\ &= 9 \times 9 \end{aligned}$$

$$\text{Side} = 9\text{m}$$

b) How much base board is needed to go around the whole room?

$$\begin{aligned} P &= 9 \text{ m} + 9 \text{ m} + 9 \text{ m} + 9 \text{ m} \\ &= 36 \text{ m} \end{aligned}$$



c) Each piece of baseboard is 1.5 m long. How many pieces of baseboard are needed

$$\begin{aligned} &\text{pieces} \\ 1.5 \text{ m} \times 10 &= 15 \text{ m} \\ 1.5 \text{ m} \times 20 &= 30 \text{ m} \\ 1.5 \text{ m} \times 30 &= 45 \text{ m} \end{aligned}$$

up by 15

up by 10

up by 9.5

$$\begin{aligned} 1.5 \text{ m} \times 24 &= 36 \\ 1.5 \text{ m} \times 25 &= 37.5 \\ 1.5 \text{ m} \times 26 &= 39 \end{aligned}$$

or

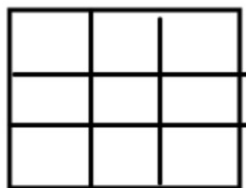
$$\begin{array}{r} 24 \\ 1.5 \overline{)36} \\ \underline{30} \\ 6 \\ \underline{6} \\ 0 \end{array}$$

long
division

Need 24 pieces

pg 8
4 a) $2 \times 2 = 4$ square unitsb)  $1 \times 1 = 1$ square unit

c)

 $3 \times 3 = 9$ square units5 a) $A = l \times w$
 $= 8 \times 8$
 $= 64 \text{ units}^2$ b) $A = l \times w$
 $= 10 \times 10$
 $= 100 \text{ units}^2$ c) $A = l \times w$
 $= 3 \times 3$
 $= 9 \text{ units}^2$ 6. Area
36

Length

1
2
3
4
6

Width

36
18
12
9
6

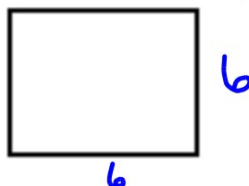
Rec

Rec

Rec

Rec

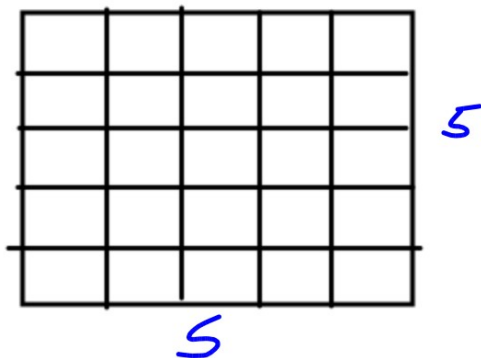
Sq

Yes, 36 is a perfect square
 $6 \times 6 = 36$ 

7. Area	Length	Width	
28	1	28	Rec
	2	14	Rec
	4	7	Rec

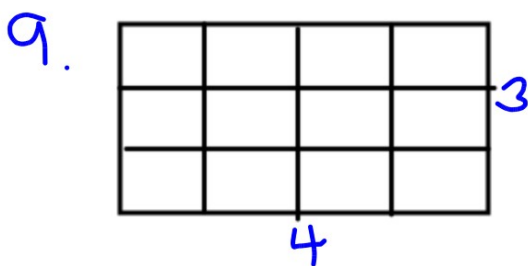
No 28 is not a perfect square, there is no number that you can multiply twice (by itself) to get 28.

8. 25 - Perfect Square



$$5 \times 5 = 25$$

25 is a perfect square that has a side length of 5.



Not a square, the sides are not the same.

No factors the same

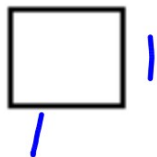
1×12 Rec
 2×6 Rec
 3×4 Rec

$$3 \times 3 = 9$$

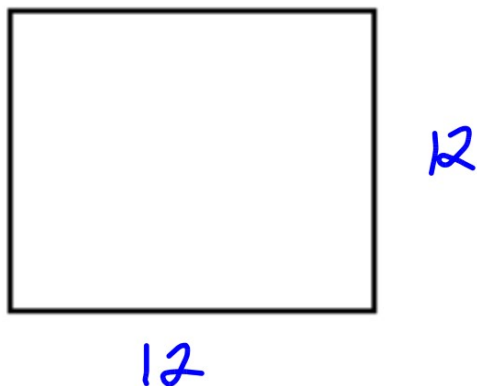
$$4 \times 4 = 16$$

No whole numbers that multiply by itself will give 12.

