LESSON MAKER PRO

Radical Designs

Simplify radicals to find lengths, areas, and perimeters.

HIGH SCHOOL · GDA.NQ.A.1

GDA.NQ.A.1 "Extend understanding of irrational and rational numbers by rewriting expressions involving radicals, including addition, subtraction, multiplication, and division, in order to recognize geometric patterns."

NAME _____ DATE _____

SIMPLIFY, THEN COMBINE

Pull perfect-square factors out of a radical before adding or subtracting. You can combine terms only when they have the same number inside the radical. To multiply or divide radicals, combine the numbers inside first, then simplify.

WORKED EXAMPLE

Simplify sqrt(147) - sqrt(48).

1. sqrt(147) = sqrt(49 × 3) = 7sqrt(3)
2. sqrt(48) = sqrt(16 × 3) = 4sqrt(3)
3. 7sqrt(3) - 4sqrt(3) = 3sqrt(3)

Answer: 3sqrt(3)

PRACTICE 6 problems

1 Simplify sqrt(32) + sqrt(8).

ANSWER _____

2 Simplify sqrt(45) - sqrt(20).

ANSWER _____

3 Simplify sqrt(6) × sqrt(24).

ANSWER _____

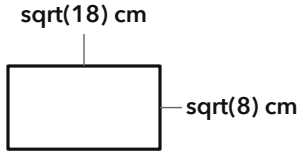
4 Simplify sqrt(72) / sqrt(2).

ANSWER _____

5 Simplify (sqrt(80) - sqrt(5)) / sqrt(5).

ANSWER _____

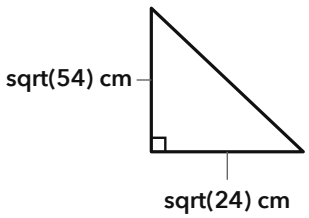
6 Find the perimeter of the rectangle in simplest radical form.



ANSWER _____

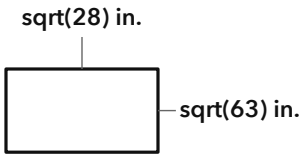
APPLY IT Show your work

1 A student cuts the triangular sticker shown for a phone case. What is its area?



ANSWER _____

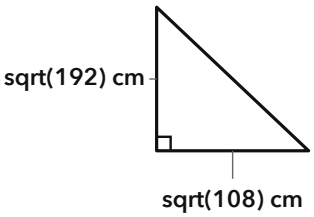
2 A student makes the rectangular concert poster shown. Find its perimeter and area in simplest form.



ANSWER _____

CHALLENGE One step up

Find the missing side length and the perimeter of this right triangle. Give both answers in simplest radical form.



WORK SPACE AND ANSWER

ANSWER KEY # Radical Designs

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Simplify sqrt(32) + sqrt(8).	**6sqrt(2)**
2	Simplify sqrt(45) - sqrt(20).	**sqrt(5)**
3	Simplify sqrt(6) × sqrt(24).	**12**
4	Simplify sqrt(72) / sqrt(2).	**6**
5	Simplify (sqrt(80) - sqrt(5)) / sqrt(5).	**3**
6	Find the perimeter of the rectangle in simplest radical form.	**10sqrt(2) cm**

PART 2 · APPLY IT

1. **18 cm^2** The labeled sides meet at the right angle, so area = sqrt(24) × sqrt(54) / 2 = sqrt(1296) / 2 = 18 cm^2.
2. **Perimeter: 10sqrt(7) in.; area: 42 in.^{2}** The sides simplify to 2sqrt(7) and 3sqrt(7) inches, giving a perimeter of 2(2sqrt(7) + 3sqrt(7)) = 10sqrt(7) inches. Their product is 6 × 7 = 42 square inches.

CHALLENGE

Missing side: 10sqrt(3) cm; perimeter: 24sqrt(3) cm

Accept equivalent exact radical expressions when the prompt does not require simplest form. For the challenge, the missing side is sqrt(108 + 192) = sqrt(300) = 10sqrt(3) cm.