

Powers of Ten

The exponent tells how many tens are multiplied.

Powers of Ten

$$10^3 = 10 \times 10 \times 10 = \underline{1,000}$$

exponent 3 three 10s multiplied 3 zeros

Write each power of ten three ways.

Exponent form	Tens multiplied	Standard form	Zeros
Example 10^2	10×10	<u>100</u>	<u>2</u>
<u> </u>	$10 \times 10 \times 10$	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u>10</u>	<u> </u>

Multiply. Look at the pattern of zeros.

Example

$7 \times 10 = \underline{70}$

$7 \times 100 = \underline{700}$

$7 \times 1,000 = \underline{7,000}$

1. $36 \times 10^1 = \underline{\hspace{2cm}}$

$36 \times 10^2 = \underline{\hspace{2cm}}$

$36 \times 10^3 = \underline{\hspace{2cm}}$

2. $405 \times 10 = \underline{\hspace{2cm}}$

$405 \times 100 = \underline{\hspace{2cm}}$

$405 \times 1,000 = \underline{\hspace{2cm}}$

3. $80 \times 10^1 = \underline{\hspace{2cm}}$

$80 \times 10^2 = \underline{\hspace{2cm}}$

$80 \times 10^3 = \underline{\hspace{2cm}}$

Write the missing exponent or number.

Example

$5,000 = 5 \times 10^{\boxed{3}}$

4. $60 \times 10^{\boxed{}} = 6,000$

5. $12 \times \underline{\hspace{2cm}} = 12,000$

6. $90 = 9 \times 10^{\boxed{}}$

Powers of Ten

Times 10, each digit moves one place to the left.

Each digit is worth 10 times as much. Draw arrows to show the moves.

Example	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
0.36			0	.	3	6	
$\times 10$							
= 3.6			3	.	6		

1.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
0.047			0	.	0	4	7
$\times 100$							
=				.			

2.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
0.513			0	.	5	1	3
$\times 10^3$							
=				.			

Now multiply without the chart.

Example	$4.25 \times 10 = 42.5$	3.	$0.8 \times 100 =$
4.	$3.06 \times 10^2 =$	5.	$0.009 \times 1,000 =$
6.	$12.4 \times 10^1 =$	7.	$0.075 \times 10^3 =$

Each digit moves to a new place. Write the place.

8. 3 tenths $\times 10 = 3$	9. 4 ones $\times 100 = 4$
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Powers of Ten

Divided by 10, each digit moves one place to the right.

Each digit is worth $\frac{1}{10}$ as much. Draw arrows to show the moves.

Example	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
4.5			4	.	5		
$\div 10$							
= 0.45			0	.	4	5	

1.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
36		3	6	.			
$\div 100$							
=				.			

2.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
208	2	0	8	.			
$\div 10^3$							
=				.			

Now divide without the chart.

Example	$52.6 \div 10 = 5.26$	3.	$7 \div 100 =$
4.	$940 \div 10^2 =$	5.	$63 \div 1,000 =$
6.	$1.8 \div 10^1 =$	7.	$425 \div 10^3 =$

Each digit moves to a new place. Write the place.

8. 6 tens $\div 100 = 6$	9. 5 ones $\div 100 = 5$
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Powers of Ten

Use exponents and patterns to multiply and divide.

Complete each pattern table.

Number	$\times 10^1$	$\times 10^2$	$\times 10^3$
Example 0.04	0.4	4	40
2.5	_____	_____	_____
0.29	_____	_____	_____
1.07	_____	_____	_____

Number	$\div 10^1$	$\div 10^2$	$\div 10^3$
Example 600	60	6	0.6
45	_____	_____	_____
8	_____	_____	_____
230	_____	_____	_____

Write the missing number or exponent.

Example $0.45 \times \underline{100} = 45$	1. $3.2 \times 10^2 = \underline{\hspace{2cm}}$
2. $\underline{\hspace{2cm}} \div 10^3 = 0.006$	3. $7.8 \div \underline{\hspace{2cm}} = 0.78$
4. $0.38 \times 10^{\square} = 38$	5. $\underline{\hspace{2cm}} \times 100 = 503$
6. $0.9 \div 10^2 = \underline{\hspace{2cm}}$	7. $1.25 \times 10^{\square} = 1,250$

Write $>$, $<$, or $=$ in each circle.

8. 4.2×10^2 $\bigcirc$ 42×10	12. 3.5×100 $\bigcirc$ 35×100
9. $0.8 \div 10$ $\bigcirc$ $8 \div 1,000$	13. $2.7 \div 10$ $\bigcirc$ $27 \div 1,000$
10. $9 \div 10^3$ $\bigcirc$ 0.09	14. $0.7 \div 10^2$ $\bigcirc$ 0.07
11. 0.05×10^3 $\bigcirc$ 5×10	15. 1.2×10^3 $\bigcirc$ 120×10

Powers of Ten

Use powers of ten to change units and count money.