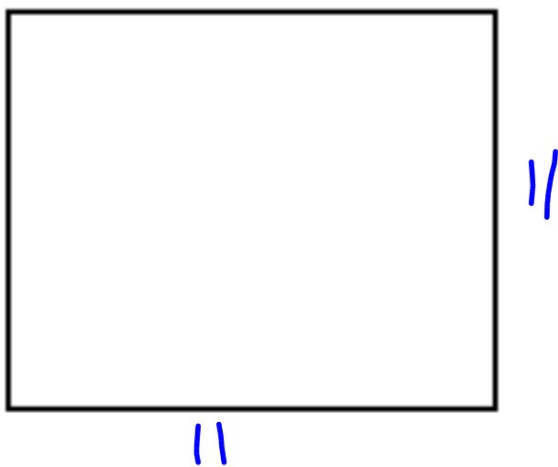
10. a) 1



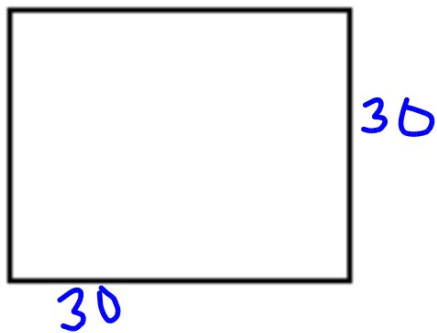
b) 144



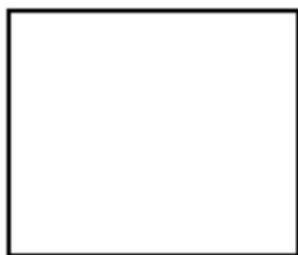
c) 121



d) 900
 30×30



$$1) \text{ Area} = 100 \text{ m}^2$$



$$10 \times 10 = 100$$

so side length
= 10m

$$b) \text{ Area} = 64 \text{ cm}^2$$

$$8 \times 8 = 64$$

so side length = 8cm

$$c) \text{ Area} = 81 \text{ m}^2$$

$$9 \times 9 = 81$$

so side length = 9m

$$d) \text{ Area} = 400 \text{ cm}^2$$

$$20 \times 20 = 400$$

so side length = 20cm.

$$12a) 10 \rightarrow \text{not perfect square}$$

$$3 \times 3 = 9, 4 \times 4 = 16$$

$$b) 50 \rightarrow \text{not perfect square}$$

there is no number that you
can multiply by itself to get 50.

$$c) 81 - \text{Perfect Square}$$

$$9 \times 9 = 81$$

$$d) 20 - \text{not a perfect square}$$

$$4 \times 4 = 16 \quad 5 \times 5 = 25$$

15. These numbers are not square numbers.

Which two consecutive square numbers
is each number between?

Describe the strategy you used.

a) 12

b) 40

c) 75

d) 200

15.	Perfect Square Before	Number	Perfect Square After
a)	9	12	16
b)	36	40	49
c)	64	75	81
d)	196	200	225

16. The floor of a large square room has
area 144 m^2 .

a) Find the length of a side of the room.

b) How much baseboard is needed to
go around the room?

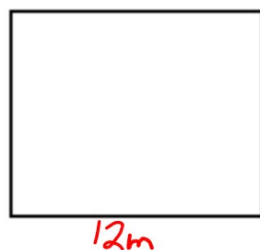
c) Each piece of baseboard is
2.5 m long.

How many pieces of baseboard
are needed?

What assumptions do you make?

$$16. \text{ Area} = 144 \text{ m}^2$$

Homework Solutions



$$12 \times 12 = 144$$

so each side
is 12m

b) Baseboard needed

$$4 \times 12 = 48 \text{ m}$$

$$c) 2.5 \times 10 = 25$$

$$2.5 \times 20 = 50$$

$$2.5 \times 19 = 47.5$$

You need 20 boards

$$48 \div 2.5$$

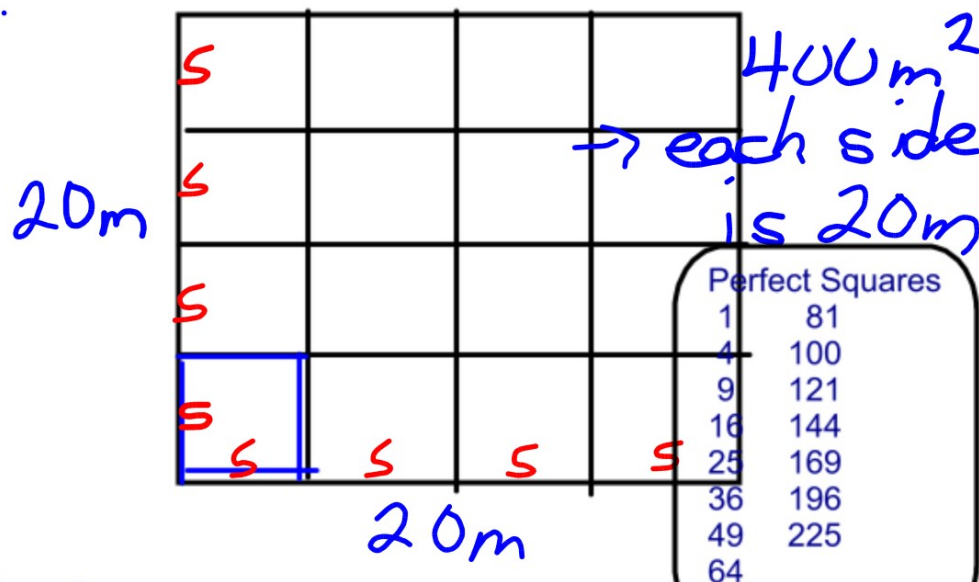
$$\begin{array}{r} 19.2 \\ 2.5 \overline{) 480.0} \\ \underline{25} \\ 230 \\ \underline{225} \\ 50 \end{array}$$

