

TRAFTON ACADEMY



SUMMER MATH PACKET - 2026

★ FOR STUDENTS ENTERING ALGEBRA 1 ★



You've completed Pre-Algebra—now get ready to rise even higher.
Every great journey begins with one bold step—Algebra 1 is yours to conquer!



Name: _____

GREATEST COMMON FACTOR (GCF)

You will learn a lot of factoring this year. In order to factor algebraic expressions and equations, you must be able to find the Greatest Common Factor. To find the Greatest Common Factor (GCF) you will identify the lowest degree of each prime factor.

**** The number 1 is not prime, but sometimes the number 1 will be the only common factor and we say those numbers are "relatively prime" to each other. ****

Prime numbers are numbers that are only divisible by 1 and the number itself. The first set of prime numbers are:

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, ...

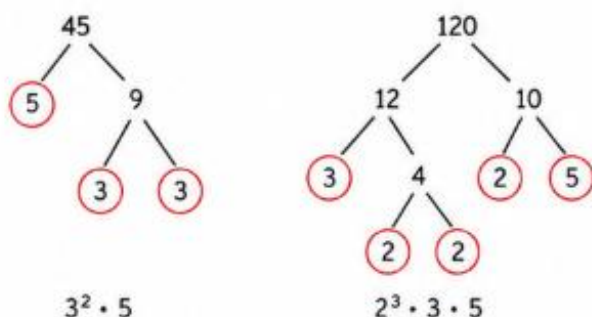
The only even prime number is 2 because it is divisible by 1 and itself. The other numbers are composite numbers. Composite numbers have 3 factors or more.

An example of a composite number is 39 which includes the factors 1, 3, 13, 39. It has four factors.

Now, let's practice writing our prime factor tree before we tackle GCF problems.

Example:

Below we break down the numbers 45 and 120.



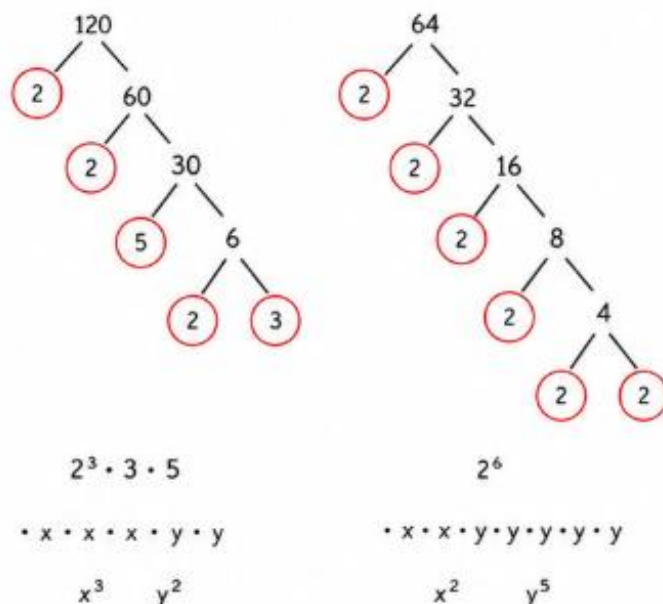
Now, to identify the GCF between 45 and 120 we will identify the lowest degree of the common factors.

- The common factors are 3 and 5.
 - Common factor of 3: there is 3^2 and 3^1 .
The lowest degree is 3^1 .
 - Common factor of 5: there is 5^1 and 5^1 .
The lowest degree is 5^1 .

The GCF is $3 \cdot 5 = 15$

Now we will find the GCF of two algebraic terms $120x^3y^2$ and $64x^2y^5$.

First, find the GCF between the coefficients of 120 and 64.



The lowest common degree of the coefficients is 2^3 or 8.

Now identify the lowest degree of each common variable.

x^3 and $x^2 \rightarrow$ the lowest degree is x^2

y^2 and $y^5 \rightarrow$ the lowest degree is y^2

The GCF is $8x^2y^2$

Find the GCF for the following.

