SUMMER MATH REVIEW PACKET

In preparation for 8th Grade Algebra I
(Answers are attached)

Viewpoint School Department of Mathematics asks incoming Middle School students to complete a summer review packet. By completing the attached problems, students will continue to practice concepts that they have already learned and sharpen their basic skills.

Please complete the work on separate paper and number each problem. We ask that you do not use a calculator for computation and you show all steps required to solve each problem.

The review packet is due upon your return to school in September. Your math teacher will collect your packet, along with the attached work, on the first day of your math class.

We also ask that you continue to practice your multiplication and division facts up through 144. For practice you may refer to: http://www.theteacherscafe.com/Worksheets/Math/Multiplication-Division.htm

If you have any questions, please email: hmeriwether@viewpoint.org

Name:_____

Practice 1
Numbers and Expressions

Use the **order of operations** to evaluate expressions.

Step 1 Simplify the expressions inside grouping symbols.

Step 2 Do all multiplications and/or divisions from left to right.

Step 3 Do all additions and/or subtractions from left to right.

Example 1

$6 \cdot 5 - 10 \div 2$

$6 \cdot 5 - 10 \div 2$	Multiply 6 and 5.
$= 30 - 10 \div 2$	Divide 10 by 2.
$= 30 - 5$	Subtract 5 from 30.
$= 25$	

Example 2

$4(3 + 6) + 2 \cdot 11$

$4(3 + 6) + 2 \cdot 11$	Evaluate (3 + 6).
$= 4(9) + 2 \cdot 11$	Multiply 4 and 9, and 2 and 11.
$= 36 + 22$	Add 36 and 22.
$= 58$	

Translate verbal phrases into numerical expressions.

Example 3 **Write and evaluate a numerical expression for the product of seventeen and three.**

Phrase	the product of seventeen and three
Key Word	product
Expression	$17 \cdot 3$

Exercises

Find the value of each expression.

1. $6 + 3 \cdot 9$

2. $7 + 7 \cdot 3$

3. $14 - 6 + 8$

4. $26 - 4 + 9$

5. $10 \div 5 \cdot 3$

6. $22 \div 11 \cdot 6$

7. $2(6 + 2) - 4 \cdot 3$

8. $5(6 + 1) - 3 \cdot 3$

9. $2[(13 - 4) + 2(2)]$

10. $4[(10 - 6) + 6(2)]$

11. $\frac{(67 + 13)}{(34 - 29)}$

12. $6(4 - 2) + 8$

13. $3[(2 + 7) \div 9] - 3$

14. $(8 \cdot 7) \div 14 - 1$

15. $\frac{4(18)}{2(9)}$

16. $(9 \cdot 8) - (100 \div 5)$

Write a numerical expression for each verbal phrase.

17. eleven less than twenty

18. twenty-five increased by six

19. sixty-four divided by eight

20. the product of seven and twelve

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Practice 2
Variables and Expressions

An **algebraic expression** is a combination of variables, numbers, and at least one operation. To evaluate an algebraic expression, replace the variable(s) with numbers and follow the order of operations.

Example 1 **ALGEBRA Evaluate each expression if $r = 6$ and $s = 2$.**

a. $8s - 2r$

$8s - 2r = 8 \cdot 2 - 2 \cdot 6$ Replace r with 6 and s with 2.

$= 16 - 12$ Multiply.

$= 4$ Subtract.

b. $3(r + s)$

$3(r + s) = 3(2 + 6)$ Replace r with 6 and s with 2.

$= 3 \cdot 8$ Evaluate the parentheses.

$= 24$ Multiply.

Example 2 **FOOTBALL Teams earn three points for field goals and six points for touchdowns.**

a. Assuming no other points, write an expression for a team's total points.

Words three points for field goals and six points for touchdowns

Variables Let f = number of field goals and t = number of touchdowns.

Expression $3f + 6t$

The total points for the team is $3f + 6t$.

b. Find the total score if a team scored two field goals and three touchdowns.

$3f + 6t = 3 \cdot 2 + 6 \cdot 3$ Replace f with 2 and t with 3.

$= 6 + 18$ Multiply.

$= 24$ Add.

The team scored a total of 24 points.

Exercises

ALGEBRA Evaluate each expression if $x = 10$, $y = 5$, and $z = 1$.

1. $x + y - z$
2. $\frac{x}{y}$
3. $2x + 4z$
4. $xy + z$
5. $\frac{6y}{10z}$
6. $x(2 + z)$
7. $x - 2y$
8. $\frac{(x + y)}{z}$

Translate each phrase into an algebraic expression.

9. eight inches taller than Mycala's height
10. twelve more than four times a number
11. the difference of sixty and a number
12. three times the number of tickets sold

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Practice 3
Adding Integers

Adding Integers with the Same Sign	Add their absolute values. Give the result the same sign as the integers.

Example 1 **Find the sum $-3 + (-4)$.**

$-3 + (-4) = -7$ Add $|-3|$ and $|-4|$. Both numbers are negative so the sum is negative.

Adding Integers with Different Signs	Subtract their absolute values. Give the result the same sign as the integer with the greater absolute value.

Example 2 **Find each sum.**

a. $-5 + 4$

$-5 + 4 = |-5| - |4|$ Subtract $|4|$ from $|-5|$.

$= 5 - 4$ or 1 Simplify.

$= -1$ The sum is negative because $|-5| > |4|$.

b. $6 + (-2)$

$6 + (-2) = |6| - |-2|$ Subtract $|-2|$ from $|6|$.

$= 6 - 2$ or 4 Simplify.

$= 4$ The sum is positive because $|6| > |-2|$.

Exercises

Find each sum.

1. $6 + (-3)$ **2.** $-3 + (-5)$ **3.** $7 + (-3)$

4. $-4 + (-4)$ **5.** $-8 + 5$ **6.** $-12 + (-10)$

7. $6 + (-13)$ **8.** $-14 + 4$ **9.** $6 + (-6)$

10. $-15 + (-5)$ **11.** $-9 + 8$ **12.** $20 + (-8)$

13. $-19 + (-11)$ **14.** $17 + (-9)$ **15.** $-16 + (-5)$

16. $-12 + 14$ **17.** $9 + (-25)$ **18.** $-36 + 19$

19. $7 + (-18)$ **20.** $-12 + (-15)$ **21.** $10 + (-14)$

22. $-33 + 19$ **23.** $-20 + (-5)$ **24.** $-12 + (-10)$

25. $-15 + 4$ **26.** $-34 + 29$ **27.** $46 + (-32)$

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Practice 4
Subtracting Integers

Subtracting Integers	To subtract an integer, add its additive inverse.

Example 1 **Find each difference.**

a. 9 – 17

$9 - 17 = 9 + (-17)$ To subtract 17, add −17.

