Christ the King Diocesian HIgh School
Incoming Geometry
Summer Math Packet

This packet will help you review basic algebra concepts.

- Please show all your work. No work No Credit!!!
  (if you need more room use loose leaf paper to do your work and staple it to the corresponding worksheet)
- I have provided notes with worked examples to help you.
- Please join my Geometry Summer Math Google Classroom by entering the following code: **u7gnmfg,** as I will include helpful videos there to help you complete these assignments.
- You will be expected to do a worksheet every week.
- Do not wait to do all of the worksheets at one time.
- This packet will be due Wednesday August 16, 2023

Proposed schedule

Worksheet		Date: Week of
Week 1	2-3 problems/day	June 5
Week 2	2-3 problems/day	June 12
Week 3	2-3 problems/day	June 19
Week 4	3-4 problems/day	June 26
Week 5	3 problems/day	July 3
Week 6	3-4 problems/day	July 10
Week 7	3-4 problems/day	July 17
Week 8	4-5 problems/day	July 24

Incoming Geometry Summer Math Name______________________________ ID: 1

Week 1- Fraction Operations

Date________________ Period____

Evaluate each expression. 2-3 problems/day

1) $\left(-\frac{10}{7}\right)+\frac{5}{7}$

2) $\frac{6}{7}-\left(-\frac{4}{3}\right)$

3) $1-\frac{3}{2}$

4) $\left(-\frac{7}{8}\right)+\left(-\frac{3}{2}\right)$

Simplify each. Write your answer as a mixed number when possible.

5) $\frac{18}{144}$

6) $\frac{18}{54}$

7) $\frac{8}{12}$

8) $\frac{36}{45}$

Find each product.

9) $\left(-\frac{5}{6}\right)\left(-\frac{4}{3}\right)$

10) $\left(\frac{9}{8}\right)\left(-\frac{3}{4}\right)$

11) $(-8)\left(\frac{1}{5}\right)$

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

Find each quotient.

13) $\frac{-2}{5}\div\frac{5}{3}$

14) $\frac{-12}{7}\div 2$

15) $\frac{-1}{2}\div\frac{-1}{2}$

16) $\frac{2}{7}\div\frac{1}{2}$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
PARTS OF A FRACTION	NUMERATOR → $\frac{7}{8}$ ← DENOMINATOR All numbers that can be written as fractions are called **rational numbers**.
SIMPLEST FORM	A fraction that cannot be simplified any further.
EXAMPLES	**Directions:** Write each fraction in simpest form.

1. $\frac{8}{20} = \frac{2}{5}$	**2.** $-\frac{6}{18} = -\frac{1}{3}$	**3.** $\frac{21}{27} = \frac{7}{9}$
4. $-\frac{24}{40} = -\frac{3}{5}$	**5.** $-\frac{12}{42} = -\frac{2}{7}$	**6.** $\frac{36}{45} = \frac{4}{5}$
7. $\frac{16}{56} = \frac{2}{7}$	**8.** $\frac{18}{3} = 6$	**9.** $-\frac{8}{28} = -\frac{2}{7}$

IMPROPER FORM	A fraction in which the numerator is larger than the denominator.
MIXED NUMBERS	A number and a proper fraction
EXAMPLES	**Directions:** Write each improper fraction as a mixed number.

10. $\frac{19}{6} = 3\frac{1}{6}$	**11.** $-\frac{26}{3} = -8\frac{2}{3}$	**12.** $\frac{17}{2} = 8\frac{1}{2}$
13. $\frac{21}{4} = 5\frac{1}{4}$	**14.** $\frac{7}{3} = 2\frac{1}{3}$	**15.** $-\frac{35}{8} = -4\frac{3}{8}$

Directions: Write each mixed number as an improper fraction.

16. $3\frac{1}{5} = \frac{16}{5}$	**17.** $7\frac{2}{3} = \frac{23}{3}$	**18.** $-1\frac{9}{10} = \frac{-19}{10}$
19. $-2\frac{11}{13} = \frac{-37}{13}$	**20.** $-4\frac{3}{7} = -\frac{31}{7}$	**21.** $10\frac{1}{8} = \frac{81}{8}$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples	
Adding & Subtracting Fractions	①	Write all mixed numbers as improper fractions.
	②	Find a **common denominator** by identifying the least common denominator. **(LCD)**
	③	Rewrite the fractions using the LCD as the denominator. Adjust each numerator to reflect the change in denominator.
	④	Add/Subtract the numberators and keep the common denominator.
	⑤	Simplify (if needed).

Examples

1. $\frac{1}{10}+\frac{3}{10} = \frac{4}{10} = \boxed{\frac{2}{5}}$

2. $\frac{1}{4}+\frac{2}{3} = \frac{3}{12} + \frac{8}{12} = \boxed{\frac{11}{12}}$

3. $\frac{3}{10}-\frac{11}{15} = \frac{9}{30} - \frac{22}{30} = \boxed{\frac{-13}{30}}$

4. $-6-\frac{1}{4} = \frac{-24}{4} - \frac{1}{4} = \boxed{\frac{-25}{4}}$ or $\boxed{-6\frac{1}{4}}$

5. $\frac{2}{9}-\left(-\frac{5}{18}\right) = \frac{4}{18} + \frac{5}{18} = \frac{9}{18} = \boxed{\frac{1}{2}}$

6. $\frac{5}{8}+\left(-\frac{1}{20}\right) = \frac{25}{40} - \frac{2}{40} = \boxed{\frac{23}{40}}$

7. $-2\frac{3}{8}-1\frac{3}{4} = \frac{-19}{8} - \frac{7}{4} = -\frac{19}{8} - \frac{14}{8} = \boxed{\frac{-33}{8}}$ or $\boxed{-4\frac{1}{8}}$

8. $1\frac{5}{6}+2\frac{3}{4} = \frac{11}{6} + \frac{11}{4} = \frac{22}{12} + \frac{33}{12} = \boxed{\frac{55}{12}}$ or $\boxed{4\frac{7}{12}}$

	9. $2\frac{4}{5}-\left(-2\frac{1}{4}\right)$ $=\frac{14}{5}+\frac{9}{4}$ $=\frac{56}{20}+\frac{45}{20}=\boxed{\frac{101}{20}}$ or $\boxed{5\frac{1}{20}}$	**10.** $1\frac{7}{16}-1\frac{1}{6}$ $=\frac{23}{16}-\frac{7}{6}$ $=\frac{69}{48}-\frac{56}{48}=\boxed{\frac{13}{48}}$
	11. $-\frac{5}{6}+1\frac{2}{9}$ $=\frac{-5}{6}+\frac{11}{9}$ $=-\frac{30}{36}+\frac{44}{36}$ $=\frac{14}{36}=\boxed{\frac{7}{18}}$	**12.** $-3\frac{1}{4}+\left(-\frac{1}{2}\right)$ $=\frac{-13}{4}-\frac{1}{2}$ $=-\frac{13}{4}-\frac{2}{4}$ $=\boxed{\frac{-15}{4}}$ or $\boxed{-3\frac{3}{4}}$
Applications	**13.** The length of a board is $2\frac{5}{8}$ feet long. If $\frac{5}{6}$ of a foot is trimmed off, find the new length. $2\frac{5}{8}-\frac{5}{6}=\frac{21}{8}-\frac{5}{6}$ $=\frac{63}{24}-\frac{20}{24}=\boxed{\frac{43}{24}\text{ ft}}$ or $\boxed{1\frac{19}{24}\text{ ft}}$	
	14. During a recent two-day snowstorm, it snowed $6\frac{1}{8}$ inches on the first day and $8\frac{5}{12}$ inches on the second day. Find the total snowfall. $6\frac{1}{8}+8\frac{5}{12}=\frac{49}{8}+\frac{101}{12}$ $=\frac{147}{24}+\frac{202}{24}=\boxed{\frac{349}{24}\text{ in}}$ or $\boxed{14\frac{13}{24}\text{ in}}$	
	15. Natalie is baking a cake and cookies for her daughter's class party. She needs $1\frac{2}{3}$ cups of milk for the cake and $\frac{1}{2}$ cup for the cookies. If she has 3 cups of milk total, how much will she have left? $1\frac{2}{3}+\frac{1}{2}$ $=\frac{5}{3}+\frac{1}{2}=\frac{10}{6}+\frac{3}{6}=\frac{13}{6}$ $3-\frac{13}{6}$ $=\frac{18}{6}-\frac{13}{6}=\boxed{\frac{5}{6}\text{ cup}}$	

Summary: ____

Name:	Date:
Topic:	**Class:**

Main Ideas/Questions	Notes/Examples
Multiplying Fractions	① Write all mixed numbers as improper fractions.
	② Simplify up and down and along the diagonals (if possible).
	③ Multiply the numerators to get the new numerator. Multiply the denominators to get the new denominator.
	④ Simplify (if needed).

Examples

1. $\frac{1}{2}\times\frac{4}{5} = \frac{1}{1} \times \frac{2}{5}$

$= \boxed{\frac{2}{5}}$

2. $\frac{1}{9}\times\frac{3}{5} = \frac{1}{3} \times \frac{1}{5}$

$= \boxed{\frac{1}{15}}$

3. $\frac{1}{7}\cdot -\frac{1}{5} = \boxed{-\frac{1}{35}}$

4. $2\frac{1}{5}\cdot 1\frac{2}{3} = \frac{11}{5} \cdot \frac{5}{3}$

$= \frac{11}{1} \cdot \frac{1}{3}$

$= \boxed{\frac{11}{3}}$ or $\boxed{3\frac{2}{3}}$

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

$= \frac{-2}{3} \cdot \frac{1}{1}$

$= \boxed{\frac{-2}{3}}$

6. $-\frac{2}{3}\cdot -2\frac{4}{5} = -\frac{2}{3} \cdot -\frac{14}{5}$

$= \boxed{\frac{28}{15}}$ or $\boxed{1\frac{13}{15}}$

Main Ideas/Questions	Notes/Examples
Dividing Fractions	① Write all mixed numbers as improper fractions.
	② Change to multiplication and FLIP the second fraction to its reciprocal (KISS!)
	③ Multiply the numerators to get the new numerator. Multiply the denominators to get the new denominator.
	④ Simplify (if needed).

Examples

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

$= \boxed{\frac{5}{6}}$

8. $\frac{3}{4} \div -\frac{1}{2} = \frac{3}{4} \cdot -\frac{2}{1}$

$= \frac{3}{2} \cdot -\frac{1}{1}$

$= \boxed{-\frac{3}{2}}$ or $\boxed{-1\frac{1}{2}}$

9. $-\frac{4}{7} \div -\frac{8}{9} = -\frac{4}{7} \cdot -\frac{9}{8}$

$= -\frac{1}{7} \cdot -\frac{9}{2}$

$= \boxed{\frac{9}{14}}$

10. $2\frac{1}{10} \div -2\frac{4}{5} = \frac{21}{10} \div -\frac{14}{5}$

$= \frac{21}{10} \cdot -\frac{5}{14}$

$= \frac{3}{2} \cdot -\frac{1}{2} = \boxed{-\frac{3}{4}}$

11. $-4\frac{2}{7} \div 1\frac{1}{3} = \frac{-30}{7} \div \frac{4}{3}$

$= \frac{-30}{7} \cdot \frac{3}{4}$

$= \frac{-15}{7} \cdot \frac{3}{2}$

$= \boxed{\frac{-45}{14}}$ or $\boxed{-3\frac{3}{14}}$

12. $2\frac{3}{4} \div 5 = \frac{11}{4} \div 5$

$= \frac{11}{4} \cdot \frac{1}{5}$

$= \boxed{\frac{11}{20}}$

Applications

13. The Statue of Liberty is 305 feet tall. A nearby building is $\frac{\ }{9}$ as tall. Find the height of the building.

$305 \cdot \frac{4}{9} = \frac{1220}{9}$ or $\boxed{135\frac{5}{9}\text{ ft}}$

14. Sarah has $27\frac{3}{4}$ feet of wire to make bead necklaces. If each necklace requires $1\frac{2}{3}$ feet of wire, how many necklaces can she make?

$27\frac{3}{4} \div 1\frac{2}{3} = \frac{111}{4} \div \frac{5}{3} = \frac{111}{4} \cdot \frac{3}{5} = \frac{333}{20}$

$\boxed{\text{16 necklaces}}$ or $16\frac{13}{20}$

Summary: ______________________________

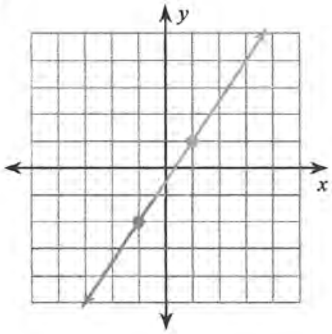
Incoming Geometry Summer Math Name________________________________ ID: 1

Week 2 - Slope Practice

Date________________ Period____

Find the slope of each line. 2-3 problems/day

1)



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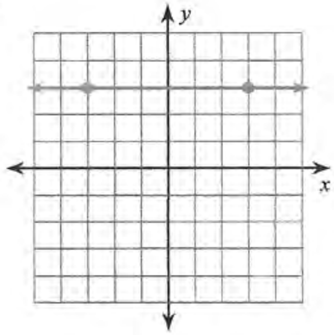

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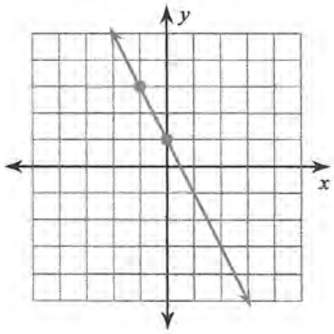

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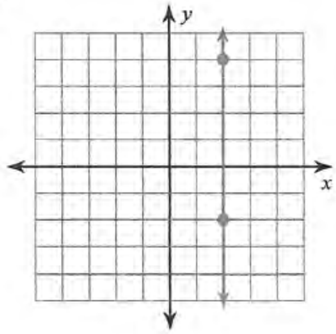


Find the slope of the line through each pair of points.

5) $(17, 10), (-3, 19)$

6) $(-17, -6), (-6, 9)$

7) $(18, 10), (-2, -13)$

8) $(-5, -5), (-15, -15)$

Find the slope of each line.

9) $y = x$

10) $y = \frac{1}{2}x + 5$

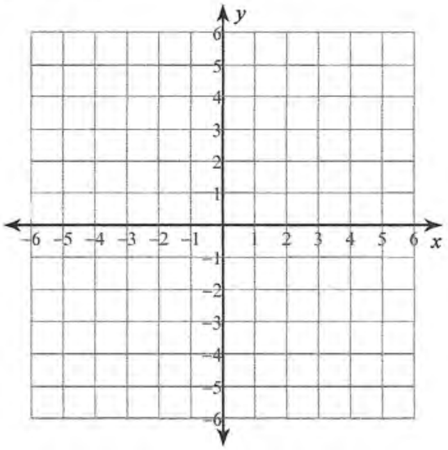
11) $2x + 3y = 6$

12) $x - y = 1$

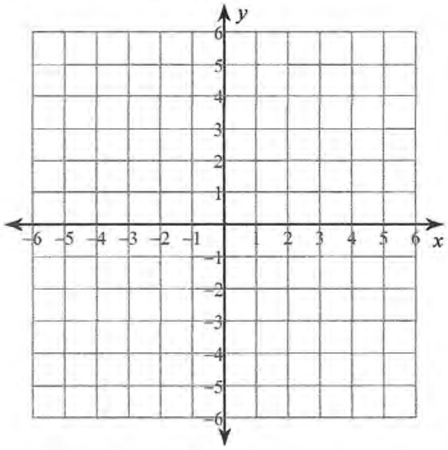
Week 2 (con't)

Sketch the graph of each line.

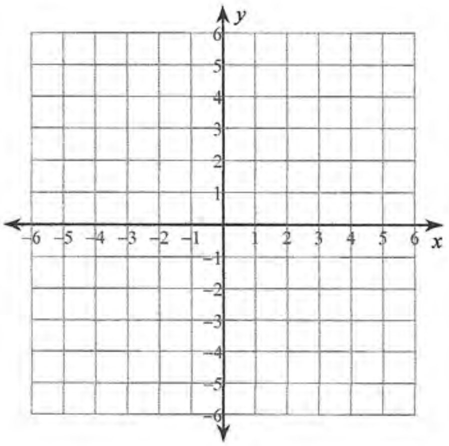
13) $3 = x$



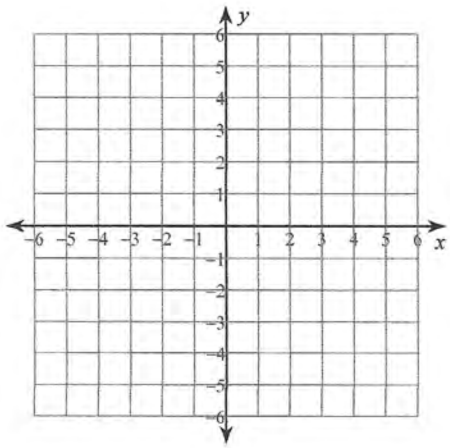
14) $2x - 24 = 8y$



15) $3y + 9 = x$



16) $3 = y - x$



Name:	Date:
Topic:	**Class:**

Main Ideas/Questions	Notes/Examples
Rate of Change	A ratio that shows how one variable changes with respect to another On a linear graph, this is called the slope of the line!

Slope

- Slope is written as a ratio of the **vertical change** (rise) to the **horizontal change** (run) between any two points on a line.
- This remains constant for any two points on the same line.
- Slope is written as a fraction in simplest form.
- Variable for slope: m

Types of Slope

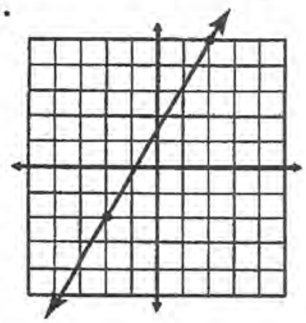
			
Positive	Negative	Zero	Undefined

Finding Slope on a Graph

$m = \dfrac{\text{rise}}{\text{run}}$

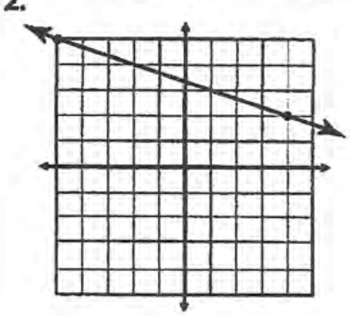
Directions: Find the slope of each line. Write your answer in simplest form!

1.



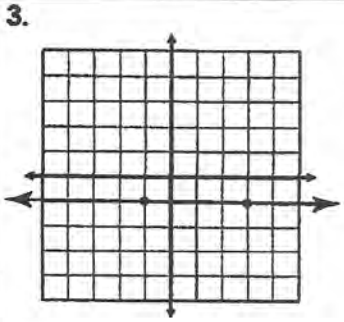
$\boxed{\dfrac{7}{4}}$

2.



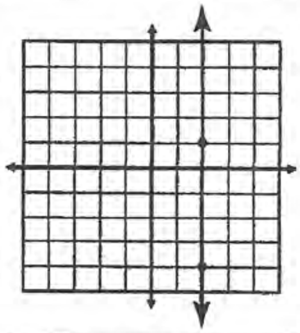
$\dfrac{-3}{9} = \boxed{-\dfrac{1}{3}}$

3.



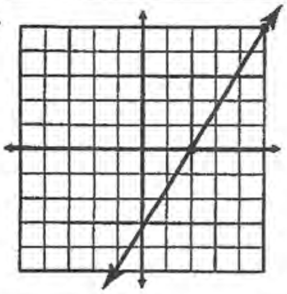
$\dfrac{0}{4} = \boxed{0}$

4.



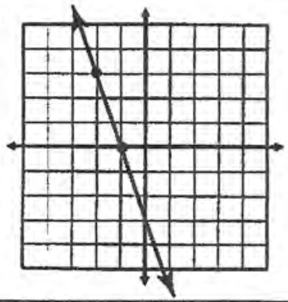
$\dfrac{5}{0} = \boxed{\text{undef.}}$

5.



