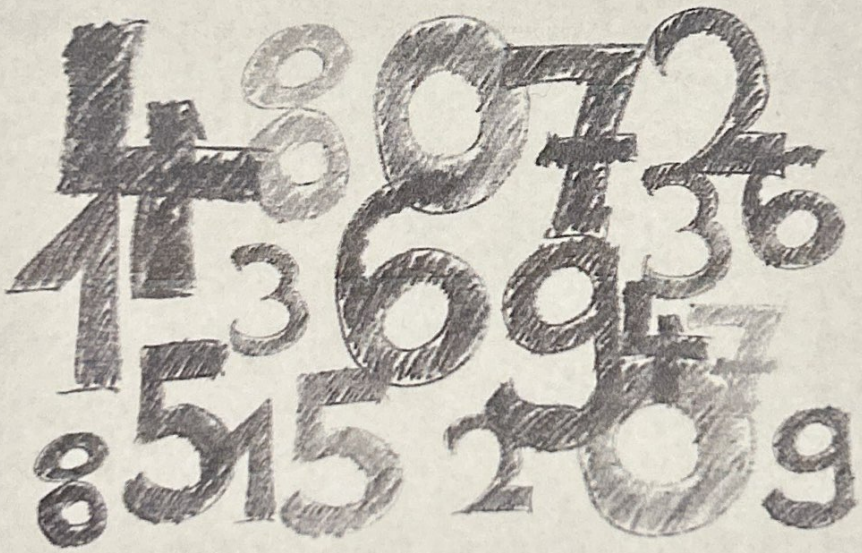
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8th Grade

Summer Math Packet



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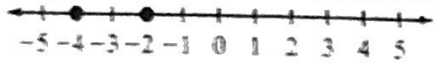
Week 1

Integers and Absolute Value

Compare. Use >, <, or = to complete each statement.

a. $-4 \square -2$

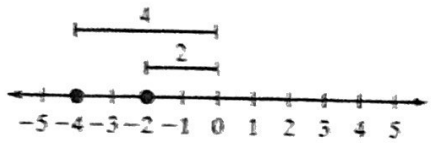
Graph -4 and -2 on the number line.



A number on the left is less than a number on the right.
Thus, -4 is less than -2.
$-4 < -2$

b. $|-4| \square |-2|$

The *absolute value* of a number is its distance from zero on the number line.



Thus $|-4| = 4$ and $|-2| = 2$.
Since $4 > 2$, $|-4| > |-2|$

Compare. Use >, <, or = to complete each statement.

1. $-3 \square -2$
2. $-5 \square 1$
3. $0 \square -2$
4. $1 \square 0$
5. $1 \square -1$
6. $-5 \square -3$
7. $|-3| \square 0$
8. $|-2| \square |-5|$
9. $|-3| \square 2$
10. $|-6| \square 6$
11. $|3| \square |-2|$
12. $|-7| \square 0$
13. $-3 \square |-3|$
14. $4 \square |-2|$
15. $|-2| \square 3$
16. $|-5| \square 3$
17. $|8| \square |-8|$
18. $-6 \square -4$
19. $5 \square |-4|$
20. $-3 \square -5$
21. $|2| \square -3$
22. $|-1| \square |1|$
23. $|-3| \square |-1|$
24. $-1 \square 2$

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Week 2

The Distributive Property

According to the Distributive Property, you distribute or "pass out" a multiplication to each part of a sum or difference in parentheses.

In $2(a + b) = 2a + 2b$, we "pass out" the 2 by multiplying it by both the a and the b.

Multiply $6(x - 9)$.

$$\begin{aligned} 6(x - 9) &= 6x - 6(9) \\ &= 6x - 54 \end{aligned}$$

Multiply $(4 - h)(-3)$.

$$\begin{aligned} (4 - h)(-3) &= 4(-3) - h(-3) \\ &= -12 - (-3h) \\ &= -12 + 3h \\ &= 3h - 12 \end{aligned}$$

Complete with the appropriate number or variable.

