



ADA MERRITT K-8 CENTER

6TH GRADE MATHEMATICS SUMMER STUDY PACKET

THE FOLLOWING STUDY GUIDE INCLUDES MATHEMATICS CONTENT THAT IS A PRE-REQUISITE FOR NEXT SCHOOL YEAR. YOU WILL RECEIVE CREDIT FOR THE COMPLETION OF THE PACKET SO MAKE SURE TO ATTACH ALL OF THE WORK NECESSARY TO ANSWER EACH PROBLEM.

STUDENT NAME: _____

Study Guide and Intervention

Divisibility Patterns

A whole number is **divisible** by another number if the remainder is 0 when the first is divided by the second. A whole number is **even** if it is divisible by 2. A whole number is **odd** if it is not divisible by 2.

Rule

A whole number is divisible by:

- 2 if the ones digit is divisible by 2.
- 3 if the sum of the digits is divisible by 3.
- 4 if the number formed by the last two digits is divisible by 4.
- 5 if the ones digit is 0 or 5.
- 6 if the number is divisible by both 2 and 3.
- 9 if the sum of the digits is divisible by 9.
- 10 if the ones digit is 0.

Examples

- 2, 4, 6, 8, 10, 12, 14, 16, ...
- 3, 6, 9, 12, 15, 18, 21, 24, ...
- 4, 8, 12, ..., 104, 108, 112, ...
- 5, 10, 15, 20, 25, 30, ...
- 6, 12, 18, 24, 30, 36, ...
- 9, 18, 27, 36, 45, ...
- 10, 20, 30, 40, 50, ...

EXAMPLE 1 Tell whether 112 is divisible by 2, 3, 4, 5, 6, 9, or 10. Then classify the number as *even* or *odd*.

- 2: Yes; the ones digit is divisible by 2.
 3: No; the sum of the digits, 4, is not divisible by 3.
 4: Yes; the number formed by the last two digits, 12, is divisible by 4.
 5: No; the ones digit is not a 0 or a 5.
 6: No; the number is not divisible by 2 and 3.
 9: No; the sum of the digits, 4, is not divisible by 9.
 10: No; the ones digit, 2, is not 0.

The number 112 is even because it is divisible by 2.

EXERCISES

Tell whether each number is divisible by 2, 3, 4, 5, 6, 9, or 10. Then classify the number as even or odd.

- | | | |
|-----------|-----------|------------|
| 1. 80 | 2. 93 | 3. 324 |
| 4. 81 | 5. 650 | 6. 23,512 |
| 7. 48 | 8. 268 | 9. 665 |
| 10. 3,579 | 11. 7,000 | 12. 24,681 |

Tell whether each sentence is *sometimes*, *always*, or *never* true.

13. A number that is divisible by both 2 and 3 is also divisible by 6.
14. Any number that is divisible by 10 is also divisible by 2 and 5.

1-4**Study Guide and Intervention****Powers and Exponents**

A product of prime factors can be written using exponents and a base. Numbers expressed using exponents are called **powers**.

| Powers | Words | Expression | Value |
|--------|------------------------------------|--|--------|
| 4^2 | 4 to the second power or 4 squared | 4×4 | 16 |
| 5^6 | 5 to the sixth power | $5 \times 5 \times 5 \times 5 \times 5 \times 5$ | 15,625 |
| 7^4 | 7 to the fourth power | $7 \times 7 \times 7 \times 7$ | 2,401 |
| 9^3 | 9 to the third power or 9 cubed | $9 \times 9 \times 9$ | 729 |

EXAMPLE 1 Write $6 \cdot 6 \cdot 6$ using an exponent. Then find the value of the power.

The base is 6. Since 6 is a factor 3 times, the exponent is 3.

$$6 \cdot 6 \cdot 6 = 6^3 \text{ or } 216$$

EXAMPLE 2 Write 2^4 as a product. Then find the value of the product.

The base is 2. The exponent is 4. So, 2 is a factor 4 times.

$$2^4 = 2 \cdot 2 \cdot 2 \cdot 2 \text{ or } 16$$

EXAMPLE 3 Write the prime factorization of 225 using exponents.

The prime factorization of 225 can be written as $3 \times 3 \times 5 \times 5$, or $3^2 \times 5^2$.