$= -8$ Simplify.

b. −7 – 3

$-7 - 3 = -7 + (-3)$ To subtract 3, add −3.

$= -10$ Simplify.

Example 2 **Find each difference.**

a. 4 – (−5)

$4 - (-5) = 4 + 5$ To subtract −5, add +5.

$= 9$ Simplify.

b. −6 – (−2)

$-6 - (-2) = -6 + 2$ To subtract −2, add +2.

$= -4$ Simplify.

Exercises

Find each difference.

1. $9 - 16$

2. $7 - 19$

3. $12 - 21$

4. $-5 - 3$

5. $-8 - 9$

6. $-13 - 17$

7. $7 - (-4)$

8. $9 - (-9)$

9. $-11 - (-2)$

10. $-6 - (-9)$

11. $-6 - 4$

12. $-16 - (-20)$

13. $-14 - 4$

14. $8 - (-6)$

15. $-10 - (-6)$

16. $13 - (-17)$

17. $24 - (-16)$

18. $17 - (-9)$

19. $-24 - 8$

20. $18 - (-9)$

21. $26 - 49$

22. $-45 - (-26)$

23. $-15 - (-25)$

24. $29 - (-6)$

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Practice 5
The Distributive Property

Use the Distributive Property to write each expression as an equivalent expression. Then evaluate the expression.

1. $6(80 + 1)$ **2.** $7(70 - 4)$ **3.** $(300 + 6)4$ **4.** $(100 + 10)9$

5. $5(400 - 90)$ **6.** $-8(700 - 3)$ **7.** $4(20 - 9)$ **8.** $(100 - 3)(-7)$

9. $-1(75 - 9)$ **10.** $14(21 - 11)$ **11.** $-25(80 + 2)$ **12.** $31(450 - 18)$

Use the Distributive Property to write each expression as an equivalent algebraic expression.

13. $7(y + 11)$ **14.** $-6(t - 1)$ **15.** $-8(u - 2)$ **16.** $(r + 9)(-4)$

17. $-1(-h + 5)$ **18.** $-2(f + 3)$ **19.** $-4(b - 1)$ **20.** $1(7 - v)$

21. $-2(d - 5)$ **22.** $22(n + 10)$ **23.** $-50(z - 1)$ **24.** $-12(g + 12)$

25. $17(p + 4)$ **26.** $(k - 21)(-8)$ **27.** $(-32 - s)(-9)$ **28.** $-28(a - 5)$

29. $-20(19 - a)$ **30.** $33(d + 4)$ **31.** $-18(-q - 5)$ **32.** $-16(c + 45)$

33. $-19(v - 1)$ **34.** $-1(r + 27)$ **35.** $53(x + 11)$ **36.** $-17(-n + 1)$

37. PLANTS A planter weighs 2 pounds and holds 3 pounds of soil. Write two equivalent expressions for the total weight of nine planters. Then find the weight.

38. UNIFORMS A uniform costs $42 for the sweater and $29 for the slacks. Write two equivalent expressions for the total cost of six uniforms. Then find the cost.

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Practice 6
Simplifying Algebraic Expressions

term: a number, a variable, or a product of numbers and variables
coefficient: the numerical part of a term that also contains a variable
constant: term without a variable
like terms: terms that contain the same variables

Example 1 **Identify the terms, like terms, coefficients, and constants in the expression $4m - 5m + n - 7$.**

$4m - 5m + n - 7 = 4m + (-5m) + n + (-7)$ Definition of subtraction

$= 4m + (-5m) + 1n + (-7)$ Identity Property

terms $4m$, $-5m$, $1n$, -7; like terms: $4m$, $-5m$; coefficients: 4, -5, 1; constants: -7

When an algebraic expression has no like terms and no parentheses, we say that it is in **simplest form.**

Example 2 **Simplify $6x - 5 - 2x + 7$.**

$6x - 5 - 2x + 7 = 6x + (-5) + (-2x) + 7$ Definition of subtraction

$= 6x + (-2x) + (-5) + 7$ Commutative Property

$= [6 + (-2)]x + (-5) + 7$ Distributive Property

$= 4x + 2$ Simplify.

Exercises

Identify the terms, like terms, coefficients, and constants in each expression.

1. $2 + 6a + 4a$

2. $m + 4m + 2m + 5$

3. $3c + 4d - c + 2$

4. $5h - 3g + 2g - h$

5. $3w + 4u - 6$

6. $4r - 5s + 5s - 2r$

Simplify each expression.

7. $9m + 3m$

8. $5x - x$

9. $8y + 2y + 3y$

10. $4 + m - 3m$

11. $13a + 7a + 2a$

12. $3y + 1 + 5 + 4y$

13. $8d - 4 - d + 5$

14. $10 - 4s + 2s - 3$

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Practice 7
Solving Two-Step Equations

A two-step equation contains two operations. To solve two-step equations, use inverse operations to undo each operation in reverse order. First, undo addition/subtraction. Then, undo multiplication/division.

Example **Solve $\frac{c}{2} - 13 = 7$.**

$$\frac{c}{2} - 13 = 7$$

$$\frac{c}{2} - 13 + 13 = 7 + 13 \quad \text{Add 13 to each side.}$$

$$\frac{c}{2} = 20$$

$$\left(\frac{c}{2}\right)2 = (20)2 \quad \text{Multiply each side by 2.}$$

$$c = 40$$

Check:

$$\frac{c}{2} - 13 = 7$$

$$\frac{40}{2} - 13 = 7$$

$$20 - 13 = 7$$

$$7 = 7 \checkmark$$

The solution is 40.

For some problems, it may be necessary to combine like terms before solving.

Exercises

Solve each equation. Check your solution.

1. $5t + 2 = 7$ **2.** $2x + 5 = 9$ **3.** $6u - 8 = 28$ **4.** $8m - 7 = 17$

5. $16 = 2w + 6$ **6.** $50 = 6d + 8$ **7.** $21 = 42 + 7k$ **8.** $4a - 10 = 42$

9. $7c - 4 = -32$ **10.** $12 - 3m = 18$ **11.** $28 = 2h - 18$ **12.** $-10 = -5x - 25$

13. $\frac{m}{4} + 6 = 70$ **14.** $5 + \frac{p}{2} = 45$ **15.** $18 = \frac{g}{3} + 6$ **16.** $4 + \frac{n}{5} = 29$

17. $\frac{m}{7} - 9 = 5$ **18.** $\frac{k}{9} - 3 = -11$ **19.** $13 + \frac{a}{4} = -3$ **20.** $-3 + \frac{c}{2} = 12$

21. $\frac{v}{-3} + 8 = 22$ **22.** $8x - 16 + 8x = 16$ **23.** $12a - 14a = 8$

24. $7c - 8 - 2c = 17$ **25.** $6 = -y + 42 - 2y$ **26.** $16 + 8r - 4r + 4 = 24$

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Practice 8
Multiplying Rational Numbers

To multiply fractions, multiply the numerators and multiply the denominators. So $\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$, where $b, d \neq 0$. The fractions may be simplified either before or after multiplying.