1. $12(5 + 9) = 12 \cdot 5 + $ _____ $\cdot 9$

2. $(3 - 8)7 =$ _____ $\cdot 7 - 8 \cdot$ _____

3. $z(a - b - c) =$ _____ $\cdot a - z \cdot$ _____ $-$ _____ $\cdot$ _____

4. $[14 + (-3)]7 = 14 \cdot$ _____ $+$ _____ $\cdot 7$

5. $p[(-3) + n] = p \cdot$ _____ $+$ _____ $\cdot$ _____

Multiply each expression.

6. $4(x + 5) =$ _____

7. $(6 - m)(-4) =$ _____

8. $s(-6 + t) =$ _____

9. $8[j - 2k + \ell] =$ _____

10. $(z - 4)(-5) =$ _____

11. $9[(-7) - y] =$ _____

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Week 2

Simplifying Variable Expressions

Simplify $5n + (-n - 4)(-2)$.

$5n + (-n - 4)(-2)$

$= 5n + (-n)(-2) - 4(-2)$ Use the Distributive Property.

$= 5n + 2n + 8$ Multiply. Think of $-4(-2)$ as $+(-4)(-2)$.

$= (5 + 2)n + 8$ Use the Distributive Property to combine like terms.

$= 7n + 8$ Add.

Complete each equation.

1. $9a - 7a + 5$

$= (9 - 7)$_____ $+ 5$

$=$ _____ $a + 5$

2. $5k - 4 - 8k$

$= 5k - 8$_____ $- 4$

$= (5 - 8)$_____ $- 4$

$=$ _____ $- 4$

Simplify each expression.

3. $12a + 4 - 10a$

_____

4. $7 + x - 7x$

_____

5. $2(n - 4) + 3$

_____

6. $-3(a + 5) + 9$

_____

7. $5(2y + 1) - 7y$

_____

8. $2(4 - 3t) - (-3) + 2t$

_____

9. $8c + 5(c - 3)$

_____

10. $-2(-4 - 3s)$

_____

11. $q(-3) + 3(2 + q)$

_____

12. $(3 + k)(-4) - 5k$

_____

13. $(-3)(1 - 2n) + 2(n + 4)$

_____

14. $9p - 3(5p + 2) + 6$

_____

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Week 3

Solving Equations by Adding or Subtracting Decimals

Solve the equation $n + 3.2 = -4.7$.

$n + 3.2 = -4.7$

$n + 3.2 - 3.2 = -4.7 - 3.2$ Subtract 3.2 from each side.

$n = -7.9$ Simplify.

Solve each equation.

1. $n - 17.9 = -31.05$

$n =$ _____

2. $h + (-8.5) = -0.6$

$h =$ _____

3. $y - 33.4 = 81.9$

$y =$ _____

4. $t + 18.5 = -41$

$t =$ _____

5. $h + 20.4 = -15.7$

$h =$ _____

6. $p - 1.1 = 4.4$

$p =$ _____

7. $a + 106.7 = 62.3$

$a =$ _____

8. $z - 241.6 = 32.7$

$z =$ _____

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Week 3

Solving Equations by Multiplying or Dividing Decimals

Solve the equations $0.7x = -2.8$ and $\frac{x}{1.5} = 0.2$.

$0.7x = -2.8$	Write the equation.
$\frac{0.7x}{0.7} = \frac{-2.8}{0.7}$	Divide each side by 0.7.
$x = -4$	Simplify.

$\frac{x}{1.5} = 0.2$	Write the equation.
$\frac{x}{1.5}(1.5) = 0.2(1.5)$	Multiply each side by 1.5.
$x = 0.3$	Simplify.

Solve each equation.

1. $4x = -2.44$

$x =$ _____

2. $1.8x = 5.76$

$x =$ _____

3. $\frac{h}{-1.05} = -0.36$

$h =$ _____

4. $\frac{z}{-0.02} = 5.9$

$z =$ _____

5. $4.25y = 0.85$

$y =$ _____

6. $\frac{n}{-1.9} = 24.6$

$n =$ _____

7. $\frac{r}{8.04} = 1.55$

$r =$ _____

8. $11.32a = -39.62$

$a =$ _____

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Week 4

Prime Factorization and Greatest Common Factor

Find the GCF of 36 and 54.

$36 = 2^2 \cdot 3^2 = 2 \cdot 2 \cdot 3 \cdot 3$
$54 = 2 \cdot 3^3 = 2 \cdot 3 \cdot 3 \cdot 3$

write the prime factorization

find the common factors

GCF = $2 \cdot 3 \cdot 3 = 2 \cdot 3^2 = 18$

Notice 2 is the lesser power of 2^2 and 2, and 3^2 is the lesser power of 3^2 and 3^3.