EXERCISES

Write each product using an exponent. Then find the value of the power.

1. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

2. $9 \cdot 9$

3. $3 \cdot 3 \cdot 3$

4. $5 \cdot 5 \cdot 5$

5. $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$

6. $10 \cdot 10$

Write each power as a product. Then find the value of the product.

7. 7^2

8. 4^3

9. 8^4

10. 5^5

11. 2^8

12. 7^3

Write the prime factorization of each number using exponents.

13. 40

14. 75

15. 100

16. 147

Study Guide and Intervention

Order of Operations

Order of Operations

1. Simplify the expressions inside grouping symbols, like parentheses.
2. Find the value of all powers.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

EXAMPLE 1 Find the value of $48 \div (3 + 3) - 2^2$.

$$\begin{aligned}
 48 \div (3 + 3) - 2^2 &= 48 \div 6 - 2^2 && \text{Simplify the expression inside the parentheses.} \\
 &= 48 \div 6 - 4 && \text{Find } 2^2. \\
 &= 8 - 4 && \text{Divide 48 by 6.} \\
 &= 4 && \text{Subtract 4 from 8.}
 \end{aligned}$$

EXAMPLE 2 Write and solve an expression to find the total cost of planting flowers in the garden.

| Item | Cost Per Item | Number of Items Needed |
|----------------------|---------------|------------------------|
| pack of flowers | \$4 | 5 |
| bag of dirt | \$3 | 1 |
| bottle of fertilizer | \$4 | 1 |

| | | | | | |
|-------------------|------------------------|------|--------------|------|--------------------|
| Words | cost of 5 flower packs | plus | cost of dirt | plus | cost of fertilizer |
| Expression | $5 \times \$4$ | + | \$3 | + | \$4 |

$$\begin{aligned}
 5 \times \$4 + \$3 + \$4 &= \$20 + \$3 + \$4 \\
 &= \$23 + \$4 \\
 &= \$27
 \end{aligned}$$

The total cost of planting flowers in the garden is \$27.

EXERCISES

Find the value of each expression.

1. $7 + 2 \times 3$

2. $12 \div 3 + 5$

3. $16 - (4 + 5)$

4. $8 \times 8 \div 4$

5. $10 + 14 \div 2$

6. $3 \times 3 + 2 \times 4$

7. $80 - 8 \times 3^2$

8. $11 \times (9 - 2^2)$

9. $25 \div 5 + 6 \times (12 - 4)$

10. **GARDENING** Refer to Example 2. Suppose that the gardener did not buy enough flowers and goes back to the store to purchase four more packs. She also purchases a hoe for \$16. Write an expression that shows the total amount she spent to plant flowers in her garden.

Order of Operations

Parentheses show what to do first.

When there are no parentheses, we follow the rule for the **order of operations**: from left to right, first multiply and divide, and then add and subtract.

$$\begin{array}{r} 7 \times 12 - 27 \div 3 \\ 84 - 9 \\ 75 \end{array}$$

$$\begin{array}{r} 7 \times (12 - 27 \div 3) \\ 7 \times (12 - 9) \\ 7 \times 3 \\ 21 \end{array}$$

$$\begin{array}{r} \frac{7+14}{3} + \frac{72}{9} \\ \frac{21}{3} + \frac{72}{9} \\ 7 + 8 \\ 15 \end{array}$$

Practice • Compute.