Change the units. Multiply or divide by a power of ten.

$1 \text{ m} = 100 \text{ cm}$

$1 \text{ cm} = 10 \text{ mm}$

$1 \text{ kg} = 1,000 \text{ g}$

$1 \text{ L} = 1,000 \text{ mL}$

Change	Multiply or divide by	Answer
Example 2.5 m to cm	$\times 100$	<u>250</u> cm
750 g to kg	_____	_____ kg
1.6 L to mL	_____	_____ mL
85 mm to cm	_____	_____ cm
340 cm to m	_____	_____ m

Count the money. Dollars $\times 10$ = dimes. Dollars $\times 100$ = pennies.

Example \$3.40 = 34 dimes

1. \$2.75 = _____ pennies

2. 45 dimes = \$ _____

3. 620 pennies = \$ _____

Who is right? Circle the right answer. Then tell why.

4. **Mia says $0.6 \times 100 = 0.600$**

Leo says $0.6 \times 100 = 60$

Why? _____

5. **Ava says $72 \div 1,000 = 0.72$**

Ben says $72 \div 1,000 = 0.072$

Why? _____

Powers of Ten

The exponent tells how many tens are multiplied.

Powers of Ten

$$10^3 = 10 \times 10 \times 10 = \underline{1,000}$$

exponent 3 three 10s multiplied 3 zeros

Write each power of ten three ways.

Exponent form	Tens multiplied	Standard form	Zeros
Example 10^2	10×10	<u>100</u>	<u>2</u>
<u> </u>	$10 \times 10 \times 10$	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u>10</u>	<u> </u>

Multiply. Look at the pattern of zeros.

Example

$7 \times 10 = \underline{70}$

$7 \times 100 = \underline{700}$

$7 \times 1,000 = \underline{7,000}$

1.

$36 \times 10^1 = \underline{\hspace{2cm}}$

$36 \times 10^2 = \underline{\hspace{2cm}}$

$36 \times 10^3 = \underline{\hspace{2cm}}$

2.

$405 \times 10 = \underline{\hspace{2cm}}$

$405 \times 100 = \underline{\hspace{2cm}}$

$405 \times 1,000 = \underline{\hspace{2cm}}$

3.

$80 \times 10^1 = \underline{\hspace{2cm}}$

$80 \times 10^2 = \underline{\hspace{2cm}}$

$80 \times 10^3 = \underline{\hspace{2cm}}$

Write the missing exponent or number.

Example

$5,000 = 5 \times 10^{\boxed{3}}$

4.

$60 \times 10^{\boxed{}} = 6,000$

5.

$12 \times \underline{\hspace{2cm}} = 12,000$

6.

$90 = 9 \times 10^{\boxed{}}$

Powers of Ten

Times 10, each digit moves one place to the left.

Each digit is worth 10 times as much. Draw arrows to show the moves.

Example	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
0.36			0	.	3	6	
$\times 10$							
= 3.6			3	.	6		

1.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
0.047			0	.	0	4	7
$\times 100$							
= _____				.			

2.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
0.513			0	.	5	1	3
$\times 10^3$							
= _____				.			

Now multiply without the chart.

Example	$4.25 \times 10 =$ 42.5	3.	$0.8 \times 100 =$ _____
4.	$3.06 \times 10^2 =$ _____	5.	$0.009 \times 1,000 =$ _____
6.	$12.4 \times 10^1 =$ _____	7.	$0.075 \times 10^3 =$ _____

Each digit moves to a new place. Write the place.

8. 3 tenths $\times 10 =$ 3 _____	9. 4 ones $\times 100 =$ 4 _____
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Powers of Ten

Divided by 10, each digit moves one place to the right.

Each digit is worth $\frac{1}{10}$ as much. Draw arrows to show the moves.

Example	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
4.5			4	.	5		
$\div 10$							
= 0.45			0	.	4	5	

1.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
36		3	6	.			
$\div 100$							
=				.			

2.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
208	2	0	8	.			
$\div 10^3$							
=				.			

Now divide without the chart.

Example	$52.6 \div 10 = 5.26$	3.	$7 \div 100 =$
4.	$940 \div 10^2 =$	5.	$63 \div 1,000 =$
6.	$1.8 \div 10^1 =$	7.	$425 \div 10^3 =$

Each digit moves to a new place. Write the place.

8. 6 tens $\div 100 = 6$	9. 5 ones $\div 100 = 5$
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Powers of Ten

Use exponents and patterns to multiply and divide.

Complete each pattern table.