1. $88, 124$

2. $19, 38$

3. $48, 72$

4. $90x^4, 60x^2$

5. $82x^3y^7, 44x^2y^5$

6. $38x^3y^4, 40x^4y^5$



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Factor the following expressions by GCF

1. $(10 + 30x)$

GCF is 10

$= 10(1 + 3x)$

2. $(12 + 14x)$

3. $(18 + 24x)$

4. $(44 + 55x)$

5. $(140 + 90x)$

6. $(35 + 25x)$

7. $(28 + 30x)$

8. $(124x + 40)$

9. $(49x - 7)$

10. $(16 + 40x)$

11. $(27 + 45x)$

12. $(32x + 80)$

13. $(63x - 21)$



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DISTRIBUTIVE PROPERTY

Examples:

$$\begin{array}{l} a(b + c) \\ = ab + ac \end{array}$$

$$\begin{array}{l} ab^2(b + c) \\ = ab^3 + ab^2c \end{array}$$

$$\begin{array}{l} 5(x + 6) \\ = 5x + 30 \end{array}$$

$$\begin{array}{l} 2x(3x - 4y) \\ = 6x^2 - 8xy \end{array}$$

$$\begin{array}{l} 3x^2(5x - 9) \\ = 15x^3 - 27x^2 \end{array}$$

$$\begin{array}{l} 2x(3x + 1) \\ = 6x^2 + 2x \end{array}$$

1. $5(2x + 3)$

2. $5(2x - 3)$

3. $4(5x - 7)$

4. $7(9x - 4)$

5. $4(7x - 1)$

6. $9(3x - 9)$

7. $2x(x + 3)$

8. $3x(5x + 2)$

9. $7x(2x - 12)$

FACTORING EXPRESSIONS BY GCF

Example: $(15 + 20x)$ the GCF between 15, $20x$ is 5

Factoring $(15 + 20x)$ by GCF means we divide each term inside the expression by the GCF which is 5.

$$\begin{array}{l} (15 + 20x) \\ 5(3 + 4x) \end{array}$$

You can check the expression by distributing the 5 to make sure you return to the original expression.

Another example: factor $(34x + 26x^3)$ by GCF

the GCF for $34x$, $26x^3$ is **2x**

$(34x + 26x^3)$ factored by GCF becomes

$$2x(17 + 13x^2)$$

Check: $2x(17 + 13x^2) = 34x + 26x^3$

Example: $2x(3x + 1)$
 $= 6x^2 + 2x$

You can check the expression by distributing the 2x to make sure you return to the original expression.



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EXAMPLES:

Two Numbers:

$$-4 - 1 \rightarrow$$

$$-4 + (-1) = -5$$

More Than Two:

$$6 - 1 - (-3) \rightarrow$$

$$6 + (-1) + 3 = 8$$

Find each difference.

1. $39 - 18$	2. $65 - 72$
3. $-85 - (-42)$	4. $-15 - (-86)$
5. $-21 - 24$	6. $-15 - (-57)$
7. $652 - (-57)$	8. $346 - 865$
9. $-8 - (-4) - (-6)$	10. $90 - (-26) - (-48)$
11. $-125 - 37 - (-68)$	12. $728 - (-314) - 259$
13. $-64 - (-128) - 37 + 19$	14. $415 - 263 - (-87) - 136$
15. $-245 - (-67) + 38 - 112$	16. $987 - (-456) - 321 + (-78)$



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Find each product/quotient.

1. $-8(6)$	2. $-10 \cdot -10$
3. $-24 \div 8$	4. $\frac{-21}{7}$
5. $-14(-4)$	6. $-96 \div -4$
7. $\frac{48}{16}$	8. $-15 \div -15$
9. $5(11)(-3)$	10. $10(-8)(-2)$
11. $-120 \div 5(-6)$	12. $\frac{-45}{3(-5)}$



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EXAMPLES:

$$\frac{-2}{3} + \frac{5}{9} = \frac{-6}{9} + \frac{5}{9} = \frac{-1}{9}$$

$$-2\frac{3}{5} - 5\frac{4}{9} = -2\frac{27}{45} + -5\frac{20}{45} = -7\frac{47}{45} = -8\frac{2}{45}$$

$$43.29 + 3.127$$

$$\begin{array}{r} 43.290 \\ + 3.127 \\ \hline 46.417 \end{array}$$

Find each sum or difference.