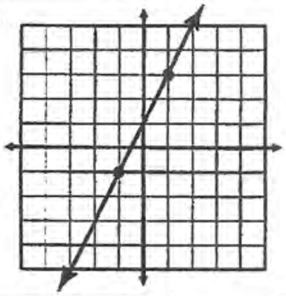
$\boxed{\frac{5}{3}}$

6.



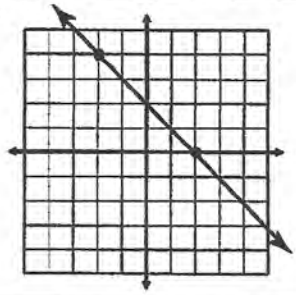
$\frac{-3}{1} = \boxed{-3}$

7.



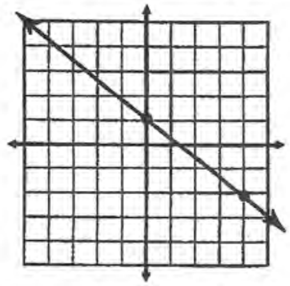
$\frac{4}{2} = \boxed{2}$

8.



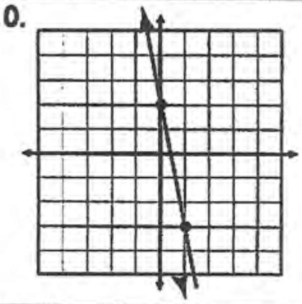
$\frac{-4}{4} = \boxed{-1}$

9.



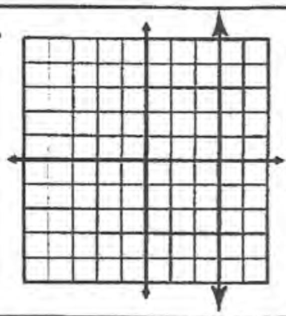
$\boxed{\frac{-3}{4}}$

10.



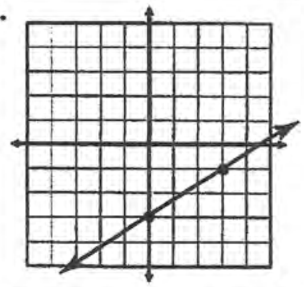
$\frac{-5}{1} = \boxed{-5}$

11.



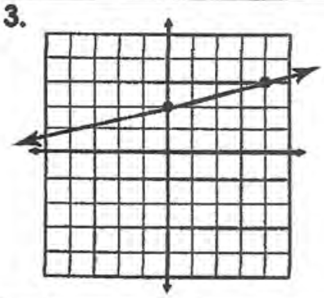
$\boxed{\text{undef.}}$

12.



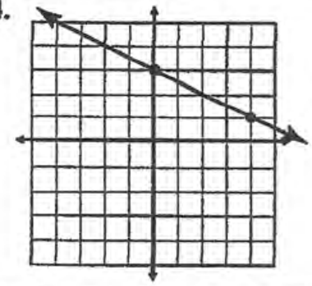
$\boxed{\frac{2}{3}}$

13.



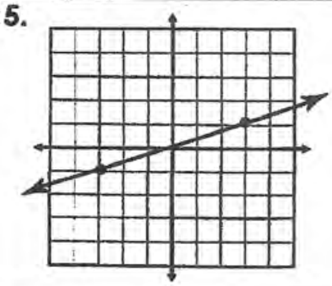
$\boxed{\frac{1}{4}}$

14.



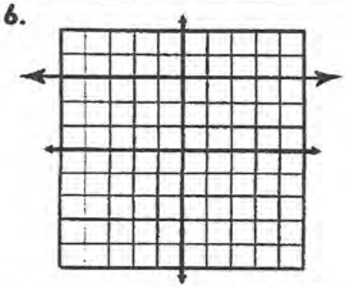
$\frac{-2}{4} = \boxed{-\frac{1}{2}}$

15.



$\frac{2}{6} = \boxed{\frac{1}{3}}$

16.



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Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
SLOPE FORMULA	The **slope formula** is used to find the slope between two points (x_1, y_1) and (x_2, y_2).
	Formula: $\boxed{m = \frac{y_2 - y_1}{x_2 - x_1}}$
	It is important to remember to SIMPLIFY your answer!
EXAMPLES	**Directions:** Find the slope between each pair of points.

1. (1, 1) and (4, 3) $m = \frac{3-1}{4-1} = \boxed{\frac{2}{3}}$	**2.** (-2, 4) and (10, -2) $m = \frac{-2-4}{10+2} = \frac{-6}{12} = \boxed{-\frac{1}{2}}$
3. (-4, 5) and (-8, -5) $m = \frac{-5-5}{-8+4} = \frac{-10}{-4} = \boxed{\frac{5}{2}}$	**4.** (10, 0) and (-2, 4) $m = \frac{4-0}{-2-10} = \frac{4}{-12} = \boxed{-\frac{1}{3}}$
5. (5, 9) and (3, 9) $m = \frac{9-9}{3-5} = \frac{0}{-2} = \boxed{0}$	**6.** (-7, 8) and (-7, 5) $m = \frac{5-8}{-7+7} = \frac{-3}{0} = \boxed{\text{undef.}}$
7. (-1, 9) and (2, 3) $m = \frac{3-9}{2+1} = \frac{-6}{3} = \boxed{-2}$	**8.** (-4, 13) and (6, -2) $m = \frac{-2-13}{6+4} = \frac{-15}{10} = \boxed{-\frac{3}{2}}$
9. (5, 6) and (6, 5) $m = \frac{5-6}{6-5} = \frac{-1}{1} = \boxed{-1}$	**10.** (9, -4) and (1, -4) $m = \frac{-4+4}{1-9} = \frac{0}{-8} = \boxed{0}$

11. (5, -9) and (3, -2)

$m = \frac{-2+9}{3-5} = \boxed{\frac{7}{-2}}$

12. (4, 6) and (4, 8)

$m = \frac{8-6}{4-4} = \frac{2}{0} = \boxed{\text{undef.}}$

GOING BACKWARDS

Sometimes you must complete the ordered pairs using a given slope.

Example: If the slope of the line passing through the points (-5, 6) and (5, *y*) is $-\frac{4}{5}$, find *y*.

$-\frac{4}{5} = \frac{y-6}{5+5}$ $\quad \frac{-4}{5} = \frac{y-6}{10}$

$-40 = 5y - 30$

$-10 = 5y$

$\boxed{-2 = y}$

MORE EXAMPLES

Directions: Find the missing value using the given slope.

13. (-3, -2) and (*x*, 6); $m = 2$

$2 = \frac{6+2}{x+3}$ $\quad 2x+6 = 8$

$2x = 2$

$\boxed{x=1}$

14. (0, -4) and (*x*, -7); $m = \frac{3}{2}$

$\frac{3}{2} = \frac{-7+4}{x-0}$ $\quad \frac{3}{2} = \frac{-3}{x}$

$3x = -6$

$\boxed{x=-2}$

15. (-3, -4) and (-5, *y*); $m = -\frac{9}{2}$

$-\frac{9}{2} = \frac{y+4}{-5+3}$ $\quad -\frac{9}{2} = \frac{y+4}{-2}$

$2y + 8 = 18$

$2y = 10$

$\boxed{y=5}$

16. (*x*, 2) and (6, 3); $m = -\frac{1}{2}$

$-\frac{1}{2} = \frac{3-2}{6-x}$ $\quad -\frac{1}{2} = \frac{1}{6-x}$

$-6+x = 2$

$\boxed{x=8}$

17. (-3, *y*) and (1, -7); $m = -4$

$-4 = \frac{-7-y}{1+3}$ $\quad -7-y = -16$

$-y = -9$

$\boxed{y=9}$

18. (*x*, 7) and (11, 8); $m = -\frac{1}{5}$

$-\frac{1}{5} = \frac{8-7}{11-x}$ $\quad -\frac{1}{5} = \frac{1}{11-x}$

$5 = -11 + x$

$\boxed{16 = x}$

19. (4, *y*) and (0, 5); $m = \frac{3}{4}$

$\frac{3}{4} = \frac{5-y}{0-4}$ $\quad \frac{3}{4} = \frac{5-y}{-4}$

$20 - 4y = -12$

$-4y = -32$

$\boxed{y=8.}$

20. (-3, *y*) and (9, -2); $m = \frac{1}{3}$

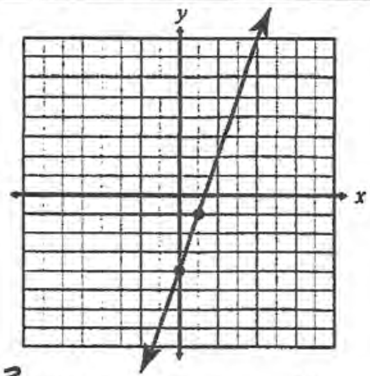
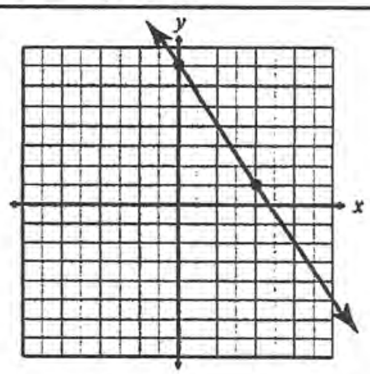
$\frac{1}{3} = \frac{-2-y}{9+3}$ $\quad \frac{1}{3} = \frac{-2-y}{12}$

$12 = -6 - 3y$

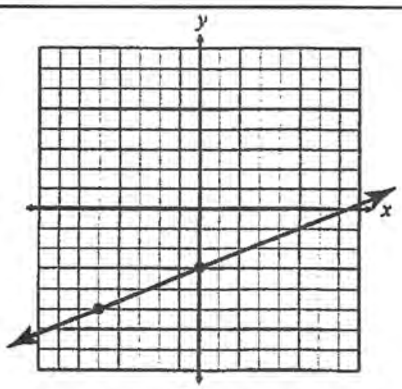
$18 = -3y$

$\boxed{-6 = y}$

Name:	Date:
Topic:	Class:

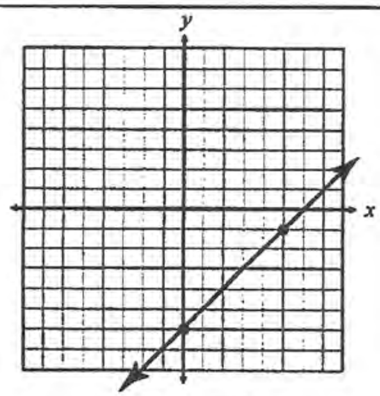
Main Ideas/Questions	Notes/Examples
Slope-Intercept Form	Linear equations are frequently written in **slope-intercept form:** $\boxed{y = mx + b}$ m is the slope and b is the y-intercept
Examples	**Directions:** Given the slope and y-intercept of the line, write the equation in slope-intercept form.
	1. slope = 2; y-intercept = -1 $y = 2x - 1$
	2. slope = $-\frac{3}{5}$; y-intercept = 4 $y = -\frac{3}{5}x + 4$
	3. slope = -3; y-intercept = 2 $y = -3x + 2$
	4. slope = -1; y-intercept = 7 $y = -x + 7$
	5. slope = $\frac{1}{4}$; y-intercept = 0 $y = \frac{1}{4}x$
	6. slope = $-\frac{5}{2}$; y-intercept = -3 $y = -\frac{5}{2}x - 3$
Given a Graph	**Directions:** Identify the slope and y-intercept of the line on the graph. Then, write the equation of the line in slope-intercept form.
	7.  $m = \frac{3}{1} = 3$ $b = -4$ Equation: $y = 3x - 4$
	8.  $m = \frac{-6}{4} = -\frac{3}{2}$ $b = 7$ Equation: $y = -\frac{3}{2}x + 7$

9.



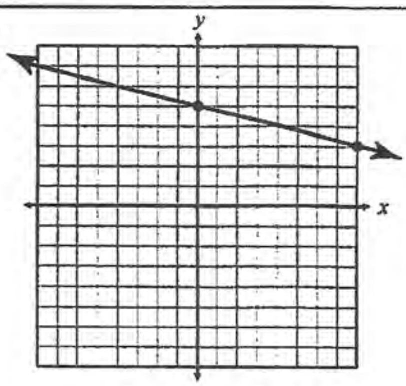
Equation: $y = \frac{2}{5}x - 3$

10.



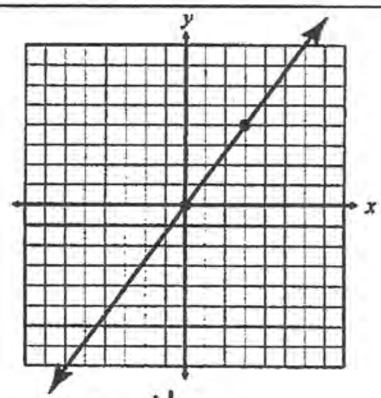
Equation: $y = x - 6$

11.



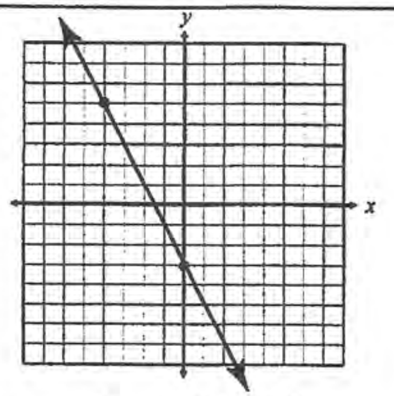
Equation: $y = -\frac{1}{4}x + 5$

12.



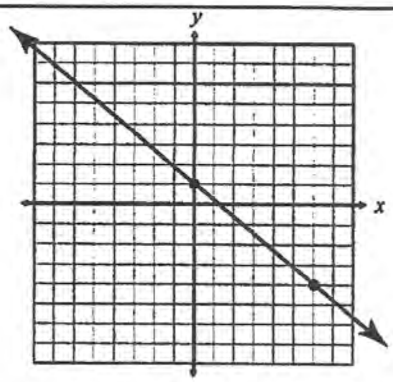
Equation: $y = \frac{4}{3}x$

13.



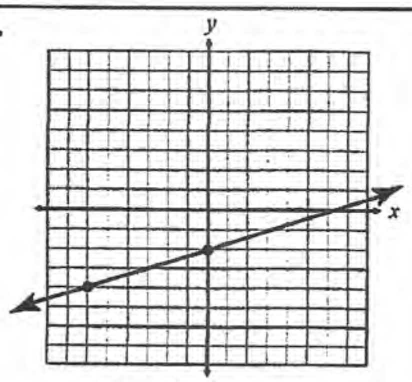
Equation: $y = -2x - 3$

14.



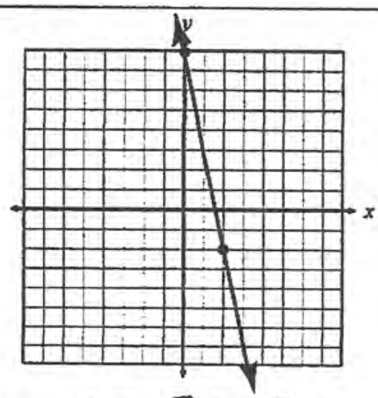
Equation: $y = \frac{-5}{6}x + 1$

15.



Equation: $y = \frac{1}{3}x - 2$

16.



Equation: $y = -5x + 8$

Name:	**Date:**
Topic:	**Class:**

Main Ideas/Questions	Notes/Examples
STANDARD FORM	Linear equations are also frequently written in **standard form:** $\boxed{Ax + By = C}$

CONVERTING
Standard Form ➡ Slope-Intercept Form

Equations written in standard form can be converted to slope-intercept form by solving for *y*!

Directons: Write each equation in slope-intercept form. Identify the slope and *y*-intercept.

1. $2x + y = 3$

$-2x \quad -2x$

$\boxed{y = -2x + 3}$

$m = -2;\ b = 3$

2. $4x + 5y = -30$

$-4x \quad -4x$

$\frac{5y}{5} = \frac{-4x}{5} - \frac{30}{5}$

$\boxed{y = -\frac{4}{5}x - 6}$

$m = -4/5;\ b = -6$

3. $x - 3y = 12$

$-x \quad -x$

$\frac{-3y}{-3} = \frac{-x}{-3} + \frac{12}{-3}$

$\boxed{y = \frac{1}{3}x - 4}$

$m = 1/3;\ b = -4$

4. $x - y = -8$

$-x \quad -x$

$\frac{-y}{-1} = \frac{-x}{-1} - \frac{8}{-1}$

$\boxed{y = x + 8}$

$m = 1;\ b = 8$

5. $4x - y = 0$

$-4x \quad -4x$

$\frac{-y}{-1} = \frac{-4x}{-1}$

$\boxed{y = 4x}$

$m = 4;\ b = 0$

6. $3x - 2y = -14$

$-3x \quad -3x$

$\frac{-2y}{-2} = \frac{-3x}{-2} - \frac{14}{-2}$

$\boxed{y = \frac{3}{2}x + 7}$

$m = 3/2;\ b = 7$

7. $-6x + 4y = 20$

$+6x \quad +6x$

$\frac{4y}{4} = \frac{6x}{4} + \frac{20}{4}$

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

$m = 3/2;\ b = 5$

8. $x + 5y = -15$

$-x \quad -x$

$\frac{5y}{5} = \frac{-x}{5} - \frac{15}{5}$

$\boxed{y = -\frac{1}{5}x - 3}$

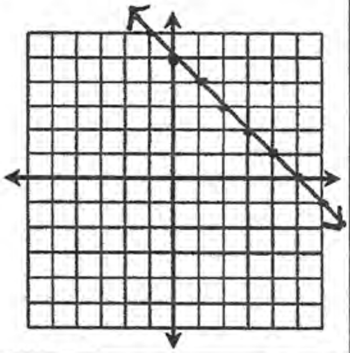
$m = -1/5;\ b = -3$

Name:	Date:
Topic:	Class:

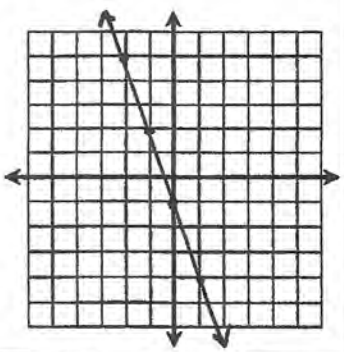
Main Ideas/Questions	Notes/Examples	
GRAPHING LINEAR EQUATIONS (By Slope-Intercept)	**Use the steps below to graph an equation using slope-intercept form:**	
	1	Write the equation in **slope-intercept form.**
	2	Graph the ***y*-intercept**. This is always point (0, b).
	3	Use the **slope** of the line to create more points. Remember slope is rise/run!
	4	Use a ruler to draw a line that extends through the points, placing an arrow on both ends.

Directions: Graph each equation using the slope-intercept method.

