



LOGIC SUMMER MATH

Summer math review in the Logic School is intended to keep our students thinking about basic concepts, a fresh memory, and continue building the foundation for returning to the classroom in August. Packets are due on the first day of school. Completion of these worksheets will constitute the first quiz grade of the quarter. While accuracy should be the pursuit, grading is not done on correct answers but rather work shown in the boxes and answers checked with the included answer key. All work must be shown, and no calculators are to be used.



ORDER OF OPERATIONS

- Parenthesis
- Exponents
- Multiplication / Division*
- Addition / Subtraction*

**In the order that it appears*

$$5 \times (4 \times 6 - 4^2)$$

$$5 \times (4 \times 6 - 16)$$

$$5 \times (24 - 16)$$

$$5 \times (8)$$

$$40$$

1. $(4 - 2) \times 4 \times 5$

2. $5 + (3 + 3)^2$

3. $3 \times 3 - 4 \div 2$

4. $16 \div (5 - 3)^2$

5. $3 \times 4 \div 2^2$

6. $(8 - 4) \div (2 + 2)$

7. $6^2 - (5 + 2 - 3)$	8. $3 \div (2^2 - 1^3)$
9. $(16 - 1) \div 3 \times 3 + (4 \div 2)^3$	10. $4 \div (5 - (4 - 1)) + 3^2 + 6$
11. $1 + 14 \div 7 + (6 + 2)^2$	12. $((24 \div 6)^2 - (6 + 5)) \times 3$
13. $(21 \times 3) \div (9 - (2^2 - 2))$	14. $28 \div (5 - (9 - 8)) + 3^2$

EVALUATING EXPRESSIONS

- Substitute the value of the variable, in place of the variable.

- Use the order of operations to evaluate.

$$x^2 + z \div 3; \text{ when } x = 1 \text{ and } z = 3$$

$$(1)^2 + 3 \div 3$$

$$1 + 3 \div 3$$

$$1 + 1$$

$$2$$

1. $h + 3i$; when $h = 1$ and $j = 5$

2. $y - (x - 2)$; when $x = 4$ and $y = 6$

3. $a + b + a$; when $a = 3$ and $p = 2$

4. $y + x \div 5$; when $x = 5$ and $y = 1$

5. $m^2 + p^2$; when $m = 6$ and $p = 2$

6. $b + b + a \div 4$; when $a = 4$ and $b = 3$

7. $nm + n - 2$; when $m = 6$ and $n = 3$	8. $y^2 + 2 - x$; when $x = 1$ and $y = 6$
9. $h + j^2 - 3$; when $h = 4$ and $j = 3$	10. $(5 - z)(y + 6)$; when $y = 1$ and $z = 2$
11. $h + jh^2$; when $h = 3$ and $j = 6$	12. $(yx)^2 \div 6$; when $x = 6$ and $y = 2$
13. $m + 3 + n^2$; when $m = 1$ and $n = 6$	14. $3m(5 + p)$; when $m = 2$ and $p = 1$

Adding and Subtracting Integers

Adding Integers:

Same sign: Add and keep the sign.

Example: $(-4) + (-5) = (-9)$

Different Signs: Subtract and keep sign of the larger number.

Example: $(-6) + 8 = 2$

Subtracting Integers:

Instead of "subtracting", add the opposite. Then use the addition rules.

Examples:

$(-5) - 9$ becomes $(-5) + (-9)$

$10 - (-7)$ becomes $10 + 7$

$(-3) - (-6)$ becomes $(-3) + 6$

1. $(-6) + 1$

2. $2 + (-3)$

3. $7 - (-6)$

4. $(-8) + 6$

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

6. $(-7) - 4$

7. $1 - (-6) - 5$	8. $(-4) - 8 + (-7)$
9. $(-6) + 6 - (-8)$	10. $(-8) - (-6) - 8$
11. $6 - (-8) + (-5)$	12. $(-8) - (-8) - (-5)$
13. $(-6) - (-1) + (-8) + (-7)$	14. $(-5) + 8 + (-6) + (-1)$