Example **Find each product. Write in simplest form.**

a. $\frac{8}{15} \cdot \frac{5}{7}$

$\frac{8}{15} \cdot \frac{5}{7} = \frac{8}{\cancel{15}_{3}} \cdot \frac{\overset{1}{\cancel{5}}}{7}$ Divide 5 and 15 by their GCF, 5.

$= \frac{8 \cdot 1}{3 \cdot 7}$ Multiply.

$= \frac{8}{21}$ Simplify.

b. $7\frac{1}{2} \cdot 2\frac{2}{3}$

$7\frac{1}{2} \cdot 2\frac{2}{3} = \frac{15}{2} \cdot \frac{8}{3}$ Rename mixed numbers as improper fractions.

$= \frac{\overset{5}{\cancel{15}}}{\underset{1}{\cancel{2}}} \cdot \frac{\overset{4}{\cancel{8}}}{\underset{1}{\cancel{3}}}$ Divide 15 and 3 by 3, and 8 and 2 by 2.

$= \frac{5 \cdot 4}{1 \cdot 1}$ Multiply.

$= \frac{20}{1}$ or 20 Simplify.

Exercises

Find each product. Write in simplest form.

1. $\frac{1}{2} \cdot \frac{3}{5}$
2. $-\frac{8}{9} \cdot \frac{5}{16}$
3. $\frac{4}{5} \cdot \frac{5}{8}$
4. $\frac{3}{10} \cdot \left(-\frac{1}{4}\right)$
5. $\frac{7}{9} \cdot \frac{11}{20}$
6. $\frac{2}{5} \cdot (-5)$
7. $-4\frac{4}{5} \cdot 1\frac{1}{6}$
8. $1\frac{5}{7} \cdot 10\frac{1}{2}$
9. $-2\frac{1}{8} \cdot \left(-4\frac{4}{7}\right)$
10. $\frac{5x}{y} \cdot \frac{y^3}{z^2}$

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Practice 9
Dividing Rational Numbers

Two numbers whose product is 1 are called multiplicative inverses or reciprocals. For any fraction $\frac{a}{b}$, where $a, b \neq 0$, $\frac{b}{a}$ is the multiplicative inverse and $\frac{a}{b} \cdot \frac{b}{a} = 1$. This means that $\frac{2}{3}$ and $\frac{3}{2}$ are multiplicative inverses because $\frac{2}{3} \cdot \frac{3}{2} = 1$.

To divide by a fraction, multiply by its multiplicative inverse: $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$, where $b, c, d \neq 0$.

Example **Find each quotient. Write in simplest form.**

a. $\frac{3}{4} \div \frac{5}{8}$

$\frac{3}{4} \div \frac{5}{8} = \frac{3}{4} \cdot \frac{8}{5}$ Multiply by the multiplicative inverse of $\frac{5}{8}$, $\frac{8}{5}$.

$= \frac{3}{\cancel{4}_{1}} \cdot \frac{\overset{2}{\cancel{8}}}{5}$ Divide 4 and 8 by their GCF, 4.

$= \frac{6}{5}$ or $1\frac{1}{5}$ Simplify.

b. $6\frac{2}{5} \div 2\frac{1}{5}$

$6\frac{2}{5} \div 2\frac{1}{5} = \frac{32}{5} \div \frac{11}{5}$ Rename mixed numbers as improper fractions.

$= \frac{32}{5} \cdot \frac{5}{11}$ Multiply by the multiplicative inverse of $\frac{11}{5}$, $\frac{5}{11}$.

$= \frac{32}{\cancel{5}_{1}} \cdot \frac{\overset{1}{\cancel{5}}}{11}$ Divide out common factors.

$= \frac{32}{11}$ or $2\frac{10}{11}$ Simplify.

Exercises

Find each quotient. Write in simplest form.

1. $\frac{5}{16} \div \frac{5}{8}$
2. $\frac{7}{9} \div \frac{2}{3}$
3. $\frac{16}{21} \div \left(-\frac{2}{7}\right)$
4. $-\frac{4}{5} \div \frac{3}{10}$
5. $1\frac{1}{4} \div 2\frac{3}{8}$
6. $-8\frac{4}{7} \div 2\frac{1}{7}$
7. $\frac{18}{21} \div 3$
8. $-4\frac{5}{8} \div \left(-3\frac{1}{3}\right)$
9. $\frac{2x}{y} \div \frac{3}{y}$
10. $\frac{c}{4d} \div \frac{3}{8d}$
11. $\frac{4a}{b} \div \frac{2ac}{b}$
12. $\frac{m}{9} \div \frac{mn^2}{3}$

Name:_____

Practice 10
Adding and Subtracting Like Fractions

To add fractions with like denominators, add the numerators and write the sum over the denominator. So, $\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$, where $c \neq 0$.

Example 1 **Find $1\frac{2}{9} + 3\frac{4}{9}$. Write the sum in simplest form.**

$1\frac{2}{9} + 3\frac{4}{9} = (1 + 3) + \left(\frac{2}{9} + \frac{4}{9}\right)$ Add the whole numbers and fractions separately or write as improper fractions.

$= 4 + \frac{2+4}{9}$ Add the numerators

$= 4\frac{6}{9}$ or $4\frac{2}{3}$ Simplify.

To subtract fractions with like denominators, subtract the numerators and write the difference over the denominator. So, $\frac{a}{c} - \frac{b}{c} = \frac{a-b}{c}$, where $c \neq 0$.

Example 2 **Find $7\frac{1}{3} - 5\frac{2}{3}$. Write the difference in simplest form.**

$7\frac{1}{3} - 5\frac{2}{3} = \frac{22}{3} - \frac{17}{3}$ Write mixed numbers as improper fractions.

$= \frac{22-17}{3}$ Subtract the numerators.

$= \frac{5}{3}$ or $1\frac{2}{3}$ Simplify.

Exercises

Find each sum or difference. Write in simplest form.

1. $\frac{11}{12} + \frac{9}{12}$

2. $\frac{13}{15} + \frac{9}{15}$

3. $\frac{19}{20} - \frac{17}{20}$

4. $\frac{23}{25} - \frac{8}{25}$

5. $3\frac{7}{8} + \left(-4\frac{5}{8}\right)$

6. $9 + 4\frac{3}{7}$

7. $9\frac{2}{5} - 6\frac{3}{5}$

8. $4\frac{11}{12} - \left(-3\frac{7}{12}\right)$

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Practice 11
Adding and Subtracting Unlike Fractions

To add fractions with unlike denominators, rename the fractions with a common denominator. Then add and simplify.

