New
PIONEERS
GRADED
MATHS

Book 6

Contents

Place Value and Powers of Ten

You can use exponents to write very large and very small numbers as power of 10.

$10^5 = 10 \times 10 \times 10 \times 10 \times 10 = 100{,}000$

$10^{-4} = \dfrac{1}{10 \times 10 \times 10 \times 10} = \dfrac{1}{10{,}000}$

$= 0{,}00001$

You can use power of 10 to write numbers in expanded form.

$48{,}369 = (4 \times 10^4) + (8 \times 10^3) + (3 \times 10^2) + (6 \times 10^1) + (9 \times 10^0)$

$0.018 = (1 \times 10^{-2}) + (8 \times 10^{-3})$

Write each number in expanded form, using powers of 10.

7,000

_____

43,000,000

_____

0.00028

_____

48,002

_____

Write each number in standard form.

$(6 \times 10^2) + (7 \times 10^0)$

_____

$(2 \times 10^{-4}) + (2 \times 10^{-3})$

_____

$(7 \times 10^5) + (9 \times 10^2) + (4 \times 10^{-2})$

_____

$(5 \times 10^{-3}) + (7 \times 10^{-4}) + (1 \times 10^{-2})$

_____

Patterns: Find a pattern in each sequence of numbers. Use your pattern to find the missing terms.

$10^1, 10^3, 10^5,$ _____, _____, _____,

$2^{-1}, 4^{-3}, 6^{-5},$ _____, _____, _____,

Compare and Order Numbers

Different Ways to Compare Numbers

You can use a number line.

Since 0.35 is to the right of 0.345,

0.35 > 0.345.

You can compare digits.

Align the decimal points. Compare digits from left to right until they are different.

| 0.35 | 5 > 4 |
| 0.345 | 0.35 > 0.345 |

Compare. Write >, <, or = for each ◯.

0.09 ◯ 0.090   30.583 ◯ 3.0583   45,298,402 ◯ 45,299,204

Order from least to greatest.

1,245,735   12,245,735   124,735   0.0037   0.307   0.037

Round and Estimate Numbers

Different Ways to Estimate Sums and Differences

Use front-end estimation.

Add (or subtract) the digits in the greatest place.

```
  8.59
+ 6.25
  14
```

Adjust.

Look at the digits in the next greatest place.

```
  8.59
+ 6.25
  14.7
```

Use rounding rules.

Round to the nearest whole number. Then add (or subtract).

```
  8.59  ⟶    9
+ 6.25  ⟶  + 6
             15
```

Round each number to the underlined place.

245,9_58,873   197.47_32   22.0_896

Estimate each sum or , difference. Identify the method you used.

4   8.21 − 5.33   7.09 + 3.54 + 4.21

Find 54.2 + 315.6.

$$\begin{array}{r} 54.2 \\ +\ \underline{315.6} \\ 369.8 \end{array}$$

Align the decimal points.

Find 15.72 − 6.4.

$$\begin{array}{r} 15.72 \\ -\ \underline{6.40} \\ 9.32 \end{array}$$

Find 3,851 + 38.

$$\begin{array}{r} 3,851 \\ +\ \underline{38} \\ 3,889 \end{array}$$

Align the digits by place value.

Find each sum or difference. Show your work.

$1.4572 - 0.731$

$4.697 + 8.29$

$14,659 + 925$

$4,157 + 1,790$

$2.067 - 1.15$

$179.2 + 14.85$

$51.64 - 7.9$

Variables and Expressions

Phrase	6 less than 19 increased by 3.6
Numerical Expression	$19 - 6 + 3.6$
Phrase	The sum of 13 and 8 decreased by 9
Algebraic Expression	$13 + 8 - 9$

Write a numerical expression to represent each phrase.

11 more than 6.2 plus 5

_____

9 less than 14.6 increased by 8

_____

7 less than 55 increased by 23

_____

3.5 more than 42 decreased by 15

_____

6.4 less than 12 plus 17

_____

7.6 more than 9 increased by 2.3

_____

Choose the expression that correctly represents each situation.