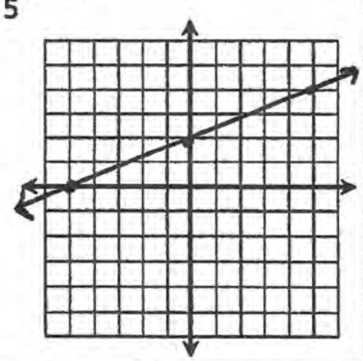
1. $y = -x + 5$



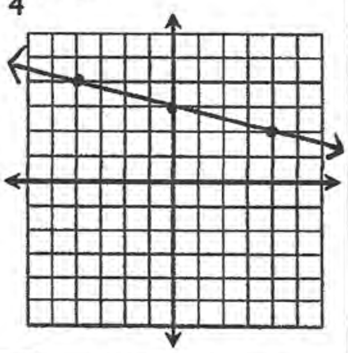
2. $y = -3x - 1$



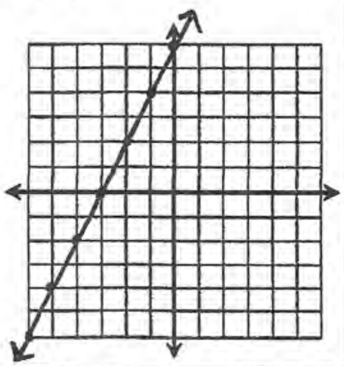
3. $y = \frac{2}{5}x + 2$



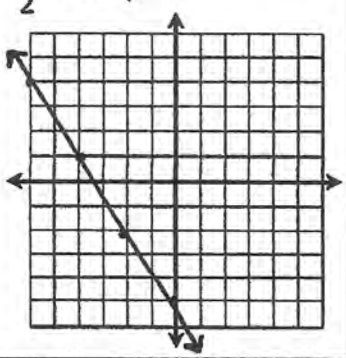
4. $y = -\frac{1}{4}x + 3$



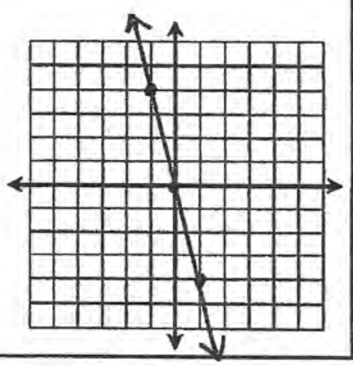
5. $y = 2x + 6$



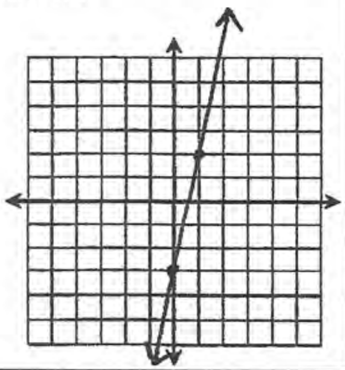
6. $y = -\frac{3}{2}x - 5$



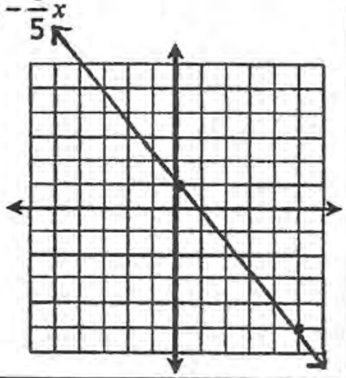
7. $y = -4x$



8. $y = -3 + 5x$



9. $y = 1 - \frac{6}{5}x$

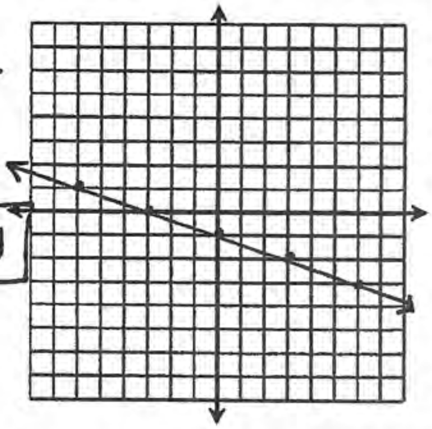


10. $x + 3y = -3$

$$\begin{array}{rr} -x & -x \\ \hline \end{array}$$

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

$$\boxed{y = -\frac{1}{3}x - 1}$$

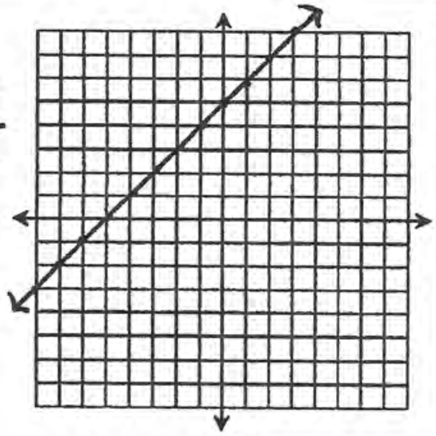


11. $x - y = -5$

$$\begin{array}{rr} -x & -x \\ \hline \end{array}$$

$$\frac{-y}{-1} = \frac{-x}{-1} - \frac{5}{-1}$$

$$\boxed{y = x + 5}$$

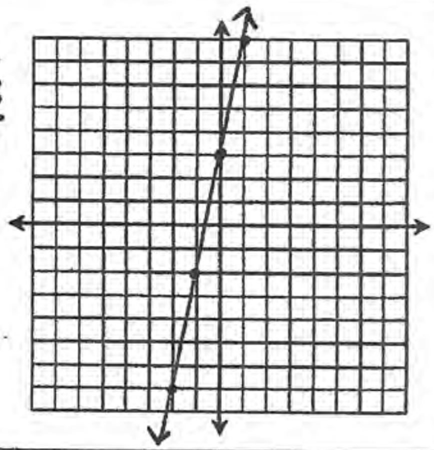


12. $5x - y = -3$

$$\begin{array}{rr} -5x & -5x \\ \hline \end{array}$$

$$\frac{-y}{-1} = \frac{-5x}{-1} - \frac{3}{-1}$$

$$\boxed{y = 5x + 3}$$

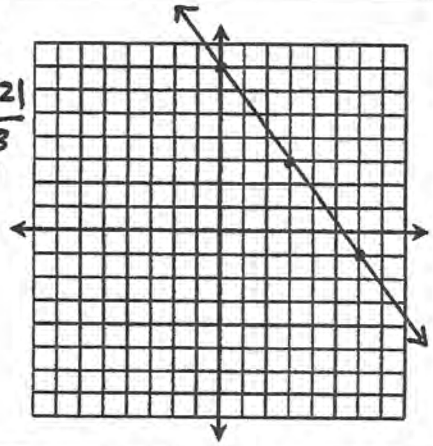


13. $4x + 3y = 21$

$$\begin{array}{rr} -4x & -4x \\ \hline \end{array}$$

$$\frac{3y}{3} = \frac{-4x}{3} + \frac{21}{3}$$

$$\boxed{y = -\frac{4}{3}x + 7}$$

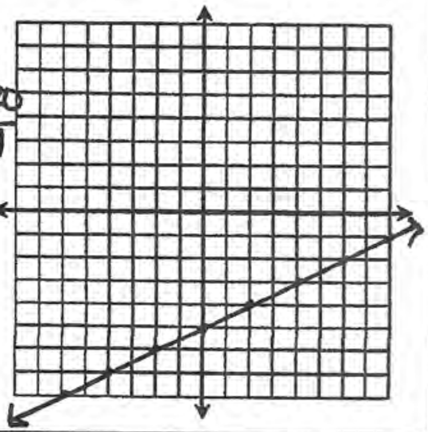


14. $2x - 4y = 20$

$$\begin{array}{rr} -2x & -2x \\ \hline \end{array}$$

$$\frac{-4y}{-4} = \frac{-2x}{-4} + \frac{20}{-4}$$

$$\boxed{y = \frac{1}{2}x - 5}$$

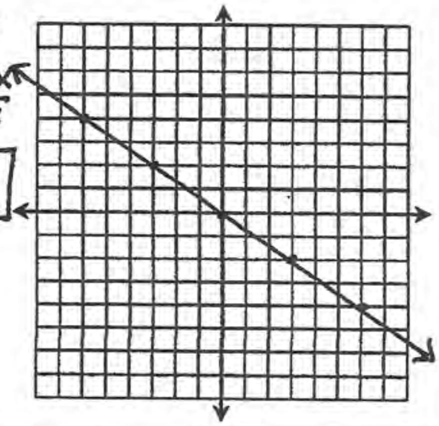


15. $2x + 3y = 0$

$$\begin{array}{rr} -2x & -2x \\ \hline \end{array}$$

$$\frac{3y}{3} = \frac{-2x}{3}$$

$$\boxed{y = -\frac{2}{3}x}$$

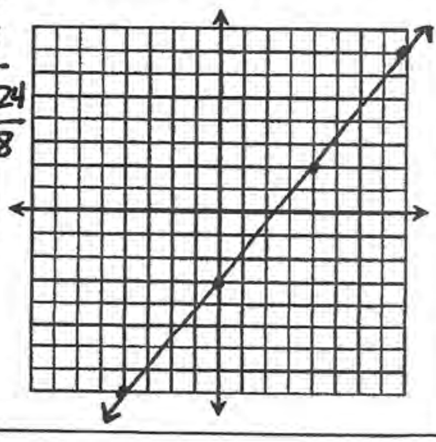


16. $10x - 8y = 24$

$$\begin{array}{rr} -10x & -10x \\ \hline \end{array}$$

$$\frac{-8y}{-8} = \frac{-10x}{-8} + \frac{24}{-8}$$

$$\boxed{y = \frac{5}{4}x - 3}$$

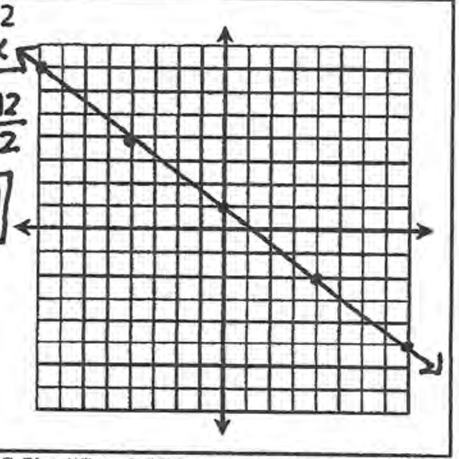


17. $9x + 12y = 12$

$$\begin{array}{rr} -9x & -9x \\ \hline \end{array}$$

$$\frac{12y}{12} = \frac{-9x}{12} + \frac{12}{12}$$

$$\boxed{y = -\frac{3}{4}x + 1}$$



Incoming Geometry Summer Math

Name________________________________ ID: 1

Week 3 - Multistep Equations

Date________________ Period____

Solve each equation. 2-3 problems/day

1) $-152 = -8 - 6(6x - 6)$

2) $-112 = -8(3r - 7)$

3) $-3(-5b + 6) = -108$

4) $7(3 + 2k) = 133$

5) $4(1 - 5k) = 144$

6) $8x - 6 = 6(6x - 1)$

7) $-17 + 7a = 2(5a - 7)$

8) $5(4 + 7x) - 6x = -14 - 5x$

9) $8v + 3 = -4(8v - 2) - 5$

10) $19 + 6x = -2(-5x - 5) - 3$

11) $-\frac{3}{2}k + \frac{3}{2} + \frac{3}{2}k = \frac{3}{2} - \frac{1}{2}$

12) $x - \frac{17}{6}x = \frac{77}{24}$

13) $-\frac{179}{80} = -\frac{19}{5}a - \frac{5}{2} + \frac{29}{8}a$

14) $\frac{17}{6}k - \frac{17}{6}k = \frac{7}{4}$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
Steps to Solve a Multi-Step Equation	1. Distribute (if necessary) 2. Combine like terms. 3. Solve!
Examples	**1.** $9x + 1 - 7x - 5 = -20$ $2x - 4 = -20$ $+4 \quad +4$ $\frac{2x}{2} = \frac{-16}{2}$ $\boxed{x = -8}$
	2. $91 = -7(3a - 1)$ $91 = -21a + 7$ $-7 \quad -7$ $\frac{84}{-21} = \frac{-21a}{-21}$ $\boxed{a = -4}$
	3. $4m - 5(3m + 10) = 126$ $4m - 15m - 50 = 126$ $-11m - 50 = 126$ $+50 \quad +50$ $\frac{-11m}{-11} = \frac{176}{-11}$ $\boxed{m = -16}$
	4. $-3(k - 8) - (k + 5) = 23$ $-3k + 24 - k - 5 = 23$ $-4k + 19 = 23$ $-19 \quad -19$ $\frac{-4k}{-4} = \frac{4}{-4}$ $\boxed{k = -1}$
	5. $20 = 10x - 6(2x + 5)$ $20 = 10x - 12x - 30$ $20 = -2x - 30$ $+30 \quad +30$ $\frac{50}{-2} = \frac{-2x}{-2}$ $\boxed{x = -25}$

	6. $8(2w-1)-4w=-116$ $16w-8-4w=-116$ $12w-8=-116$ $\quad +8 \quad +8$ $12w=-108$ $\frac{12w}{12}=\frac{-108}{12}$ $\boxed{w=-9}$
	7. $11h-(2h-1)=118$ $11h-2h+1=118$ $9h+1=118$ $\quad -1 \quad -1$ $9h=117$ $\frac{9h}{9}=\frac{117}{9}$ $\boxed{h=13}$
	8. $-25=\frac{1}{2}(10x-2)+3x$ $-25=5x-1+3x$ $-25=8x-1$ $+1 \quad +1$ $-24=8x$ $\frac{-24}{8}=\frac{8x}{8}$ $\boxed{x=-3}$
	9. $7-\frac{5}{2}(8r-6)+2r=32$ $7-20r+15+2r=32$ $-18r+22=32$ $\quad -22 \quad -22$ $-18r=10$ $\frac{-18r}{-18}=\frac{10}{-18}$ $\boxed{r=-\frac{5}{9}}$
Translate & Solve  	**10.** "*Five times the difference of twice a number and three, decreased by the sum of the number and eight, equals 13.*" $5(2n-3)-(n+8)=13$ $10n-15-n-8=13$ $9n-23=13$ $\quad +23 \quad +23$ $9n=36$ $\frac{9n}{9}=\frac{36}{9}$ $\boxed{n=4}$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples	
Steps to Solve	1. Distribute (if necessary)	
	2. Combine like terms.	
	3. Move Variables to one side.	
	4. Solve!	
Examples	**1.** $5y - 8 = 3y + 12$ $-3y \quad -3y$ $2y - 8 = 12$ $+8 \quad +8$ $\frac{2y}{2} = \frac{20}{2}$ $\boxed{y = 10}$	**2.** $-6x + 14 = 12 - 8x$ $+8x \quad +8x$ $2x + 14 = 12$ $-14 \quad -14$ $\frac{2x}{2} = \frac{-2}{2}$ $\boxed{x = -1}$
	3. $7k = 3k - 36$ $-3k \quad -3k$ $\frac{4k}{4} = \frac{-36}{4}$ $\boxed{k = -9}$	**4.** $12 - 2u = 9u + 45$ $+2u \quad +2u$ $12 = 11u + 45$ $-45 \quad -45$ $\frac{-33}{11} = \frac{11u}{11}$ $\boxed{-3 = u}$
	5. $11 - m = 51 - 6m$ $+6m \quad +6m$ $11 + 5m = 51$ $-11 \quad -11$ $\frac{5m}{5} = \frac{40}{5}$ $\boxed{m = 8}$	**6.** $-10k + 1 = 40 - 7k$ $+10k \quad +10k$ $1 = 40 + 3k$ $-40 \quad -40$ $\frac{-39}{3} = \frac{3k}{3}$ $\boxed{-13 = k}$

	7. $3(6p-1)=11p-45$ $18p-3=11p-45$ $-11p \quad -11p$ $7p-3=-45$ $+3 \quad +3$ $\frac{7p}{7}=\frac{-42}{7}$ $\boxed{p=-6}$	**8.** $2(4w-1)=-10(w-3)+4$ $8w-2=-10w+30+4$ $8w-2=-10w+34$ $+10w \quad +10w$ $18w-2=34$ $+2 \quad +2$ $\frac{18w}{18}=\frac{36}{18}$ $\boxed{w=2}$
	9. $9(m-3)+3m=7m+43$ $9m-27+3m=7m+43$ $12m-27=7m+43$ $-7m \quad -7m$ $5m-27=43$ $+27 \quad +27$ $\frac{5m}{5}=\frac{70}{5}$ $\boxed{m=14}$	**10.** $-16-7(2a+3)=23-2a$ $-16-14a-21=23-2a$ $-14a-37=23-2a$ $+14a \quad +14a$ $-37=23+12a$ $-23 \quad -23$ $\frac{-60}{12}=\frac{12a}{12}$ $\boxed{-5=a}$
	11. $5x-(x-18)=6-2(x+15)$ $5x-x+18=6-2x-30$ $4x+18=-2x-24$ $+2x \quad +2x$ $6x+18=-24$ $-18 \quad -18$ $\frac{6x}{6}=\frac{-42}{6}$ $\boxed{x=-7}$	**12.** $8(y+4)-2(y-1)=70-3y$ $8y+32-2y+2=70-3y$ $6y+34=70-3y$ $+3y \quad +3y$ $9y+34=70$ $-34 \quad -34$ $\frac{9y}{9}=\frac{36}{9}$ $\boxed{y=4}$

Summary: ____

NO SOLUTION & INFINITE SOLUTION

No Solution	Infinite Solution
$-4(2x + 1) = -8x - 2$ $-8x - 4 = -8x - 2$ $+8x \quad +8x$ $-4 \neq -2$ $\boxed{\emptyset}$	$-5 - 9x = 3(1 - 3x) - 8$ $-5 - 9x = 3 - 9x - 8$ $-5 - 9x = -5 - 9x$ $+9x \quad +9x$ $-5 = -5$ $\boxed{\infty}$
There is **no possible number** that could work as a solution to the equation!	**Every number** could work as a solution!

MORE EXAMPLES!

1. $3(2x + 2) - 3x = 6 + 3x$
$6x + 6 - 3x = 6 + 3x$
$3x + 6 = 6 + 3x$
$-3x \quad -3x$
$6 = 6$
$\boxed{\infty}$

2. $6(2x - 6) = -7(-2x + 4)$
$12x - 36 = 14x - 28$
$-12x \quad -12x$
$-36 = 2x - 28$
$+28 \quad +28$
$\frac{-8}{2} = \frac{2x}{2}$
$\boxed{-4 = x}$

3. $8(5x - 3) = 6(-3x - 4)$
$40x - 24 = -18x - 24$
$+18x \quad +18x$
$58x - 24 = -24$
$+24 \quad +24$
$\frac{58x}{58} = \frac{0}{58}$
$\boxed{x = 0}$

4. $3x - 13 = 7(x + 2) - 4(x - 7)$
$3x - 13 = 7x + 14 - 4x + 28$
$3x - 13 = 3x + 42$
$-3x \quad -3x$
$-13 \neq 42$
$\boxed{\emptyset}$

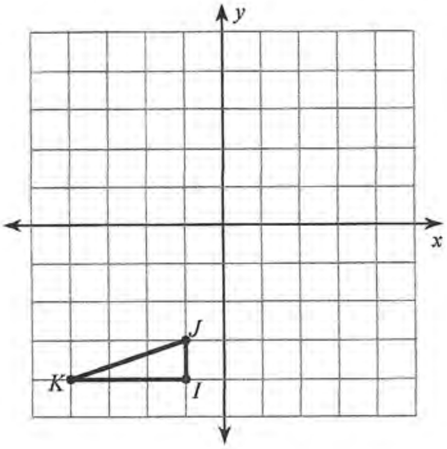
 Name________________________________ ID: 1

Week 4 - Translations 3-4 problems/day

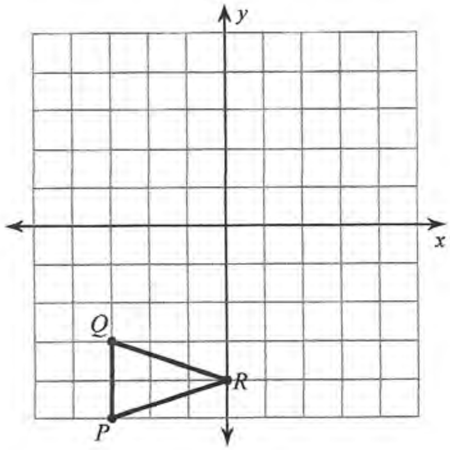
Date________________ Period____

Graph the image of the figure using the transformation given.

