GRADE 7 ACCELERATED · UNIT 4 · LESSON 4

Real-World Problems and Significant Digits

MA.8.NSO.1.6

I can solve a real-world problem with numbers in scientific notation and report the answer with the right number of significant digits.

Warm-Up

1. $(4 \times 10^5)(3 \times 10^{-2})$
2. $(6.3 \times 10^7) - (4.1 \times 10^6)$
3. Write 0.00902 in scientific notation.
4. Round 4.738 to the nearest hundredth.

Warm-Up

1. $(4 \times 10^5)(3 \times 10^{-2})$ **1.2×10^4**
2. $(6.3 \times 10^7) - (4.1 \times 10^6)$ **5.89×10^7**
3. Write 0.00902 in scientific notation. **9.02×10^{-3}**
4. Round 4.738 to the nearest hundredth. **4.74**

Vocabulary

significant digits

the digits of a measurement that carry information: every nonzero digit, every zero between nonzero digits, and a trailing zero only when a decimal point is written

leading zero

a zero before the first nonzero digit. 0.0047 has two leading zeros and two significant digits

measurement

a quantity that was measured, so its last digit is uncertain. A count is not a measurement — 24 students is exactly 24, and 60 seconds in a minute is exact

Notes

I. Which digits are significant

Measurement	Digits	Why
4,207	4	the middle zero counts
0.0058	2	leading zeros never count
3.200	4	trailing zeros count after a decimal point
52,000	2	no decimal point, so they do not

Notes

II. Multiplying or dividing: count the digits

$$(2.5 \times 10^{2})(4.13 \times 10^{2}) = 1.0325 \times 10^{5}$$

2 significant digits and 3, so the answer keeps 2: 1.0×10^{5}

Multiply or divide: the answer takes the smaller of the two significant-digit counts.

Notes

III. Adding or subtracting: a different rule

$$1{,}234 + 5.6 = 1{,}239.6$$

1,234 stops at the ones place; 5.6 stops at the tenths

so the sum stops at the ones place: $1{,}240 = 1.240 \times 10^3$

Add or subtract: the answer stops at the leftmost of the two last-digit places.

Example 1

A solar array measures 1.25×10^2 m by 8.6×10^1 m.

What is its area?

Give the answer to the correct number of significant digits.

Example 1

$(1.25 \times 10^{2})(8.6 \times 10^{1}) = 10{,}750$

1.25 has 3 digits, 8.6 has 2 digits

$10{,}750 \approx 11{,}000 = 1.1 \times 10^{4}$

Answer: 1.1×10^{4} square meters

Your Turn

A field measures 4.6×10^2 m by 2.35×10^2 m.

What is its area?

Your Turn

A field measures 4.6×10^2 m by 2.35×10^2 m.

What is its area?

$4.6 \times 2.35 = 10.81$ and $10^2 \times 10^2 = 10^4$

$10.81 \times 10^4 = 108{,}100$

Keep 2 significant digits (4.6 has 2): 1.1×10^5

Answer: 1.1×10^5 square meters

Example 2

A container holds 3.09×10^{-3} cubic feet of liquid.

3.472×10^{-5} cubic feet evaporates.

How much is left? Give the answer with the correct precision.

Example 2

$0.00309 - 0.00003472 = 0.00305528$

0.00309 stops at 10^{-5}

$0.00305528 \approx 0.00306 = 3.06 \times 10^{-3}$

Answer: 3.06×10^{-3} cubic feet

Your Turn

A road is 3.85×10^3 m long.

A section 2.74×10^2 m long is repaved.

How much of the road is not repaved?

Your Turn

A road is 3.85×10^3 m long.

A section 2.74×10^2 m long is repaved.

How much of the road is not repaved?

$3{,}850 - 274 = 3{,}576$

3,850 stops at the tens place, so round to tens: 3,580

$3{,}580 = 3.58 \times 10^3$

Answer: 3.58×10^3 m

Whiteboards · Question 1 of 9

How many significant digits are in 0.00470 ?

Answer it.

Whiteboards · Question 1 of 9

How many significant digits are in 0.00470 ?

Leading zeros do not count: 0.00

4, 7 and the final 0 count: 3 significant digits

Answer: 3

Whiteboards · Question 2 of 9

A pond's surface measures 1.4×10^2 m by 8.5×10^1 m.

The pond is 3 meters deep.

Find the surface area. Round to the correct number of significant digits.

Answer it.

Whiteboards · Question 2 of 9

A pond's surface measures 1.4×10^2 m by 8.5×10^1 m.

The pond is 3 meters deep.

Find the surface area. Round to the correct number of significant digits.