MULTIPLYING and DIVIDING integers

Same signs = POSITIVE

Different Signs = NEGATIVE

THAT'S IT 😊

EXAMPLES:

$$(-4)(-5) = 20$$

$$(3)(-6) = -18$$

$$(-2)(-7) = 14$$

$$(-8)(10) = -80$$

1. $(-8)(-8)$

2. $(-7)(8)$

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


4. $(5)(-4)$

5. $(-6)(-1)(2)$

6. $(2)(-3)(4)$

7. $-30 \div 3$	8. $-56 \div -8$
9. $49 \div -7$	10. $-36 \div -6$
11. $-14 \div 7$	12. $-45 \div -9$
13. $(-15) \div (3)(-2)$	14. $(-4)(3) \div ((-6)(-1))$

DISTRIBUTIVE PROPERTY


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

Examples:

1. $3(x+5) = 3x+15$

2. $-5(2m-10) = -10m+50$

1. $2(3p - 5)$	2. $-5(3r + 6)$
3. $3(-2s - 9)$	4. $7(2x - 11)$
5. $-4(-4y + 8)$	6. $6(3k - 10)$
7. $-3(12m - 4)$	8. $10(-9f - 5)$
9. $6(-2x + 6y)$	10. $-7(11a - 2b)$

Combining Like Terms

Add terms that have the same variable, and same exponent. Add constants together.

$$\begin{array}{c} 3x + 5 - 9x - 2 \\ \boxed{3x} + \boxed{5} - \boxed{9x} - \boxed{2} \\ -6x + 3 \end{array}$$

1. $-5n - 5 - n + 6$	2. $a - 5 - 4 + 5a$
3. $1 + 3n - n + 5$	4. $k + 8 + 3k + 3$
5. $-6 + 5x + x - 5$	6. $a - 6 - 9a + 1$
7. $-4x - 10(x + 6)$	8. $2(1 - 5a) - 10a$
9. $-10a + 2(a - 8)$	10. $10(x + 1) - 4(2 - 3x)$

One-Step Equations

Do the inverse (opposite) of whatever operation is being performed to the variable, on both sides. Get the variable by itself.

$$\begin{array}{r} x + 4 = 11 \\ -4 \quad -4 \end{array}$$

$$x = 7$$

1. $n - 2 = -16$	2. $90 = -15m$
3. $-13 + x = 7$	4. $13 = n - 1$
5. $n - 20 = -30$	6. $-60 = -10n$
7. $11 + x = -9$	8. $-15 = \frac{r}{4}$
9. $\frac{x}{3} = 14$	10. $24 = 5 + v$

TWO-STEP EQUATIONS

Get the variable by itself.

Example:

1) Using an inverse operation, get rid of the number NOT connected to the variable using addition or subtraction.

$$\begin{array}{r} 3x - 4 = 11 \\ +4 \quad +4 \end{array}$$

2) Using an inverse operation, get rid of the number connected to the variable using multiplication or division.

$$\frac{3x}{3} = \frac{15}{3}$$

$$x = 5$$

1. $3v + 3 = -12$

2. $13 = \frac{x}{2} + 4$

3. $-9 + \frac{r}{8} = -8$

4. $-3 - 3n = -42$

5. $\frac{k-6}{3} = 2$	6. $2 + \frac{p}{5} = -1$
7. $5 + 4n = 85$	8. $-88 = 8x + 8$
9. $\frac{n+4}{3} = -5$	10. $12 = 5 + \frac{x}{2}$
11. $57 = 8 - 7x$	12. $9 + \frac{n}{9} = 10$

PROPORTIONS

1) Cross multiply

2) Divide to isolate the variable.

3) Reduce answer to simplest form.