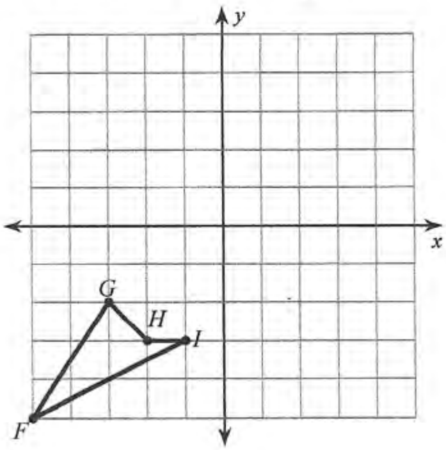
1) translation: 1 unit left and 4 units up



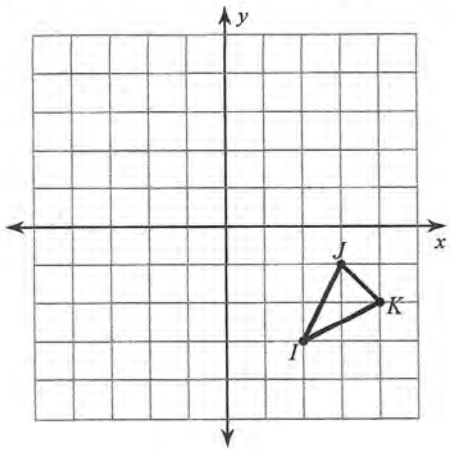
2) translation: 4 units right and 3 units up



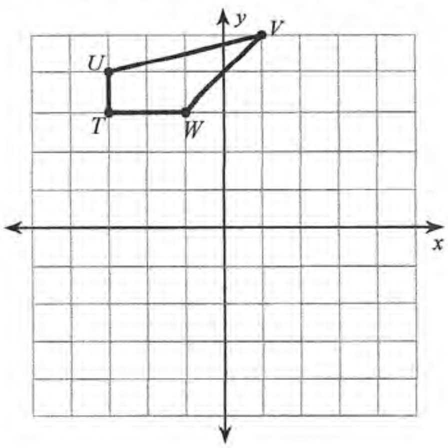
3) translation: 6 units right



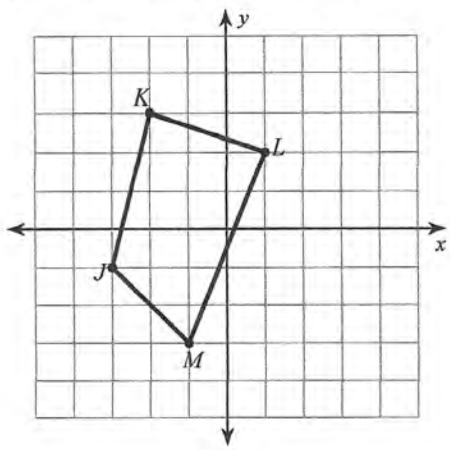
4) translation: $(x, y) \rightarrow (x, y - 2)$



5) translation: $(x, y) \rightarrow (x + 2, y - 2)$



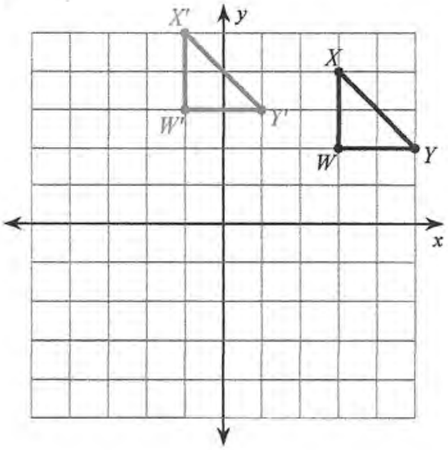
6) translation: $(x, y) \rightarrow (x, y - 1)$



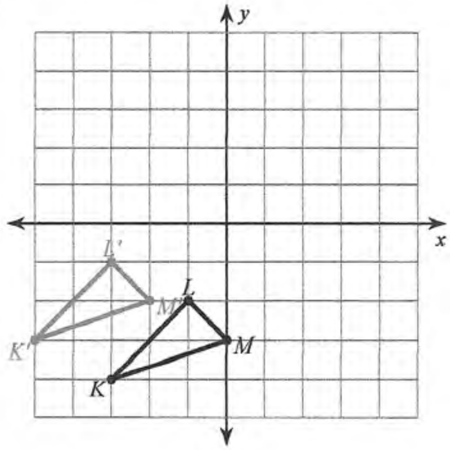
Week 4 (cont)

Write a rule to describe each transformation.

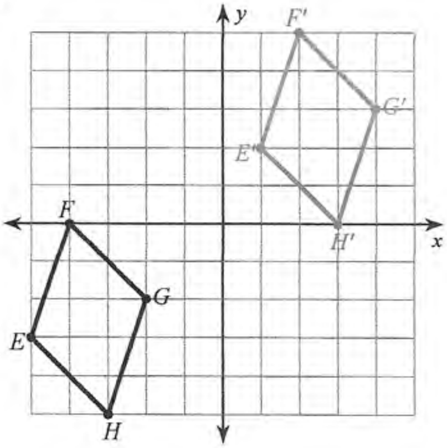
7)



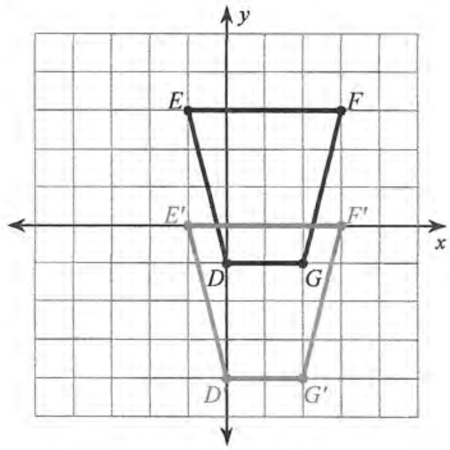
8)



9)

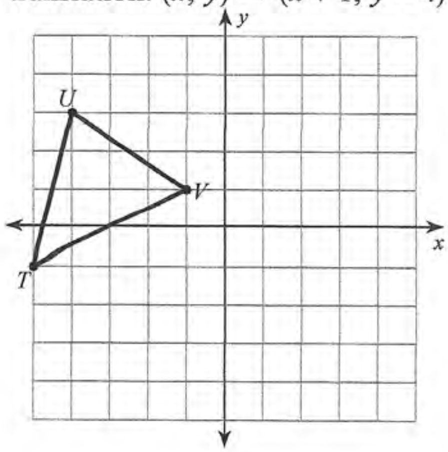


10)

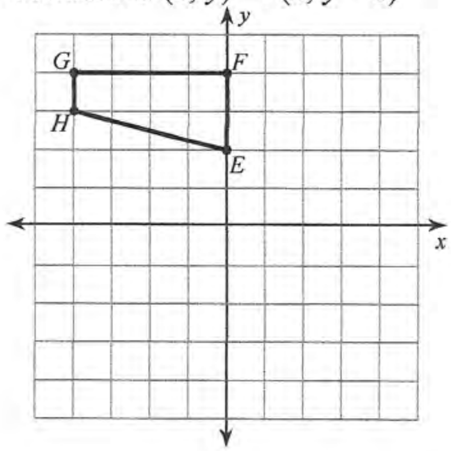


Find the coordinates of the vertices of each figure after the given transformation.

11) translation: $(x, y) \rightarrow (x + 1, y - 4)$

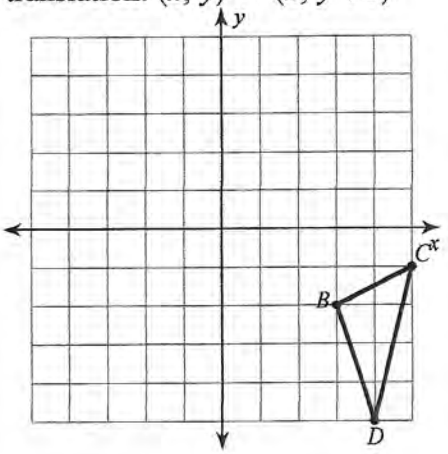


12) translation: $(x, y) \rightarrow (x, y - 1)$

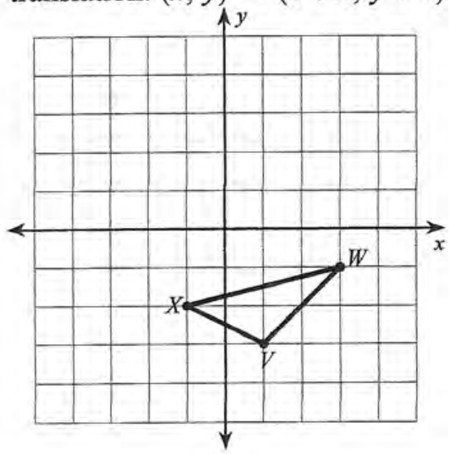


Week 4 (con't.)

13) translation: $(x, y) \rightarrow (x, y + 5)$



14) translation: $(x, y) \rightarrow (x + 2, y + 6)$



Write a rule to describe each transformation.

15) $T(-5, 3)$, $U(-4, 5)$, $V(-2, 4)$
to
$T'(-3, 2)$, $U'(-2, 4)$, $V'(0, 3)$

16) $Q(-4, -4)$, $R(-3, 1)$, $S(-2, 1)$, $T(-3, -3)$
to
$Q'(2, -2)$, $R'(3, 3)$, $S'(4, 3)$, $T'(3, -1)$

17) $C(-2, 4)$, $D(-2, 5)$, $E(3, 5)$, $F(0, 2)$
to
$C'(-2, 3)$, $D'(-2, 4)$, $E'(3, 4)$, $F'(0, 1)$

18) $K(-3, 2)$, $L(-3, 3)$, $M(-1, 2)$
to
$K'(1, -3)$, $L'(1, -2)$, $M'(3, -3)$

Find the coordinates of the vertices of each figure after the given transformation.

19) translation: $(x, y) \rightarrow (x - 2, y - 5)$
$S(-1, 0)$, $T(0, 3)$, $U(3, 2)$

20) translation: $(x, y) \rightarrow (x + 2, y - 4)$
$E(-5, 1)$, $D(-4, 4)$, $C(-1, 4)$, $B(-1, 2)$

21) translation: $(x, y) \rightarrow (x + 5, y - 5)$
$A(-5, 1)$, $B(-3, 3)$, $C(-4, 0)$

22) translation: $(x, y) \rightarrow (x - 4, y)$
$S(2, -2)$, $R(3, 1)$, $Q(5, -2)$, $P(5, -4)$

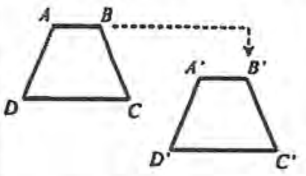
23) Triangle *FGH* is translated 7 units to the right and 3 units down to create triangle *F′G′H′*. Write a rule that describes the translation that is applied to triangle *FGH* to create triangle *F′G′H′*.

Move the correct answer to each box. Each answer may be used more than once. Not all answers will be used.

$x - 3$ | $x - 7$ | $x + 7$ | $7x$ | $y - 3$ | $y - 7$ | $y + 3$ | $3y$

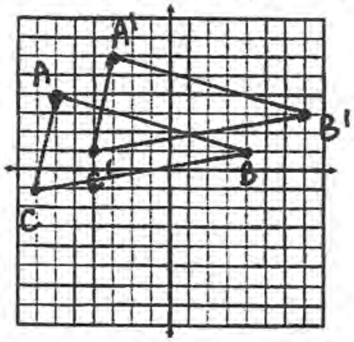
Triangle *FGH* was translated according to the rule (x, y) → (☐ , ☐).

Name:	Date:
Topic:	**Class:**

Main Ideas/Questions	Notes/Examples
TRANSLATION 	• A **translation** is a vertical and/or horizontal Slide. • **Symbolic Form:** $(x, y) \rightarrow (x+h, y+k)$ h represents the horizontal shift k represents the vertical shift • Translations result in Congruent polygons.

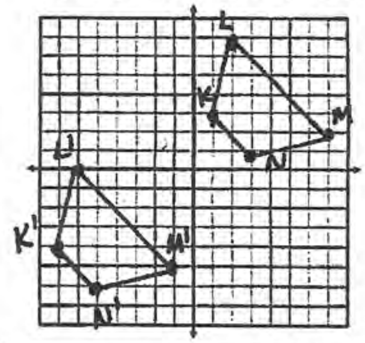
Practice! Graph and label each figure and its image under the given translation. Give the new coordinates.

1. Triangle ABC with vertices $A(-6, 4)$, $B(4, 1)$, and $C(-7, -1)$: $(x, y) \rightarrow (x+3, y+2)$



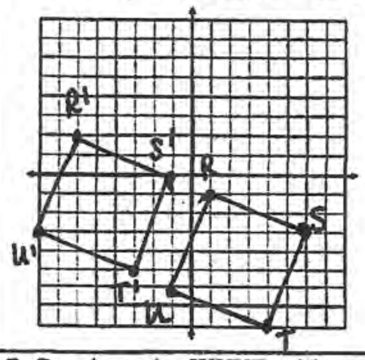
A'(-3, 6)
B'(7, 3)
C'(-4, 1)

2. Trapezoid $KLMN$ with vertices $K(1, 3)$, $L(2, 7)$, $M(7, 2)$, and $N(3, 1)$: $(x, y) \rightarrow (x-8, y-7)$



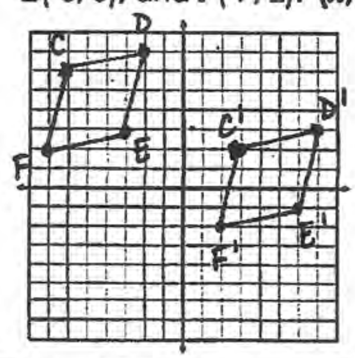
K'(-7, -4)
L'(-6, 0)
M'(-1, -5)
N'(-5, -6)

3. Square $RSTU$ with vertices $R(1, -1)$, $S(6, -3)$, $T(4, -8)$, and $U(-1, -6)$: $(x, y) \rightarrow (x-7, y+3)$



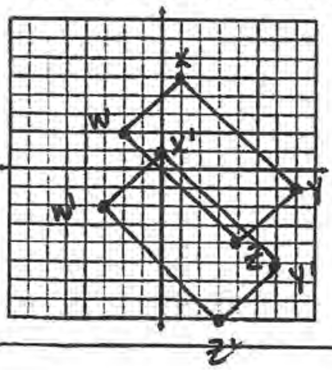
R'(-6, 2)
S'(-1, 0)
T'(-3, -5)
U'(-8, -3)

4. Rhombus $CDEF$ with vertices $C(-6, 6)$, $D(-2, 7)$, $E(-3, 3)$, and $F(-7, 2)$: $(x, y) \rightarrow (x+9, y-4)$



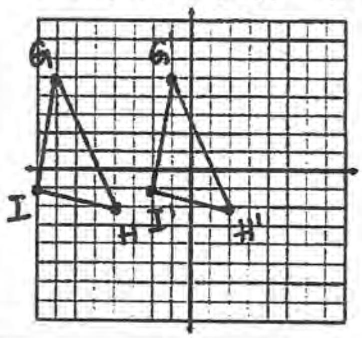
C'(3, 2)
D'(7, 3)
E'(6, -1)
F'(2, -2)

5. Rectangle $WXYZ$ with vertices $W(-2, 2)$, $X(1, 5)$, $Y(7, -1)$, and $Z(4, -4)$: $(x, y) \rightarrow (x-1, y-4)$



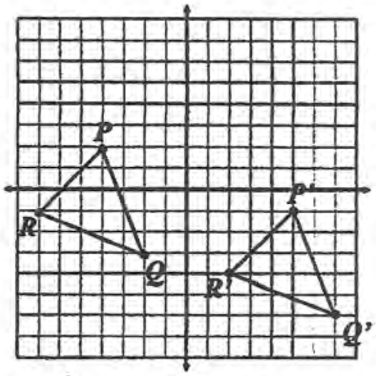
W'(-3, -2)
X'(0, 1)
Y'(6, -5)
Z'(3, -8)

6. Triangle GHI with vertices $G(-7, 5)$, $H(-4, -2)$, and $I(-8, -1)$: $(x, y) \rightarrow (x+6, y)$



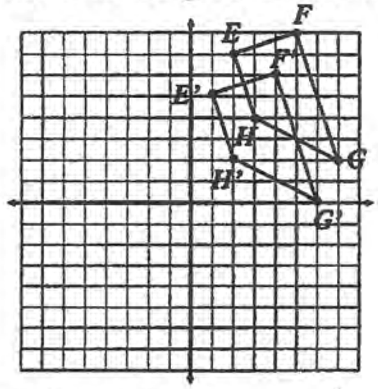
G'(-1, 5)
H'(2, -2)
I'(-2, -1)

7. Write a rule describing the translation below:



Rule: $(x, y) \rightarrow (x+9,\ y-3)$

8. Write a rule describing the translation below:

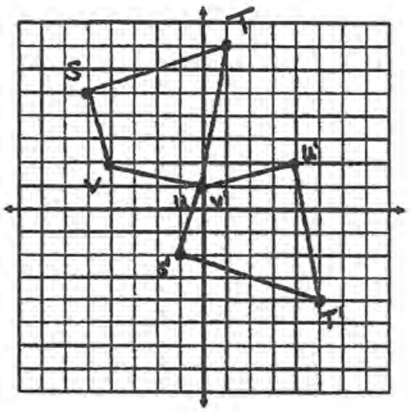


Rule: $(x, y) \rightarrow (x-1,\ y-2)$

Directions: Graph and label each figure and its image under the given transformations. Give the new coordinates.

9. Quadrilateral $STUV$ with vertices $S(-5, 5)$, $T(1, 7)$, $U(0, 1)$ and $Z(-4, 2)$:

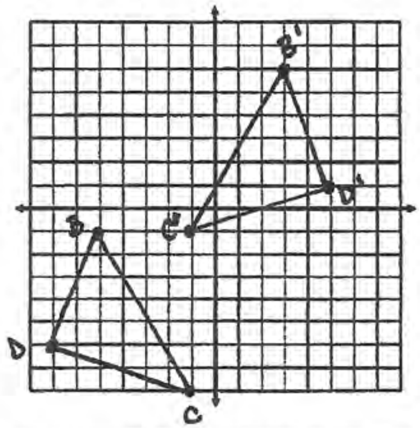
(a) Reflection: in the x-axis
(b) Translation: $(x, y) \rightarrow (x + 4, y + 3)$



S'(-1 , -2)
T'(5 , -4)
U'(4 , 2)
V'(0 , 1)

10. Triangle BCD with vertices $B(-5, -1)$, $C(-1, -8)$, and $D(-7, -6)$:

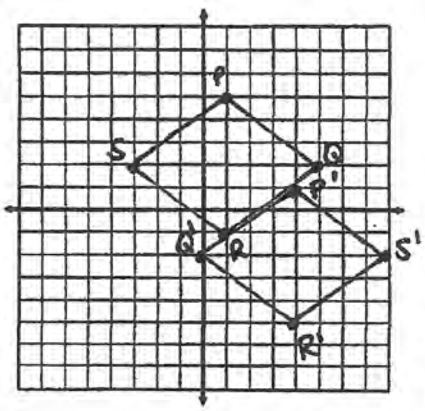
(a) Reflection: in the y-axis
(b) Translation: $(x, y) \rightarrow (x - 2, y + 7)$



B'(3 , 6)
C'(-1 , -1)
D'(5 , 1)

11. Rhombus $PQRS$ with vertices $P(1, 5)$, $Q(5, 2)$, $R(1, -1)$, and $S(-3, 2)$:

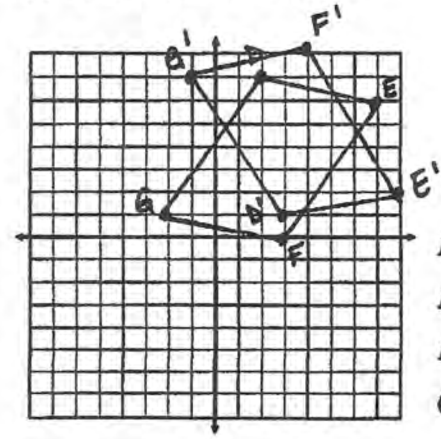
(a) Translation: $(x, y) \rightarrow (x - 5, y - 4)$
(b) Reflection: in the y-axis



P'(4 , 1)
Q'(0 , -2)
R'(4 , -5)
S'(8 , -2)

12. Parallelogram $DEFG$ with vertices $D(2, 7)$, $E(7, 6)$, $F(3, 0)$ and $G(-2, 1)$:

(a) Translation: $(x, y) \rightarrow (x + 1, y - 8)$
(b) Reflection: in the x-axis



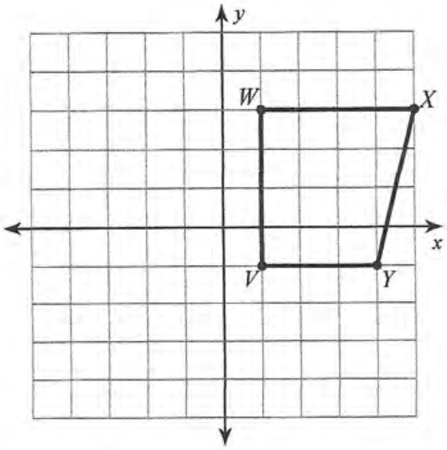
D'(3 , 1)
E'(8 , 2)
F'(4 , 8)
G'(-1 , 7)

Geometry Name______________________________ ID: 1

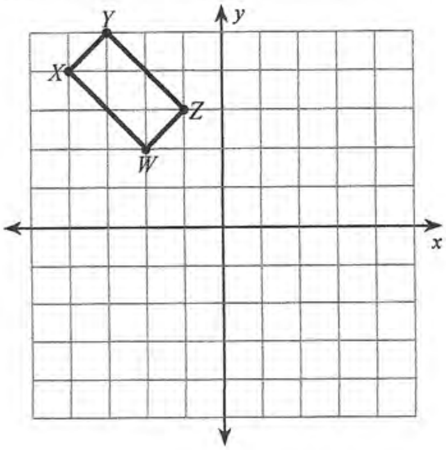
Week 5 - Reflections 3 problems/day Date______________ Period____

Graph the image of the figure using the transformation given.