1. $8\frac{5}{12} - 2\frac{7}{12}$	2. $\frac{14}{21} + \frac{-2}{7}$
3. $\frac{5}{8} - \frac{2}{3}$	4. $-1\frac{3}{4} + \frac{-3}{16}$
5. $\frac{4}{7} + \frac{-2}{7}$	6. $\frac{14}{25} + \frac{2}{5}$
7. $85.3 - 37.07$	8. $27 + 5.19$
9. $-34.1 + (-17.63)$	10. $-18.21 - (-7.3)$
11. $3\frac{2}{3} + 2\frac{5}{6}$	12. $5\frac{7}{8} - 3\frac{5}{12}$
13. $-2\frac{1}{5} + 1\frac{7}{10}$	14. $-4\frac{3}{4} - 2\frac{5}{6}$



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EXAMPLES:

Evaluate the expression $4xy$, if $x = -5$ and $y = -6$.

$$4xy \rightarrow 4(-5)(-6) \rightarrow 120$$

Evaluate each expression.

1. Evaluate $3x$ when $x = -6$.	2. Evaluate $-8x$ when $x = -5$.
3. Evaluate $0 \div y$ when $y = -12$.	4. Evaluate $\frac{x}{4}$ when $x = -8$.
5. Evaluate $\frac{-144}{y}$ when $y = -12$.	6. Evaluate $-2(x + y)$ when $x = -1$ and $y = 4$.
7. Evaluate $3(y + x)$ when $x = 6$ and $y = 1$.	8. Evaluate $(a + c) - b$ when $a = 0.4$, $b = 3.5$, and $c = 15.61$.
9. Evaluate $c - d - a$ when $a = 0.4$, $c = 15.61$, and $d = 0.03$.	10. Evaluate $x + y$ when $x = \frac{3}{8}$ and $y = \frac{3}{4}$.
11. Evaluate $5m - 2n$ when $m = -3.2$ and $n = 1.7$.	12. Evaluate $\frac{2p + q}{4}$ when $p = -6$ and $q = 10$.
13. Evaluate $-3(a - b) + 2$ when $a = 5$ and $b = -4$.	14. Evaluate $\frac{3r - 2s}{r + s}$ when $r = 6$ and $s = -2$.
15. Evaluate $2x^2 - 3x + 1$ when $x = -4$.	16. Evaluate $\frac{m^2 - n^2}{m - n}$ when $m = 7$ and $n = 2$.



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EXAMPLES:

"Seven less than some number" "Thirteen dollars plus the cost of food"
 Let n = some number $\rightarrow n - 7$ Let f = cost of food $\rightarrow 13 + f$

Identify the variable. Then, translate into an expression.

1. A number more than seven	2. The product of some number and six
3. Some number decreased by twelve	4. The quotient of ninety and a number
5. Eight less than some number	6. Twice the number
7. Half of some number	8. Seventeen more than a number
9. Brian is triple his nephew's age	10. Maria ran $4\frac{1}{2}$ miles more than Amy
11. The difference of a number and five	12. Three times a number increased by ten
13. The sum of a number and sixteen	14. Six less than half of a number



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Examples:

$$2x - 10 = 12$$

$$\begin{array}{r} + 10 \quad + 10 \\ \hline \end{array}$$

$$2x = 22$$

$$\div 2 \quad \div 2$$

$$x = 11$$

$$7x + 9 = -12$$

$$\begin{array}{r} - 9 \quad - 9 \\ \hline \end{array}$$

$$7x = -21$$

$$\div 7 \quad \div 7$$

$$x = -3$$

$$-3x + 4 = 19$$

$$\begin{array}{r} - 4 \quad - 4 \\ \hline \end{array}$$

$$-3x = 15$$

$$\div -3 \quad \div -3$$

$$x = -5$$

$$\frac{x}{3} + 7 = 10$$

$$\begin{array}{r} - 7 \quad - 7 \\ \hline \end{array}$$

$$\frac{x}{3} = 3$$

$$\bullet 3 \quad \bullet 3$$

$$x = 9$$

Solve and check. Show all of your work.