Number	$\times 10^1$	$\times 10^2$	$\times 10^3$
Example 0.04	0.4	4	40
2.5	_____	_____	_____
0.29	_____	_____	_____
1.07	_____	_____	_____

Number	$\div 10^1$	$\div 10^2$	$\div 10^3$
Example 600	60	6	0.6
45	_____	_____	_____
8	_____	_____	_____
230	_____	_____	_____

Write the missing number or exponent.

Example $0.45 \times \underline{100} = 45$

1. $3.2 \times 10^2 = \underline{\hspace{2cm}}$

2. $\underline{\hspace{2cm}} \div 10^3 = 0.006$

3. $7.8 \div \underline{\hspace{2cm}} = 0.78$

4. $0.38 \times 10^{\square} = 38$

5. $\underline{\hspace{2cm}} \times 100 = 503$

6. $0.9 \div 10^2 = \underline{\hspace{2cm}}$

7. $1.25 \times 10^{\square} = 1,250$

Write $>$, $<$, or $=$ in each circle.

8. $4.2 \times 10^2 \bigcirc 42 \times 10$	12. $3.5 \times 100 \bigcirc 35 \times 100$
9. $0.8 \div 10 \bigcirc 8 \div 1,000$	13. $2.7 \div 10 \bigcirc 27 \div 1,000$
10. $9 \div 10^3 \bigcirc 0.09$	14. $0.7 \div 10^2 \bigcirc 0.07$
11. $0.05 \times 10^3 \bigcirc 5 \times 10$	15. $1.2 \times 10^3 \bigcirc 120 \times 10$

Powers of Ten

Use powers of ten to change units and count money.

Change the units. Multiply or divide by a power of ten.

$1 \text{ m} = 100 \text{ cm}$

$1 \text{ cm} = 10 \text{ mm}$

$1 \text{ kg} = 1,000 \text{ g}$

$1 \text{ L} = 1,000 \text{ mL}$

Change	Multiply or divide by	Answer
Example 2.5 m to cm	$\times 100$	<u>250</u> cm
750 g to kg	_____	_____ kg
1.6 L to mL	_____	_____ mL
85 mm to cm	_____	_____ cm
340 cm to m	_____	_____ m

Count the money. Dollars $\times 10$ = dimes. Dollars $\times 100$ = pennies.

Example \$3.40 = 34 dimes

1. \$2.75 = _____ pennies

2. 45 dimes = \$ _____

3. 620 pennies = \$ _____

Who is right? Circle the right answer. Then tell why.

4. **Mia says $0.6 \times 100 = 0.600$**

Leo says $0.6 \times 100 = 60$

Why? _____

5. **Ava says $72 \div 1,000 = 0.72$**

Ben says $72 \div 1,000 = 0.072$

Why? _____

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The exponent tells how many tens are multiplied.

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exponent 3 three 10s multiplied 3 zeros

Write each power of ten three ways.

Exponent form	Tens multiplied	Standard form	Zeros
Example 10^2	10×10	<u>100</u>	<u>2</u>
<u>10^3</u>	$10 \times 10 \times 10$	<u>1,000</u>	<u>3</u>
<u>10^1</u>	<u>10</u>	<u>10</u>	<u>1</u>

Multiply. Look at the pattern of zeros.

Example

$7 \times 10 = \underline{70}$

$7 \times 100 = \underline{700}$

$7 \times 1,000 = \underline{7,000}$

1.

$36 \times 10^1 = \underline{360}$

$36 \times 10^2 = \underline{3,600}$

$36 \times 10^3 = \underline{36,000}$

2.

$405 \times 10 = \underline{4,050}$

$405 \times 100 = \underline{40,500}$

$405 \times 1,000 = \underline{405,000}$

3.

$80 \times 10^1 = \underline{800}$

$80 \times 10^2 = \underline{8,000}$

$80 \times 10^3 = \underline{80,000}$

Write the missing exponent or number.

Example

$5,000 = 5 \times 10^{\boxed{3}}$

4.

$60 \times 10^{\boxed{2}} = 6,000$

5.

$12 \times \underline{1,000} = 12,000$

6.

$90 = 9 \times 10^{\boxed{1}}$

Powers of Ten

Times 10, each digit moves one place to the left.

Each digit is worth 10 times as much. Draw arrows to show the moves.

Example	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
0.36			0	.	3	6	
$\times 10$							
= 3.6			3	.	6		

1.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
0.047			0	.	0	4	7
$\times 100$							
= 4.7			4	.	7		

2.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
0.513			0	.	5	1	3
$\times 10^3$							
= 513	5	1	3	.			

Now multiply without the chart.

Example	$4.25 \times 10 = 42.5$	3.	$0.8 \times 100 = 80$
4.	$3.06 \times 10^2 = 306$	5.	$0.009 \times 1,000 = 9$
6.	$12.4 \times 10^1 = 124$	7.	$0.075 \times 10^3 = 75$

Each digit moves to a new place. Write the place.