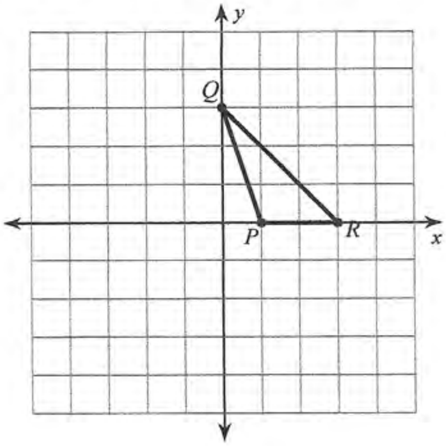
1) reflection across the y-axis



2) reflection across the x-axis

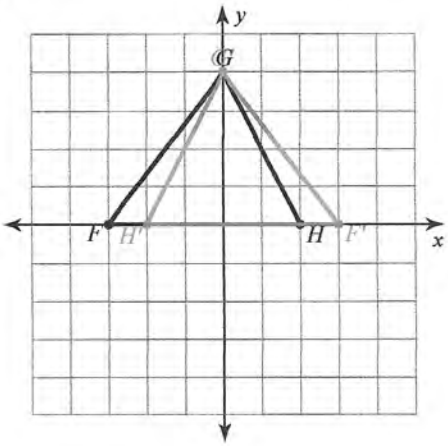


3) reflection across the x-axis

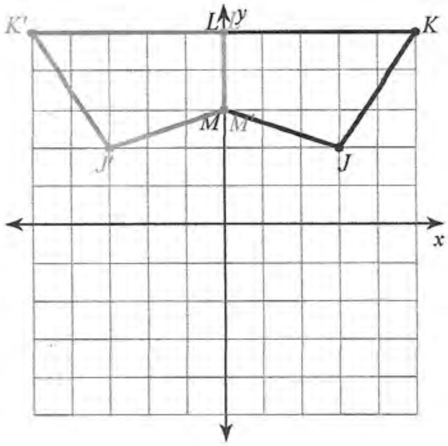


Write a rule to describe each transformation.

4)

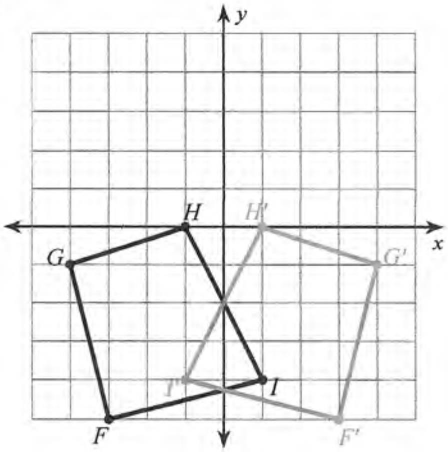


5)

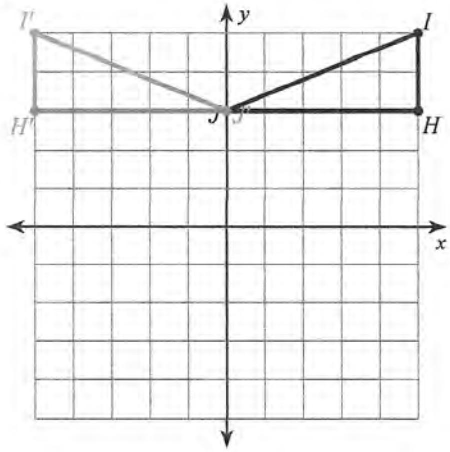


Week 5 (con't)

6)

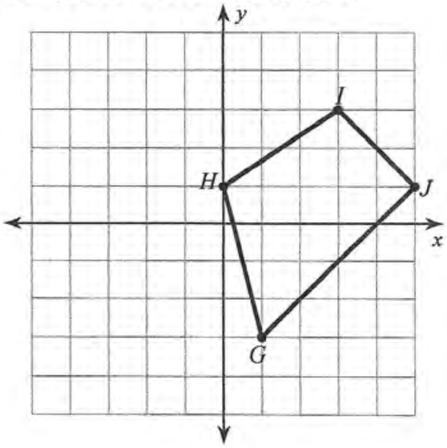


7)

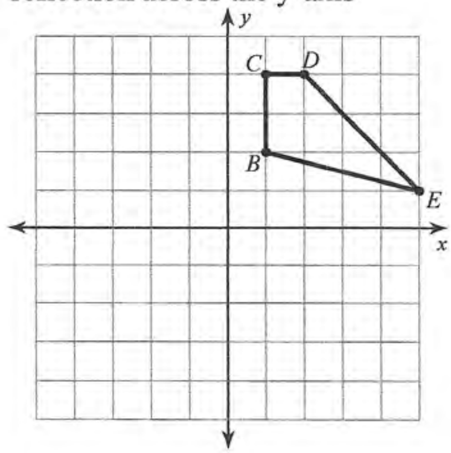


Find the coordinates of the vertices of each figure after the given transformation.

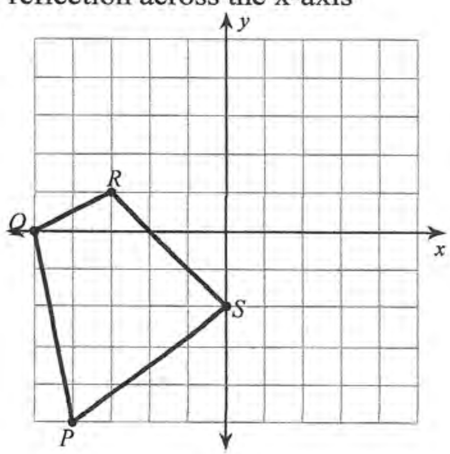
8) reflection across the x-axis



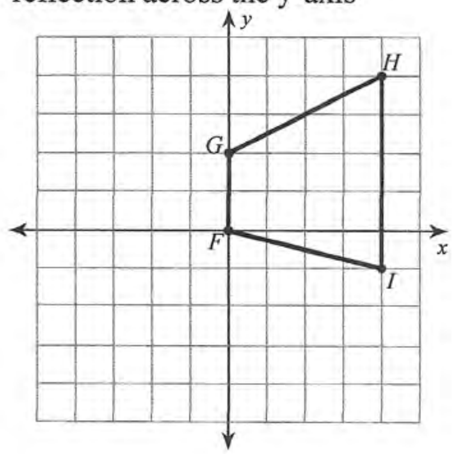
9) reflection across the y-axis



10) reflection across the x-axis



11) reflection across the y-axis



Write a rule to describe each transformation.

12) $E(0, 1)$, $F(2, 5)$, $G(5, 1)$
to
$F'(2, -5)$, $G'(5, -1)$, $E'(0, -1)$

13) $T(1, -3)$, $S(2, 0)$, $R(4, -4)$
to
$S'(2, 0)$, $R'(4, 4)$, $T'(1, 3)$

week 5 (con't 2)

14) $T(-4, -3), U(-3, -1), V(-1, -2)$
to
$U'(3, -1), V'(1, -2), T'(4, -3)$

15) $G(-4, -1), H(-5, 3), I(-2, 1)$
to
$H'(-5, -3), I'(-2, -1), G'(-4, 1)$

Find the coordinates of the vertices of each figure after the given transformation.

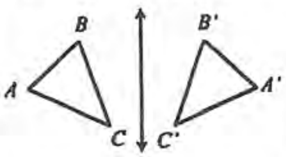
16) reflection across the y-axis
$T(2, -4), U(4, -1), V(5, -2), W(4, -4)$

17) reflection across the x-axis
$R(0, -2), S(-1, 3), T(3, 3), U(4, -2)$

18) reflection across the y-axis
$U(-5, -1), V(-4, 3), W(-3, 3), X(-3, -1)$

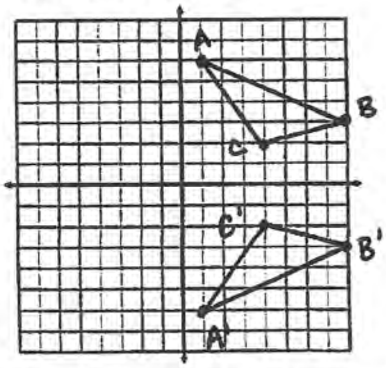
19) reflection across the x-axis
$K(-4, -4), J(-4, 1), I(1, 3), H(0, -2)$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
Transformation	• A transformation is an operation that **maps an original figure** called the pre-image onto a **new figure** called the image. • A transformation can change the size, position, or orientation of a figure. • There are **four types of transformations:** translations, reflections, rotations, and dilation.
Reflections 	• A flip over a line called the line of reflection. • Each point and its image are the same distance from the line of reflection. • The x - axis and y - axis are common lines of reflection. • Reflections result in congruent polygons.

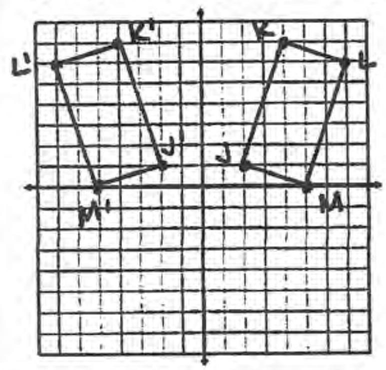
Practice! Graph and label each figure and its image under the given reflection. Give the new coordinates.

1. Triangle ABC with vertices $A(1, 6)$, $B(8, 3)$, and $C(4, 2)$ in the **x-axis.**



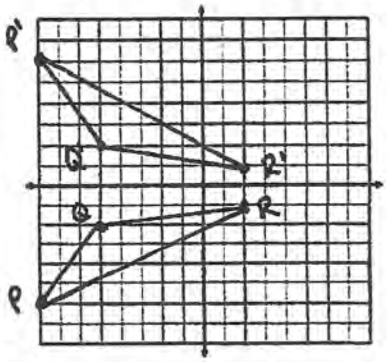
A'(1 , -6)
B'(8 , -3)
C'(4 , -2)

2. Rectangle $JKLM$ with vertices $J(2, 1)$, $K(4, 7)$, $L(7, 6)$, and $M(5, 0)$ in the **y-axis.**



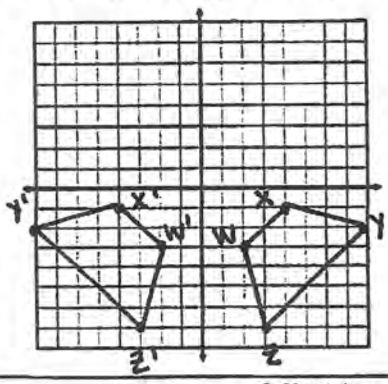
J'(-2 , 1)
K'(-4 , 7)
L'(-7 , 6)
M'(-5 , 0)

3. Triangle PQR with vertices $P(-8, -6)$, $Q(-5, -2)$, and $R(2, -1)$ in the **x-axis.**



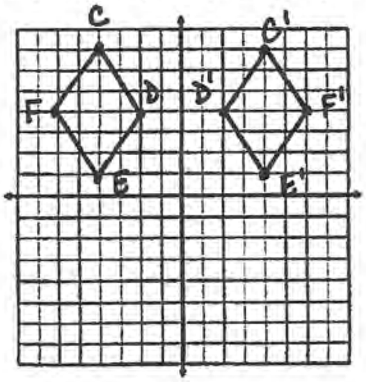
P'(-8 , 6)
Q'(-5 , 2)
R'(2 , 1)

4. Trapezoid $WXYZ$ with vertices $W(2, -3)$, $X(4, -1)$, $Y(8, -2)$, and $Z(3, -7)$ in the **y-axis.**



W'(-2 , -3)
X'(-4 , -1)
Y'(-8 , -2)
Z'(-3 , -7)

5. Rhombus *CDEF* with vertices $C(-4, 7)$, $D(-2, 4)$, $E(-4, 1)$, and $F(-6, 4)$ in the ***y*-axis.**



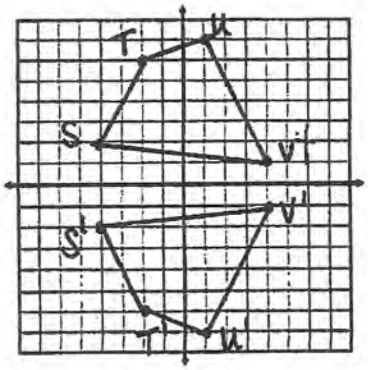
$C'($ 4 , 7 $)$

$D'($ 2 , 4 $)$

$E'($ 4 , 1 $)$

$F'($ 6 , 4 $)$

6. Quadrilateral *STUV* with vertices $S(-4, 2)$, $T(-2, 6)$, $U(1, 7)$, and $V(4, 1)$ in the ***x*-axis.**



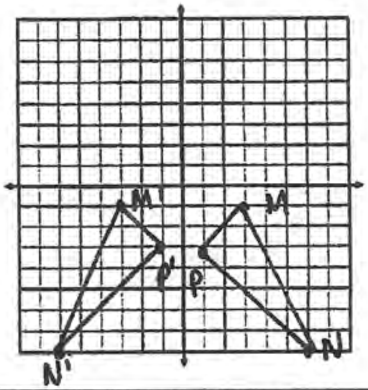
$S'($ -4 , -2 $)$

$T'($ -2 , -6 $)$

$U'($ 1 , -7 $)$

$V'($ 4 , -1 $)$

7. Triangle *MNP* with vertices $M(3, -1)$, $N(6, -8)$, and $P(1, -3)$ in the ***y*-axis.**

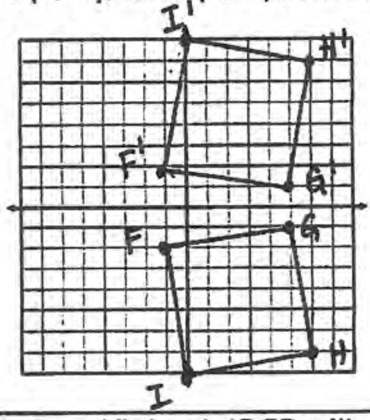


$M'($ -3 , -1 $)$

$N'($ -6 , -8 $)$

$P'($ -1 , -3 $)$

8. Square *FGHI* with vertices $F(-1, -2)$, $G(5, -1)$, $H(6, -7)$, and $I(0, -8)$ in the ***x*-axis.**



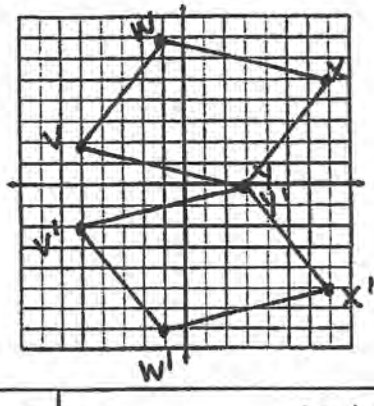
$F'($ -1 , 2 $)$

$G'($ 5 , 1 $)$

$H'($ 6 , 7 $)$

$I'($ 0 , 8 $)$

9. Parallelogram *VWXY* with vertices $V(-5, 2)$, $W(-1, 7)$, $X(7, 5)$, and $Y(3, 0)$ in the ***x*-axis.**



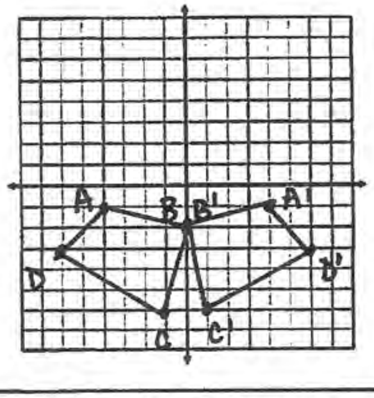
$V'($ -5 , -2 $)$

$W'($ -1 , -7 $)$

$X'($ 7 , -5 $)$

$Y'($ 3 , 0 $)$

10. Quadrilateral *ABCD* with vertices $A(-4, -1)$, $B(0, -2)$, $C(-1, -6)$, and $(-6, -3)$ in the ***y*-axis.**



$A'($ 4 , -1 $)$

$B'($ 0 , -2 $)$

$C'($ 1 , -6 $)$

$D'($ 6 , -3 $)$

RULE

Look for a pattern in the reflections to create general rules:

$r_{x\text{-axis}}(x, y) \rightarrow (x, -y)$

$r_{y\text{-axis}}(x, y) \rightarrow (-x, y)$

11. ΔLMN with vertices $L(-8, -2)$, $M(-3, -1)$, and $N(-1, -8)$ undergoes a reflection with new coordinates $L'(8, -2)$, $M'(3, -1)$, and $N'(1, -8)$. Name the line of reflection.

r y-axis

12. Which pair of points represents a reflection across the ***x*-axis?**

A. $A(-7, 2)$ and $A'(7, 2)$

B. $B(0, 3)$ and $B'(-3, 0)$

C. $C(4, -5)$ and $C'(-4, 5)$

D. $D(1, -8)$ and $D'(1, 8)$

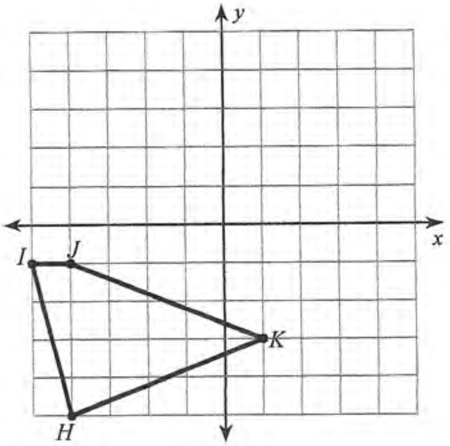
Incoming Geometry Summer Math Name______________________________ ID: 1

Week 6 - Rotations 3-4 problems/day

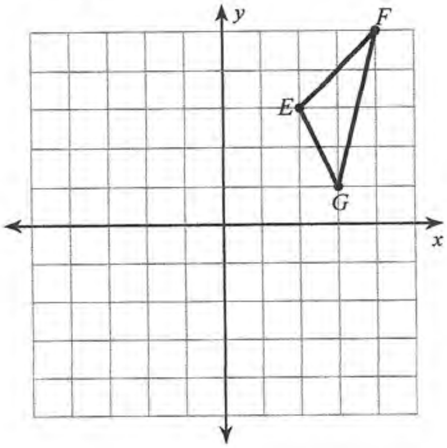
Date________________ Period____

Graph the image of the figure using the transformation given.