1. $6m + 1 = -23$

2. $5 + 4d = 37$

3. $3 - 7y = -25$

4. $6 - 5b = -14$

5. $\frac{11}{12}e + 25 = 47$

6. $15 - \frac{1}{7}w = -3$

7. $8(x + 3) = 72$

8. $-7(z - 6) = -70$

9. $-0.6(r + 0.2) = 1.8$

10. $\frac{-2}{3}(w - \frac{4}{9}) = -\frac{4}{5}$



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Example:

A number increased by 6 is 24.

Let x = the number

$$x + 6 = 24$$

Five less than a number times three is -25

Let x = the number

$$3x - 5 = -25$$

Identify the variable. Translate into an equation.

1. Twice a number decreased by 7 is 19.

2. Six times a number increased by 8 is -84.

3. Four minus one-fifth a number is -6.

4. Eight plus two-thirds a number is 12.

5. A company charges \$2 for each balloon in an arrangement and a \$3 delivery fee. You have \$9 to spend. Write an equation for this situation.

6. It costs \$7.50 to enter a petting zoo. Each cup of food to feed the animals is \$2.50. If you have \$12.50, how many cups can you buy?

7. Jamal and two cousins received the same amount of money to go to a movie. Each boy spent \$15. Afterward, the boys had \$30 altogether. How much money did each boy receive?

8. Mr. Singh had three sheets of stickers. He gave 20 stickers from each sheet to his students and has 12 total stickers left. How many stickers were originally on each sheet?

Let x = the number of stickers on each sheet.

Three sheets: $3x$

He gave away 20 from each sheet (3 sheets): - 60

Leftover: 12

Equation: $3x - 60 = 12$

$$3x - 60 = 12$$

$$+ 60 \quad + 60$$

$$3x = 72$$

$$\div 3 \quad \div 3$$

$$x = 24$$

Each sheet originally had 24 stickers.

Check:

$$3x - 60 = 12$$

$$3(24) - 60 = 12$$

$$72 - 60 = 12$$

$$12 = 12 \quad \checkmark$$



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To solve and graph inequalities:

1. **Isolate** the variable by using inverse operations.

2. **Graph** the solution on the number line.

- A closed circle is used when the point is included. ($\leq$, $\geq$)

- An open circle is used when the point is not included. ($<$, $>$)

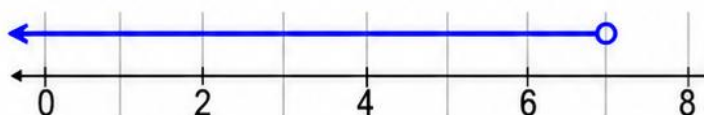
Example:

$$x + 9 < 16$$

$$\begin{array}{r} -9 \quad -9 \\ \hline \end{array}$$

$$x < 7$$

Since x is less than 7, shade all values that are less than 7. Use an open circle.



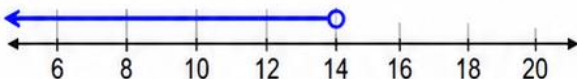
Solve and graph each inequality:

1. $x - 4 < 10$

$$x - 4 < 10$$

$$\begin{array}{r} +4 \quad +4 \\ \hline \end{array}$$

$$x < 14$$



2. $x + 9 > 12$



3. $4x \leq 2.4$



4. $0.7x \geq 56$



5. $\frac{x}{4} \leq 8$



6. $\frac{x}{9} \geq 1.5$





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Geometry

Area of square: s^2

Area of trapezoid: $\frac{b+b_2}{2} \cdot h$

perimeter: add all sides

Area of rectangle: $b \cdot h$

Area of circle: $\pi \cdot r^2$

circumference: $2 \cdot \pi \cdot r$ or $\pi \cdot d$

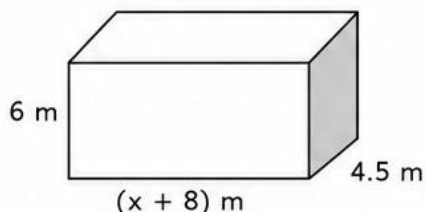
Area of parallelogram: $b \cdot h$

Area of triangle: $\frac{b \cdot h}{2}$

Volume of prism: Area of base $\cdot h$

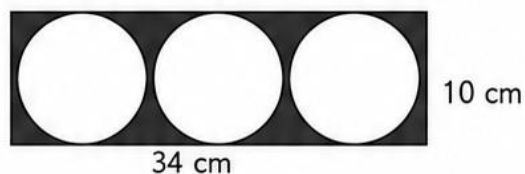
Solve. Show all work!

1. Find the volume of a rectangular prism if $x = 2.5$ m



$$\begin{aligned} V &= l \cdot w \cdot h \\ V &= (x + 8)(4.5)(6) \\ V &= (2.5 + 8)(4.5)(6) \\ V &= (10.5)(4.5)(6) \\ V &= 47.25(6) \\ V &= 283.5 \text{ m}^3 \end{aligned}$$

2. Find the area of the shaded region.



hint: Find the area of rectangle and 3 circles

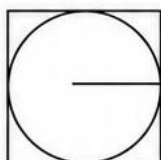
3. Find the area of a triangle whose base is 7.5 cm and whose height is 3.7cm. Round to the nearest tenth.

4. Find the volume of a cube whose side is 14 meters.

5. Find the circumference of a circle whose radius is 2.75 feet. Round to the nearest tenth

6. Find the area of a square whose side is $5\frac{2}{3}$ m.

7. Find the area of the square given a radius of 5 cm.



8. Find the perimeter of a square with a side of $3\frac{1}{9}$ in.



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Percents

Setting Up:

1. Set up a **proportion** $\frac{\%}{100} = \frac{\text{part(is)}}{\text{whole(of)}}$
2. Labels must match vertically or horizontally.

Solve:

1. Solve by cross multiplying.

Sydney completed 3 out of her 5 skill sheets, what percent did she complete?

$$\frac{3\text{completed}}{5\text{total}} = \frac{\% \text{completed}}{100\text{total}}$$

Solve. Show All Work!

1. Express 30% as a fraction in simplest form.	2. Express $18\frac{4}{5}\%$ as a decimal.
3. If 125% of a number is 20, what is the number? $\frac{125}{100} \times n = 20$ $1.25n = 20$ $n = 20 \div 1.25$ $n = 16$ The number is 16.	4. $33\frac{1}{3}\%$ of 150 is what number?
5. What percent of 52 is 6.24?	6. A bike that is originally \$240 is on sale for 20% off. What is the sales price?
7. In your class, there are 8 girls and 14 boys. What percent of your class is girls?	8. 272 out of 320 students in your school were surveyed about their favorite soda. What percent of the school population was surveyed?
9. Diane's allowance is \$20 per week. She saves 30% of her allowance. How much does she save each week?	10. Your Dad bought a concert ticket for \$126. He said that you have to pay 75% of the cost of the ticket. How much did you have to give your Dad?



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Percents

Setting Up:

1. Set up a **proportion** $\frac{\%}{100} = \frac{\text{part(is)}}{\text{whole(of)}}$
2. Labels must match vertically or horizontally.

Solve:

1. Solve by cross multiplying.

Sydney completed 3 out of her 5 skill sheets, what percent did she complete?

$$\frac{3\text{completed}}{5\text{total}} = \frac{\% \text{completed}}{100\text{total}}$$

Solve. Show All Work!

