Advanced Geometry
Summer Work

The following worksheets contain Algebra I practice problems that will help you review and get prepared for Advanced Geometry class in the fall. All students entering Advanced-level Math classes at Mt. Ararat High School are required to do work over the summer as a review unit for the course.

1) Solve all problems, showing work to justify your answers. This is not an exercise on how well you can use a calculator. You will need to attach extra paper. Please check your answers when possible.

2) Bring the completed work to the first day of Math class in the fall as it will be collected by the teacher.

3) If you do not remember how to do a particular type of problem, you can find help online at sites such as Khan Academy (khanacademy.org), Hippocampus (hippocampus.org), and WebMATH (webmath.com).

4) If you lose or misplace the worksheets, then you can find them online by logging onto the Mt. Ararat High School website (mta.link75.org) and open the Math Department page under Our Schools > Departments and Programs tab.

5) Please work hard and definitely do pace yourself so you will be able to complete this work on time. The recommendation is to finish at least one page per week to maintain a good rate.

Evaluate each expression.

1. $(15 - 5) \cdot 2$ _____
2. $9 \cdot (3 + 4)$ _____
3. $5 + 7 \cdot 4$ _____

4. $12 + 5 - 6 \cdot 2$ _____
5. $7 \cdot 9 - 4(6 + 7)$ _____
6. $8 \div (2 + 2) \cdot 7$ _____

7. $4(3 + 5) - 5 \cdot 4$ _____
8. $22 \div 11 \cdot 9 - 3^2$ _____
9. $6^2 + 3 \cdot 7 - 9$ _____

Evaluate each expression if $a = 12$, $b = 9$, and $c = 4$.

10. $a^2 + b - c^2$ _____
11. $b^2 + 2a - c^2$ _____

12. $2c(a + b)$ _____
13. $4a + 4b - c^2$ _____

14. $\dfrac{bc^2 + a}{c}$ _____
15. $\dfrac{2c^3 - ab}{4}$ _____

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

16. $\dfrac{5}{a} = \dfrac{30}{54}$ _____
17. $\dfrac{v}{46} = \dfrac{34}{23}$ _____
18. $\dfrac{40}{56} = \dfrac{k}{7}$ _____

19. $\dfrac{5}{12} = \dfrac{x+1}{4}$ _____
20. $\dfrac{r+2}{7} = \dfrac{5}{7}$ _____

21. Ann Carlyle is planning a business trip for which she needs to rent a car. The car rental company charges $36 per day plus $0.50 per mile over 100 miles. Suppose Ms. Carlyle rents the car for 4 days and drives 180 miles. Write an expression for how much it will cost Ms. Carlyle to rent the car.

22. Ysidra paints a room that has 400 square feet of wall space in 2½ hours. At this rate, how long will it take her to paint a room that has 720 square feet of wall space?

23. Walker is planning a summer vacation. He wants to visit Petrified National Forest and Meteor Crater, Arizona, the 50,000-year-old impact site of a large meteor. On a map with a scale of 2 in. = 75 mi., the two areas are about 1½ inches apart. What is the distance between Petrified National Forest and Meteor Crater?

Simplify by distributing, commuting, or associating.

1. $3 + 2(x + 5)$ _____

2. $5 + 3(x - 4)$ _____

3. $4(6 - x) + 7$ _____

4. $5(8x - 5) - 3$ _____

5. $\frac{1}{3}(6x - 18)$ _____

6. $\frac{3}{2}\left(4x - \frac{4}{3}\right)$ _____

7. $9 - 2(-3x - 4)$ _____

8. $4 - 2(x + 4) - 3(5x - 2)$ _____

9. $x^3 + y^3 - 4x^2 + 8x^2 - 5x + 6x + 9$ _____

10. $8(x - 9) - 4(3x - 6)$ _____

11. $4x^2 - (5x^2 - 8x) + 9x$ _____

12. $(3x - 8) \cdot (-3) - (3x - 6)$ _____

13. $8 - (7 - x) + 3x - 9$ _____

14. $x(2y + 3) - 5xy + 7x$ _____

15. $y(x + 4) + 4(y - 8)$ _____

16. $3x(x + 5) + 5(3x + 5)$ _____

17. $x(x - 5) + 5(x - 5)$ _____

18. $5x(5x + 2) - 2(5x + 2)$ _____

Write expressions to describe the given situations.

19. You have x cents, then you spend 35 cents. How much do you have? _____

20. You are y years old. Your little brother is three-fourths of your age. _____
    How old is your little brother?

21. There are twice as many freshmen in your class as there are sophomores. _____
   If there are s sophomores, how many freshmen are there?

Solve.