Example:

$$\frac{4}{7} = \frac{2}{x}$$

$$4x = 14$$

$$x = \frac{14}{4} = \frac{7}{2}$$

1. $\frac{2}{5} = \frac{m}{6}$

2. $\frac{n}{7} = \frac{6}{10}$

3. $\frac{9}{10} = \frac{n}{2}$

4. $\frac{2}{10} = \frac{10}{k}$

5. $\frac{5x}{2} = \frac{9}{10}$

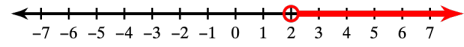
6. $\frac{n}{9} = \frac{2}{7}$

7. $\frac{p}{3} = \frac{2}{7}$	8. $\frac{4}{3} = \frac{x}{6}$
9. $\frac{5}{k} = \frac{6}{4}$	10. $\frac{10}{5} = \frac{9}{n}$
11. $\frac{r}{10} = \frac{5}{8}$	12. $\frac{6x}{5} = \frac{6}{3}$
13. $\frac{3}{v+7} = \frac{6}{5}$	14. $\frac{9}{2} = \frac{a-5}{3}$

Graphing Inequalities

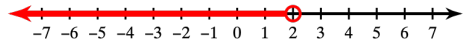
$>$ "Greater Than"

$x > 2$



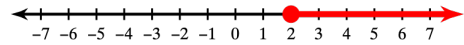
$<$ "Less Than"

$x < 2$



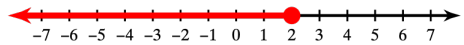
\geq "Greater Than or Equal To"

$x \geq 2$

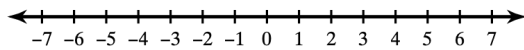


\leq "Less Than or Equal To"

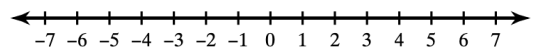
$x \leq 2$



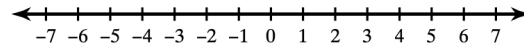
1. $x > -2$



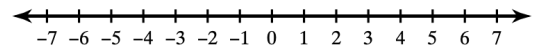
2. $n > 3$



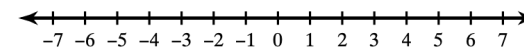
3. $r < -3$



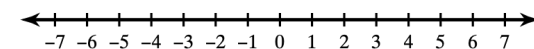
4. $n \geq 1$



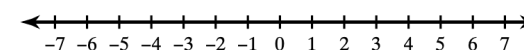
5. $x < 4$



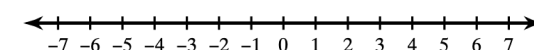
6. $k \geq 5$



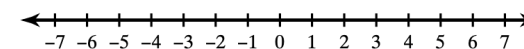
7. $n > -4$



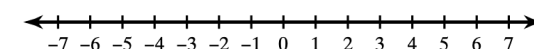
8. $x > 1$



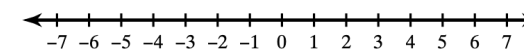
9. $n < -5$



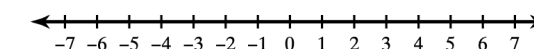
10. $n > 6$



11. $x \geq -6$



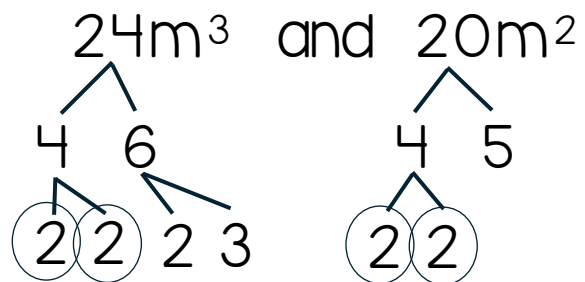
12. $n \geq -3$



Greatest Common Factor

- Identify the largest common factor in both coefficients. You can make a factor tree if needed.

- Identify which variables they have in common and the largest exponent that they BOTH have.



$$\text{GFC: } 4m^2$$

1. $18u, 20u$

2. $28x, 21y^2$

3. $27n^2, 15n$

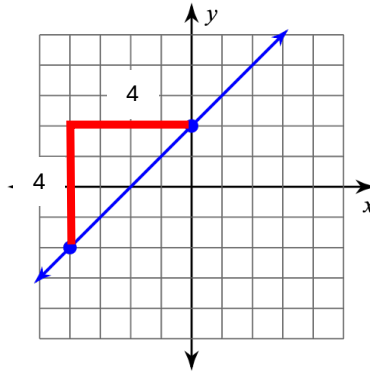
4. $24y, 12y^2$

7. $35x^2, 42x^2$	8. $16x^2, 32x^3$
9. $24x, 36xy$	10. $40xy^2, 16y$
11. $42u^3v, 48u^2$	12. $22xy^2, 33xy$
13. $72n^2, 52n$	14. $84b^3, 78b$

