PICKENS COUNTY SCHOOLS

Standards-Based Assignment Packet

Subject/Grade: ELA 12
Writing Introductions: Thesis Sentence

A thesis sentence is the main topic sentence of an essay or other written piece. It states the main opinion and often forecasts the principle sections of the piece. It is usually placed at the end of the introduction.

**Example:**

Topic: Should students be allowed to eat during class?

Possible thesis sentence: Students should not eat during class as students would not be paying attention while they eat, they may leave trash in the classroom, and other students might be distracted while their neighbor eats.

**Write a thesis sentence for each topic below.**

1. Discuss who was the greater president of the United States: George Washington or Abraham Lincoln.

2. What was the greatest challenge in your life?

3. What are the most important character traits for a good brother?

4. Explain your favorite character in literature.

5. Should motorcycles be outlawed on public streets?
Charles Dickens: David Copperfield and His Aunt

Charles Dickens' *David Copperfield*, published in 1849, is one of his most famous works. Dickens tells the life of David from the time he is born until he is an adult. David was born after his father died, and while his mother was very loving, she was also dependent and innocent. His mother married again to Mr. Murdstone when David was seven. Mr. Murdstone was very cruel to David and beat him. David is sent to boarding school and while there, his mother dies. After Mr. Murdstone removes him from school and sends him to work, David runs away to his great-aunt's home.

In the scene below, Mr. Murdstone and his sister have arrived to take David back. David's great-aunt, who is referred to as his aunt, confronts Murdstone about his cruel behavior and refuses to hand David over to his stepfather. His aunt begins the passage, speaking to Murdstone about David's mother.

Chapter 14. My Aunt Makes Up Her Mind About Me

"It was clear enough, as I have told you, years before YOU ever saw her—and why, in the mysterious dispensations of Providence, you ever did see her, is more than humanity can comprehend—it was clear enough that the poor soft little thing would marry somebody, at some time or other; but I did hope it wouldn't have been as bad as it has turned out. That was the time, Mr. Murdstone, when she gave birth to her boy here," said my aunt; "to the poor child you sometimes tormented her through afterwards, which is a disagreeable remembrance and makes the sight of him odious now. Aye, aye! you needn't wince!" said my aunt. "I know it's true without that."

He had stood by the door, all this while, observant of her with a smile upon his face, though his black eyebrows were heavily contracted. I remarked now, that, though the smile was on his face still, his colour had gone in a moment, and he seemed to breathe as if he had been running.

"Good day, sir," said my aunt, "and good-bye! Good day to you, too, ma'am," said my aunt, turning suddenly upon his sister. "Let me see you ride a donkey over my green again, and as sure as you have a head upon your shoulders, I'll knock your bonnet off, and tread upon it!"

It would require a painter, and no common painter too, to depict my aunt's face as she delivered herself of this very unexpected sentiment, and Miss Murdstone's face as she heard it. But the manner of the speech, no less than the matter, was so fiery, that Miss Murdstone, without a word in answer, discreetly put her arm through her brother's, and walked haughtily out of the cottage; my aunt remaining in the window looking after them; prepared, I have no doubt, in case of the donkey's reappearance, to carry her threat into instant execution.

1. What is the "disagreeable remembrance" the aunt refers to?

2. What was one of Mr. Murdstone reactions to the aunt's speech?

3. What does David's aunt threaten to do if Miss Murdstone rides a donkey across her lawn again?

4. The author says David's aunt was prepared "to carry her threat into instant execution." What does execution mean in this quotation?
Correct the Text:

In January 1929, Dorothy Eustis established The Seeing Eye, the first American training school for dogs' and there blind owner's. An experienced breeder, Eustis had already trained german shepherds to serve army and police units across Europe. Soon Dorothy started a school in Germany that trained dogs to assist blind veterans she knew they could be used to aid others too. The school's first canine helper was appropriately named Buddy!
EXHIBIT 4.1. Four Words Sheet

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Identify and explain each oxymoron in the sentences below.