You will need
20 board

- 17.** A garden has area 400 m^2 .
 The garden is divided into
 16 congruent square plots.
 Sketch a diagram of the garden.
 What is the side length of each plot?

17.

Homework Solutions



Each square plot is 5m by 5m

18. **Assessment Focus** Which whole numbers between 50 and 200 are perfect squares?

Explain how you know.

18. The perfect squares between 50 and 200 are:
64, 81, 100, 121, 144, 169, 196

19. Area $< 60\text{m}^2$. It is a square

19. Lee is planning to fence a square kennel for her dog.

Its area must be less than 60m^2 .

a) Sketch a diagram of the kennel.

b) What is the kennel's greatest possible area?

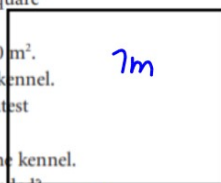
c) Find the side length of the kennel.

d) How much fencing is needed?

e) One metre of fencing costs \$10.00.

What is the cost of the fencing?

What assumptions do you make?



b) Greatest pos.

$$\begin{aligned} \text{Area} &= l \times w \\ &= 7 \times 7 \\ &= 49\text{m}^2 \end{aligned}$$

c) Side Length 7m

$$\begin{aligned} \text{d) Per} &= 4 \times 7 \\ &= 28\text{m} \end{aligned}$$

$$\begin{aligned} \text{e) Cost} &= 28 \times 10 \\ &= \$280 \end{aligned}$$

for largest possible square kenne

20. **Take It Further** Devon has a piece of poster board 45 cm by 20 cm.

His teacher challenges him to cut the board into parts, then rearrange the parts to form a square.

a) What is the side length of the square?

b) What are the fewest cuts

Devon could have made?

Explain.

$$\begin{aligned} 20 \quad A &= l \times w \\ &= 45 \times 20 \\ &= 900\text{cm}^2 \end{aligned}$$

If the area is 900cm^2 , the largest possible square is 30m by 30m.

b) —

- 21. Take It Further** The digital root of a number is the result of adding the digits of the number until a single-digit number is reached. For example, to find the digital root of 147:

$$1 + 4 + 7 = 12 \text{ and } 1 + 2 = 3$$

- a) Find the digital roots of the first 15 square numbers.
What do you notice?

- b) What can you say about the digital root of a square number?

Homework Solutions

21 Perfect Sq.

1
4
9
16
25
36
49
64
81
100
121
144
169
196
225

(13)

Digital Square root

1
4
9
7
7
9
4
-
9
-
5
-
6
-
5
-
6

- c) Use your results in part b.
Which of these numbers might be square numbers?
i) 440 ii) 2809 iii) 3008
iv) 4225 v) 625

Write out the factors for each number below

1	1								→ 1 factor
2	1	2							→ 2 factors
3	1	3							→ 2 factors
4	1	2	4						→ 3 factors
5	1	5							→ 2 factors
6	1	2	3	6					→ 4 factors
7	1	7							→ 2 factors
8	1	2	4	8					→ 4 factors
9	1	3	9						→ 3 factors
10	1	2	5	10					→ 4 factors
11	1	11							→ 2 factors
12	1	2	3	4	6	12			→ 6 factors
13	1	13							→ 2 factors
14	1	2	7	14					→ 4 factors
15	1	3	5	15					→ 4 factors
16	1	2	4	8	16				→ 5 factors
17	1	17							
18	1	2	3	6	9	18			
19	1	19							
20	1	2	4	5	10	20			
21	1	3	7	21					
22	1	2	11	22					
23	1	23							
24	1	2	3	4	6	8	12	24	
25	1	5	25						
26	1	2	13	26					
27									
28									
29									
30									