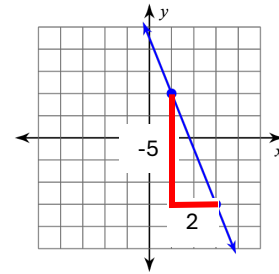
SLOPE OF A LINE

$$\text{Slope: } \frac{\text{RISE} = 4}{\text{RUN} = 4}$$

$$\text{Slope: } \frac{4}{4} = 1$$

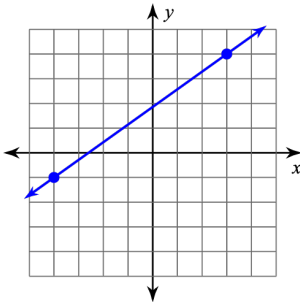


* Slopes can be positive or negative

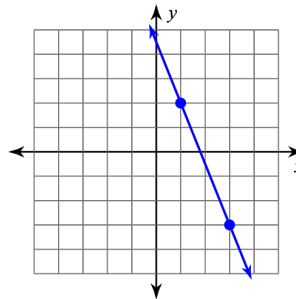


$$\text{Slope: } \frac{-5}{2}$$

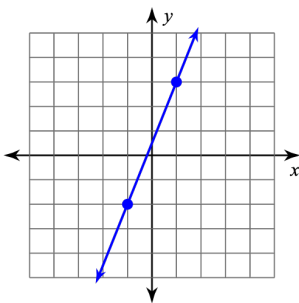
1.



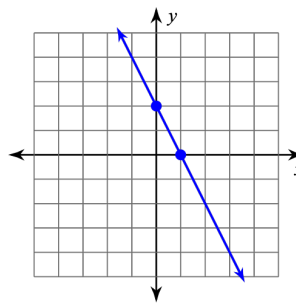
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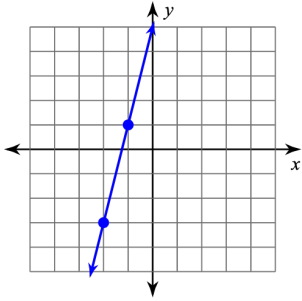
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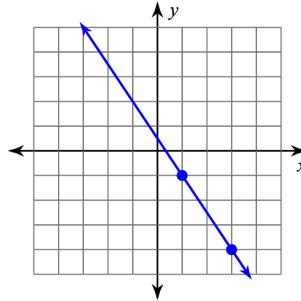
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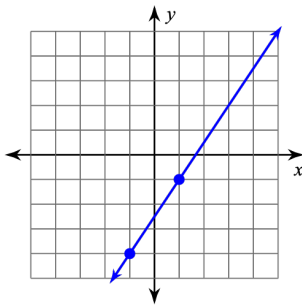
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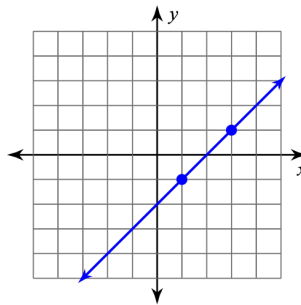
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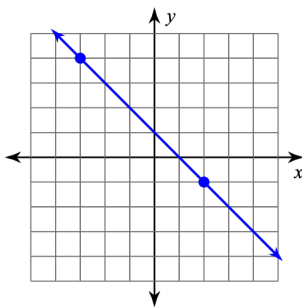
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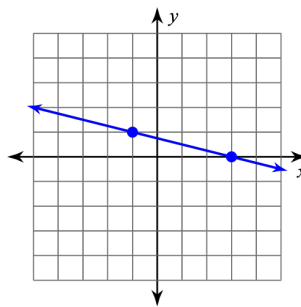
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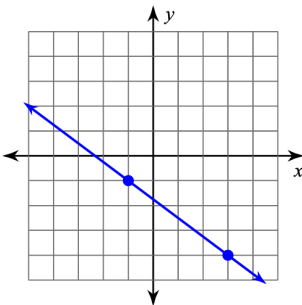
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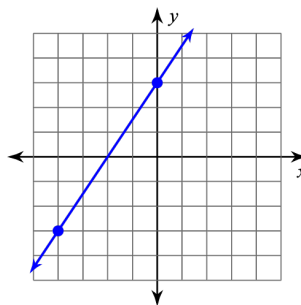
10.