8. 3 tenths $\times 10 = 3$ ones	9. 4 ones $\times 100 = 4$ hundreds
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Powers of Ten

Divided by 10, each digit moves one place to the right.

Each digit is worth $\frac{1}{10}$ as much. Draw arrows to show the moves.

Example	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
4.5			4	.	5		
$\div 10$							
= 0.45			0	.	4	5	

1.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
36		3	6	.			
$\div 100$							
= 0.36			0	.	3	6	

2.	Hundreds	Tens	Ones	.	Tenths	Hundredths	Thousandths
208	2	0	8	.			
$\div 10^3$							
= 0.208			0	.	2	0	8

Now divide without the chart.

Example	$52.6 \div 10 = 5.26$	3.	$7 \div 100 = 0.07$
4.	$940 \div 10^2 = 9.4$	5.	$63 \div 1,000 = 0.063$
6.	$1.8 \div 10^1 = 0.18$	7.	$425 \div 10^3 = 0.425$

Each digit moves to a new place. Write the place.

8. 6 tens $\div 100 = 6$ tenths	9. 5 ones $\div 100 = 5$ hundredths
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Powers of Ten

Use exponents and patterns to multiply and divide.

Complete each pattern table.

Number	$\times 10^1$	$\times 10^2$	$\times 10^3$
Example 0.04	0.4	4	40
2.5	<u>25</u>	<u>250</u>	<u>2,500</u>
0.29	<u>2.9</u>	<u>29</u>	<u>290</u>
1.07	<u>10.7</u>	<u>107</u>	<u>1,070</u>

Number	$\div 10^1$	$\div 10^2$	$\div 10^3$
Example 600	60	6	0.6
45	<u>4.5</u>	<u>0.45</u>	<u>0.045</u>
8	<u>0.8</u>	<u>0.08</u>	<u>0.008</u>
230	<u>23</u>	<u>2.3</u>	<u>0.23</u>

Write the missing number or exponent.

Example $0.45 \times \underline{100} = 45$

1. $3.2 \times 10^2 = \underline{320}$

2. $\underline{6} \div 10^3 = 0.006$

3. $7.8 \div \underline{10} = 0.78$

4. $0.38 \times 10^{\underline{2}} = 38$

5. $\underline{5.03} \times 100 = 503$

6. $0.9 \div 10^2 = \underline{0.009}$

7. $1.25 \times 10^{\underline{3}} = 1,250$

Write $>$, $<$, or $=$ in each circle.

8. $4.2 \times 10^2 \text{ (} = \text{)} 42 \times 10$

12. $3.5 \times 100 \text{ (} < \text{)} 35 \times 100$

9. $0.8 \div 10 \text{ (} > \text{)} 8 \div 1,000$

13. $2.7 \div 10 \text{ (} > \text{)} 27 \div 1,000$

10. $9 \div 10^3 \text{ (} < \text{)} 0.09$

14. $0.7 \div 10^2 \text{ (} < \text{)} 0.07$

11. $0.05 \times 10^3 \text{ (} = \text{)} 5 \times 10$

15. $1.2 \times 10^3 \text{ (} = \text{)} 120 \times 10$

Powers of Ten

Use powers of ten to change units and count money.

Change the units. Multiply or divide by a power of ten.

$1 \text{ m} = 100 \text{ cm}$

$1 \text{ cm} = 10 \text{ mm}$

$1 \text{ kg} = 1,000 \text{ g}$

$1 \text{ L} = 1,000 \text{ mL}$

Change	Multiply or divide by	Answer
Example 2.5 m to cm	$\times 100$	<u>250</u> cm
750 g to kg	$\div 1,000$	<u>0.75</u> kg
1.6 L to mL	$\times 1,000$	<u>1,600</u> mL
85 mm to cm	$\div 10$	<u>8.5</u> cm
340 cm to m	$\div 100$	<u>3.4</u> m

Count the money. Dollars $\times 10$ = dimes. Dollars $\times 100$ = pennies.

Example \$3.40 = 34 dimes

1. \$2.75 = 275 pennies

2. 45 dimes = \$ 4.50

3. 620 pennies = \$ 6.20

Who is right? Circle the right answer. Then tell why.

4. Mia says $0.6 \times 100 = 0.600$

Leo says $0.6 \times 100 = 60$

Why? 6 tenths $\times 100 = 6$ tens. Every digit moves 2 places to the left,
so $0.6 \times 100 = 60$.

5. Ava says $72 \div 1,000 = 0.72$

Ben says $72 \div 1,000 = 0.072$

Why? 7 tens $\div 1,000 = 7$ hundredths. Every digit moves 3 places to the right,
so $72 \div 1,000 = 0.072$.