1. Express 30% as a fraction in simplest form.	2. Express $18\frac{4}{5}\%$ as a decimal.
3. If 125% of a number is 20, what is the number? $\frac{\%}{100} = \frac{\text{is}}{\text{of}}$ $\frac{125}{100} = \frac{20}{n}$ $125n = 2000$ $n = \frac{2000}{125}$ $n = 16$ The number is 16.	4. $33\frac{1}{3}\%$ of 150 is what number?
5. What percent of 52 is 6.24?	6. A bike that is originally \$240 is on sale for 20% off. What is the sales price?
7. In your class, there are 8 girls and 14 boys. What percent of your class is girls?	8. 272 out of 320 students in your school were surveyed about their favorite soda. What percent of the school population was surveyed?
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Section 8: Graphing in the Coordinate Plane

When locating points on a coordinate plane, we use a pair of values called coordinates to tell us where to place the point. The coordinates are written this way: (x, y) where the x -value tells us how many spaces horizontally to travel away from the origin and the y -value tells us how many spaces vertically to travel away from the origin. The coordinates $A(-3, 5)$ mean to go 3 spaces left of the origin and then 5 spaces up. Mark the point and call it A.

Cartesian X-Y coordinate system (2 Dimensions)

1. Graph the following points on the coordinate grid provided. Mark each point with the letter given.

A(-2, 3)

B(5, -7)

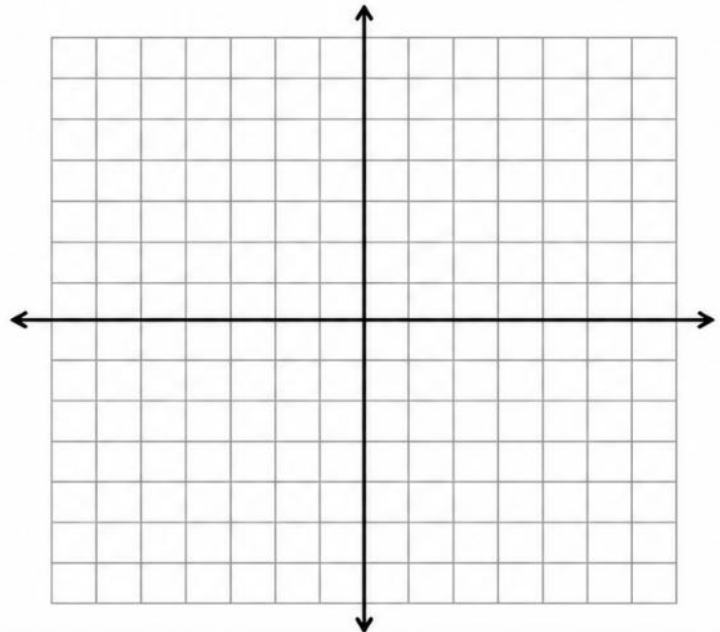
C(0, 4)

D(1, 6)

E(-4, -5)

F(-1, 0)

G(3, -3)





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Multiply and Divide Mixed Numbers

Hints/Guide:

To multiply mixed numbers, we can first convert the mixed numbers into improper fractions. This is done by multiplying the denominator by the whole number part of the mixed number and then adding the numerator to this product. This sum is the numerator of the improper fraction. The denominator of the improper fraction is the same as the denominator of the mixed number.

For example: $3\frac{2}{5}$ leads to $3 \cdot 5 + 2 = 17$, so $3\frac{2}{5} = \frac{17}{5}$.

Once the mixed numbers are converted into improper fractions, we multiply and simplify just as with regular fractions. For example: $5\frac{1}{5} \cdot 3\frac{1}{2} = \frac{26}{5} \cdot \frac{7}{2} = \frac{182}{10} = \frac{91}{5} = 18\frac{1}{5}$

To divide mixed numbers, we must convert to improper fractions then multiply by the reciprocal of the second fraction and simplify. For example: $2\frac{1}{2} \div 3\frac{1}{3} = \frac{5}{2} \cdot \frac{3}{10} = \frac{15}{20} = \frac{3}{4}$

Exercises: Solve in lowest terms.

No Calculators!

SHOW ALL WORK. Use a separate sheet of paper (if needed) and staple to this page.