1) My younger brother took the larger half of the blueberry muffin.

2) The teacher asked the class to keep the noise down to a dull roar.

3) When Elizabeth mentioned her election idea to the committee, it went over like a lead balloon.

4) It was a minor miracle that no one was hurt when the car ran off the country road.

5) James became a one-man band to raise money for the school project.

6) He is always able to give an unbiased opinion when he is asked politely.

7) The toy company faced a friendly takeover by the bicycle manufacturer.

8) She asked in a loud whisper if anyone wanted to leave the movie with her.
Correcting Dangling Modifiers

Sometimes in a sentence it is difficult to tell what a modifying word or phrase is describing. That modifying word or phrase is called a dangling modifier.

Example: Working hard all afternoon in the kitchen, the cake I baked tasted terrible.

Working hard all afternoon in the kitchen is a modifying phrase. It is difficult, however, to understand who or what worked hard: the cake or I. Obviously the cake can’t work hard, so the phrase must be modifying I. This confusion is the basis of a dangling modifier.

Correcting a dangling modifier often requires more than just moving words around. Usually the correction requires adding a word or phrase or rewording the sentence.

I worked hard all afternoon in the kitchen, and the cake I baked tasted terrible.

OR

Even after working hard all afternoon in the kitchen, I baked a terrible tasting cake.

Rewrite each of the following sentences correcting the dangling modifier.

1. After centuries of lying on the ocean floor, the treasure hunters found the Spanish galleon.

2. Watching carefully for hours, the flock of butterflies never arrived.

3. Thirsty, the glass of water was swallowed in one gulp.

4. Driving down the street, the park came into view.

5. Resolving to study more, the textbooks seemed more interesting.
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David Copperfield and His Aunt

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Poetry and Poets: Robert Frost:

Robert Frost (1874-1963) is one of the most celebrated American poets. He received the Pulitzer Prize for Poetry four times and received the Congressional Gold Medal in 1960. Frost wrote vibrant poetry about nature and the rural life. Below is one of his poems from a collection published in 1916. Read it carefully and answer the questions below.

The Line-Gang

by Robert Frost

Here come the line-gang pioneering by.
They throw a forest down less cut than broken.
They plant dead trees for living, and the dead
They string together with a living thread.
They string an instrument against the sky
Wherein words whether beaten out or spoken
Will run as hushed as when they were a thought.
But in no hush they string it: they go past
With shouts afar to pull the cable taut,
To hold it hard until they make it fast,
To ease away—they have it. With a laugh,
An oath of towns that set the wild at naught
They bring the telephone and telegraph.

Questions:

1. What is the rhyme scheme in this poem?

2. What does “beaten out” and “spoken” refer to in the phrase “words whether beaten out or spoken”?

3. Explain what the phrase “They plant dead trees for living” means.

4. What is the meaning of the word “fast” in the poem?

5. How many syllables are in the first line? In the last?
ALGEBRA II

The problems in this packet are designed to help you review topics that are important to your success in Algebra 2. All work must be shown for each problem – use the space provided and/or attach additional pages if necessary. Circle all final solutions. The problems should be completely attempted.
Show all work for all problems.

1. Complete these fraction operations WITHOUT the use of a calculator. Answer in simplest form. You must show all of your steps.
   a. $\frac{2}{3} + \frac{4}{9}$
   b. $\frac{7}{4} - \frac{4}{5}$
   c. $\frac{4}{3} \times \frac{2}{9}$
   d. $15 \times \frac{3}{8}$

2. Evaluate the expression if $x = 3$ and $y = -2$
   $x + y^2(x + 5) - y$

3. Solve the following equations. Show your work AND check your answers.
   a. $(x - 1) - (4x + 6) = 8$
   b. $-2(3x - 1) = 5x + 3(x - 4)$
   c. $5(-x + 2) = 3 - 2x - 3x + 7$
   d. $2(x + 2) - 2 = 3 - (x - 3)$
4. A car salesman’s weekly salary is a base amount plus an additional amount for each car sold. The table below shows a person’s weekly salary earned for the last three weeks.

