GRADE 7 · UNIT 5 · LESSON 9

Dimensions and Areas

MA.7.GR.1.5

I can find the real area of something from its scale drawing, in the right square units.

Warm-Up

1. Plan 9 in., scale 1 in. : 4 ft. Real length?
2. A 30 cm^2 shape is scaled by 3. New area?
3. Find the mean: 15, 22, 18, 25
4. Area of a rectangle 12 ft by 9 ft?

Warm-Up

1. Plan 9 in., scale 1 in. : 4 ft. Real length? **36 ft**
2. A 30 cm^2 shape is scaled by 3. New area? **270 cm^2**
3. Find the mean: 15, 22, 18, 25 **20**
4. Area of a rectangle 12 ft by 9 ft? **108 ft^2**

Vocabulary

square feet

the unit of a real area — ft^2 — and it is not the same as square inches

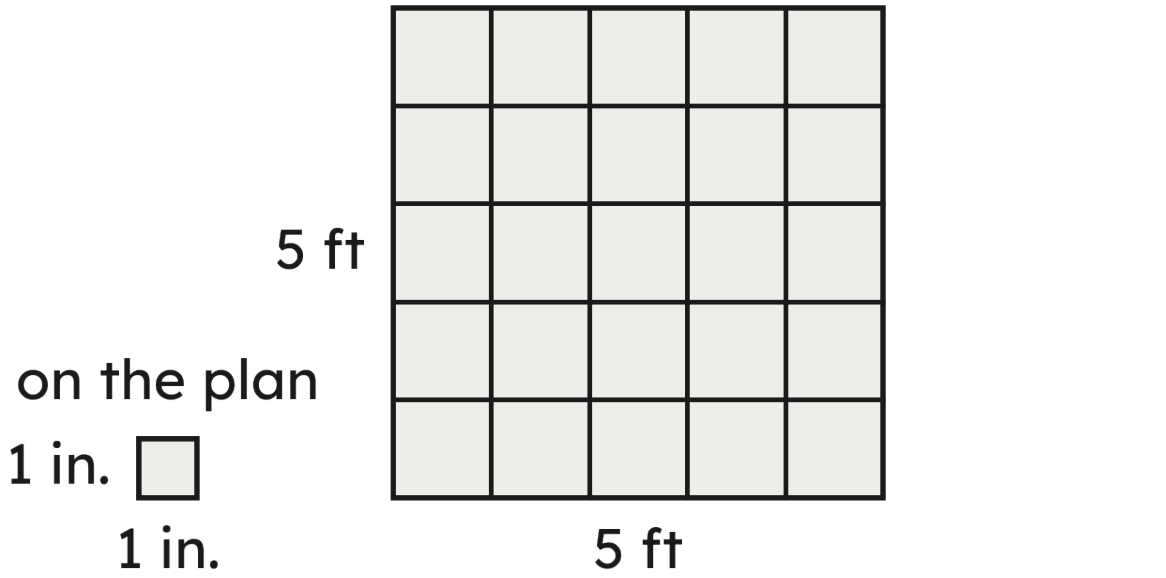
area factor

the scale used twice: if 1 in. stands for 5 ft, 1 in^2 stands for 25 ft^2

Notes

I. What one square inch is worth

really: 25 squares, each 1 ft by 1 ft



(the real square is drawn far smaller than it is)

1 in. : 5 ft 1 in^2 : 25 ft^2

Notes

II. Two roads, one answer

A room is 6 in. by 4 in. on a plan at 1 in. : 5 ft.

Road 1: $30 \cdot 20 = 600$ Road 2: $24 \cdot 25 = 600$

Road 1: scale each side (30 ft by 20 ft), then multiply them.

Road 2: the plan's area (24 in^2), times 25 — each square inch is 25 ft^2.

Either road: 600 ft^2.

Notes

III. Backwards, and the units tell you

A room's real area is 450 ft^2. The plan uses 1 in. : 5 ft.

$$450 \div 25 = 18$$

Each square inch is 25 ft^2, so the plan's area is 18 in^2.

Example 1

A floor plan uses the scale 1 in. : 6 ft.

On the plan a room is 5 in. by 3 in.

What is the room's real area?

Example 1

$5 \cdot 6 = 30$ $\quad$ $3 \cdot 6 = 18$

$30 \cdot 18 = 540$

$15 \cdot 36 = 540$

Answer: 540 ft^2

Your Turn

A plan uses 1 in. : 4 ft. A room is 5 in. by 3 in. on the plan.

Find the room's real area.

Your Turn

A plan uses 1 in. : 4 ft. A room is 5 in. by 3 in. on the plan.

Find the room's real area.

Real sides: $5 \cdot 4 = 20$ and $3 \cdot 4 = 12$

Area: $20 \cdot 12 = 240$

Answer: 240 ft^2

Example 2

A plan uses the scale 1 cm : 3 m.

On the plan a hall is 8 cm by 5 cm.

What is the hall's real area?

Example 2

$8 \cdot 3 = 24$ $\quad$ $5 \cdot 3 = 15$

$24 \cdot 15 = 360$

Answer: 360 m²

Your Turn

A plan uses 1 cm : 4 m. A room is 6 cm by 3 cm on the plan.

Find the room's real area.

Your Turn

A plan uses 1 cm : 4 m. A room is 6 cm by 3 cm on the plan.

Find the room's real area.

Real sides: $6 \cdot 4 = 24$ and $3 \cdot 4 = 12$

Area: $24 \cdot 12 = 288$

Answer: 288 m²

Whiteboards · Question 1 of 9

On a plan, a garage measures 8 in. by 7 in.