Find the GCF.

1. 50 = _____
   35 = _____
   GCF = _____

2. 75 = _____
   30 = _____
   GCF = _____

3. 48 = _____
   60 = _____
   GCF = _____

4. 45 = _____
   72 = _____
   GCF = _____

5. 98 = _____
   42 = _____
   GCF = _____

6. 24 = _____
   80 = _____
   GCF = _____

7. 315 = _____
   360 = _____
   GCF = _____

8. 156 = _____
   208 = _____
   GCF = _____

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Week 5

Exponents and Multiplication

Simplify $m^3 \cdot m^4$ and $(n^2)^3$.

The base of m^3 is m and the base of m^4 is m. So, they have the same base. To multiply variables with the same base, add the exponents.

$m^3 \cdot m^4 = m^{3+4} = m^7$

This rule works because you are combining 3 factors of m and 4 factors of m.

$m^3 \cdot m^4 = (m \cdot m \cdot m) \cdot (m \cdot m \cdot m \cdot m) = m^7$

Simplifying $(n^2)^3$ involves raising a power (n^2) to a power. To find a power of a power, multiply the exponents.

$(n^2)^3 = n^{2 \cdot 3} = n^6$

This rule works because you are using n^2 as a factor 3 times.

$(n^2)^3 = n^2 \cdot n^2 \cdot n^2 = (n \cdot n) \cdot (n \cdot n) \cdot (n \cdot n) = n^6$

Simplify each expression. Show an intermediate step.

1. $4^7 \cdot 4^2 =$ (_____) $\cdot$ (_____) = _____
2. $a^3 \cdot a^6 =$ (_____) $\cdot$ (_____) = _____
3. $3x^2 \cdot 4x^5 =$ (_____) $\cdot$ (_____) = _____
4. $3^4 \cdot 3^3 =$ (_____) $\cdot$ (_____) = _____
5. $y^5 \cdot y^3 =$ (_____) $\cdot$ (_____) = _____
6. $7r^4 \cdot 3r^2 =$ (_____) $\cdot$ (_____) = _____
7. $(5^3)^4 =$ _____ = _____
8. $(h^2)^5 =$ _____ = _____
9. $(m^4)^8 =$ _____ = _____
10. $(x^3y^2)^3 =$ _____ = _____
11. $(2s^4t^5)^4 =$ _____ = _____
12. $(-pqr^2)^3 =$ _____ = _____

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Week 6

Powers of Products and Quotients

Simplify $\left(\frac{x^3}{-y^2}\right)^5$.

$\left(\frac{x^3}{-y^2}\right)^5 = \frac{(x^3)^5}{(-y^2)^5}$ Raise both the numerator and the denominator to the power of 5.

$= \frac{x^{15}}{(-1)^5(y^2)^5}$ Multiply exponents in the numerator. Raise each factor to the power of 5 in the denominator.

$= -\frac{x^{15}}{y^{10}}$ Multiply exponents and simplify.

Simplify each expression.

1. $(2 \cdot 5)^4$ _____
2. $(-3 \cdot 2)^3$ _____
3. $(4x)^2$ _____
4. $(a^2b)^5$ _____
5. $(3ab^3)^2$ _____
6. $-(5m^2n^3)^3$ _____
7. $\left(\frac{2}{9}\right)^2$ _____
8. $\left(-\frac{7}{8}\right)^2$ _____
9. $\left(-\frac{3}{16}\right)^3$ _____
10. $\left(\frac{4}{x^4}\right)^2$ _____
11. $\left(\frac{3x}{5}\right)^3$ _____
12. $\left(-\frac{a^2}{b^5}\right)^4$ _____
13. $\left(\frac{xy^2}{2z^3}\right)^5$ _____
14. $\left(\frac{-1}{2r^3}\right)^4$ _____
15. $\left(\frac{-2r^3s}{3t^2}\right)^2$ _____
16. $\left(\frac{-3}{a^2bc^2}\right)^3$ _____
17. $(p^4q^3r^2)^3$ _____
18. $\left(\frac{x^2y^{-3}}{z^2}\right)^4$ _____
19. $\left(\frac{5}{j^2k}\right)^2$ _____
20. $\left(\frac{qc^4}{4b}\right)^3$ _____

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Week 7

Proportions

Solve $\frac{x}{6} = \frac{10}{4}$

Method 1: Multiplication Property of Equality

$\frac{x}{6} = \frac{10}{4}$

$\frac{x}{6} \cdot 6 = \frac{10}{4} \cdot 6$ Multiply each side by 6.