11.



12.



Adding and Subtracting Fractions

** To add and subtract fractions, you must have a common denominator.

Finding a Common Denominator -

The denominator is the bottom of the fraction. Find the Least Common Multiple of the two denominators (smallest number both denominators go into evenly). Whatever you have to multiply the bottom by to get that number, also multiply the top.

- After finding the common denominator, add the numerators and KEEP the denominator. Reduce fraction to simplest terms.

Examples:

$$\frac{3}{4} + \frac{5}{6} \quad \text{** LCM of 4 and 6 is 12.}$$

$$\frac{3 \cdot 3}{4 \cdot 3} + \frac{5 \cdot 2}{6 \cdot 2} = \frac{9}{12} + \frac{10}{12} = \frac{19}{12}$$

$$\frac{7}{10} - \frac{8}{15} \quad \text{** LCM of 10 and 15 is 30.}$$

$$\frac{7 \cdot 3}{10 \cdot 3} - \frac{8 \cdot 2}{15 \cdot 2} = \frac{21}{30} - \frac{16}{30} = \frac{5}{30} = \frac{1}{6}$$

1. $\frac{8}{7} + \frac{5}{3}$

2. $\frac{1}{2} - \frac{2}{5}$

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

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

$$5. \frac{1}{2} - \frac{3}{8}$$

$$6. \frac{10}{7} + \frac{3}{2}$$

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

$$8. \frac{4}{5} - \frac{1}{2}$$

$$9. \frac{3}{4} + \frac{5}{12}$$

$$10. \frac{3}{2} - \frac{4}{5}$$

$$11. \frac{5}{8} + \frac{1}{3}$$

$$12. \frac{13}{11} - \frac{4}{5}$$

Mean, Median, and Mode

22, 4, 49, 33, 44, 6, 38, 15, 18

Mean - The average. Add the terms and divide by how many there are

$$\frac{22 + 4 + 49 + 33 + 44 + 6 + 38 + 15 + 18}{9} = 25.4$$

Median - The "middle" number. Put them in order and find the middle.

4, 6, 15, 18, **22**, 33, 38, 44, 49

Mode - The number that shows up the most.

This set has no mode.

1. 7, 9, 18, 20, 20, 24, 31, 40, 42	2. 20, 9, 42, 40, 18, 47, 7, 31, 42
Mean: Median: Mode:	Mean: Median: Mode:
3. 3, 34, 27, 47, 3, 19, 49, 24, 3	4. 17, 47, 11, 29, 4, 34, 2, 17, 40
Mean: Median: Mode:	Mean: Median: Mode:
5. 35, 13, 27, 41, 22, 45, 8, 13	6. 36, 50, 39, 38, 50, 44, 30, 47
Mean: Median: Mode:	Mean: Median: Mode:

PERCENTS

What is 15% of 40?

$$\frac{\text{part}}{\text{Whole}} = \frac{\text{Percent}}{100}$$

$$\frac{\text{part}}{40} = \frac{15}{100}$$

$$100x = 600$$
$$x = 6$$

*You will always be missing one of the 4 parts of the proportion. Fill in the 3 knowns and the missing part is your variable. Cross multiply to solve.

1. 35% of 37 is what?

2. 3.8 is what percent of 21?

3. 7.9 is 97% of what?

4. 23 is what percent of 39?

5. What percent of 43 is 7?	6. 59 is what percent of 80?
7. 66% of 17 is what?	8. 9 is 86% of what?
9. What percent of 77 is 41?	10. 62% of what is 37?
11. 7 is what percent of 74?	12. 38% of what is 68?