<table>
<thead>
<tr>
<th>Cars sold (c)</th>
<th>Weekly salary (S)</th>
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<tr>
<td>4</td>
<td>$500</td>
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<tr>
<td>9</td>
<td>$1000</td>
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<tr>
<td>12</td>
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a. Write an equation to determine \( S \) the weekly salary for \( c \) number of cars sold.

b. What is the person’s weekly salary when 13 cars are sold?

5. Solve the following equations by clearing fractions FIRST. Leave exact solutions (improper fractions).

a. \( \frac{4}{9}x + 5 = -\frac{2}{3}x - 8 \)

b. \( \frac{2x+1}{3} = \frac{5x-1}{4} \)

6. Indicate the solutions shown on the number line using inequality statement(s).

a.

b.

7. Line \( l \) contains the points \((-2, 3)\) and \((1, 5)\). Write the equation of the line in slope-intercept form.
8. Find the value of $r$ so that the line that passes through the pair of points has the given slope. **use the slope formula $m = \frac{y_2-y_1}{x_2-x_1}$

a. $(11, 6), (-11, r), m = \frac{8}{11}$

b. $(10, r), (4, -3), m = \frac{4}{3}$

9. Graph the following equations:

a. $y = 2x - 3$

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

c. $x = -4$
10. Convert the following linear equations to standard form.
   a. $y - 5 = 3(2x - 1)$ to slope-intercept form $\{y = mx + b\}$

   b. $y + 1 = -2(x + 4)$ to standard form $\{ax + by = c\}$

   c. $5x - 2y = 8$ to standard form $\{ax + by = c\}$

11. Line $k$ passes through the point $(8, -3)$ and is parallel to the line $y = 3x - 4$. Write an equation for line $k$.

12. Write the equation for the line perpendicular to the given line and through the given point.
    $y = \frac{4}{3}x - 3$ and $(3, -1)$
13. Graph each of the following lines.
   a. slope: \(-\frac{3}{4}\), through \((-5, -1)\)
   b. slope: \(-3\), x-intercept: 4
   c. slope: 0; y-intercept: -2

14. State whether each set is a function. Find the domain and range.
   a. \{(2, 5), (5, 6), (2, -6), (3, 8)\}    Domain:    Range: 
   b. \{(1, -2), (8, -4), (-3, 8), (-1, 2)\}    Domain:    Range: 

15. Determine whether each graph is the graph of a function.
16. Use $f(x) = x^2 - 3$ and $g(x) = 4x - 1$ to find each value.
   a. $f(-3)$
   b. $g(-7)$
   c. $f\left(\frac{4}{3}\right)$
   d. $f(-5) + 8$

17. The function $g(x) = 1.5x + 160$ models the weight gain of a basketball player as he starts a workout program where $g$ is the weight in pounds after $x$ weeks.
   a. Explain the meaning of 160 in the context of this problem.
   b. Explain the meaning of 1.5 in the context of this problem.
   c. Evaluate $g(6)$ and explain its meaning.

18. Solve the following systems of equations by graphing.
   a. $y = -\frac{1}{2}x + 4$
      $y = 2x - 6$
   b. $y = -\frac{2}{3}x + 3$
      $4x + 6y = 18$

19. Solve the following systems by substitution:
a. \( a = -4b - 4 \)
   \( 3a - 5b = 22 \)

b. \( 6x - 7y = 23 \)
   \( y = -2x + 11 \)

c. \( 9y + 3x = 18 \)
   \( 3y + x = -6 \)

20. Solve the following systems by elimination:
   a. \( 5x + 7y = 2 \)
      \( 2x - 7y = -9 \)

   b. \( x - 6y = 44 \)
      \( 8x + 12y = 0 \)

   c. \( -5x + 11y = 35 \)
      \( 6x + 8y = 62 \)