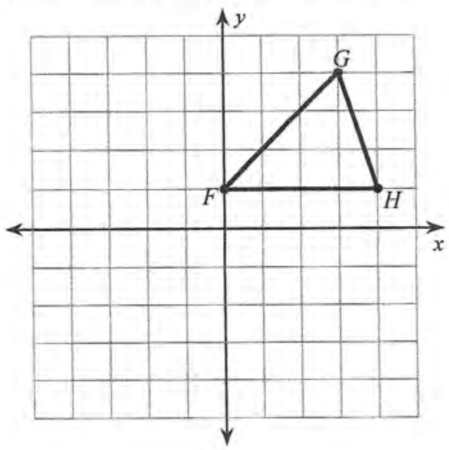
1) rotation 180° about the origin



2) rotation 90° counterclockwise about the origin

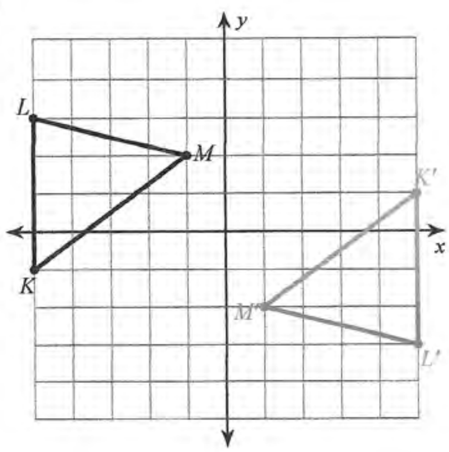


3) rotation 180° about the origin

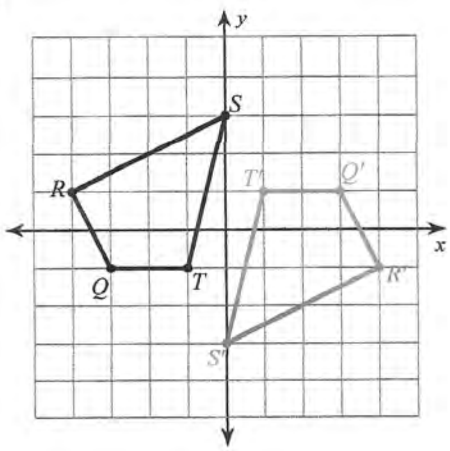


Write a rule to describe each transformation.

4)

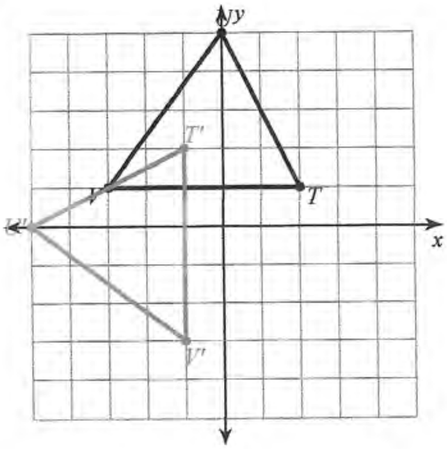


5)

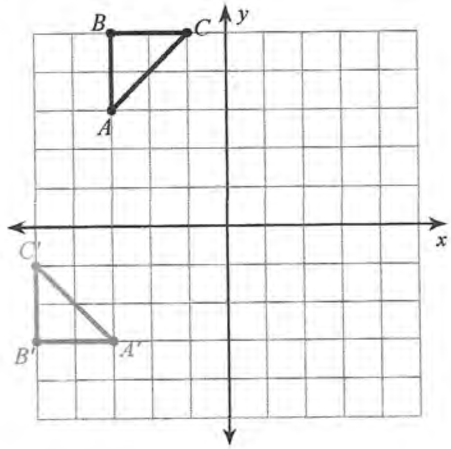


Week 6 (con't)

6)

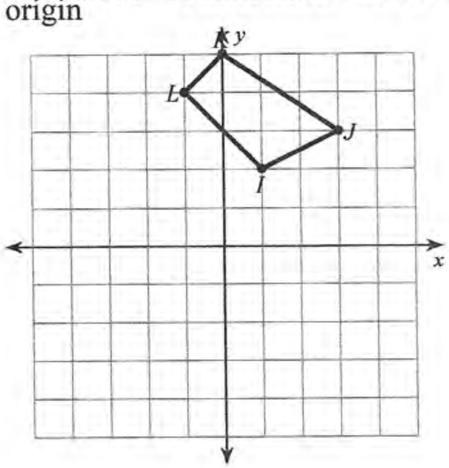


7)

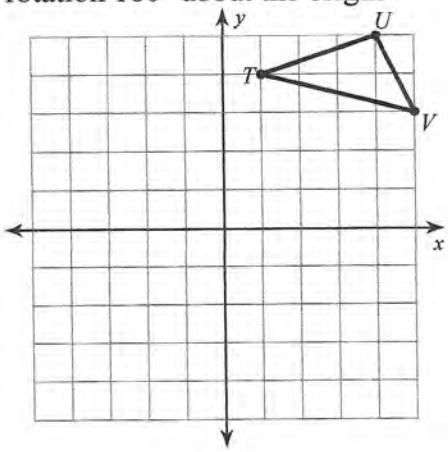


Find the coordinates of the vertices of each figure after the given transformation.

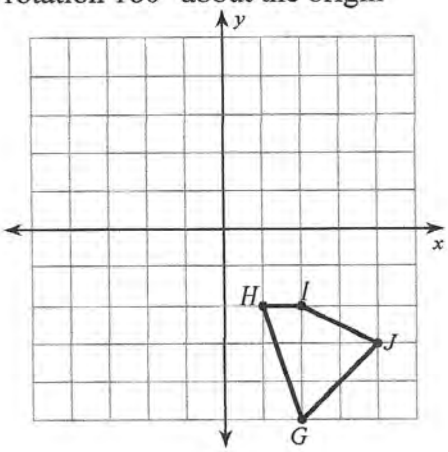
8) rotation 90° counterclockwise about the origin



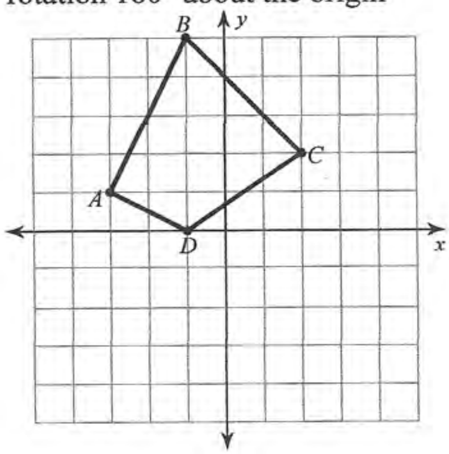
9) rotation 180° about the origin



10) rotation 180° about the origin



11) rotation 180° about the origin



Write a rule to describe each transformation.

12) $I(2, 1), J(2, 5), K(4, 4), L(4, -1)$
to
$I'(-1, 2), J'(-5, 2), K'(-4, 4), L'(1, 4)$

13) $R(-4, 0), S(-5, 5), T(-3, 4)$
to
$R'(4, 0), S'(5, -5), T'(3, -4)$

Week 6 (cont 2)

14) $C(1, -5), D(3, 0), E(5, -2)$
to
$C'(5, 1), D'(0, 3), E'(2, 5)$

15) $A(2, 2), B(3, 3), C(5, 1)$
to
$A'(-2, -2), B'(-3, -3), C'(-5, -1)$

Find the coordinates of the vertices of each figure after the given transformation.

16) rotation 180° about the origin
$T(0, 3), U(0, 4), V(4, 4), W(5, 1)$

17) rotation 90° counterclockwise about the origin
$K(-5, 3), J(-5, 4), I(-3, 4), H(-2, -1)$

18) rotation 180° about the origin
$F(-3, -4), E(-2, -1), D(2, -5)$

19) rotation 180° about the origin
$R(-1, -3), S(1, 1), T(4, 1), U(3, -3)$

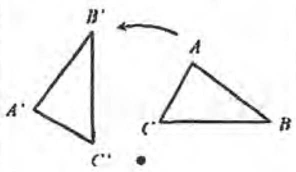
20) A quadrilateral undergoes a single transformation. For each transformation listed in the table, indicate which features of the quadrilateral remained the same.

Select the correct answer in each row.

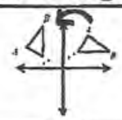
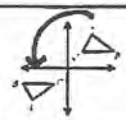
Transformation	Orientation of the Vertices	Side Lengths
$(x, y) \rightarrow (\frac{5}{4}x, \frac{5}{4}y)$	☐	☐
A reflection of the quadrilateral across the y-axis	☐	☐
$(x, y) \rightarrow (x-5, y+8)$	☐	☐
The quadrilateral is rotated 180° about the origin	☐	☐

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
ROTATION	• A turn around a fixed point called the **center of rotation.** • The figure rotates at a specific angle and direction. • Rotations result in Congruent polygons.

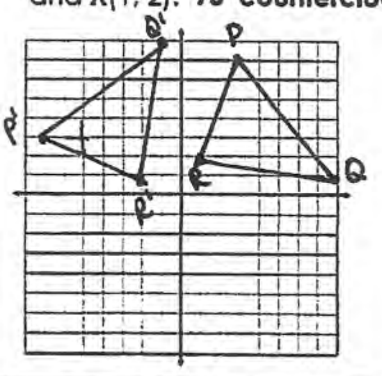


Rules for rotating COUNTERCLOCKWISE about the ORIGIN

90°		$(x,y) \to (-y,x)$
180°		$(x,y) \to (-x,-y)$
270°		$(x,y) \to (y,-x)$

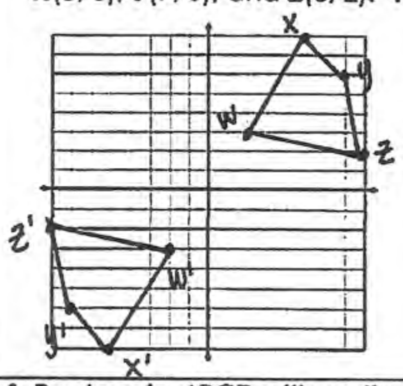
Practice! Graph and label each figure and its image under the given rotation. Give the new coordinates.

1. Triangle PQR with vertices $P(3, 7)$, $Q(8, 1)$, and $R(1, 2)$: **90° counterclockwise**



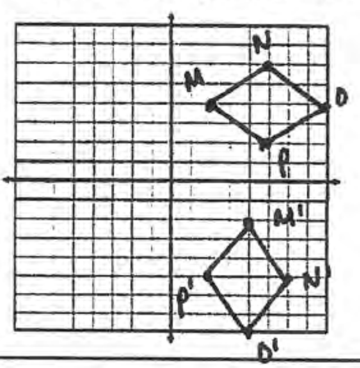
$P'(-7, 3)$
$Q'(-1, 8)$
$R'(-2, 1)$

2. Quadrilateral $WXYZ$ with vertices $W(2, 3)$, $X(5, 8)$, $Y(7, 6)$, and $Z(8, 2)$: **180°**



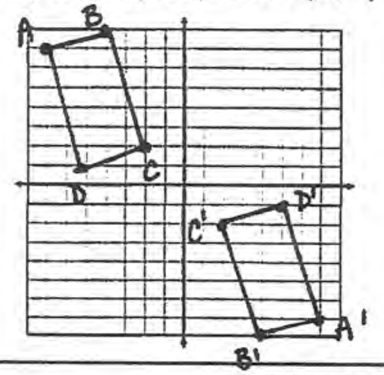
$W'(-2, -3)$
$X'(-5, -8)$
$Y'(-7, -6)$
$Z'(-8, -2)$

3. Rhombus $MNOP$ with vertices $M(2, 4)$, $N(5, 6)$, $O(8, 4)$, and $P(5, 2)$: **270° counterclockwise**



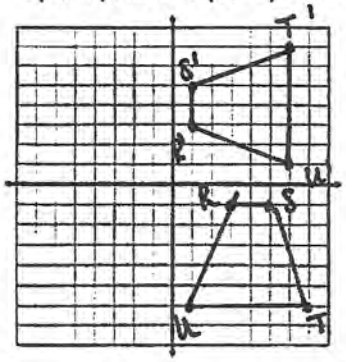
$M'(4, -2)$
$N'(6, -5)$
$O'(4, -8)$
$P'(2, -5)$

4. Rectangle $ABCD$ with vertices $A(-7, 7)$, $B(-4, 8)$, $C(-2, 2)$, and $D(-5, 1)$: **180°**



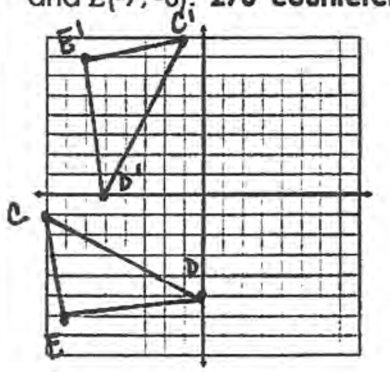
$A'(7, -7)$
$B'(4, -8)$
$C'(2, -2)$
$D'(5, -1)$

5. Trapezoid *RSTU* with vertices *R*(3, -1), *S*(5, -1), *T*(7, -6), and *U*(1, -6): **90° counterclockwise**



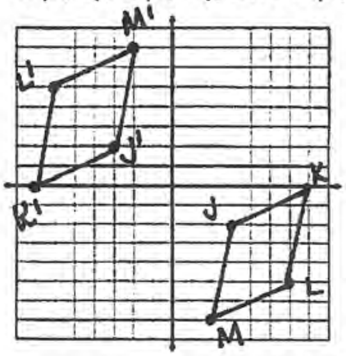
R'(1 , 3)
S'(1 , 5)
T'(6 , 7)
U'(6 , 1)

6. Triangle *CDE* with vertices *C*(-8, -1), *D*(0, -5), and *E*(-7, -6): **270° counterclockwise**



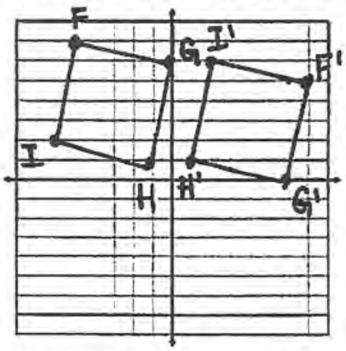
C'(-1 , 8)
D'(-5 , 0)
E'(-6 , 7)

7. Parallelogram *JKLM* with vertices *J*(3, -2), *K*(7, 0), *L*(6, -5), and *M*(2, -7): **180°**



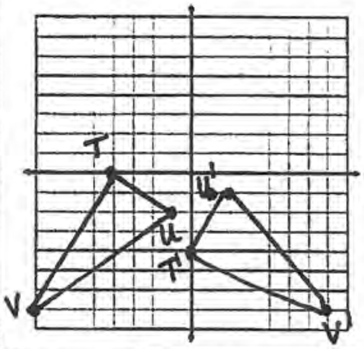
J'(-3 , 2)
K'(-7 , 0)
L'(-6 , 5)
M'(-2 , 7)

8. Square *FGHI* with vertices *F*(-5, 7), *G*(0, 6), *H*(-1, 1), and *I*(-6, 2): **270° counterclockwise**



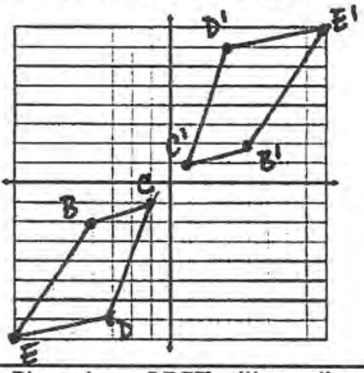
F'(7 , 5)
G'(6 , 0)
H'(1 , 1)
I'(2 , 6)

9. Triangle *TUV* with vertices *T*(-4, 0), *U*(-1, -2), and *V*(-8, -7): **90° counterclockwise**



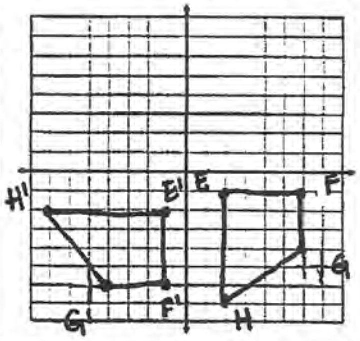
T'(0 , -4)
U'(2 , -1)
V'(7 , -8)

10. Quadrilateral *BCDE* with vertices *B*(-4, -2), *C*(-1, -1), *D*(-3, -7), and *E*(-8, -8): **180°**



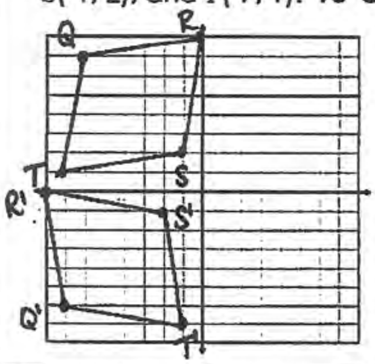
B'(4 , 2)
C'(1 , 1)
D'(3 , 7)
E'(8 , 8)

11. Trapezoid *EFGH* with vertices *E*(2, -1), *F*(6, -1), *G*(6, -4), and *H*(2, -7): **270° counterclockwise**



E'(-1 , -2)
F'(-1 , -6)
G'(-4 , -6)
H'(-7 , -2)

12. Rhombus *QRST* with vertices *Q*(-6, 7), *R*(0, 8), *S*(-1, 2), and *T*(-7, 1): **90° counterclockwise**



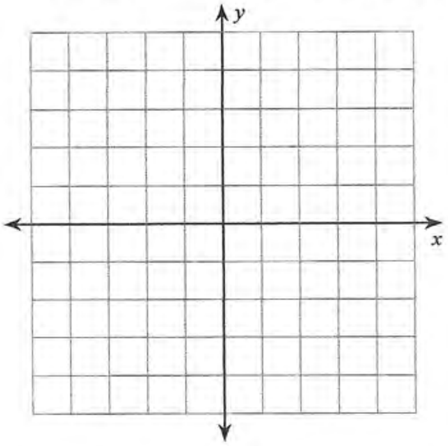
Q'(-7 , -6)
R'(-8 , 0)
S'(-2 , -1)
T'(-1 , -7)

Incoming Geometry Summer Math Name________________________ ID: 1

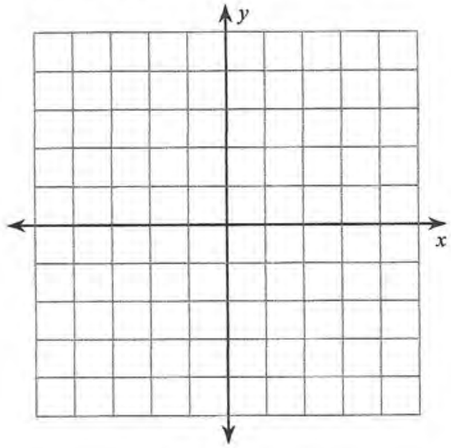
Week 7 - Dilations 3-4 problems | day Date________________ Period____

Graph the image of the figure using the transformation given.

