

Name _____

Date _____

3.1 Multiplying and dividing by powers of 10 — worksheet

Multiply and divide whole numbers and decimals by powers of 10. · 56 questions · Show your working.

Remember

- $10^1 = 10$, $10^2 = 100$, $10^3 = 1000$, $10^4 = 10\,000$ — the **index** is the number of zeros.
- **Multiplying** by 10^n moves every digit **n places to the left**. The number gets bigger.
- **Dividing** by 10^n moves every digit **n places to the right**. The number gets smaller.
- It is the **digits** that move, not the decimal point — but moving the point the other way gives the same result, so either picture works.
- Fill any empty places with zeros: $4.5 \times 10^3 = 4500$, and $47 \div 10^3 = 0.047$.
- “Crossing off zeros” only works if the number has enough zeros to cross off, so it is safer to move the digits.
- Always sanity-check: should the answer be bigger or smaller than you started with?

A · Fluency — Multiply and divide by powers of 10.

- 1 Work out 3.7×10^3

- 2 Work out 0.39×10^5

- 3 Work out 4.6×10^2

- 4 Work out 0.052×10^4

- 5 Work out 27×10^3

- 6 Work out 8.15×10^1

- 7 Work out 0.006×10^5

- 8 Work out 1.234×10^3

- 9 Work out 56×10^2

- 10 Work out 0.7×10^6

- 11 Work out 9.04×10^3

12 Work out 0.0038×10^4

13 Work out $80\,000 \div 10^4$

14 Work out $510\,000 \div 10^3$

15 Work out $8\,460\,000\,000 \div 10^5$

16 Work out $36\,800\,000 \div 10^6$

17 Work out $2\,350\,000 \div 10^5$

18 Work out $45.6 \div 10^2$

19 Work out $930 \div 10^3$

20 Work out $7.2 \div 10^1$

21 Work out $6400 \div 10^2$

22 Work out $18 \div 10^4$

23 Work out $250\,000 \div 10^4$

24 Work out $0.9 \div 10^3$

B · Reasoning — Index notation and missing powers.

25 What does 10^4 mean?

- ☐ 10×4
- ☐ $10 \times 10 \times 10 \times 10$
- ☐ 40
- ☐ 4 tens

26 Write 10^6 as an ordinary number.

27 How many zeros does 10^5 have?

28 Multiplying by 10^3 moves the digits ...

- ☐ 3 places to the left
- ☐ 3 places to the right
- ☐ 3 places up
- ☐ it does not move them

- 29** Dividing by 10^2 moves the digits ...
☐ 2 places to the left
☐ 2 places to the right
☐ 2 places down
☐ it does not move them
- 30** Marcus says: "When I divide a whole number by 10^4 I just cross four zeros off the end." Is he always right?
☐ Yes, always
☐ No — only when the number ends in enough zeros
- 31** Copy and complete: $4.5 \times 10\Box = 4500$. What is the missing index?

- 32** Copy and complete: $6200 \div 10\Box = 6.2$. What is the missing index?

- 33** Work out 0.06×1000 .

- 34** Work out $47 \div 1000$.

- 35** Which calculation gives the largest answer?
☐ 3.2×10^2
☐ 32×10^1
☐ 0.32×10^3
☐ All three are equal
- 36** Work out $2\,350\,000 \div 10^5$.

C · Challenge — Two moves at once, and working backwards.

- 37** Work out $0.39 \times 10^5 \div 10^2$.

- 38** Work out $36\,800\,000 \div 10^6 \times 10^2$.

- 39** A number multiplied by 10^3 gives 4500. What is the number?

- 40** A number divided by 10^4 gives 0.007. What is the number?

- 41** Which is the same as multiplying by 10^4 and then dividing by 10^2 ?
☐ Multiplying by 10^2
☐ Multiplying by 10^6
☐ Dividing by 10^2
☐ Doing nothing
- 42** Work out 0.0004×10^6 .

43 Work out $8\,460\,000\,000 \div 10^5 \div 10^2$.

44 Sofia works out $2\,350\,000 \div 10^5$ by moving the decimal point 5 places left instead of right. What answer does she get? Give your answer as a decimal.

D · Word problems — Unit conversion and large numbers.

45 One box holds 10^3 paperclips. How many paperclips are in 4.5 boxes?

46 A city has 2 350 000 people. Write this in hundreds of thousands, that is, work out $2\,350\,000 \div 10^5$.

47 A sheet of paper is 0.09 mm thick. How thick is a stack of 10^3 sheets, in mm?

48 A factory makes 36 800 000 screws a year. How many million is that?

49 A bag of rice weighs 25 kg. Write its mass in grams ($1\text{ kg} = 10^3\text{ g}$).

50 A journey is 8460 m. Write it in kilometres.

51 A virus is 0.00012 mm across. Write this length in micrometres ($1\text{ mm} = 10^3\text{ micrometres}$).

52 A country's budget is \$510 000 million. Write it in millions of millions by working out $510\,000 \div 10^3$.

53 A tank holds 4.6 kilolitres. How many litres is that ($1\text{ kilolitre} = 10^3\text{ litres}$)?

54 A ribbon is 7.2 m long. How long is it in centimetres?

55 A microchip is 0.0038 m wide. How wide is it in centimetres?

56 A stadium holds 80 000 people. Express this in tens of thousands.