21. Use the laws of exponents to simplify each expression. (Negative exponents should be simplified)
a. \(3a^4b(-5a^7b^3)\)

b. \((3y^2z^2)(-5yz^4)\)

c. \(x^0\)

d. \((2c^{-3})^2(4c^2)\)

e. \(\frac{22x^5y^6}{14x^{13}y^{-3}}\)

f. \((3x^4y)^3\)

g. \(\frac{(3x^{-2})^2}{3x^6}\)

22. Simplify the radicals – answer in simplified radical form (not decimal!).

a. \(\sqrt{40}\)

b. \(\frac{2\sqrt{6}}{\sqrt{3}}\)

c. \(-3\sqrt{98}\)

d. \(\sqrt{18} \cdot \sqrt{32}\)
DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.
1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word line indicates a straight line.
4. The word average indicates arithmetic mean.

1. On level ground, a vertical rod 12 feet tall casts a shadow 4 feet long, and at the same time a nearby vertical flagpole casts a shadow 12 feet long. How many feet tall is the flagpole?
   - A. 4
   - B. 8
   - C. 12
   - D. 20
   - E. 36

DO YOUR FIGURING HERE.

2. Kalino earned 85, 95, 93, and 80 points on the 4 tests, each worth 100 points, given so far this term. How many points must he earn on his fifth test, also worth 100 points, to average 90 points for the 5 tests given this term?
   - F. 87
   - G. 88
   - H. 90
   - J. 92
   - K. 97

3. If \( x = \frac{5}{3} \), what is the value of \( \frac{x^2 - 1}{x + 1} \)?
   - A. -6
   - B. -4
   - C. 4
   - D. 5\(\frac{4}{3}\)
   - E. 19

GO ON TO THE NEXT PAGE.

The ONLY Official Prep Guide from the Makers of the ACT
4. Kaya ran 1\(\frac{2}{5}\) miles on Monday and 2\(\frac{1}{3}\) miles on Tuesday. What was the total distance, in miles, Kaya ran during those 2 days?

F. 3\(\frac{3}{15}\)
G. 3\(\frac{2}{8}\)
H. 3\(\frac{2}{5}\)
J. 3\(\frac{7}{15}\)
K. 3\(\frac{11}{15}\)

5. Consider the 3 statements below to be true.
   
   All insects that are attracted to honey are ants.
   Insect I is not an ant.
   Insect J is attracted to honey.
   
   Which of the following statements is necessarily true?
   
   A. Insect I is an ant not attracted to honey.
   B. Insect I is an ant attracted to honey.
   C. Insect I is attracted to honey.
   D. Insect J is not attracted to honey.
   E. Insect J is an ant.

6. What is the value of the expression \(\sqrt{\frac{m}{x-3}}\) when \(x = -1\) and \(m = -16\)?

   F. -2
   G. 2
   H. 2\(\sqrt{2}\)
   J. 2i
   K. 2i\(\sqrt{2}\)

7. Tickets for a community theater production cost $6 each when bought in advance and $8 each when bought at the door. The theater group's goal is at least $2,000 in ticket sales for opening night. The theater group sold 142 opening-night tickets in advance. What is the minimum number of tickets they need to sell at the door on opening night to make their goal?

   A. 143
   B. 144
   C. 192
   D. 250
   E. 357
8. Mark and Juanita own a sandwich shop. They offer 3 kinds of bread, 5 kinds of meat, and 3 kinds of cheese. Each type of sandwich has a combination of exactly 3 ingredients: 1 bread, 1 meat, and 1 cheese. How many types of sandwiches are possible?

F. 11
G. 15
H. 30
J. 45
K. 120

9. If \(12(x - 11) = -15\), then \(x = ?\)

A. \(-\frac{49}{4}\)
B. \(-\frac{13}{6}\)
C. \(-\frac{5}{4}\)
D. \(-\frac{1}{3}\)
E. \(\frac{39}{4}\)

10. In the figure below, \(A, D, C, \) and \(E\) are collinear. \(\overline{AD}, \overline{BD}, \) and \(\overline{BC}\) are all the same length, and the angle measure of \(\angle ABD\) is as marked. What is the degree measure of \(\angle BCD\)?