1. $6\frac{2}{3} \cdot 7\frac{3}{7} =$

2. $3\frac{1}{3} \cdot 6\frac{4}{5} =$

3. $7\frac{1}{8} \cdot 6 =$

4. $4\frac{1}{4} \div \frac{5}{7} =$

5. $3\frac{2}{3} \div 4\frac{3}{7} =$

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

7. $6\frac{1}{5} \cdot 8\frac{2}{5} =$

8. $8\frac{2}{7} \cdot 7\frac{8}{9} =$

9. $6\frac{4}{7} + 3\frac{3}{5} =$



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Equations - Variables on Each Side

Hints/Guide:

As we know, the key in equation solving is to isolate the variable. In equations with variables on each side of the equation, we must combine the variables first by adding or subtracting the amount of one variable on each side of the equation to have a variable term on one side of the equation. Then, we must undo the addition and subtraction, then multiplication and division. Remember the golden rule of equation solving. Examples:

$$\begin{array}{rcl}
 8x - 6 & = & 4x + 5 \\
 - 4x & & - 4x \\
 \hline
 4x - 6 & = & 5 \\
 + 6 & & + 6 \\
 \hline
 4x & = & 11 \\
 4 & & 4 \\
 \hline
 x & = & 2\frac{3}{4}
 \end{array}$$

$$\begin{array}{rcl}
 5 - 6t & = & 24 + 4t \\
 + 6t & & + 6t \\
 \hline
 5 & = & 24 + 10t \\
 - 24 & & - 24 \\
 \hline
 -19 & = & 10t \\
 10 & & 10 \\
 \hline
 -1\frac{9}{10} & = & t
 \end{array}$$

Exercises: Solve the following problems:

No Calculators!

SHOW ALL WORK. Use a separate sheet of paper (if necessary) and staple to this page.

$$\begin{array}{rcl}
 1. \quad 4r - 7 & = & 8r + 13 \\
 - 4r & & - 4r \\
 \hline
 -7 & = & 4r + 13 \\
 -13 & & -13 \\
 \hline
 -20 & = & 4r \\
 4 & & 4 \\
 \hline
 r & = & -5
 \end{array}$$

$$2. \quad 14 + 3t = 5t - 12$$

$$3. \quad 4x + 5 = 3x - 3$$

$$4. \quad 6y + 5 = 4y - 13$$

$$5. \quad 5x - 8 = 6 - 2x$$

$$6. \quad 7p - 8 = -4p + 6$$



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Evaluating Expressions and Formulas

To evaluate an expression, first replace the variable by a given value. Then simplify the resulting numerical expression.

Evaluate the expression when $x = -2$ and $y = 5$.

$$\begin{aligned} 1. \quad x + y \\ = (-2) + 5 \\ = 3 \end{aligned}$$

$$2. \quad x^2 + y^3$$

$$3. \quad 2x - y$$

$$4. \quad -2(y - 2x)$$

$$5. \quad \frac{3x-y}{11}$$

$$6. \quad \frac{x}{3-y}$$

Properties of Operations

Commutative Property of Addition:

$$a + b = b + a$$

Commutative Property of Multiplication:

$$a \times b = b \times a$$

Associative Property of Addition:

$$(a + b) + c = a + (b + c)$$

Associative Property of Multiplication:

$$(a \times b) \times c = a \times (b \times c)$$

Identity Property of Addition:

$$a + 0 = a$$

Identity Property of Multiplication:

$$a \times 1 = a$$

Name the property illustrated by each expression.

$$1. \quad 8 \times 12 = 12 \times 8$$

$$2. \quad 3 \times (2 \times 5) = (3 \times 2) \times 5$$

$$3. \quad 2 + 5 + 12 = 5 + 2 + 12$$

$$4. \quad xy + 0 = xy$$

$$5. \quad 1x = x$$

$$6. \quad 5 + 7 = 7 + 5$$

$$7. \quad 3 + (4 + 5) = 3 + (5 + 4)$$

$$8. \quad 3xy = 3xy(1)$$

$$9. \quad (4 + 8) + 5 = 4 + (8 + 5)$$

$$10. \quad 5 \times 6 \times 8 = 8 \times 5 \times 6$$