Example 1 **Find $\frac{4}{7} + \frac{1}{3}$.**

$\frac{4}{7} + \frac{1}{3} = \frac{4}{7} \cdot \frac{3}{3} + \frac{1}{3} \cdot \frac{7}{7}$ Use 7 · 3 or 21 as the common denominator.

$= \frac{12}{21} + \frac{7}{21}$ Rename each fraction with the common denominator.

$= \frac{19}{21}$ Add the numerators.

To subtract fractions with unlike denominators, rename the fractions with a common denominator. Then subtract and simplify.

Example 2 **Find $9\frac{2}{9} - 8\frac{5}{6}$.**

$9\frac{2}{9} - 8\frac{5}{6} = \frac{83}{9} - \frac{53}{6}$ Write the mixed numbers as improper fractions.

$= \frac{83}{9} \cdot \frac{2}{2} - \frac{53}{6} \cdot \frac{3}{3}$ Rename fractions using the LCD, 18.

$= \frac{166}{18} - \frac{159}{18}$ Simplify.

$= \frac{7}{18}$ Subtract the numerators.

Exercises

Find each sum or difference. Write in simplest form.

1. $\frac{8}{9} + \frac{2}{5}$

2. $\frac{7}{15} - \frac{3}{10}$

3. $-\frac{2}{3} + \frac{1}{4}$

4. $-\frac{6}{11} - \frac{6}{11}$

5. $\frac{7}{8} + \frac{1}{4}$

6. $\frac{13}{15} - \frac{2}{5}$

7. $3\frac{1}{5} + 2\frac{3}{4}$

8. $7\frac{5}{6} + \left(-3\frac{1}{3}\right)$

9. $\frac{3}{8} - \frac{1}{12}$

10. $4\frac{3}{10} - \left(-2\frac{4}{5}\right)$

11. $6\frac{3}{4} + 3\frac{1}{2}$

12. $7\frac{4}{9} + 9\frac{1}{6}$

13. $4\frac{1}{6} - 3\frac{1}{8}$

14. $5\frac{8}{9} - \left(-2\frac{1}{3}\right)$

15. $5\frac{1}{10} - 3\frac{2}{3}$

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Practice 12
Solving Equations with Rational Numbers

To solve rational number equations, use the same skills applied to solving equations involving integers.

Example 1 **Solve $4.2 = p - 1.7$.**

$4.2 = p - 1.7$	Write the equation.
$4.2 + 1.7 = p - 1.7 + 1.7$	Add 1.7 to each side.
$5.9 = p$	Simplify.

Example 2 **Solve $y + \frac{1}{2} = \frac{8}{9}$.**

$y + \frac{1}{2} = \frac{8}{9}$	Write the equation.
$y + \frac{1}{2} - \frac{1}{2} = \frac{8}{9} - \frac{1}{2}$	Subtract $\frac{1}{2}$ from each side.
$y = \frac{8}{9} - \frac{1}{2}$	Simplify.
$y = \frac{16}{18} - \frac{9}{18}$ or $\frac{7}{18}$	Rename fractions using LCD and subtract.

Example 3 **Solve $-6z = 4.2$.**

$-6z = 4.2$	Write the equation.
$\frac{-6z}{-6} = \frac{4.2}{-6}$	Divide each side by –6.
$z = -0.7$	Simplify.

Example 4 **Solve $8 = \frac{3}{4}x$.**

$8 = \frac{3}{4}x$	Write the equation.
$\frac{4}{3}(8) = \frac{4}{3}\left(\frac{3}{4}x\right)$	Multiply each side by $\frac{4}{3}$.
$\frac{32}{3} = x$	Simplify.
$10\frac{2}{3} = x$	Simplify.

Exercises

Solve each equation. Check your solution.

1. $p + 7.4 = 9.8$
2. $a - 5.8 = -1.3$
3. $\frac{1}{3} + h = \frac{5}{6}$
4. $9v = 8.1$
5. $\frac{5}{6}q = \frac{15}{42}$
6. $1\frac{1}{2} = c - 3\frac{2}{5}$
7. $m + \frac{1}{2} = 9$
8. $\frac{7}{8}d = 56$

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Practice 13
Using Proportions

A **proportion** is an equation stating that two ratios are equal. You can use cross products to solve a proportion.

Example **Solve the proportion $\frac{14.1}{c} = \frac{3}{4}$.**

$\frac{14.1}{c} = \frac{3}{4}$

$14.1 \cdot 4 = c \cdot 3$ Cross products.

$56.4 = 3c$ Multiply.

$\frac{56.4}{3} = \frac{3c}{3}$ Divide.

$18.8 = c$

The solution is 18.8.

Exercises

ALGEBRA Solve each proportion.

1. $\frac{x}{9} = \frac{16}{12}$

2. $\frac{32}{28} = \frac{w}{7}$

3. $\frac{5}{u} = \frac{60}{132}$

4. $\frac{36}{21} = \frac{24}{s}$

5. $\frac{a}{64} = \frac{225}{480}$

6. $\frac{42}{w} = \frac{56}{8}$

7. $\frac{1}{10} = \frac{m}{12}$

8. $\frac{5}{3} = \frac{85}{h}$

9. $\frac{24}{g} = \frac{2}{30}$

10. $\frac{f}{21} = \frac{57}{63}$

11. $\frac{22}{z} = \frac{121}{16.5}$

12. $\frac{2}{3} = \frac{k}{12.6}$

13. $\frac{r}{9} = \frac{5}{20}$

14. $\frac{d}{21} = \frac{1.5}{3.5}$

15. $\frac{46}{57.5} = \frac{360}{q}$

16. $\frac{4.2}{4.8} = \frac{d}{80}$

17. $\frac{1}{c} = \frac{4.5}{11.7}$

18. $\frac{0.3}{n} = \frac{4.75}{14.25}$

19. $\frac{9.1}{14.7} = \frac{1.3}{p}$

20. $\frac{0.4}{3} = \frac{y}{98.25}$

21. $\frac{v}{33.44} = \frac{1}{3.2}$

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Practice 14
Solving Equations with Variables on Each Side

To solve equations with variables on each side, use the Addition or Subtraction Property of Equality to write an equivalent equation with the variable on one side. Then solve the equation.

Example **Solve the equation $12x - 3 = 4x + 13$. Then check your solution.**

$12x - 3 = 4x + 13$	Write the equation.
$12x - 4x - 3 = 4x - 4x + 13$	Subtract $4x$ from each side.
$8x - 3 = 13$	Simplify.
$8x - 3 + 3 = 13 + 3$	Add 3 to each side.
$8x = 16$	Simplify.
$x = 2$	Mentally divide each side by 8.

To check your solution, replace x with 2 in the original equation.