1. $5x + 3 = -12$ _____
2. $5x - 3 = -12$ _____

3. $5x + 3 - 7x = -9$ _____
4. $3(x + 2) = 15$ _____

5. $4 + 2(5x - 8) = -12$ _____
6. $3(2x - 4) + 7x = 14$ _____

7. $4(3x - 5) + 4 = 0$ _____
8. $6(4 - x) - x = -11$ _____

9. $18 = 3x - 2(x - 5)$ _____
10. $21 = 2 + 3x - 3 - x$ _____

11. $9.2x - 6.4 = 8.2$ _____
12. $5.6x - 7.3 = 9.2 + 8.7x$ _____

13. $6(3 - 4.5x) = 8.5 - 9x$ _____
14. $8(4 - 3x) = 17x + 15$ _____

15. $9x + 3(4x - 6) = 25 - (x + 3)$ _____
16. $9 - 3(4x - 7) = 5x + 37$ _____

17. $5x - 4(4x - 24) = 97$ _____
18. $4 + 5(2x - 6) = 2(5x + 8)$ _____

**Write expressions to describe each situation.**

19. You are paid $6 an hour plus an additional $25 for extra work. If you work for x hours, how much do you get paid? _____

20. You have 76 tickets to sell and you sell them at the rate of about 6 per day. How many tickets do you have left after d days of selling? _____

21. You have a bag of 24 cookies. Each of your friends grab an average of 2.5 cookies per person. If f of your friends grab cookies, how many cookies do you have left? _____

22. You have $426 in your savings account. If you save $2.50 a month, how much will you have x years from now? _____

Determine whether each relation is a function. (Yes or No)

1.
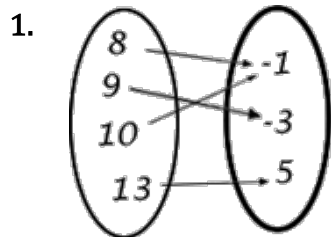
2.

Input	Output
3	0
4	7
5	10
4	14
10	25

3.

4.

5.
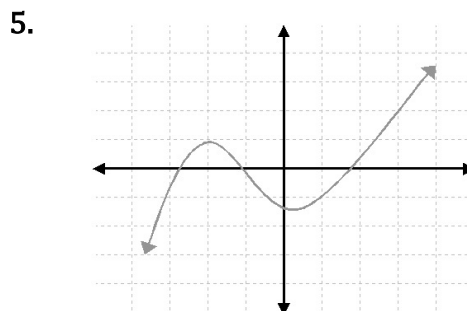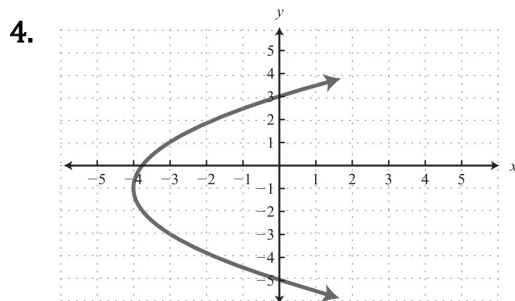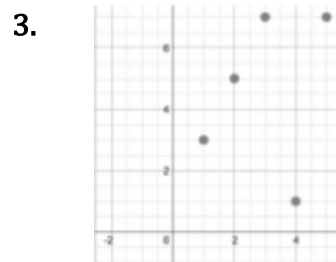
If $f(x) = 2x - 6$ and $g(x) = x - 2x^2$, find each value.

6. $f(2)$ _____

7. $f(-\tfrac{1}{2})$ _____

8. $g(-1)$ _____

9. $g\left(\tfrac{1}{3}\right)$ _____

10. $f(7) - 9$ _____

11. $g(-3) + 13$ _____

12. $f(h + 9)$ _____

13. $g(3y)$ _____

14. $2[g(b) + 1]$ _____

15. Male fireflies flash in various patterns to signal location and perhaps to ward off predators. Different species of fireflies have different flash characteristics, such as the intensity of the flash, its rate, and its shape. The table below shows the rate at which a male firefly is flashing.

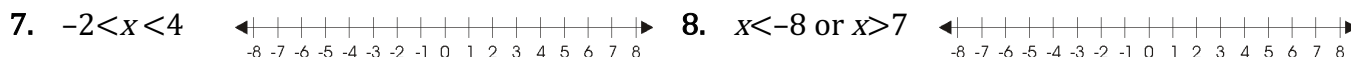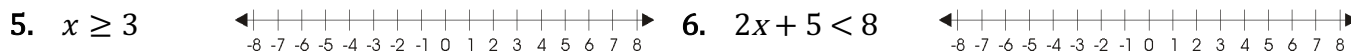| Time (seconds)	1	2	3	4	5
Number of Flashes	2	4	6	8	10

a.   Write an equation in function notation for the relation.   _____

b.   How many times will the firefly flash in 20 seconds?   _____

**Write an inequality for each given number line graph.**

1.