$x = \frac{60}{4}$ Simplify.

$x = 15$

Method 2: cross products

$\frac{x}{6} \times \frac{10}{4}$

$4x = 60$ Find the cross products.

$\frac{4x}{4} = \frac{60}{4}$ Divide each side by 4.

$x = 15$ Simplify.

Solve each proportion. When necessary, round to the nearest hundredth.

1. $\frac{6}{p} = \frac{28}{42}$ _____

2. $\frac{12}{21} = \frac{x}{14}$ _____

3. $\frac{y}{9} = \frac{26}{6}$ _____

4. $\frac{x}{9} = \frac{7}{12}$ _____

5. $\frac{62}{t} = \frac{14}{16}$ _____

6. $\frac{28}{15} = \frac{y}{25}$ _____

7. $\frac{7}{20} = \frac{e}{70}$ _____

8. $\frac{8}{3} = \frac{40}{k}$ _____

9. $\frac{m}{54} = \frac{5}{12}$ _____

10. $\frac{8}{w} = \frac{5}{24}$ _____

11. $\frac{63}{18} = \frac{14}{z}$ _____

12. $\frac{a}{70} = \frac{2}{5}$ _____

13. $\frac{5}{13} = \frac{20}{r}$ _____

14. $\frac{6}{t} = \frac{7}{56}$ _____

15. $\frac{c}{21} = \frac{6}{20}$ _____

16. $\frac{10}{r} = \frac{15}{27}$ _____

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Week 7

Suppose you select a letter at random from the words MIDDLE SCHOOL. Find $P(\text{L})$ and $P(\text{not L})$.

First determine the number of possible outcomes. There are 12 letters in the two words, so there are 12 possible outcomes when you select a letter at random. Next determine the number of favorable outcomes for $P(\text{L})$. There are two L's.

Thus, $P(\text{L}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}} = \frac{2}{12} = \frac{1}{6}$

You can find $P(\text{not L})$ several ways. Since there are 12 possible outcomes and 2 are L, $12 - 2 = 10$ are not L.

Thus, $P(\text{not L}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}} = \frac{10}{12} = \frac{5}{6}$

Also $P(\text{not L}) = 1 - P(\text{L})$

$= 1 - \frac{1}{6} = \frac{5}{6}$

A drawer contains 6 red socks, 4 blue socks, and 14 white socks. A sock is pulled from the drawer at random. Find the probability for each case.

1. $P(\text{red})$ _____
2. $P(\text{blue})$ _____
3. $P(\text{red or white})$ _____
4. $P(\text{red, white, or blue})$ _____
5. $P(\text{not red})$ _____
6. $P(\text{green})$ _____

Suppose you spin a spinner that is equally likely to land on any one of the numbers from 1 to 20. Find the probability for each event.

7. $P(17)$ _____
8. $P(\text{an odd number})$ _____
9. $P(\text{a number divisible by 5})$ _____
10. $P(26)$ _____
11. $P(\text{a number with a 1 in it})$ _____
12. $P(\text{a prime number})$ _____
13. $P(\text{a number less than 6})$ _____
14. $P(\text{a number})$ _____
15. $P(\text{a number that is not less than 17})$ _____
16. **$P(\text{a number divisible by 3 or 4})$** _____

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Week 8

Solving Two-Step Equations

Solve $\frac{k}{5} - 9 = -7$.

$\frac{k}{5} - 9 = -7$	
$\frac{k}{5} - 9 + 9 = -7 + 9$	Add 9 to each side.
$\frac{k}{5} = 2$	Simplify.
$\frac{k}{5} \cdot 5 = 2 \cdot 5$	Multiply each side by 5.
$k = 10$	Simplify.

Complete the example.