CHECK

$12x - 3 = 4x + 13$	Write the equation.
$12(2) - 3 \stackrel{?}{=} 4(2) + 13$	Replace x with 2.
$24 - 3 \stackrel{?}{=} 8 + 13$	Check to see whether the statement is true.
$21 = 21$	The statement is true.

Exercises

Solve each equation. Check your solution.

1. $2x + 1 = x + 11$

2. $a + 2 = 5 + 4a$

3. $7y + 25 = 2y$

4. $n + 11 = 2n$

5. $7 - 4c = 3c - 7$

6. $4 - 3b = 6b - 5$

7. $9d - 9 = 3d - 3$

8. $f - 4 = 6f + 26$

9. $-2s + 3 = 5s + 24$

10. $5a - 3 = 8a + 6$

11. $8n - 12 = -12n + 8$

12. $7y + 8 = -2y - 64$

13. $1 + 3x = 7x - 7$

14. $6a - 3 = 4 + 7a$

15. $3b - 1 = 14 + 2b$

16. $12c + 18 = 4 + 5c$

17. $9y + 3 = 5y - 13$

18. $3n - 2 = 5n + 12$

Name:_____

Practice 15

Solving Equations with Grouping Symbols

Equations with grouping symbols can be solved by first using the Distributive Property to remove the grouping symbols.

Example 1 **Solve the equation $2(6m - 1) = 8m$. Check your solution.**

$2(6m - 1) = 8m$	Write the equation.
$12m - 2 = 8m$	Apply the Distributive Property.
$12m - 12m - 2 = 8m - 12m$	Subtract $12m$ from each side.
$-2 = -4m$	Simplify.
$\frac{-2}{-4} = \frac{-4m}{-4}$	Divide each side by –4.
$\frac{1}{2} = m$	Simplify.

CHECK

$2(6m - 1) = 8m$	
$2\left(6\left(\frac{1}{2}\right) - 1\right) \stackrel{?}{=} 8(\frac{1}{2})$	Replace m with $\frac{1}{2}$.
$2(3 - 1) \stackrel{?}{=} 4$	Simplify.
$4 = 4\checkmark$	The solution checks.

Some equations have no solution. The solution set is the **null** or **empty set.** Other equations have every number as a solution. Such an equation is called an **identity.**

Example 2 **Solve each equation.**

a. $2(x - 1) = 4 + 2x$

$-2x - 2 = 4 + 2x$

$2x - 2x - 2 = 4 + 2x - 2x$

$-2 = 4$

The solution set is Ø.

b. $-2(x - 1) = 2 - 2x$

$-2x + 2 = 2 - 2x$

$-2x + 2 - 2 = 2 - 2 - 2x$

$-2x = -2x$

$x = x$

The solution set is all real numbers.

Exercises

Solve each equation. Check your solution.

1. $8(g - 3) = 24$ **2.** $5(x + 3) = 25$ **3.** $7(2c - 5) = 7$ **4.** $2(3d + 7) = 5 + 6d$

5. $2(s + 11) = 5(s + 2)$ **6.** $7y - 1 = 2(y + 3) - 2$ **7.** $2(f + 3) - 2 = 8 + 2f$

8. $2(x - 2) + 3 = 2x - 1$ **9.** $1 + 2(b + 6) = 5(b - 1)$ **10.** $2x - 5 = 3(x + 3)$

Name:_____

Practice 16
Solving Multi-Step Inequalities

Some inequalities require more than one step to solve. For such inequalities, undo the operations in reverse order, just as in solving multi-step equations.

Remember to reverse the inequality symbol when multiplying or dividing each side of the inequality by a negative number.

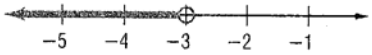
Example **Solve $12 - 2x > 24 + 2x$ and check your solution. Graph the solution on a number line.**

$12 - 2x > 24 + 2x$	Write the inequality.
$12 - 2x - 2x > 24 + 2x - 2x$	Subtract $2x$ from each side.
$12 - 4x > 24$	Simplify.
$12 - 12 - 4x > 24 - 12$	Subtract 12 from each side.
$-4x > 12$	Simplify.
$\frac{-4x}{-4} < \frac{12}{-4}$	Divide each side by –4 and reverse the symbol.
$x < -3$	Simplify.

CHECK

$12 - 2x > 24 + 2x$	Try –4, a number less than –3.
$12 - 2(-4) > 24 + 2(-4)$	Replace x with –4.
$12 + 8 > 24 - 8$	Simplify.
$20 > 16$ ✓	The solution checks.

Graph the solution $x < -3$.

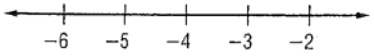


If the inequality contains parentheses, use the Distributive Property to begin simplifying the inequality.

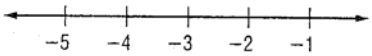
Exercises

Solve each inequality and check your solution. Graph the solution on a number line.

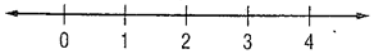
1. $5c + 9 < -11$



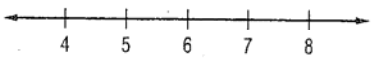
2. $8 - 4p > 20$



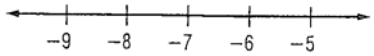
3. $c + 5 \leq 4c - 1$



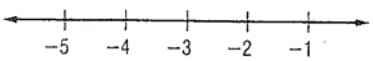
4. $18 - 2n \geq 6$



5. $3(d + 2) < -15$



6. $\frac{b}{3} + 9 > 8$



Name:_____

Practice 17

Linear Equations in Two Variables

A function can be represented with an equation. An equation such as $y = 1.50x$ is called a linear equation. A linear equation in two variables is an equation in which the variables appear in separate terms and neither variable contains an exponent other than 1.

Linear Equations $y = x + 1$, $y = -2x$, $y = \frac{1}{3}x$

Nonlinear Equations $y = x^2 + 1$, $y = -2x^3$, $y = \frac{3}{x}$, $xy = 4$

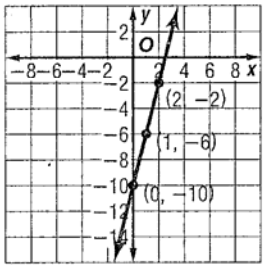
Solutions of a linear equation are ordered pairs that make the equation true. One way to find solutions is to make a table.

Example 1 **Complete the table. Use the results to write four solutions of $y = 4x - 10$. Write the solution as ordered pairs.**

x	$y = 4x - 10$	y	(x, y)
-1	$y = 4(-1) - 10$	-14	$(-1, -14)$
0	$y = 4(0) - 10$	-10	$(0, -10)$
1	$y = 4(1) - 10$	-6	$(1, -6)$
2	$y = 4(2) - 10$	-2	$(2, -2)$

Example 2 **A linear equation can also be represented by a graph. The coordinates of all points on a line are solutions to the equation. Graph $y = 4x - 10$ by plotting ordered pairs.**

Plot the points found in Example 1. Connect the points using a straight line.