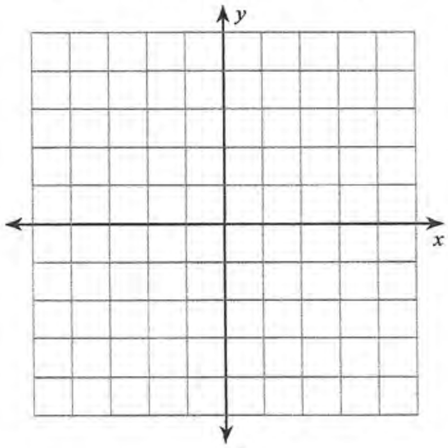
1) dilation of $\frac{1}{2}$ about the origin
$U(-2, 0)$, $V(-3, 2)$, $W(1, 3)$, $X(3, -2)$



2) dilation of 2.5 about the origin
$F(-1, 0)$, $G(1, 2)$, $H(0, -2)$



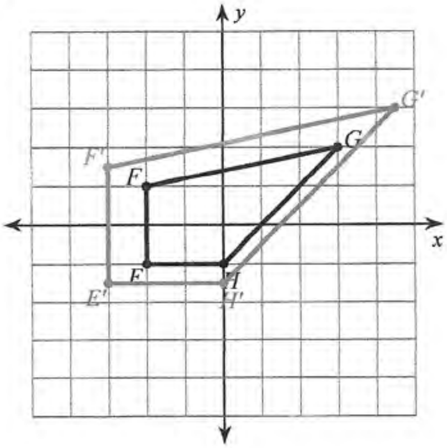
3) dilation of 1.5 about the origin
$I(-2, 1)$, $J(3, 2)$, $K(-1, -1)$



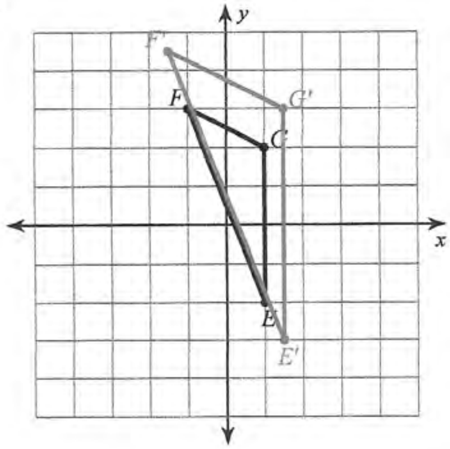
Week 7 (con't)

Write a rule to describe each transformation.

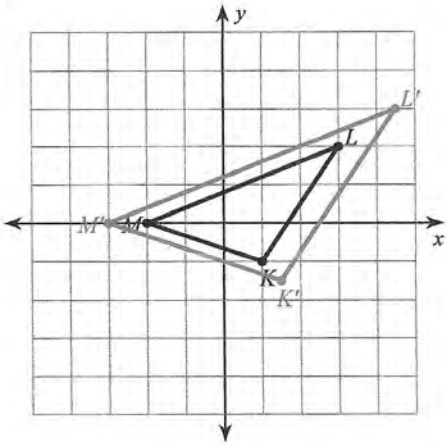
4)



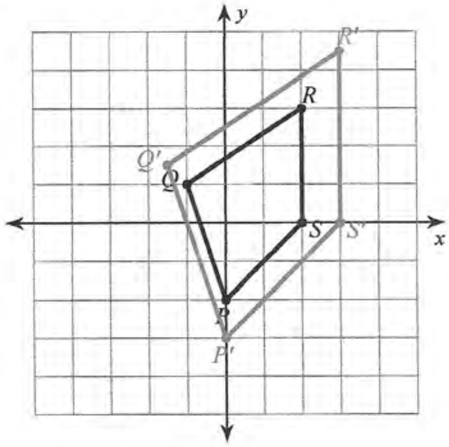
5)



6)

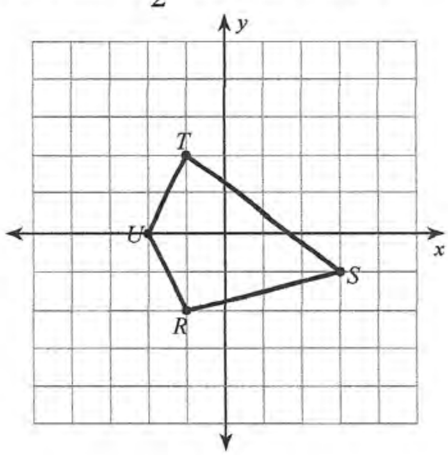


7)

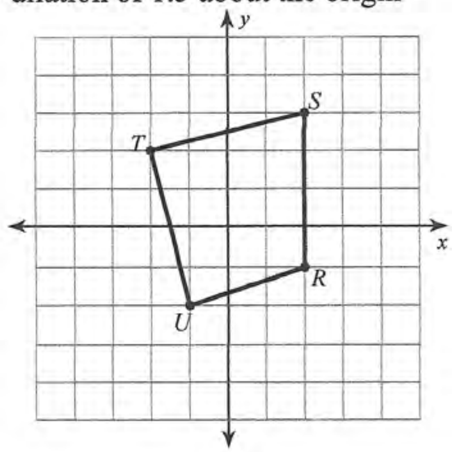


Find the coordinates of the vertices of each figure after the given transformation.

8) dilation of $\frac{1}{2}$ about the origin

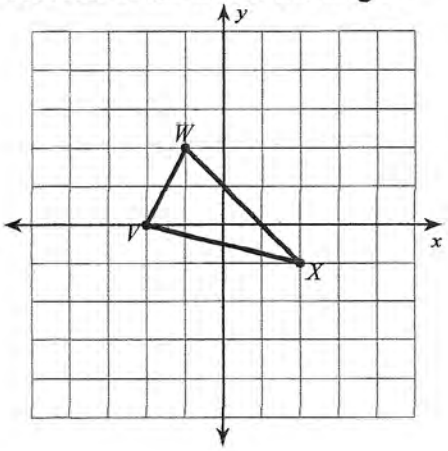


9) dilation of 1.5 about the origin

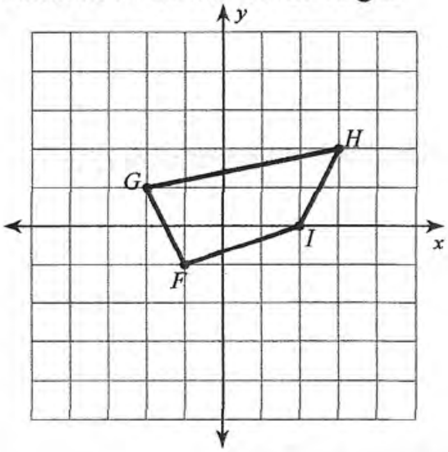


Week 7 (con't 2)

11) dilation of 2.5 about the origin



12) dilation of 1.5 about the origin



13) dilation of 2 about the origin
$X(-1, -2), W(0, 2), V(2, 1)$

14) dilation of 3.5 about the origin
$E(-1, 0), F(-1, 1), G(1, 0)$

15) dilation of 2.5 about the origin
$V(-1, 1), W(-2, 2), X(2, 2), Y(-2, -1)$

16) dilation of 2 about the origin
$J(-1, -1), K(-1, 2), L(2, 1)$

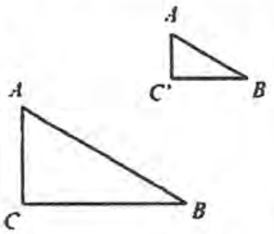
17) **A polygon will be dilated on a coordinate grid to create a larger polygon. The polygon is dilated using the origin as the center of dilation. Which rules could represent the dilation?**

Select TWO correct answers.

- ☐ $(x, y) \rightarrow (\frac{2}{3}x, \frac{2}{3}y)$
- ☐ $(x, y) \rightarrow (\frac{8}{7}x, \frac{8}{7}y)$
- ☐ $(x, y) \rightarrow (x + 5, y + 5)$
- ☐ $(x, y) \rightarrow (3x, 3y)$
- ☐ $(x, y) \rightarrow (0.4x, 0.4y)$

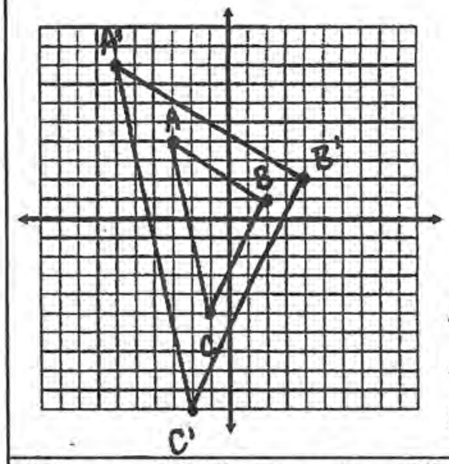
Name:	Date:
Topic:	**Class:**

Main Ideas/Questions	Notes/Examples
# Dilation	• The <u>enlargement</u> or <u>reduction</u> of a figure.
	• The <u>scale factor</u> indicates how much the figure will enlarge or reduce.
	• Variable for scale factor: <u>k</u>
	➢ When <u>$k > 1$</u>, the dilation is an <u>enlargement</u>.
	➢ When <u>$k < 1$</u>, the dilation is a <u>reduction</u>.
	• Dilations result in <u>similar figures</u>!



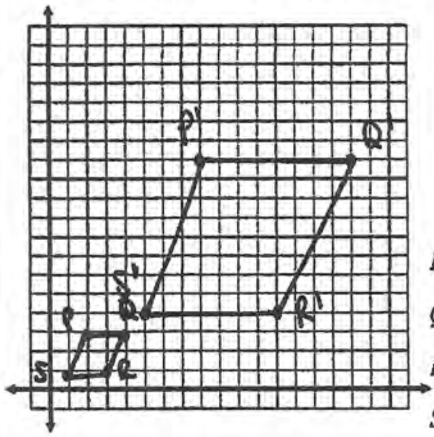
Practice! Graph and label each figure and its image under the given dilation. Give the new coordinates.

1. Triangle ABC with vertices $A(-3, 4)$, $B(2, 1)$, and $C(-1, -5)$: $\boldsymbol{k = 2}$



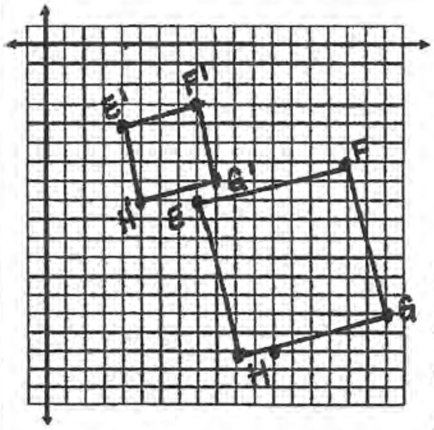
A'(-6 , 8)
B'(4 , 2)
C'(-2 , -10)

2. Parallelogram $PQRS$ with vertices $P(2, 3)$, $Q(4, 3)$, $R(3, 1)$, and $S(1, 1)$: $\boldsymbol{k = 4}$



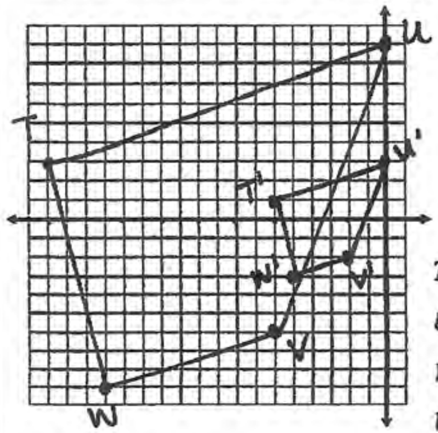
P'(8 , 12)
Q'(16 , 12)
R'(12 , 4)
S'(4 , 4)

3. Square $EFGH$ with vertices $E(8, -8)$, $F(16, -6)$, $G(18, -14)$, and $H(10, -16)$: $\boldsymbol{k = 1/2}$



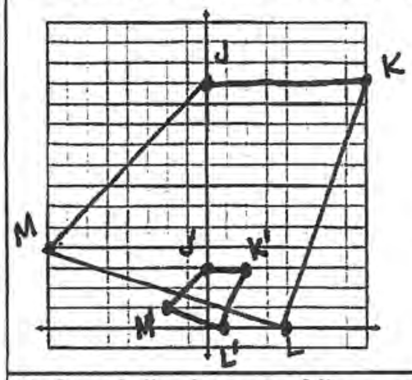
E'(4 , -4)
F'(8 , -3)
G'(9 , -7)
H'(5 , -8)

4. Trapezoid $TUVW$ with vertices $T(-18, 3)$, $U(0, 9)$, $V(-6, -6)$, and $W(-15, -9)$: $\boldsymbol{k = 1/3}$



T'(-6 , 1)
U'(0 , 3)
V'(-2 , -2)
W'(-5 , -3)

5. Quadrilateral $JKLM$ with vertices $J(0, 12)$, $K(8, 12)$, $L(4, 0)$, and $M(-8, 4)$: $k = 1/4$



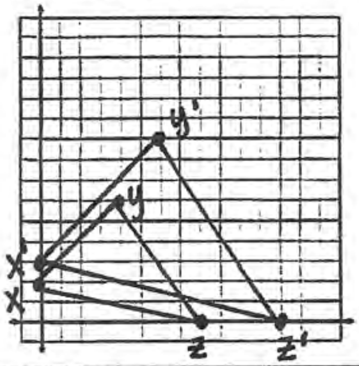
$J'($ 0 , 3 $)$

$K'($ 2 , 3 $)$

$L'($ 1 , 0 $)$

$M'($ -2 , 1 $)$

6. Triangle XYZ with vertices $X(0, 2)$, $Y(4, 6)$, and $Z(8, 0)$: $k = 3/2$

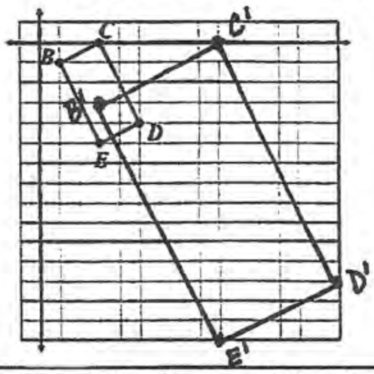


$X'($ 0 , 3 $)$

$Y'($ 6 , 9 $)$

$Z'($ 12 , 0 $)$

7. Graph the image of the rectangle below using a scale factor of $k = 3$.



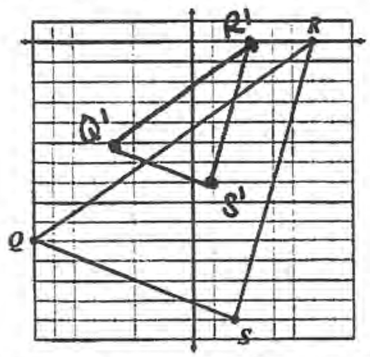
$B'($ 3 , -3 $)$

$C'($ 9 , 0 $)$

$D'($ 15 , -12 $)$

$E'($ 9 , -15 $)$

8. Graph the image of the triangle below using using a scale factor of $k = 1/2$.

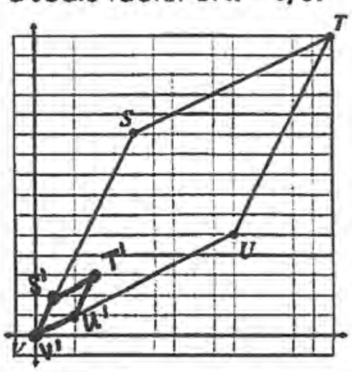


$Q'($ -4 , -5 $)$

$R'($ 3 , 0 $)$

$S'($ 1 , -7 $)$

9. Graph the image of the rhombus below using a scale factor of $k = 1/5$.



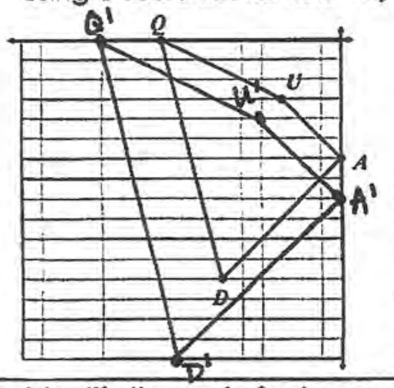
$S'($ 1 , 2 $)$

$T'($ 3 , 3 $)$

$U'($ 2 , 1 $)$

$V'($ 0 , 0 $)$

10. Graph the image of the quadrilateral below using a scale factor of $k = 4/3$.



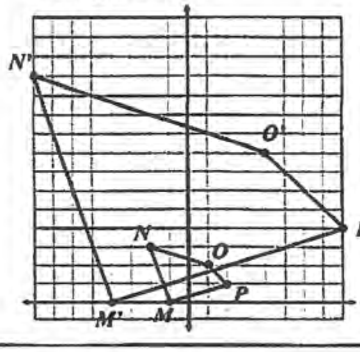
$Q'($ -12 , 0 $)$

$U'($ -4 , -4 $)$

$A'($ 0 , -8 $)$

$D'($ -8 , -16 $)$

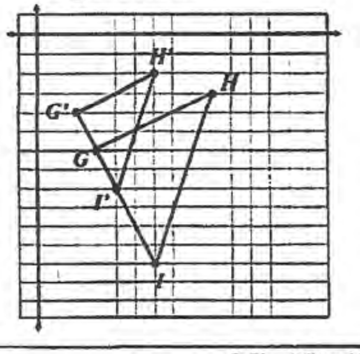
11. Identify the scale factor used to graph the image below.



P(2,1)
P'(8,4)

$k =$ 4

12. Identify the scale factor used to graph the image below.



H(9,-3)
H'(6,-2)

$k =$ 2/3

Incoming Geometry Summer Math Name________________________________ ID: 1

Week 8 - Radicals Review (4-5 problems/day) Date________________ Period____

Simplify.

1) $\sqrt{36}$

2) $\sqrt{81}$

3) $\sqrt{96}$

4) $\sqrt{32}$

5) $9\sqrt{80}$

6) $6\sqrt{252}$

7) $3\sqrt{144}$

8) $10\sqrt{20}$

9) $2\sqrt{5} \cdot -\sqrt{2}$

10) $\sqrt{15} \cdot \sqrt{15}$

11) $-3\sqrt{6} \cdot 2\sqrt{6}$

12) $\sqrt{25} \cdot -5\sqrt{5}$

13) $\sqrt{6}\left(\sqrt{2} + 5\right)$

14) $-3\sqrt{3}\left(-5\sqrt{10} + \sqrt{3}\right)$

15) $5\sqrt{2}\left(-\sqrt{2} - \sqrt{3}\right)$

16) $\frac{2\sqrt{15}}{\sqrt{9}}$

17) $\frac{\sqrt{10}}{4\sqrt{45}}$

18) $\frac{\sqrt{2}}{4\sqrt{18}}$

19) $\frac{4\sqrt{9}}{5\sqrt{25}}$

20) $\frac{\sqrt{20}}{\sqrt{5}}$

21) $\frac{4}{2\sqrt{2}}$

22) $-\frac{5}{\sqrt{3}}$

Week 8 (con't.)

23) $\frac{\sqrt{4}}{\sqrt{20}}$

24) $\frac{\sqrt{5}}{\sqrt{3}}$

25) $\frac{5}{\sqrt{3}}$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples

WARM-UP

List the perfect squares, cubes, and fourths.

Perfect Squares:
1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ...

Perfect Cubes:
1, 8, 27, 64, 125, 216, 343, 512, 729, 1000, ...

Perfect Fourths:
1, 16, 81, 256, 625, 1296, 2401, 4096, 6561, 10000, ...

N^TH ROOTS

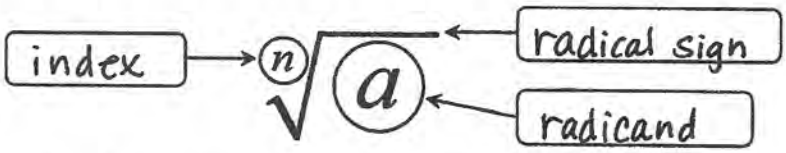
Definition: x is the n^{th} **root** of a real number a if $x^n = a$

Examples:

- 9 and -9 are **square roots** of 81 because $9^2 = 81$ and $(-9)^2 = 81$
- -2 is the **cube root** of -8 because $(-2)^3 = -8$
- 4 and -4 are **fourth roots** of 256 because $4^4 = 256$ and $(-4)^4 = 256$

RADICAL Expression

The n^{th} root of a real number, a, can be written as the radical expression $\sqrt[n]{a}$



- If there is **no index**, it is assumed that $n = 2$.
- **Number of Roots:**

Index	Radicand	Type of Roots	# of Roots
Even	Positive	real	2 (±)
Odd	Positive	real	1 (+)
Odd	Negative	real	1 (-)
★ Even	Negative	imaginary	2 (±)

- If a radicand has more than one n^{th} root, the radical sign indicates only the **principal, or positive, root.**

EVALUATING Radicals

Find each value.