![Diagram with angle measure 25°]

F. 50°
G. 100°
H. 105°
J. 130°
K. 160°

11. If \(f(x) = 9x^2 + 5x - 8\), then \(f(-2) = ?\)

A. -54
B. -18
C. 18
D. 36
E. 38

12. What is the least common multiple of 30, 20, and 70?

F. 40
G. 42
H. 120
J. 420
K. 42,000

GO ON TO THE NEXT PAGE.
13. While doing a problem on his calculator, Tom meant to divide a number by 2, but instead he accidentally multiplied the number by 2. Which of the following calculations could Tom then do to get the result on the calculator screen to obtain the result he originally wanted?
   A. Subtract the original number
   B. Multiply by 2
   C. Multiply by 4
   D. Divide by 2
   E. Divide by 4

14. The 8-sided figure below is divided into 5 congruent squares. The total area of the 5 squares is 125 square inches. What is the perimeter, in inches, of the figure?
   F. 25
   G. 60
   H. 80
   J. 100
   K. 125

15. Hai has $100 available to buy USB drives to back up data for his business computers. Each USB drive has a price of $8, and Hai will pay a sales tax of 7% of the total price of the USB drives. What is the maximum number of USB drives Hai can buy?
   A. 11
   B. 12
   C. 13
   D. 14
   E. 15

16. A certain computer performs $1.5 \times 10^8$ calculations per second. How many seconds would it take this computer to perform $6.0 \times 10^{16}$ calculations?
   F. $2.5 \times 10^{-9}$
   G. $9.0 \times 10^5$
   H. $4.0 \times 10^2$
   J. $4.0 \times 10^8$
   K. $9.0 \times 10^{24}$

17. One of the following is an equation of the linear relation shown in the standard $(x,y)$ coordinate plane below. Which equation is it?

A. $y = 5x$
B. $y = 2x$
C. $y = 3x + 2$
D. $y = 2x - 5$
E. $y = 2x + 5$
18. A square is circumscribed about a circle of 7-foot radius, as shown below. What is the area of the square, in square feet?

F. 49
G. 36
H. 98
J. 49π
K. 196

19. Two workers were hired to begin work at the same time. Worker A’s contract called for a starting salary of $20,000 with an increase of $800 after each year of employment. Worker B’s contract called for a starting salary of $15,200 with an increase of $2,000 after each year of employment. If x represents the number of full years’ employment (that is, the number of yearly increases each worker has received), which of the following equations could be solved to determine the number of years until B’s yearly salary equals A’s yearly salary?

A. \(20,000 + 800x = 15,200 + 2,000x\)
B. \(20,000 + 2,000x = 15,200 + 800x\)
C. \((20,000 + 800)x = (15,200 + 2,000)x\)
D. \((2,000 + 800)x = 20,000 - 15,200\)
E. \((2,000 - 800)x = 20,000 + 15,200\)

20. A ramp for loading trucks is 13 feet long and covers 12 feet along the level ground, as shown below. How many feet high is the highest point on the ramp?

F. 1
G. 2
H. 4
J. 5
K. \(6\frac{1}{4}\)
21. The expression \(7(x + 3) - 3(2x - 2)\) is equivalent to:
A. \(x + 1\)
B. \(x + 15\)
C. \(x + 19\)
D. \(x + 23\)
E. \(x + 27\)

22. If 115% of a number is 460, what is 75% of the number?
F. 280
G. 300
H. 320
J. 345
K. 400

23. When \((2x - 3)^2\) is written in the form \(ax^2 + bx + c\), where \(a\), \(b\), and \(c\) are integers, \(a + b + c = \)?
A. -17
B. -5
C. 1
D. 13
E. 25

24. What is the area, in square feet, of the figure below?

```
  25 feet
  15 feet
  5 feet

  15 feet
```

E. 60
G. 80
H. 275
J. 375
K. 450
25. Barb is going to cover a rectangular area 8 feet by 10 feet with rectangular paving blocks that are 4 inches by 8 inches by 2 inches to make a flat patio. What is the minimum number of paving blocks she will need if all the paving blocks will face the same direction?
(Note: Barb will not cut any of the paving blocks.)
A. 80
B. 360
C. 601
D. 960
E. 1,213