Find the area on the plan.

Answer it.

Whiteboards · Question 1 of 9

On a plan, a garage measures 8 in. by 7 in.

Find the area on the plan.

$$8 \cdot 7 = 56$$

Answer: 56 in^2

Whiteboards · Question 2 of 9

Same plan: 56 in^2, at the scale 1 in. : 3 ft.

Find the garage's real area.

Answer it.

Whiteboards · Question 2 of 9

Same plan: 56 in², at the scale 1 in. : 3 ft.

Find the garage's real area.

One square inch is $3 \cdot 3 = 9$ square feet.

$56 \cdot 9 = 504$

Answer: 504 ft²

Whiteboards · Question 3 of 9

A plan uses 1 in. : 7 ft.

What is one square inch of the plan worth?

A. $14\ ft^2$

B. $28\ ft^2$

C. $49\ ft^2$

D. $7\ ft^2$

Answer it.

Whiteboards · Question 3 of 9

A plan uses 1 in. : 7 ft.

What is one square inch of the plan worth?

A square 1 in. by 1 in. is 7 ft by 7 ft.

$7 \cdot 7 = 49$

Answer: C — 49 ft²

Whiteboards · Question 4 of 9

A plan uses 1 in. : 10 ft. A warehouse is 9 in. by 7 in. on the plan.

Find the warehouse's real area.

Answer it.

Whiteboards · Question 4 of 9

A plan uses 1 in. : 10 ft. A warehouse is 9 in. by 7 in. on the plan.

Find the warehouse's real area.

Real sides: $9 \cdot 10 = 90$ and $7 \cdot 10 = 70$

Area: $90 \cdot 70 = 6{,}300$

Answer: 6,300 ft²

Whiteboards · Question 5 of 9

A room's real area is 272 ft^2. The plan uses 1 in. : 4 ft.

Find the area on the plan.

Answer it.

Whiteboards · Question 5 of 9

A room's real area is 272 ft². The plan uses 1 in. : 4 ft.

Find the area on the plan.

One square inch is $4 \cdot 4 = 16$ square feet.

$272 \div 16 = 17$

Answer: 17 in²

Whiteboards · Question 6 of 9

At 1 in. : 5 ft, a student found a 9 in. by 3 in. room to be 135 ft^2.

What went wrong?

A. Nothing: $27 \cdot 5 = 135$ is right.

B. The scale was used once, not twice.

C. The sides should be added first.

D. It should be in square inches.

Answer it.

Whiteboards · Question 6 of 9

At 1 in. : 5 ft, a student found a 9 in. by 3 in. room to be 135 ft^2.

What went wrong?

Plan area: $9 \cdot 3 = 27$

One square inch is $5 \cdot 5 = 25$ square feet.

$27 \cdot 25 = 675$, so 675 ft^2

Answer: B — the scale is used twice: 675 ft^2

Whiteboards · Question 7 of 9

Over 4 revisions, a plan's area came out 20 in^2 at the scale 1 in. : 3 ft.

Find the real area.

Answer it.

Whiteboards · Question 7 of 9

Over 4 revisions, a plan's area came out 20 in² at the scale 1 in. : 3 ft.

Find the real area.

One square inch is $3 \cdot 3 = 9$ square feet.

$20 \cdot 9 = 180$

Answer: 180 ft²

Whiteboards · Question 8 of 9

A real room is 32 ft by 24 ft. A plan uses 1 in. : 8 ft.

Find the room's area on the plan.

Answer it.

Whiteboards · Question 8 of 9

A real room is 32 ft by 24 ft. A plan uses 1 in. : 8 ft.

Find the room's area on the plan.

Plan sides: $32 \div 8 = 4$ and $24 \div 8 = 3$

Area: $4 \cdot 3 = 12$

Answer: 12 in^2

Whiteboards · Question 9 of 9

A plan is drawn at 1 in. : 8 ft.

Explain why one square inch of the plan stands for 64 square feet.

Write your answer in sentences.

Whiteboards · Question 9 of 9

A plan is drawn at 1 in. : 8 ft.

Explain why one square inch of the plan stands for 64 square feet.

A square 1 in. by 1 in. stands for 8 ft by 8 ft.

$8 \cdot 8 = 64$

Answer: Both sides of the square are scaled: it is 8 ft by 8 ft, and 8 · 8 = 64, so 64 ft².

Independent Practice

1. On a plan a garden is 11 in. by 4 in. Find the area on the plan.

2. The scale is 1 in. : 4 ft. Find the garden's real area.

3. A plan uses 1 cm : 7 m and a gym is 13 cm^2 on the plan. Find the real area.

4. Across 3 revisions, a plan's area is 22 in^2 and the scale is 1 in. : 5 ft. Find the real area.

5. A real floor is 720 ft^2 and the plan uses 1 in. : 6 ft. Find the area on the plan.

6. A student finds a real area by multiplying the plan's area by the scale once. In one sentence, say what is wrong.

Before You Go

At 1 in. : 5 ft, one square inch of the plan is twenty-five square feet.

A length uses the scale once; an area uses it twice.

Tomorrow: maps and models — the same rules, out in the world.

IXL

1. Open IXL and start today's skills.
2. Work on paper where the question needs work. The answer box does not show it.
3. Every skill listed is required, to a SmartScore of 60. Due by the Unit 5 test.

Today's skills — all required

Scale drawings: find the scale factor or missing side (XHM)