Discuss Factors, have students complete factor sheet 1- 30

1	1							
2	1	2						
3	1	3						
4	1	2	4					
5	1	5						
6	1	2	3	6				
7	1	7						
8	1	2	4	8				
9	1	3	9					
10	1	2	5	10				
11	1	11						
12	1	2	3	4	6	12		
13	1	13						
14	1	2	7	14				
15	1	3	5	15				
16	1	2	4	8	16			
17	1	17						
18	1	2	3	6	9	18		
19	1	19						
20	1	2	4	5	10	20		
21	1	3	7	21				
22	1	2	11	22				
23	1	23						
24	1	2	3	4	6	8	12	24
25	1	5	25					
26	1	2	13	26				
27	1	3	9	27				
28	1	2	4	7	14	28		
29	1	29						
30	1	2	3	5	6	10	15	30

Section 1.2

Squares and Square Roots



Discuss a number having an odd number of factors.



Any number with an odd number of factors will be a perfect square.

Ex) The factors of 136 are listed below:

1, 2, 4, 8, 17, 34, 68, 136

Is 136 a square number? How do you know?

136 → has 8 factors
↓
even # factor
↓
136 Not a perfect square

(Perfect square)

Square number: a PRODUCT of a number multiplied by itself

25 is a square number since $5 \times 5 = 25$

area of the square

Square root: a number that when it is multiplied by itself produces a perfect square



- This is the symbol for square root.

6 is the square root of 36

$$\sqrt{36} = 6$$

side length

* Square Roots - $\sqrt{\quad}$
 * Given Area of Square then
 * Side = $\sqrt{\text{Area}}$ *

Draw a square with the following little squares inside it:

Area $\Rightarrow$ (a) 36

$$\text{Side} = \sqrt{36} = 6$$

(b) 9 = Area

$$\text{Side} = \sqrt{9} = 3$$

(c) 4 $\Rightarrow$ Area

$$\text{Side} = \sqrt{4} = 2$$

(d) 64 $\Rightarrow$ Area

$$\text{Side} = \sqrt{64} = 8$$

Add to notes

$$\sqrt{x^2} = x \quad \text{or} \quad (\sqrt{x})^2 = x$$

Evaluate

$$\text{ex) } \sqrt{7^2} = 7$$

$\downarrow$
 $\sqrt{49}$

$$\text{ex) } (\sqrt{11})^2 = 11$$

Class/Homework



→ odd or even # factors

6 ω page. 14

$$8^2 = 64$$

$$8 \boxed{x^2}$$

$$8 \boxed{\Delta} 2$$

$$7) a) \sqrt{25} = 5$$

6(a,b,c,d),

7(a,b,c,d),

8(a,) i, ii, iii, iv

~~10(a),~~

11(a,b),

12(i),

14, bcd

15 bcd

(96 write factors)

$$14a) \sqrt{3^2} = 3$$

$$15a) (\sqrt{4})^2 = 4$$

$$8a) i \text{ Square } i) 1^2 = 1$$

Then Finish Page 8 from last day

Page 8 11ad, 12ad, 15ad, 16abc

5. Find the square of each number.

- a) 4 b) 6 c) 2 d) 9

6. Find.

- a) 8^2 b) 3^2 c) 1^2 d) 7^2

7. Find a square root of each number.

- a) 25 b) 81 c) 64 d) 169

8. a) Find the square of each number.

- i) 1 ii) 10 iii) 100 iv) 1000

- 10.** List the factors of each number in ascending order.
Find a square root of each number.
a) 256 b) 625 c) 121

- 11.** The factors of each number are listed in ascending order.
Which numbers are square numbers?
How do you know?
a) 225: 1, 3, 5, 9, 15, 25, 45, 75, 225
b) 500: 1, 2, 4, 5, 10, 20, 25, 50, 100, 125, 250, 500
c) 324: 1, 2, 3, 4, 6, 9, 12, 18, 27, 36, 54, 81, 108, 162, 324
d) 160: 1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 80, 160

- 12. a)** List the factors of each number in ascending order.
i) 96 ii) 484
iii) 240 iv) 152
v) 441 vi) 54

13. Find each square root.

- | | |
|-----------------|-----------------|
| a) $\sqrt{1}$ | b) $\sqrt{49}$ |
| c) $\sqrt{144}$ | d) $\sqrt{9}$ |
| e) $\sqrt{16}$ | f) $\sqrt{100}$ |
| g) $\sqrt{625}$ | h) $\sqrt{225}$ |

14. Find a square root of each number.

- | | |
|-----------|------------|
| a) 3^2 | b) 6^2 |
| c) 10^2 | d) 117^2 |

15. Find the square of each number.

- | | |
|-----------------|-----------------|
| a) $\sqrt{4}$ | b) $\sqrt{121}$ |
| c) $\sqrt{225}$ | d) $\sqrt{676}$ |