26. What is the slope of the line represented by the equation $6y - 14x = 5$?
F. $-14$
G. $\frac{5}{6}$
H. $\frac{7}{3}$
J. 6
K. 14

27. Let $m$ and $n$ be 2 positive integers, such that $m < n$. Which of the following compound inequalities must be true?
A. $0 < \sqrt{mn} < m$
B. $1 < \sqrt{mn} < m$
C. $m < \sqrt{mn} < n$
D. $\sqrt{m} < \sqrt{mn} < \sqrt{n}$
E. $\sqrt{m} - n < \sqrt{mn} < \sqrt{m} + n$

28. Two similar triangles have perimeters in the ratio 3:5. The sides of the smaller triangle measure 3 cm, 5 cm, and 7 cm, respectively. What is the perimeter, in centimeters, of the larger triangle?
F. 15
G. 18
H. 20
J. 25
K. 36
29. Thomas and Jonelle are playing darts in their garage using the board with the point values for each region shown below. The radius of the outside circle is 10 inches, and each of the other circles has a radius 2 inches smaller than the next larger circle. All of the circles have the same center. Thomas has only 1 dart left to throw and needs at least 30 points to win the game. Assuming that his last dart hits at a random point within a single region on the board, what is the percent chance that Thomas will win the game?

A. 36%
B. 30%
C. 16%
D. 9%
E. 1\(\frac{1}{2}\)%

![Image of dart board with point values]

30. When asked his age, the algebra teacher said, "If you square my age, then subtract 23 times my age, the result is 50." How old is he?
F. 23
G. 25
H. 27
J. 46
K. 50

31. The distance, \(d\), an accelerating object travels in \(t\) seconds can be modeled by the equation \(d = \frac{1}{2}at^2\), where \(a\) is the acceleration rate, in meters per second per second. If a car accelerates from a stop at the rate of 20 meters per second per second and travels a distance of 80 meters, about how many seconds did the car travel?
A. Between 1 and 2
B. Between 2 and 3
C. Between 3 and 4
D. 4
E. 8

32. Which of the following is the set of all real numbers \(x\) such that \(x + 3 > x + 5\)?
F. The empty set
G. The set containing all real numbers
H. The set containing all negative real numbers
J. The set containing all nonnegative real numbers
K. The set containing only zero

GO ON TO THE NEXT PAGE.
Use the following information to answer questions 33–35.

A survey in a study skills class asked the 20 students enrolled in the class how many hours (rounded to the nearest hour) they had spent studying on the previous evening. The 20 responses are summarized by the histogram below.

33. What fraction of the students responded that they had spent less than 3 hours studying?
   A. \( \frac{13}{100} \)
   B. \( \frac{1}{5} \)
   C. \( \frac{3}{10} \)
   D. \( \frac{13}{20} \)
   E. \( \frac{17}{20} \)

34. The teacher decides to show the data in a circle graph (pie chart). What should be the measure of the central angle of the sector for 3 hours?
   F. 18°
   G. 20°
   H. 36°
   J. 72°
   K. 90°

35. To the nearest tenth of an hour, what is the average number of hours for the 20 survey responses?
   A. 2.0
   B. 2.1
   C. 2.3
   D. 2.5
   E. 3.0
36. Pentagons have 5 diagonals, as illustrated below.

How many diagonals does the octagon below have?

F. 8  
G. 16  
H. 20  
J. 30  
K. 40

37. The bottom of the basket of a hot-air balloon is parallel to the level ground. One taut tether line 144 feet long is attached to the center of the bottom of the basket and is anchored to the ground at an angle of $72^\circ$, as shown in the figure below. Which of the following expressions gives the distance, in feet, from the center of the bottom of the basket to the ground?