- | | | |
|--|---------------------------------------|--|
| 1. $5 \times (2 + 7)$ _____ | 2. $18 - (2 \times 6)$ _____ | 3. $(9 - 3) \times 7$ _____ |
| 4. $25 \div (10 - 5)$ _____ | 5. $4 \times 6 \div 3$ _____ | 6. $7 + 3 \times 9$ _____ |
| 7. $18 - 5 \times 3$ _____ | 8. $3 \times 7 + 12 \div 2$ _____ | 9. $36 \div 9 + 8$ _____ |
| 10. $8 + 15 \div 3$ _____ | 11. $26 - 21 \div 3$ _____ | 12. $40 \div 4 \times 3$ _____ |
| 13. $9 \times (9 - 2)$ _____ | 14. $5 \times 3 - 25 \div 5$ _____ | 15. $7 + 42 \div 6$ _____ |
| 16. $8 + 8 \div 2 + 3$ _____ | 17. $12 \div 4 + 24 \div 8$ _____ | 18. $12 \times 3 - 4$ _____ |
| 19. $7 - 16 \div 4$ _____ | 20. $30 \div 3 \times 2$ _____ | 21. $18 - 9 \div 3 \times 2$ _____ |
| 22. $7 + 9 - 2 \times 7$ _____ | 23. $(4 \times 9) \div 3$ _____ | 24. $8 \times (6 \div 3) - 4$ _____ |
| 25. $8 + \frac{49}{7}$ _____ | 26. $\frac{12+8}{4}$ _____ | 27. $(21 - 3) \div 9 + 42 \div 6$ _____ |
| 28. $\frac{14+4}{3}$ _____ | 29. $\frac{8+4}{8-6}$ _____ | 30. $\frac{4 \times 8}{2}$ _____ |
| 31. $\frac{28}{7} - 3$ _____ | 32. $9 \times (14 \div 2)$ _____ | 33. $63 \div 7 \times 2$ _____ |
| 34. $8 \times (25 - \frac{36}{4})$ _____ | 35. $\frac{32+8}{10}$ _____ | 36. $\frac{42}{6} + 26$ _____ |
| 37. $3 + \frac{18}{9}$ _____ | 38. $7 \times 3 - \frac{45}{5}$ _____ | 39. $\frac{30+18}{8}$ _____ |
| 40. $\frac{28-4}{4}$ _____ | 41. $5 \times (3 + 4)$ _____ | 42. $6 \times 7 - \frac{18}{6}$ _____ |
| 43. $4 \times 7 + \frac{39}{13}$ _____ | 44. $\frac{14-8}{3}$ _____ | 45. $6 \times (43 - \frac{63}{9})$ _____ |

Lesson 11b

Place value

A. Read each decimal.

4.236

4 and 236 thousandths

27.0015

27 and 15 ten-thousandths

0.000075 or .000075

75 millionths

B. Write each decimal.

56 and 3 hundredths

56.03

728 hundred-thousandths

0.00728 or .00728

90 and 4 thousandths

90.004

If you take 4 apples from 6 apples, what do you have?

To check your answer, write each number in the place-value chart. Then shade each box that contains the digit 5.

1. 4618 ten-thousandths
2. 251 and 1 tenth
3. 152 and 3005 ten-thousandths
4. 50 and 1356 hundred-thousandths
5. 259 and 6052 hundred-thousandths
6. 55 and 5555 ten-thousandths
7. 21 and 3025 ten-thousandths
8. 1 and 94,158 hundred-thousandths
9. 7 and 395 ten-thousandths
10. 21 and 79 hundredths
11. 21,897 and 2 tenths
12. 7 millionths

| millions | hundred-thousands | ten-thousands | thousands | hundreds | tens | ones | tenths | hundredths | thousandths | ten-thousandths | hundred-thousandths | millionths |
|----------|-------------------|---------------|-----------|----------|------|------|--------|------------|-------------|-----------------|---------------------|------------|
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Rounding Decimals

Round 24.37 to the nearest tenth.

Think: The digit in the tenths place is 3.
 The digit to the right is 5 or greater.
 Round up. Increase the digit in the
 tenths place by 1.

$$\begin{array}{c} \downarrow \\ 24.37 \\ \uparrow \end{array}$$

24.37 rounded to the nearest tenth is 24.4.

Practice • Round to the nearest whole number.

- | | | | |
|-----------------|-------------------|-------------------|-------------------|
| 1. 15.7 _____ | 2. 173.08 _____ | 3. 53.61 _____ | 4. 2.386 _____ |
| 5. 17.1 _____ | 6. 72.5 _____ | 7. 0.72 _____ | 8. 4.704 _____ |
| 9. 68.089 _____ | 10. 162.534 _____ | 11. 401.725 _____ | 12. 230.499 _____ |

Round to the nearest tenth.

- | | | | |
|------------------|------------------|------------------|------------------|
| 13. 0.48 _____ | 14. 0.58 _____ | 15. 6.528 _____ | 16. 42.875 _____ |
| 17. 3.55 _____ | 18. 0.28 _____ | 19. 0.782 _____ | 20. 6.074 _____ |
| 21. 16.408 _____ | 22. 75.041 _____ | 23. 521.98 _____ | 24. 80.947 _____ |

Round to the nearest hundredth.