_____

2.

_____

3.

_____

4.

_____
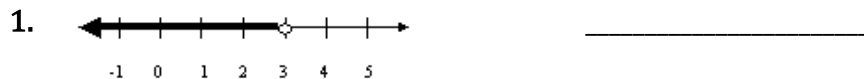
Graph each solution set of each inequality.

5. $x \geq 3$

6. $2x + 5 < 8$

7. $-2 < x < 4$

8. $x < -8$ or $x > 7$

9. $x + 2 > 5$

10. $3x - 5 > x + 7$

11. $x + 8 \leq 9$

12. $-1 + x \geq 27 - 6x$

13. $2(x - 3) \geq x + 7$

14. $5 + 2(4 - x) > 2x + 3$

15. $5 - 2x \leq 7$

16. $\frac{1}{3}x + 3 \geq 1$

Find the values of *x* which will make the absolute value statements true. Write the solution set.

1. $|x| = 8$ _____

2. $|x| = 7$ _____

3. $|x| = -6$ _____

4. $|x + 3| = 8$ _____

5. $|x + 5| = 12$ _____

6. $|3x + 4| = 10$ _____

7. $|6 + 2x| = 6$ _____

8. $|2x - 9| + 4 = 7$ _____

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

9.

10.

11.
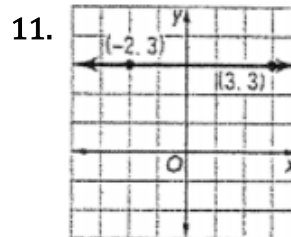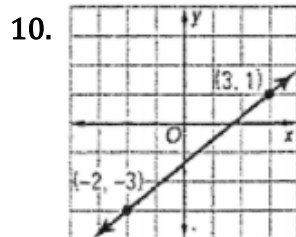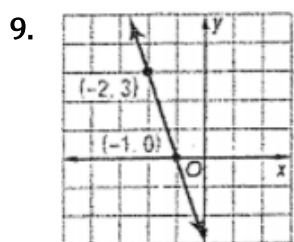
12. $(6, 3), (7, -4)$ _____

13. $(-9, -3), (-7, -5)$ _____

14. $(6, -2), (5, -4)$ _____

15. $(7, -4), (4, 8)$ _____

16. $(-7, 8), (-7, 5)$ _____

17. $(5, 9), (3, 9)$ _____

18. $(15, 2), (-6, 5)$ _____

19. $(3, 9), (-2, 8)$ _____

Find the value of *r* so the line that passes through each pair of points has the given slope.

20. $(-2, r), (6, 7)$; $m = \frac{1}{2}$ _____

21. $(-4, 3), (r, 5)$; $m = \frac{1}{4}$ _____

22.   The *pitch* of a roof is the number of feet the roof raises for each 12 feet horizontally. If a roof has a pitch of 8, what is the slope expressed as a positive number?

23.   A daily newspaper had 12,125 subscribers when it began publication. Five years later, it had 10,100 subscribers. What is the average yearly rate of change in the number of subscribers for the five-year period?

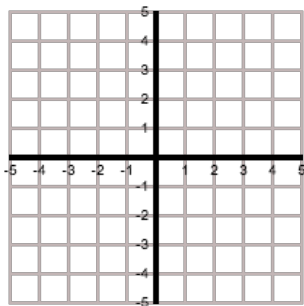**Write an equation in slope-intercept form for each given criteria.**

1. slope: $\frac{1}{4}$, y-intercept: 3 _____

2. slope: $\frac{3}{2}$, y-intercept: –4 _____

3. slope: 1.5, y-int.: –1 _____

4. slope: –2.5, y-int.: 3.5 _____
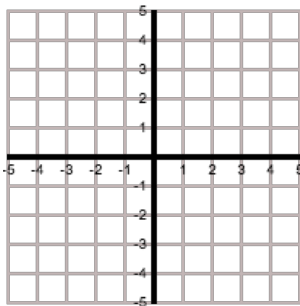
Write an equation of the line shown in the graph.
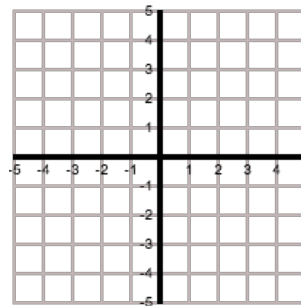
5.

6.