$\sqrt{16} = 4$	$-\sqrt{121} = -11$	$\sqrt{289} = 17$	$-\sqrt{\frac{4}{25}} = -\frac{2}{5}$
$\sqrt[3]{8} = 2$	$\sqrt[3]{343} = 7$	$\sqrt[3]{-125} = -5$	$\sqrt[3]{-\frac{1}{27}} = -\frac{1}{3}$
$-\sqrt[4]{1} = -1$	$\sqrt[4]{2{,}401} = 7$	$-\sqrt[4]{4{,}096} = -8$	$\sqrt[4]{\frac{81}{16}} = \frac{3}{2}$

SIMPLIFYING *Radicals*	1. $\sqrt{117} = \sqrt{9}\cdot\sqrt{13}$ $\boxed{= 3\sqrt{13}}$	2. $4\sqrt{320} = 4\cdot\sqrt{64}\cdot\sqrt{5}$ $= 4\cdot 8\cdot\sqrt{5}$ $\boxed{= 32\sqrt{5}}$
	3. $2\sqrt[3]{48} = 2\cdot\sqrt[3]{8}\cdot\sqrt[3]{6}$ $= 2\cdot 2\cdot\sqrt[3]{6}$ $\boxed{= 4\sqrt[3]{6}}$	4. $3\sqrt[3]{108} = 3\cdot\sqrt[3]{27}\cdot\sqrt[3]{4}$ $= 3\cdot 3\cdot\sqrt[3]{4}$ $\boxed{= 9\sqrt[3]{4}}$
	5. $\sqrt[3]{-250} = \sqrt[3]{-125}\cdot\sqrt[3]{2}$ $\boxed{= -5\sqrt[3]{2}}$	6. $6\sqrt[3]{-2} = 6\cdot\sqrt[3]{-1}\cdot\sqrt[3]{2}$ $= 6\cdot(-1)\cdot\sqrt[3]{2}$ $\boxed{= -6\sqrt[3]{2}}$
	7. $3\sqrt[4]{162} = 3\cdot\sqrt[4]{81}\cdot\sqrt[4]{2}$ $= 3\cdot 3\cdot\sqrt[4]{2}$ $\boxed{= 9\sqrt[4]{2}}$	8. $5\sqrt[4]{2{,}592} = 5\cdot\sqrt[4]{1296}\cdot\sqrt[4]{2}$ $= 5\cdot 6\cdot\sqrt[4]{2}$ $\boxed{= 30\sqrt[4]{2}}$
Radicals with **VARIABLES**	**Square Roots** Exponents must be multiples of 2! **Cube Roots** Exponents must be multiples of 3! **4th Roots** Exponents must be multiples of 4!	
	9. $\sqrt{32x^4y^9} = \sqrt{16x^4y^8}\cdot\sqrt{2y}$ $\boxed{= 4x^2y^4\sqrt{2y}}$	10. $\sqrt{324a^3b^7} = \sqrt{324a^2b^6}\cdot\sqrt{ab}$ $\boxed{= 18ab^3\sqrt{ab}}$
	11. $\sqrt[3]{216m^3n^6}$ $\boxed{= 6mn^2}$	12. $\sqrt[3]{56r^8s^4} = \sqrt[3]{8r^6s^3}\cdot\sqrt[3]{7r^2s}$ $\boxed{= 2r^2s\sqrt[3]{7r^2s}}$
	13. $\sqrt[3]{-64x^{10}y^{21}} = \sqrt[3]{-64x^9y^{21}}\cdot\sqrt[3]{x}$ $\boxed{= -4x^3y^7\sqrt[3]{x}}$	14. $\sqrt[3]{-81p^2q^{12}} = \sqrt[3]{-27q^{12}}\cdot\sqrt[3]{3p^2}$ $\boxed{= -3q^4\sqrt[3]{3p^2}}$
	15. $\sqrt[4]{w^4v^{17}} = \sqrt[4]{w^4v^{16}}\cdot\sqrt[4]{v}$ $\boxed{= wv^4\sqrt[4]{v}}$	16. $\sqrt[4]{48m^8n^3} = \sqrt[4]{16m^8}\cdot\sqrt[4]{3n^3}$ $\boxed{= 2m^2\sqrt[4]{3n^3}}$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
ADDING & SUBTRACTING *Radicals*	① **SIMPLY** all radicals.
	② Identify radicals with the **SAME INDEX** and **SAME RADICAND.** Only these can be combined!
	③ For common radicals, **add/subtract the coefficients** and **KEEP THE COMMON RADICAL.**

1. $3\sqrt{27}-2\sqrt{12}$

$3\sqrt{9}\sqrt{3}-2\sqrt{4}\sqrt{3}$

$3\cdot3\sqrt{3}-2\cdot2\sqrt{3}$

$9\sqrt{3}-4\sqrt{3}=\boxed{5\sqrt{3}}$

2. $3\sqrt[3]{54}-2\sqrt[3]{2}+7\sqrt[3]{-16}$

$3\sqrt[3]{27}\sqrt[3]{2}$ $7\sqrt[3]{-8}\sqrt[3]{2}$

$3\cdot3\sqrt[3]{2}$ $7\cdot(-2)\sqrt[3]{2}$

$9\sqrt[3]{2}-2\sqrt[3]{2}-14\sqrt[3]{2}=\boxed{-7\sqrt[3]{2}}$

3. $7\sqrt[4]{48}-2\sqrt[4]{3}+3\sqrt[3]{72}$

$7\sqrt[4]{16}\sqrt[4]{3}$ $3\sqrt[3]{8}\sqrt[3]{9}$

$7\cdot2\sqrt[4]{3}$ $3\cdot2\sqrt[3]{9}$

$14\sqrt[4]{3}-2\sqrt[4]{3}+6\sqrt[3]{9}$

$\boxed{=12\sqrt[4]{3}+6\sqrt[3]{9}}$

4. $10\sqrt{28}+\sqrt[3]{-56}-4\sqrt{175}$

$10\sqrt{4}\sqrt{7}$ $\sqrt[3]{-8}\sqrt[3]{7}$ $-4\sqrt{25}\sqrt{7}$

$10\cdot2\sqrt{7}$ $-2\sqrt[3]{7}$ $-4\cdot5\sqrt{7}$

$20\sqrt{7}$ $-20\sqrt{7}$

$20\sqrt{7}-2\sqrt[3]{7}-20\sqrt{7}=\boxed{-2\sqrt[3]{7}}$

5. $\sqrt{98x^4y^2}-3x^2y\sqrt{2}$

$\sqrt{49x^4y^2}\sqrt{2}$

$7x^2y\sqrt{2}-3x^2y\sqrt{2}$

$=\boxed{4x^2y\sqrt{2}}$

6. $\sqrt[3]{-40a^7}+2a^2\cdot\sqrt[3]{135a^4}$

$\sqrt[3]{-8a^6}\sqrt[3]{5a}$ $2a^2\sqrt[3]{27a^3}\sqrt[3]{5a}$

$-2a^2\sqrt[3]{5a}$ $2a^2\cdot3a\sqrt[3]{5a}$

$=\boxed{-2a^2\sqrt[3]{5a}+6a^3\sqrt[3]{5a}}$

Main Ideas/Questions	Notes/Examples
MULTIPLYING *Radicals*	① Multiply coefficients, then use the **PRODUCT RULE:** $\sqrt[n]{a}\cdot\sqrt[n]{b}=\sqrt[n]{a\cdot b}$
	② **SIMPLIFY** the resulting radical.

7. $\sqrt{27}\cdot\sqrt{5}=\sqrt{135}$

$=\sqrt{9}\sqrt{15}$

$\boxed{=3\sqrt{15}}$

8. $3\sqrt{10}\cdot-2\sqrt{18}=-6\sqrt{180}$

$=-6\sqrt{36}\sqrt{5}$

$=-6\cdot6\sqrt{5}$

$=\boxed{-36\sqrt{5}}$

9. $2\sqrt[3]{9}\cdot5\sqrt[3]{-24}=10\sqrt[3]{-216}$

$=10\cdot-6$

$=\boxed{-60}$

10. $-3\sqrt[4]{64}\cdot-\sqrt[4]{8}=3\sqrt[4]{512}$

$=3\sqrt[4]{256}\sqrt[4]{2}$

$=3\cdot4\sqrt[4]{2}=\boxed{12\sqrt[4]{2}}$

11. $\sqrt{6x^4}\cdot 5\sqrt{8x^5}$

$5\sqrt{48x^9} = 5\sqrt{16x^8}\,\sqrt{3x}$

$= 5\cdot 4x^4\sqrt{3x}$

$= \boxed{20x^4\sqrt{3x}}$

12. $\sqrt[3]{54m^8}\cdot\sqrt[3]{5m^4}$

$\sqrt[3]{270m^{12}} = \sqrt[3]{27m^{12}}\,\sqrt[3]{10}$

$\boxed{=3m^4\sqrt[3]{10}}$

13. $\sqrt[3]{-3a^7b^4}\cdot\sqrt[3]{36a^6b^2}$

$\sqrt[3]{-108a^{13}b^6}$

$= \sqrt[3]{-27a^{12}b^6}\,\sqrt[3]{4a}$

$= \boxed{-3a^4b^2\sqrt[3]{4a}}$

14. $2\sqrt[4]{p^2q}\cdot 7\sqrt[4]{p^3q^{10}}$

$14\sqrt[4]{p^5q^{11}}$

$= 14\sqrt[4]{p^4q^8}\,\sqrt[4]{pq^3}$

$\boxed{= 14pq^2\sqrt[4]{pq^3}}$

BINOMIAL
Examples

15. $\sqrt{10}(5\sqrt{5}-2\sqrt{2})$

$5\sqrt{50} - 2\sqrt{20}$

$= 5\sqrt{25}\,\sqrt{2} - 2\sqrt{4}\,\sqrt{5}$

$= 5\cdot 5\sqrt{2} - 2\cdot 2\sqrt{5}$

$= \boxed{25\sqrt{2} - 4\sqrt{5}}$

16. $(8-\sqrt{10})(3-\sqrt{10})$

$24 - 8\sqrt{10} - 3\sqrt{10} + \sqrt{100}$

$= 24 - 11\sqrt{10} + 10$

$= \boxed{34 - 11\sqrt{10}}$

17. $(6\sqrt{6}-6\sqrt{2})(\sqrt{6}+\sqrt{2})$

$6\sqrt{36} + 6\sqrt{12} - 6\sqrt{12} - 6\sqrt{4}$

$= 6\cdot 6 - 6\cdot 2$

$= 36 - 12$

$\boxed{= 24}$

18. $(4-\sqrt{5})^2$

$(4-\sqrt{5})(4-\sqrt{5})$

$= 16 - 4\sqrt{5} - 4\sqrt{5} + \sqrt{25}$

$= 16 - 8\sqrt{5} + 5$

$\boxed{= 21 - 8\sqrt{5}}$

19. $\sqrt{3k}(\sqrt{12k}-2\sqrt{15k^2})$

$\sqrt{36k^2} - 2\sqrt{45k^3}$

$= 6k - 2\sqrt{9k^2}\,\sqrt{5k}$

$= 6k - 2\cdot 3k\sqrt{5k}$

$= \boxed{6k - 6k\sqrt{5k}}$

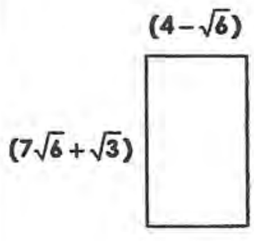
20. $(\sqrt{x}-\sqrt{8})(\sqrt{x}+\sqrt{2})$

$\sqrt{x^2} + \sqrt{2x} - \sqrt{8x} - \sqrt{16}$

$= x + \sqrt{2x} - \sqrt{4}\,\sqrt{2x} - 4$

$= x + \sqrt{2x} - 2\sqrt{2x} - 4$

$= \boxed{x - \sqrt{2x} - 4}$



21. Find the area and perimeter of the rectangle shown to the left.

Area: $(4-\sqrt{6})(7\sqrt{6}+\sqrt{3})$

$= 28\sqrt{6} + 4\sqrt{3} - 7\sqrt{36} - \sqrt{18}$

$= 28\sqrt{6} + 4\sqrt{3} - 7\cdot 6 - \sqrt{9}\,\sqrt{2}$

$\boxed{= 28\sqrt{6} + 4\sqrt{3} - 42 - 3\sqrt{2}}$

Perimeter:

$2(4-\sqrt{6}) + 2(7\sqrt{6}+\sqrt{3})$

$= 8 - 2\sqrt{6} + 14\sqrt{6} + 2\sqrt{3}$

$\boxed{= 8 + 12\sqrt{6} + 2\sqrt{3}}$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
DIVIDING *Radicals*	① Divide coefficients, then use the **QUOTIENT RULE:** $\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$
	② **SIMPLIFY** the resulting radical.
	1. $\frac{12\sqrt{160}}{2\sqrt{5}} = 6\sqrt{32} = 6\sqrt{16}\sqrt{2} = 6\cdot 4\sqrt{2} = \boxed{24\sqrt{2}}$
	2. $\frac{36\sqrt[4]{1{,}250}}{9\sqrt[4]{2}} = 4\sqrt[4]{625} = 4\cdot 5 = \boxed{20}$
	3. $\frac{\sqrt{x^3y^9}}{\sqrt{x^2y^5}} = \sqrt{xy^4} = \sqrt{y^4}\sqrt{x} = \boxed{y^2\sqrt{x}}$
	4. $\frac{28\sqrt[3]{-16m^6}}{4\sqrt[3]{2m}} = 7\sqrt[3]{-8m^5} = 7\sqrt[3]{-8m^3}\sqrt[3]{m^2} = 7\cdot -2m\sqrt[3]{m^2} = \boxed{-14m\sqrt[3]{m^2}}$
	5. $\sqrt{\frac{48}{16}} = \boxed{\sqrt{3}}$
	6. $\sqrt[3]{\frac{40}{27}} = \frac{\sqrt[3]{8}\sqrt[3]{5}}{\sqrt[3]{27}} = \boxed{\frac{2\sqrt[3]{5}}{3}}$
	7. $\sqrt[3]{\frac{7x^5}{64y^6}} = \frac{\sqrt[3]{x^3}\sqrt[3]{7x^2}}{\sqrt[3]{64y^6}} = \boxed{\frac{x\sqrt[3]{7x^2}}{4y^2}}$
	8. $\sqrt[4]{\frac{32w}{81}} = \frac{\sqrt[4]{16}\sqrt[4]{2w}}{\sqrt[4]{81}} = \boxed{\frac{2\sqrt[4]{2w}}{3}}$
RATIONALIZING *the Denominator*	* **Monomial Denominators:** Multiply the numerator and denominator by the radical. * **Binomial Denominators:** Multiply the numerator and denominator by the conjugate. (The same expression but with the opposite sign in the middle.)
	9. $\frac{3}{2\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{3\sqrt{5}}{2\cdot 5} = \boxed{\frac{3\sqrt{5}}{10}}$
	10. $\sqrt{\frac{8}{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}} = \frac{\sqrt{120}}{\sqrt{225}} = \frac{\sqrt{4}\sqrt{30}}{15} = \boxed{\frac{2\sqrt{30}}{15}}$

11. $$\frac{3\sqrt{12}\cdot\sqrt{7}}{4\sqrt{7}\cdot\sqrt{7}} = \frac{3\sqrt{84}}{4\sqrt{49}} = \frac{3\sqrt{4}\sqrt{21}}{4\cdot 7} = \frac{6\sqrt{21}}{28} = \boxed{\frac{3\sqrt{21}}{14}}$$

12. $$\frac{\sqrt{32a^5}}{\sqrt{3a}} = \frac{\sqrt{32a^4}\cdot\sqrt{3}}{\sqrt{3}\cdot\sqrt{3}} = \frac{\sqrt{96a^4}}{\sqrt{9}} = \frac{\sqrt{16a^4}\sqrt{6}}{3} = \boxed{\frac{4a^2\sqrt{6}}{3}}$$

13. $$\frac{(\sqrt{8}-\sqrt{2})\cdot\sqrt{2}}{\sqrt{2}\cdot\sqrt{2}} = \frac{\sqrt{16}-\sqrt{4}}{\sqrt{4}} = \frac{4-2}{2} = \boxed{1}$$

14. $$\frac{(3\sqrt{2}+\sqrt{6})\cdot\sqrt{12}}{\sqrt{12}\cdot\sqrt{12}} = \frac{3\sqrt{24}+\sqrt{72}}{\sqrt{144}} = \frac{3\sqrt{4}\sqrt{6}+\sqrt{36}\sqrt{2}}{12} = \frac{6\sqrt{6}+6\sqrt{2}}{12} = \boxed{\frac{\sqrt{6}+\sqrt{2}}{2}}$$

BINOMIAL

Denominators

15. $$\frac{(4)(4-\sqrt{2})}{(4+\sqrt{2})(4-\sqrt{2})} = \frac{16-4\sqrt{2}}{16-4\sqrt{2}+4\sqrt{2}-\sqrt{4}} = \frac{16-4\sqrt{2}}{14} = \boxed{\frac{8-2\sqrt{2}}{7}}$$

16. $$\frac{(2)(6+\sqrt{5})}{(6-\sqrt{5})(6+\sqrt{5})} = \frac{12+2\sqrt{5}}{36+6\sqrt{5}-6\sqrt{5}-\sqrt{25}} = \boxed{\frac{12+2\sqrt{5}}{31}}$$

17. $$\frac{(\sqrt{3})(1+4\sqrt{2})}{(1-4\sqrt{2})(1+4\sqrt{2})} = \frac{\sqrt{3}+4\sqrt{6}}{1+4\sqrt{2}-4\sqrt{2}-16\sqrt{4}} = \frac{\sqrt{3}+4\sqrt{6}}{-31} = \boxed{\frac{-\sqrt{3}-4\sqrt{6}}{31}}$$

18. $$\frac{(5-\sqrt{5})(\sqrt{5}-\sqrt{3})}{(\sqrt{5}+\sqrt{3})(\sqrt{5}-\sqrt{3})} = \frac{5\sqrt{5}-5\sqrt{3}-\sqrt{25}+\sqrt{15}}{\sqrt{25}-\sqrt{15}+\sqrt{15}-\sqrt{9}} = \boxed{\frac{5\sqrt{5}-5\sqrt{3}-5+\sqrt{15}}{2}}$$

19. $$\frac{(3+\sqrt{7})(2-2\sqrt{7})}{(2+2\sqrt{7})(2-2\sqrt{7})} = \frac{6-6\sqrt{7}+2\sqrt{7}-2\sqrt{49}}{4-4\sqrt{7}+4\sqrt{7}-4\sqrt{49}} = \frac{6-4\sqrt{7}-14}{4-28} = \frac{-8-4\sqrt{7}}{-24} = \boxed{\frac{2+\sqrt{7}}{6}}$$

20. $$\frac{(8-\sqrt{6})(3+4\sqrt{6})}{(3-4\sqrt{6})(3+4\sqrt{6})} = \frac{24+32\sqrt{6}-3\sqrt{6}-4\sqrt{36}}{9+12\sqrt{6}-12\sqrt{6}-16\sqrt{36}} = \frac{24+29\sqrt{6}-24}{9-96} = \frac{29\sqrt{6}}{-87} = \boxed{-\frac{\sqrt{6}}{3}}$$