- | | | | |
|------------------|-------------------|-------------------|-------------------|
| 25. 0.341 _____ | 26. 0.675 _____ | 27. 2.509 _____ | 28. 55.485 _____ |
| 29. 7.534 _____ | 30. 0.889 _____ | 31. 0.025 _____ | 32. 40.608 _____ |
| 33. 43.508 _____ | 34. 18.8051 _____ | 35. 73.0092 _____ | 36. 64.6718 _____ |

Round to the nearest thousandth.

- | | | | |
|------------------|-------------------|-------------------|-------------------|
| 37. 0.0428 _____ | 38. 0.4829 _____ | 39. 0.3284 _____ | 40. 8.4212 _____ |
| 41. 0.0617 _____ | 42. 0.6882 _____ | 43. 7.4267 _____ | 44. 4.0006 _____ |
| 45. 3.2045 _____ | 46. 31.4903 _____ | 47. 26.0781 _____ | 48. 75.3246 _____ |

Use with text pages 38–39.

Lesson 13a

Adding decimals

Find $46.5 + 2.84 + 15$.

| | | | | |
|---|------|------|--------|------------|
| | tens | ones | tenths | hundredths |
| | 4 | 6 | .5 | 0 |
| | | 2 | .8 | 4 |
| + | 1 | 5 | .0 | 0 |
| | | | | |

Line up the decimal points and places. You can write zeros to show each number in hundredths. Put the decimal point in the answer.

| | | | | |
|---|------|------|--------|------------|
| | tens | ones | tenths | hundredths |
| | 1 | 1 | | |
| | 4 | 6 | .5 | 0 |
| | | 2 | .8 | 4 |
| + | 1 | 5 | .0 | 0 |
| | | | | |

Then add as you do with whole numbers.

Add.

1.
$$\begin{array}{r} 6.8 \\ 2.4 \\ + 1.7 \\ \hline \end{array}$$

2.
$$\begin{array}{r} .49 \\ .7 \\ + 3.83 \\ \hline \end{array}$$

3.
$$\begin{array}{r} 11.65 \\ .68 \\ + 2.3 \\ \hline \end{array}$$

4.
$$\begin{array}{r} 9.000 \\ 8.020 \\ + 7.894 \\ \hline \end{array}$$

5. $3.25 + .65$

6. $1.05 + .073$

7. $.125 + 16.95$

8. $.561 + 3.745$

9. $1.62 + 5.078$

10. $.243 + 7.894$

11. $46.2 + 8.041$

12. $.9341 + .038$

13. $56.64 + 3.2 + .48$

14. $814.6 + 38 + .04 + 1.205$

Lesson 14a Subtracting decimals

Find $38.6 - 7.89$.

| | | | |
|------|------|--------|------------|
| tens | ones | tenths | hundredths |
| 3 | 8 | . 6 | 0 |
| | | | |
| - | 7 | . 8 | 9 |
| | | | |

Line up the decimal points and places.
Write a zero to show 38.6 in hundredths.
Put the decimal point in the answer.

| | | | |
|------|------|--------|------------|
| tens | ones | tenths | hundredths |
| | 7 | 8 | 10 |
| 3 | 8 | . 6 | 0 |
| | | | |
| - | 7 | . 8 | 9 |
| | | | |
| 3 | 0 | . 7 | 1 |

Then subtract as you do with whole numbers.

Subtract.

1.
$$\begin{array}{r} 8.76 \\ - 4.35 \\ \hline \end{array}$$

2.
$$\begin{array}{r} 7.368 \\ - 4.210 \\ \hline \end{array}$$

3.
$$\begin{array}{r} 86.10 \\ - 9.62 \\ \hline \end{array}$$

4.
$$\begin{array}{r} 1.590 \\ - .257 \\ \hline \end{array}$$

5. $3.75 - 1.927$

6. $.094 - .08$

7. $14.9 - 1.73$

8. $100.05 - 26.2$

9. $8.051 - 3.2$

10. $52 - 7.86$

11. $9 - .253$

12. $6.9 - .472$

13. $12.02 - 8.119$

14. $40.08 - 18.7$

15. $27.63 - 15.008$

16. $61.3 - .102$