Answers

Order of Operations: (pg 3)

- | | |
|-------|--------|
| 1. 40 | 7. 32 |
| 2. 41 | 8. 1 |
| 3. 7 | 9. 23 |
| 4. 4 | 10. 17 |
| 5. 3 | 11. 67 |
| 6. 1 | 12. 15 |
| | 13. 9 |
| | 14. 16 |

Multiplying and Dividing Integers: (pg 9)

- | | |
|--------|--------|
| 1. 64 | 8. 7 |
| 2. -56 | 9. -7 |
| 3. 8 | 10. 6 |
| 4. -20 | 11. -2 |
| 5. 12 | 12. 5 |
| 6. -24 | 13. 10 |
| 7. -10 | 14. -2 |

Evaluating Expressions: (pg 5)

- | | |
|-------|--------|
| 1. 16 | 8. 37 |
| 2. 4 | 9. 10 |
| 3. 11 | 10. 21 |
| 4. 2 | 11. 57 |
| 5. 40 | 12. 24 |
| 6. 7 | 13. 40 |
| 7. 19 | 14. 36 |

Distributive Property: (pg 11)

- | | |
|----------------|------------------|
| 1. $6p - 10$ | 6. $18k - 60$ |
| 2. $-15r - 30$ | 7. $-36m + 12$ |
| 3. $-6s - 27$ | 8. $-90f - 50$ |
| 4. $14x - 77$ | 9. $-12x + 36y$ |
| 5. $16y - 32$ | 10. $-77a + 14b$ |

Adding and Subtracting Integers: (pg 7)

- | | |
|--------|---------|
| 1. -5 | 8. -19 |
| 2. -1 | 9. 8 |
| 3. 13 | 10. -10 |
| 4. -2 | 11. 9 |
| 5. -8 | 12. 5 |
| 6. -11 | 13. -20 |
| 7. 2 | 14. -4 |

Combining Like terms : (pg 12)

- | | |
|-------------|--------------|
| 1. $-6n+1$ | 6. $-8a-5$ |
| 2. $6a-9$ | 7. $-14x-60$ |
| 3. $6+2n$ | 8. $2-20a$ |
| 4. $4k+11$ | 9. $-8a-16$ |
| 5. $-11+6x$ | 10. $22x+2$ |

One-Step Equations: (pg 13)

- | | |
|--------|--------|
| 1. -14 | 6. 6 |
| 2. -6 | 7. -20 |
| 3. 20 | 8. -60 |
| 4. 14 | 9. 42 |
| 5. -20 | 10. 19 |

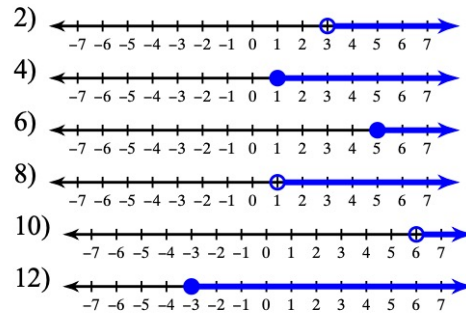
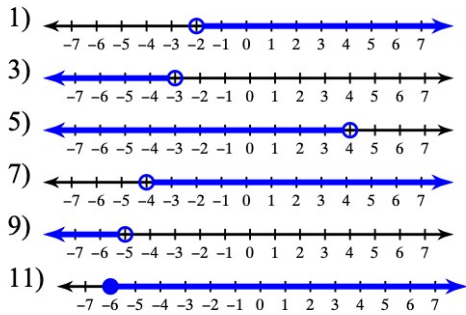
Two-Step Equations: (pg 14)

- | | |
|--------|--------|
| 1. -5 | 7. 20 |
| 2. 18 | 8. -12 |
| 3. 8 | 9. -19 |
| 4. 13 | 10. 14 |
| 5. 12 | 11. -7 |
| 6. -15 | 12. 9 |

Proportions: (pg 16)