Exercises

Find four solutions of each equation. Write the solutions as ordered pairs.

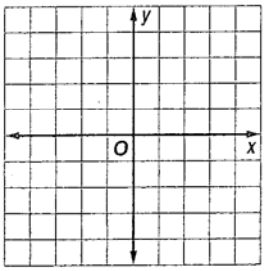
1. $y = 2x + 4$

2. $y = -3x - 7$

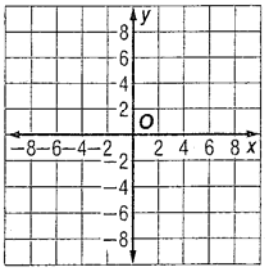
3. $4x + y = 5$

Graph each equation by plotting ordered pairs.

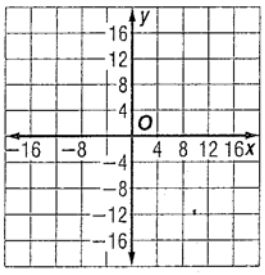
4. $y = -4x$



5. $y = x + 6$



6. $-2x + y = 8$



Name:_____

Practice 18
Graphing Linear Equations Using Intercepts

Finding Intercepts	
The x-intercept is the x-coordinate of a point where a graph crosses the x-axis. The y-coordinate of this point is 0.	To find the x-intercept, let $y = 0$ in the equation and solve for x.
The y-intercept is the y-coordinate of a point where a graph crosses the y-axis. The x-coordinate of this point is 0.	To find the y-intercept, let $x = 0$ in the equation and solve for y.

Example 1 **Find the x-intercept and the y-intercept for the graph of $2x + 5y = 10$.**

To find the x-intercept, let $y = 0$.

$2x + 5y = 10$ Write the equation.

$2x + 5(0) = 10$ Replace y with 0.

$x = 5$ Simplify.

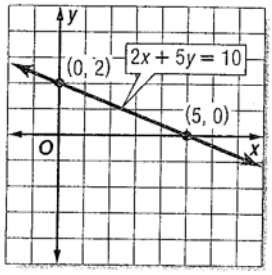
To find the y-intercept, let $x = 0$.

$2x + 5y = 10$ Write the equation.

$2(0) + 5y = 10$ Replace x with 0.

$y = 2$ Simplify.

Example 2 **Graph $2x + 5y = 10$.**



Exercises

Find the x-intercept and the y-intercept for the graph of each equation.

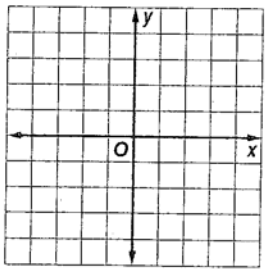
1. $y = x - 5$

2. $y - 1 = 0$

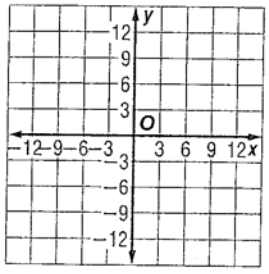
3. $3x - 2y = 12$

Graph each equation using the x- and y-intercepts.

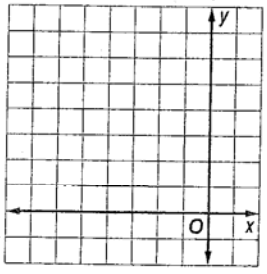
4. $y = -3x - 3$



5. $y = x + 5$



6. $y = -x + 5$



Name: _____

Practice 19
Slope

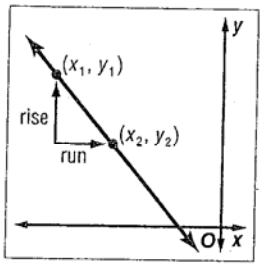
Slope describes the steepness of a line.

$\text{slope} = \frac{\text{rise}}{\text{run}}$ ← vertical change

Note that the slope is the same for any two points on a straight line.

Symbols $m = \frac{y_2 - y_1}{x_2 - x_1}$, where $x_2 \neq x_1$

Model



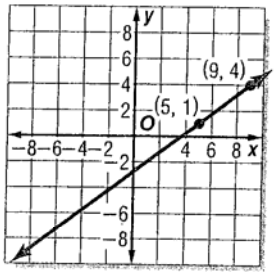
Example **Find the slope of the line.**

$m = \frac{y_2 - y_1}{x_2 - x_1}$ Definition of slope

$m = \frac{4 - 1}{9 - 5}$ $(x_1, y_1) = (5, 1)$, $(x_2, y_2) = (9, 4)$

$m = \frac{3}{4}$

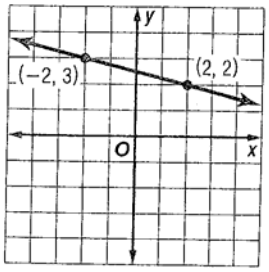
The slope is $\frac{3}{4}$.



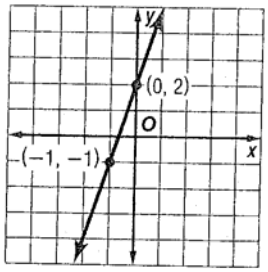
Exercises

Find the slope of each line.

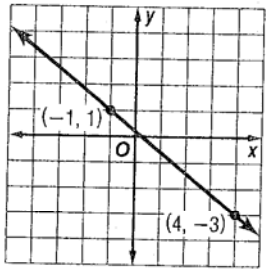
1.



2.



3.



Find the slope of the line that passes through each pair of points.

4. $A(2, 2), B(-5, 4)$

5. $L(5, 5), M(4, 2)$

6. $R(7, -4), S(7, 3)$

Name:_____

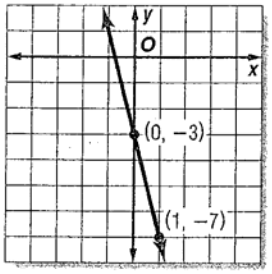
Practice 20

Slope-Intercept Form

The **slope-intercept form** of a line makes it easy to graph the line:

$y = mx + b$	**Example:** $y = 3x + 2$
slope $= m$	slope $= 3$
y-intercept $= b$	y-intercept $= 2$

Example **Graph $y = -4x - 3$ using the slope and y-intercept.**



Step 1 Find the slope and y-intercept.
slope $= -4$ y-intercept $= -3$

Step 2 Graph the y-intercept point at $(0, -3)$.

Step 3 Write the slope -4 as $\frac{-4}{1}$. Use the slope to locate a second point on the line.