7.
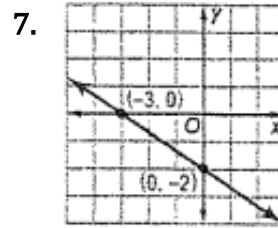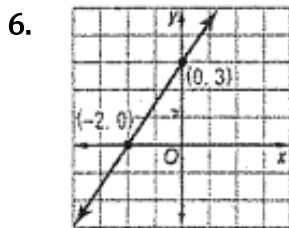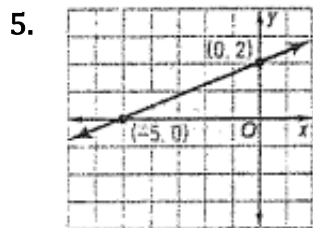
Graph each equation.

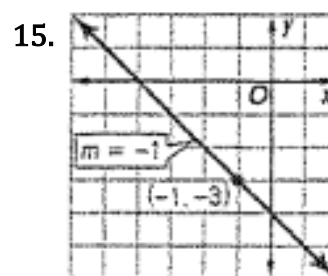8. $y = -\frac{1}{2}x + 2$

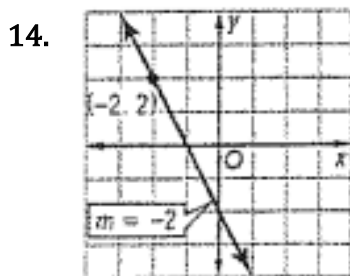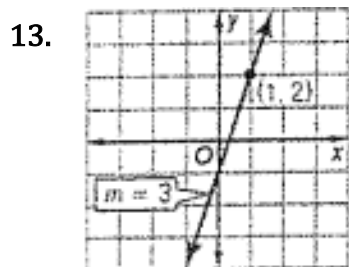9. $3y = 2x - 6$

10. $6x + 3y = 6$

Write a linear equation in slope-intercept form to model each situation.

11. A computer technician charges $75 for a consultation plus $35 per hour. _____

12. The population of Easton is 6791 and is decreasing at the rate of 7 per year. _____

Write the equation of the line that passes through each point with the given slope.

13.

14.

15.

Use the substitution method to solve each system of equations. If the system does *not* have exactly one solution, state whether it has *no solution* or *infinitely many solutions*

1. $y = 6x$
   $2x + 3y = -20$

2. $x = 3y$
   $3x - 5y = 12$

3. $x = 2y + 7$
   $x = y + 4$

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

5. $Y = 2x + 6$
   $2x - y = 2$

6. $3x + y = 12$
   $y = -x - 2$

Use the elimination method to solve each system of equations.

7. $x - y = 1$
   $x + y = -9$

8. $p + q = -2$
   $p - q = 8$

9. $4x + y = 23$
   $3x - y = 12$

10. $2x + 5y = -3$
    $2x + 2y = 6$

11. $3x + 2y = -1$
    $4x + 2y = -6$

12. $5x + 3y = 22$
    $5x - 2y = 2$

13. $2x - y = -1$
    $3x - 2y = 1$

14. $5x - 2y = -10$
    $3x + 6y = 66$

15. $7x + 4y = -4$
    $5x + 8y = 28$

16. The sum of two numbers is 41 and their difference is 5. What are the numbers? _____

17. Four times one number added to another number is 36. Three times the first _____
    number minus the other number is 20. Find the numbers.

Simplify.

18. $(-5x^2y)(3x^4)$

19. $(3cd^4)(-2c^2)$

20. $(-xy)^3(xz)$

21. $\dfrac{a^4b^6}{ab^3}$

22. $\dfrac{m^5np}{m^4p}$

23. $\dfrac{8y^7z^6}{6y^6z^8}$

Find the product. Express the resulting polynomials in descending powers of the variables.

1. $(x + 3)(x + 4)$

2. $(x - 4)(x - 5)$

3. $(2x + 2)(3x - 2)$

4. $(2x + 1)^2$

5. $(x - 5)(x + 5)$

6. $(x + 9)(2x - 3)$

7. $(x - 1)^2$

8. $(3x + 2y)^2$

Factor as a product of linear binomials or write *prime*.

9. $x^2 - 4$

10. $x^2 - 9$

11. $x^2 - 16$

12. $x^2 - 25$

13. $4x^2 - 1$

14. $9x^2 - 1$

15. $x^2 + 5x + 6$

16. $3x^2 + 4x + 1$

17. $4x^2 - 3x - 1$

18. $x^2 - 4x + 4$

Solve each equation by using the Quadratic Formula.   Round to the nearest hundredth, if necessary.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

19. $g^2 + 2g - 3 = 0$

20. $a^2 + 8a + 7 = 0$

21. $k^2 - 4k + 6 = 0$