- | | |
|-------------------|--------------------|
| 1. $\frac{12}{5}$ | 8. $\frac{35}{9}$ |
| 2. $\frac{21}{5}$ | 9. $\frac{10}{3}$ |
| 3. $\frac{9}{5}$ | 10. $\frac{9}{2}$ |
| 4. 50 | 11. $\frac{25}{4}$ |
| 5. $\frac{9}{25}$ | 12. $\frac{5}{3}$ |
| 6. 8 | 13. $-\frac{9}{2}$ |
| 7. $\frac{6}{7}$ | 14. $\frac{37}{2}$ |

Graphing Inequalities: (pg 18)



Area of Rectangles and Triangles: (pg 19)

- | | |
|-------------------------|-------------------------|
| 1. 103.2 cm^2 | 8. 11.4 in^2 |
| 2. 61 mi^2 | 9. 38 km^2 |
| 3. 68 km^2 | 10. 51.7 yd^2 |
| 4. 27 km^2 | 11. 42.3 yd^2 |
| 5. 78 yd^2 | 12. 24 km^2 |
| 6. 67.6 mi^2 | 13. 17.6 mi^2 |
| 7. 13.3 cm^2 | 14. 21.2 m^2 |

Area of Circles: (pg 21)

- | | |
|-------------------------|--------------------------|
| 1. 50.3 km^2 | 8. 24.6 cm^2 |
| 2. 153.9 cm^2 | 9. 149.6 ft^2 |
| 3. 380.1 m^2 | 10. 47.8 m^2 |
| 4. 28.3 in^2 | 11. 141 km^2 |
| 5. 452.4 cm^2 | 12. 232.4 in^2 |
| 6. 153.9 mi^2 | 13. 30.2 m^2 |
| 7. 113.1 km^2 | 14. 254.5 mi^2 |

Greatest Common Factor: (pg 23)

- | | |
|-----------|------------|
| 1. $2u$ | 8. $16x^2$ |
| 2. 7 | 9. $12x$ |
| 3. $3n$ | 10. $8y$ |
| 4. $12y$ | 11. $6u^2$ |
| 5. $3x^2$ | 12. $11xy$ |
| 6. $4x^2$ | 13. $3n$ |
| 7. $7x^2$ | 14. $6b$ |

Slope of a Line: (pg 25)

- | | |
|-----------|------------|
| 1. $5/7$ | 7. $3/2$ |
| 2. $-5/2$ | 8. 1 |
| 3. $5/2$ | 9. -1 |
| 4. -2 | 10. $-1/4$ |
| 5. 4 | 11. $-3/4$ |
| 6. $-3/2$ | 12. $3/2$ |

Pythagorean Theorem: (pg 27)

- | | |
|-----------|------------|
| 1. 14.2 | 7. 17 |
| 2. 8.7 | 8. 4.1 |
| 3. 7.2 | 9. 10.4 |
| 4. 13.9 | 10. 10.6 |
| 5. 2.6 | 11. 10.9 |
| 6. 4 | 12. 6 |

Adding and Subtracting Fractions: (pg 29)

- | | |
|------------|-------------|
| 1. $59/21$ | 7. $29/10$ |
| 2. $1/10$ | 8. $3/10$ |
| 3. $7/6$ | 9. $7/6$ |
| 4. $41/28$ | 10. $7/10$ |
| 5. $1/8$ | 11. $23/24$ |
| 6. $41/14$ | 12. $21/55$ |

Mean, Median, and Mode: (pg 31)

- | |
|---|
| 1. Mean: 23.4
Median: 20
Mode: 20 |
| 2. Mean: 28.4
Median: 31
Mode: 42 |
| 3. Mean: 23.2
Median: 24
Mode: 3 |
| 4. Mean: 22.3
Median: 17
Mode: 17 |
| 5. Mean: 25.5
Median: 24.5
Mode: 13 |
| 6. Mean: 41.8
Median: 41.5
Mode: 50 |

Percents: (pg 32)

- | | |
|-------------|-------------|
| 1. 13 | 7. 11.2 |
| 2. 18.1% | 8. 10.5 |
| 3. 8.1 | 9. 53.2% |
| 4. 59% | 10. 59.7 |
| 5. 16.3% | 11. 9.5% |
| 6. 73.8% | 12. 178.9 |