The total number of points scored by Team *A* was 96. Team *B* scored *W* points. How many more points did Team *A* score?
(Team *A* was the winner)

   a $96 + w$

   b $96 - w$

   c $w - 96$

Sara invited 14 friends to her party. She also invited *S* people from her family. How many people did she invite in all?

   a $14 - S$

   b $S - 14$

   c $S + 14$

Use Addition Properties

Commutative Property	$8 + 3 = 3 + 8$	$a + b = b + a$
Associative Property	$(6 + 7) + 2 = 6 + (7 + 2)$	$(a + b) + c = a + (b + c)$
Identity Property	$5 + 0 = 5$	$a + 0 = a$

Estimate. Identify the property or properties you used.

$5.63 + 0 + 11$

$45 + 9.4 + 55$

_____

_____

$72 + (a + 19)$,
given $a = 28$

$28 + 59 + c$
given $c = 12$

_____

_____

$31 + b + 44$,
given $b = 0$

$26 + s + 64$,
given $s = 5$

_____

_____

$78.1 + m + 1.9$
given $m = 3$

_____

Use >, <, or = to make each statement true.

$9.3 + (14 + 3.6)$ ◯ $(9.3 + 14) + 3.6$

$(16.8 + 23) + 4$ ◯ $18.6 + (23 + 4)$

$87 + b + 42$ ◯ $87 + b + 24$

Estimate Products and Quotients

Ways to Estimate 39 x 53

Round to Greatest Place

$$
\begin{array}{r} 39 \\ \times\ 53 \\ \hline \end{array}
\qquad
\begin{array}{r} 40 \\ \times\ 50 \\ \hline 2{,}000 \end{array}
$$

Round Up to Overestimate

$$
\begin{array}{r} 39 \\ \times\ 53 \\ \hline \end{array}
\qquad
\begin{array}{r} 40 \\ \times\ 60 \\ \hline 2{,}400 \end{array}
$$

Use Front-end Estimation to Underestimate

$$
\begin{array}{r} 39 \\ \times\ 53 \\ \hline \end{array}
\qquad
\begin{array}{r} 30 \\ \times\ 50 \\ \hline 1{,}500 \end{array}
$$

Estimate 5,237 ÷ 64 using compatible numbers.

Underestimate

$$60\overline{)5000}\ \ ^{80}$$

?

$$64\overline{)5{,}237}$$

Overestimate 70

$$70\overline{)5{,}000}$$

Estimate each product or quotient. Identify the method you used.

56 x 82	$19\overline{)785}$	58 x 657	$32\overline{)1{,}566}$
512 x 87	$84\overline{)5{,}585}$	616 x 279	$24\overline{)4{,}850}$
691 x 525	$47\overline{)2{,}754}$	8,298 x 53	$53\overline{)5{,}581}$

Multiphy Whole Numbers

Find 56 x 36

Step 1

Multiply by the ones digit. Regroup if necessary.

```
  3
  56
x 36
 336
```

Step 2

Multiply by the tens digit. Regroup if necessary.

```
  1
  4
  56
x 36
 336
1680
```

Step 3

Add the partial products.

```
  1
  56
x 36
 336
1680
2016
```

Find each product. Estimate to see if your answer is reasonable. Show your work.

```
   57          39         245         496
x  48       x  62       x  12       x  53
```

```
  391         662       3,755
x 255       x 124       x 732
```

2,583 x 39   838 x 134   3.502 x 85

Order of Operations

Evaluate. Indicated the order of operations you performed.

$6 + 7 \times 9$ _____

$5^2 \times 4 \div 2 - (8 - 3)$ _____

Evaluate each expression, given $q = 3$, $r = 5$, and $s = 9$.

$s \div (q + 0)$ _____

$q \times s \div q$ _____

$r^2 - (s + q)$ _____

$(q \times r) + s^2 \div q$ _____

$r \times s - q \times r$ _____

$q + (s - r)^2$ _____

Insert parentheses to make each pair of expressions equal.

$4 + 3^2 = 49$

$6 \times 10 - 7 \times 5 = 90$

$100 \div 4 \times 8 - 3 = 125$

$4 \times 7 + 5 - 8 = 40$