$m = \frac{-4}{1}$ change in y: down 4 units; change in x: right 1 unit

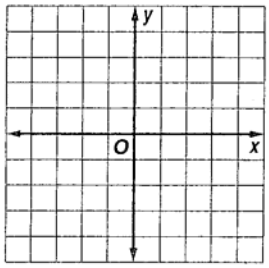
Step 4 Draw a line through the two points.

Step 5 Check by locating another point on the line and substituting the coordinates into the original equation.

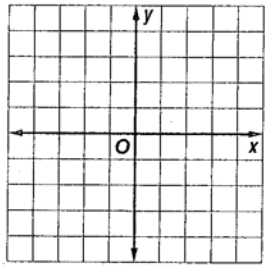
Exercises

Given the slope and y-intercept, graph each line.

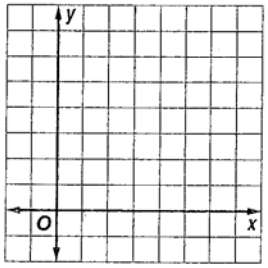
1. slope $= 4$, y-intercept $= -1$



2. slope $= 6$, y-intercept $= 4$

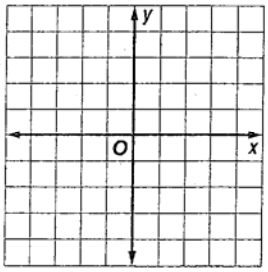


3. slope $= -\frac{1}{4}$, y-intercept $= 5$

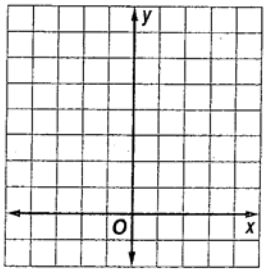


Graph each equation using the slope and y-intercept.

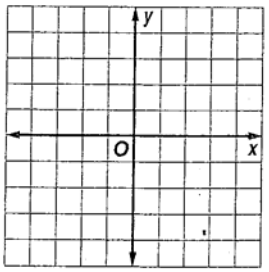
4. $y = 3x - 2$



5. $y = \frac{2}{3}x + 3$



6. $y = 5x - 3$



Answers

Practice 1:

1. 33 **2.** 28 **3.** 16 **4.** 31 **5.** 6 **6.** 12 **7.** 4 **8.** 26 **9.** 26 **10.** 64 **11.** 16 **12.** 20 **13.** 0 **14.** 3 **15.** 4 **16.** 52
17. 20-11 **18.** 25+6 **19.** 64÷8 **20.** $12 \cdot 7$

Practice 2:

1. 14 **2.** 2 **3.** 24 **4.** 51 **5.** 3 **6.** 30 **7.** 0 **8.** 15 **9.** h+8 **10.** 4n+12 **11.** 60-n **12.** 3t

Practice 3:

1. 3 **2.** -8 **3.** 4 **4.** -8 **5.** -3 **6.** -22 **7.** -7 **8.** -10 **9.** 0 **10.** -20 **11.** -1 **12.** 12 **13.** -30 **14.** 8 **15.** -21 **16.** 2
17. -16 **18.** -17 **19.** -11 **20.** -27 **21.** -4 **22.** -14 **23.** -25 **24.** -22 **25.** -11 **26.** -5 **27.** 14

Practice 4:

1. -7 **2.** -12 **3.** -9 **4.** -8 **5.** -17 **6.** -30 **7.** 11 **8.** 18 **9.** -9 **10.** 3 **11.** -10 **12.** 4 **13.** -18 **14.** 14 **15.** -4 **16.** 30
17. 40 **18.** 26 **19.** -32 **20.** 27 **21.** -23 **22.** -19 **23.** 10 **24.** 35

Practice 5:

1. 480+6;486 **2.** 490-28; 462 **3.** 1200+24; 1224 **4.** 900+90; 990 **5.** 2000-450; 1550 **6.** -5600+24; -5576
7. 80-36; 44 **8.** -700+21; -679 **9.** -75+9; -66 **10.** 294-154; 140 **11.** -2000-50; -2050 **12.** 13,950-558; 13,392
13. 7y+77 **14.** -6t+6 **15.** -8u+16 **16.** -4r-36 **17.** h-5 **18.** -2f-6 **19.** -4b+4 **20.** –v+7 **21.** -2d+10 **22.** 22n+220
23. -50z+50 **24.** -12g-144 **25.** 17p+68 **26.** -8k+168 **27.** 9s+288 **28.** -28a+140 **29.** 20a-380 **30.** 33d+132
31. 18q+90 **32.** -16c-720 **33.** -19v+19 **34.** –r-27 **35.** 53x+583 **36.** 17n-17 **37.** 9(2+3) , 9(2)+9(3); 45 pounds
38. 6(42+29) , 6(42)+6(29); $426

Practice 6:

1. 2, 6a, 4a; 6a, 4a; 6, 4; 2 **2.** m, 4m, 2m, 5; m, 4m, 2m; 1, 4, 2; 5 **3.** 3c, 4d, -c, 2; 3c, -c; 3, 4, -1; 2
4. 5h, -3g, 2g, -h; 5h, -h and -3g, 2g; 5, -3, 2, -1; none **5.** 3w, 4u, -6; none; 3, 4; -6
6. 4r, -5s, 5s, -2r; 4r, -2r and -5s, 5s; 4, -5, 5, -2; none **7.** 12m **8.** 4x **9.** 13y **10.** -2m+4 **11.** 22a **12.** 7y+6
13. 7d+1 **14.** -2s+7

Practice 7:

1. t=1 **2.** x=2 **3.** u=6 **4.** m=3 **5.** w=5 **6.** d=7 **7.** k=-3 **8.** a=13 **9.** c=-4 **10.** m=-2 **11.** h=23 **12.** x=-3
13. m=256 **14.** p=80 **15.** g=36 **16.** n=125 **17.** m=98 **18.** k=-72 **19.** a=-64 **20.** c=30 **21.** v=-42 **22.** x=2
23. a=-4 **24.** c=5 **25.** y=12 **26.** r=1

Practice 8:

1. $\frac{3}{10}$ **2.** $\frac{-5}{18}$ **3.** $\frac{1}{2}$ **4.** $\frac{-3}{40}$ **5.** $\frac{77}{180}$ **6.** -2 **7.** $-5\frac{3}{5}$ **8.** 18 **9.** $9\frac{5}{7}$ **10.** $\frac{5xy^2}{z^2}$

Practice 9:

1. $\frac{1}{2}$ **2.** $1\frac{1}{6}$ **3.** $-2\frac{2}{3}$ **4.** $-2\frac{2}{3}$ **5.** $\frac{10}{19}$ **6.** -4 **7.** $\frac{2}{7}$ **8.** $1\frac{31}{80}$ **9.** $\frac{2x}{3}$ **10.** $\frac{2c}{3}$ **11.** $\frac{2}{c}$ **12.** $\frac{1}{3n^2}$