1. $4n + 13 = 1$

_____	Subtract 13 from each side.
_____	Simplify.
_____	Divide each side by 4.
_____	Simplify.

Solve each equation.

2. $3x - 5 = 10$ $x =$ _____

3. $\frac{n}{2} + 10 = 7$ $n =$ _____

4. $\frac{m}{7} - 9 = -5$ $m =$ _____

5. $5w - 2 = -12$ $w =$ _____

6. $4a + 12 = -8$ $a =$ _____

7. $\frac{b}{3} + 8 = -7$ $b =$ _____

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Week 8

Multi-Step Equations With Fractions and Decimals

Solve $0.25x - 0.4 = 1.6$

You can clear the decimals first. Since 0.25 is the decimal with the greatest number of decimal places and $0.25 = \frac{25}{100}$, multiply each side by 100.

$0.25x - 0.4 = 1.6$	
$100(0.25x - 0.4) = 100(1.6)$	Multiply each side by 100.
$25x - 40 = 160$	Distribute and simplify.
$25x - 40 + 40 = 160 + 40$	Add 40 to each side.
$25x = 200$	Simplify.
$\frac{25x}{25} = \frac{200}{25}$	Divide each side by 25.
$x = 8$	Simplify.

Solve each equation.

1. $0.8x + 2.1 = 5.3$

$x =$ _____

2. $0.5k - 3.4 = 0.1$

$k =$ _____

3. $2.7n + 4.1 = 36.5$

$n =$ _____

4. $0.96m - 1.8m = -12.6$

$m =$ _____

5. $0.7b + 6 - 0.3b = 6.8$

$b =$ _____

6. $1.4a + 3.5a - 4.3 = 44.7$

$a =$ _____

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Week 9

Simple and Compound Interest

Find the balance in an account when $500 is deposited at 4% interest compounded semi-annually for 2 years.

The table shows the interest and balance for each half year.

Principal at Beginning of Period	Interest	Balance
$\frac{1}{2}$ year: $500		
1 year:		
$1\frac{1}{2}$ year:		
2 year:		

The balance after 2 years is $541.21.

You can also find the balance with the formula $B = p(1 + r)^n$, where B is the ending balance. The principal p is 500. The rate is for a half year; 4% annual interest equals 2% per half year. Thus r is 0.02. The number of compounding periods n is 4, because there are 4 half years in 2 years.

$B = p(1 + r)^n$

$B = 500(1 + 0.02)^4$ Substitute.

$B = \$541.22$ Use a calculator. Round to the nearest cent.

With the formula, the ending balance is $541.22. The difference is due to rounding error.

Find the ending balance when $1,500 is deposited at 6% interest compounded semi-annually for 2 years.

1. Use a table.

Principal at Beginning of Period	Interest	Balance
$\frac{1}{2}$ year: $1,500		
1 year:		
$1\frac{1}{2}$ year:		
2 year:		

2. Use the formula:
$B = p(1 + r)^n =$ _____ = _____

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Week 10

Write $\frac{7}{8}$ as a percent and 64% as a fraction in lowest terms.

Divide $7 \div 8$.

$$\begin{array}{r} 0.875 \\ 8\overline{)7.000} \\ \underline{64} \\ 60 \\ \underline{56} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

$\frac{7}{8} = 0.875$

$0.875 = 87.5\%$

Thus $\frac{7}{8} = 87.5\%$.

64% means 64 parts per 100.

$64\% = \frac{64}{100}$

$= \frac{2^6}{2^2 \cdot 5^2}$

$= \frac{16}{25}$

Thus $64\% = \frac{16}{25}$.

Write each fraction as a percent.

1. $\frac{7}{10}$ _____
2. $\frac{3}{5}$ _____
3. $\frac{11}{20}$ _____
4. $\frac{17}{25}$ _____
5. $\frac{1}{5}$ _____
6. $\frac{39}{100}$ _____
7. $\frac{1}{20}$ _____
8. $\frac{13}{50}$ _____
9. $\frac{5}{8}$ _____
10. $\frac{3}{16}$ _____

Write each percent as a fraction in simplest terms.

11. 15% _____
12. 12.5% _____
13. 76% _____
14. 14% _____
15. 60% _____
16. 97% _____
17. 25% _____
18. 30% _____
19. 82% _____
20. 68.75% _____

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