$1.4 \times 8.5 = 11.9$ and $10^2 \times 10^1 = 10^3$

$11.9 \times 10^3 = 11{,}900$

Keep 2 significant digits: 1.2×10^4

Answer: 1.2×10^4 square meters

Whiteboards · Question 3 of 9

Two measurements are multiplied. One has 3 significant digits and the other has 5. The exact product is 7.4126×10^5.

How should the answer be written?

Answer it.

Whiteboards · Question 3 of 9

Two measurements are multiplied. One has 3 significant digits and the other has 5. The exact product is 7.4126×10^5.

How should the answer be written?

The answer keeps the smaller count: 3 significant digits.

7.4126×10^5 becomes 7.41×10^5

Answer: 7.41×10^5

Whiteboards · Question 4 of 9

$(2.5 \times 10^3) + (4.71 \times 10^2)$ meters, both measured.

Write the sum with the correct precision.

Answer it.

Whiteboards · Question 4 of 9

$(2.5 \times 10^3) + (4.71 \times 10^2)$ meters, both measured.

Write the sum with the correct precision.

2,500 + 471 = 2,971

2,500 stops at the hundreds place, so round to hundreds: 3,000

$3{,}000 = 3.0 \times 10^3$

Answer: 3.0×10^3 m

Whiteboards · Question 5 of 9

How many significant digits are in 0.03080 ?

A. 4

B. 2

C. 5

D. 3

Answer it.

Whiteboards · Question 5 of 9

How many significant digits are in 0.03080 ?

Leading zeros do not count: 0.0

3, 0, 8 and the final 0 count: 4 significant digits

Answer: A — 4

Whiteboards · Question 6 of 9

A rectangle measures 6.0×10^2 cm by 4.35×10^2 cm.

Which is the area, to the correct significant digits?

A. 26.1×10^4 cm^2

B. 2.6×10^5 cm^2

C. 2.6×10^4 cm^2

D. 2.61×10^5 cm^2

Answer it.

Whiteboards · Question 6 of 9

A rectangle measures 6.0×10^2 cm by 4.35×10^2 cm.

Which is the area, to the correct significant digits?

$6.0 \times 4.35 = 26.1$ and $10^2 \times 10^2 = 10^4$

$26.1 \times 10^4 = 261{,}000$

Keep 2 significant digits (6.0 has 2): 2.6×10^5

Answer: B — 2.6×10^5 cm²

Whiteboards · Question 7 of 9

A car travels 4.20×10^2 km in 3.0 hours.

What is its average speed, to the right number of significant digits?

Answer it.

Whiteboards · Question 7 of 9

A car travels 4.20×10^2 km in 3.0 hours.

What is its average speed, to the right number of significant digits?

$420 \div 3.0 = 140$

3.0 has 2 significant digits, so keep 2: 1.4×10^2

Answer: 1.4×10^2 km/h

Whiteboards · Question 8 of 9

A measured length times a measured width gives an area of 3.6×10^3 m^2. The length measured 9.0×10^1 m.

What did the width measure, to two significant digits?

Answer it.

Whiteboards · Question 8 of 9

A measured length times a measured width gives an area of 3.6×10^3 m². The length measured 9.0×10^1 m.

What did the width measure, to two significant digits?

$3{,}600 \div 90 = 40$

Two significant digits: 4.0×10^1

Answer: 4.0×10^1 m

Whiteboards · Question 9 of 9

Ellis says: 9,145 has 4 significant digits and 4.8 has 2,

so the sum $9{,}145 + 4.8$ must be written with 2: 9.1×10^3.

Explain why he is wrong, and give the correct sum.

Write your answer in sentences.

Whiteboards · Question 9 of 9

Ellis says: 9,145 has 4 significant digits and 4.8 has 2,

so the sum $9{,}145 + 4.8$ must be written with 2: 9.1×10^3.

Explain why he is wrong, and give the correct sum.

Adding uses decimal places, not a count of digits.

$9{,}145 + 4.8 = 9{,}149.8$

9,145 stops at the ones place, so round to ones: 9,150

Answer: $9{,}150 = 9.150 \times 10^3$

Independent Set

1. How many significant digits are in $6{,}030$ grams?
2. How many significant digits are in 0.00710 meters?
3. A rectangle measures 2.4×10^2 m by 3.15×10^2 m. Find its area, to the correct number of significant digits.
4. $(6.30 \times 10^4) + (2.8 \times 10^3)$ meters, both measured. Write the sum with the correct precision.
5. A car travels 1.80×10^2 km in 4.0 hours. Find its average speed, to the correct number of significant digits.
6. $(3.7 \times 10^{-2}) - (8.45 \times 10^{-4})$ grams, both measured. Write the difference with the correct precision.

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 67. Due by the Unit 4 test.

Today's skills — all required

Add, subtract, multiply, and divide numbers written in scientific notation: word problems — D5S