Practice 10:

1. $1\frac{2}{3}$ **2.** $1\frac{7}{15}$ **3.** $\frac{1}{10}$ **4.** $\frac{3}{5}$ **5.** $\frac{-3}{4}$ **6.** $13\frac{3}{7}$ **7.** $2\frac{4}{5}$ **8.** $8\frac{1}{2}$

Practice 11:

1. $1\frac{13}{45}$ **2.** $\frac{1}{6}$ **3.** $\frac{-5}{12}$ **4.** $-1\frac{1}{11}$ **5.** $1\frac{1}{8}$ **6.** $\frac{7}{15}$ **7.** $5\frac{19}{20}$ **8.** $4\frac{1}{2}$ **9.** $\frac{7}{24}$ **10.** $7\frac{1}{10}$ **11.** $10\frac{1}{4}$ **12.** $16\frac{11}{18}$

13. $1\frac{1}{24}$ **14.** $8\frac{2}{9}$ **15.** $1\frac{13}{30}$

Practice 12:

1. p=2.4 **2.** a=4.5 **3.** h=$\frac{1}{2}$ **4.** v=0.9 **5.** q=$\frac{3}{7}$ **6.** c=$4\frac{9}{10}$ **7.** m=$8\frac{1}{2}$ **8.** d=64

Practice 13:

1. x=12 **2.** w=8 **3.** u=11 **4.** s=14 **5.** a=30 **6.** w=6 **7.** m=1.2 **8.** h=51 **9.** g=360 **10.** f=19 **11.** z=3 **12.** k=8.4 **13.** r=2.25 **14.** d=9 **15.** q=450 **16.** d=70 **17.** c=2.6 **18.** n=0.9 **19.** p=2.1 **20.** y=13.1 **21.** v=10.45

Practice 14:

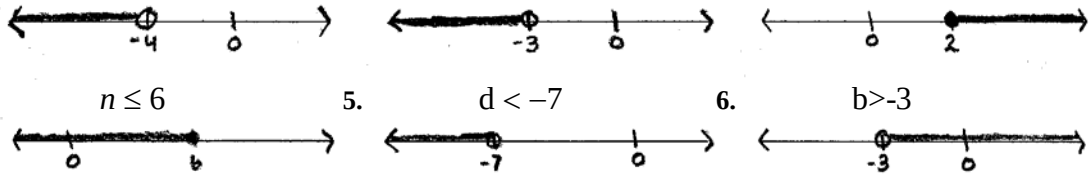
1. x=10 **2.** a=-1 **3.** y=-5 **4.** n=11 **5.** c=2 **6.** b=1 **7.** d=1 **8.** f=-6 **9.** s=-3 **10.** a=-3 **11.** n=1 **12.** y=-8 **13.** x=2 **14.** a=-7 **15.** b=15 **16.** c=-2 **17.** y=-4 **18.** n=-7

Practice 15:

1. g=6 **2.** x=2 **3.** c=3 **4.** Ø **5.** s=4 **6.** y=1 **7.** Ø **8.** all numbers **9.** b=6 **10.** x=-14

Practice 16:

1. $c < -4$ **2.** $p < -3$ **3.** $c \geq 2$

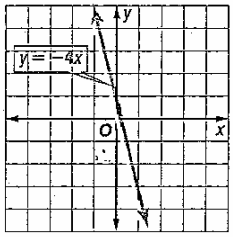


4. $n \leq 6$ **5.** $d < -7$ **6.** $b > -3$

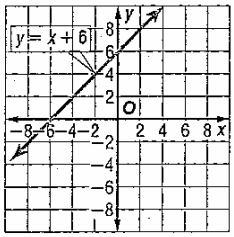
Practice 17:

1. (-1,2), (0,4), (1,6), (2,8) **2.** (-1,-4), (0,-7), (1,-10), (2,-13) **3.** (-1,9), (0,5), (1,1), (2,-3)

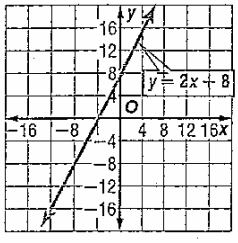
4. $y = -4x$



5. $y = x + 6$



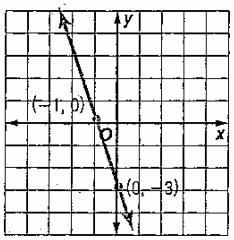
6. $-2x + y = 8$



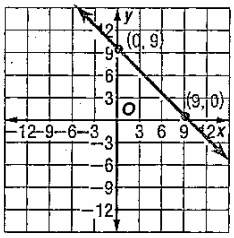
Practice 18:

1. (5,0),(0,-5) **2.** none, (0,1) **3.** (4,0), (0,-6)

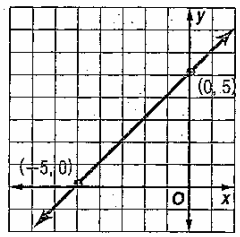
4. $y = -3x - 3$



5. $y = x + 5$



6. $y = -x + 5$



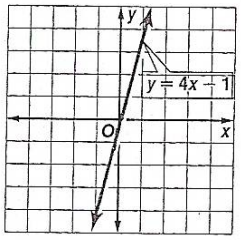
Practice 19:

1. $\frac{-1}{4}$ **2.** 3 **3.** $\frac{-4}{5}$ **4.** $\frac{-2}{7}$ **5.** 3 **6.** undefined

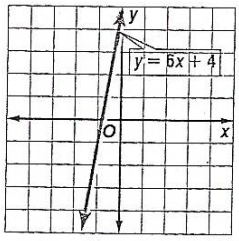
Practice 20:

Given the slope and *y*-intercept, graph each line.

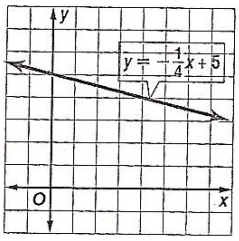
1. slope = 4, *y*-intercept = −1



2. slope = 6, *y*-intercept = 4

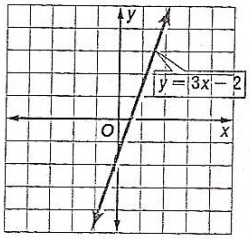


3. slope = $-\frac{1}{4}$, *y*-intercept = 5

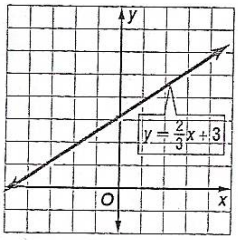


Graph each equation using the slope and *y*-intercept.

4. $y = 3x - 2$



5. $y = \frac{2}{3}x + 3$



6. $y = 5x - 3$