A. $\frac{144}{\cos 72^\circ}$  
B. $\frac{144}{\sin 72^\circ}$  
C. $144 \tan 72^\circ$  
D. $144 \cos 72^\circ$  
E. $144 \sin 72^\circ$

38. The coordinates of the endpoints of $\overline{GH}$, in the standard $(x,y)$ coordinate plane, are $(-8,-3)$ and $(2,3)$. What is the $x$-coordinate of the midpoint of $\overline{GH}$?

F. -6  
G. -3  
H. 0  
J. 3  
K. 5

GO ON TO THE NEXT PAGE.
39. Let $2x + 3y = 4$ and $5x + 6y = 7$. What is the value of $8x + 9y$?
   A. $-10$
   B. $-1$
   C. 2
   D. 7
   E. 10

40. What are the values of $\theta$, between 0 and $2\pi$, when $\tan \theta = -1$?
   F. $\frac{\pi}{4}$ and $\frac{3\pi}{4}$ only
   G. $\frac{2\pi}{4}$ and $\frac{3\pi}{4}$ only
   H. $\frac{3\pi}{4}$ and $\frac{7\pi}{4}$ only
   J. $\frac{3\pi}{4}$ and $\frac{7\pi}{4}$ only
   K. $\frac{\pi}{4}$, $\frac{3\pi}{4}$, $\frac{5\pi}{4}$, and $\frac{7\pi}{4}$

41. For the complex number $i$ and an integer $x$, which of the following is a possible value of $i^x$?
   A. 0
   B. 1
   C. 2
   D. 3
   E. 4

42. A can of soda pop has the shape of a right circular cylinder with an inside height of 6 inches and an inside diameter of 2 inches. When you pour the soda pop from the full can into a cylindrical glass with an inside diameter of 3 inches, about how many inches high is the soda pop in the glass?
   (Note: The volume of a right circular cylinder is $\pi r^2 h$.)
   F. $2\frac{2}{3}$
   G. 4
   H. 5
   J. $6\frac{2}{3}$
   K. 8

GO ON TO THE NEXT PAGE.
43. The height and radius of the right circular cylinder below are given in meters. What is the volume, in cubic meters, of the cylinder?

A. 30π
B. 31π
C. 150π
D. 180π
E. 900π

44. Lines \( l_1 \) and \( l_2 \) intersect each other and 3 parallel lines, \( l_3 \), \( l_4 \), and \( l_5 \), at the points shown in the figure below. The ratio of the perimeter of \( \triangle ABC \) to the perimeter of \( \triangle AFG \) is 1:3. The ratio of \( DE \) to \( FG \) is 2:3. What is the ratio of \( AC \) to \( CE \)?

F. 1:1
G. 1:2
H. 1:3
J. 2:1
K. 3:1

45. A rocket lifted off from a launch pad and traveled vertically 30 kilometers, then traveled 40 kilometers at 30° from the vertical, and then traveled 100 kilometers at 45° from the vertical, as shown in the figure below. At that point, the rocket was how many kilometers above the height of the launch pad?

A. 100
B. 170
C. 190
D. \( 20\sqrt{3} + 50\sqrt{2} \)
E. \( 30 + 20\sqrt{3} + 50\sqrt{2} \)
46. Machine A produces 500 springs a day. The number of defective springs produced by this machine each day is recorded for 60 days. Based on the distribution given below, what is the expected value of the number of defective springs produced by Machine A in any single day?

<table>
<thead>
<tr>
<th>Number, ( n ), of defective springs produced</th>
<th>Probability that ( n ) defective springs are produced in any single day</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.70</td>
</tr>
<tr>
<td>1</td>
<td>0.20</td>
</tr>
<tr>
<td>2</td>
<td>0.05</td>
</tr>
<tr>
<td>3</td>
<td>0.05</td>
</tr>
</tbody>
</table>

F. 0.00
G. 0.45
H. 0.70
J. 1.00
K. 1.30

47. The height above the ground, \( h \) units, of an object \( t \) seconds after being thrown from the top of a building is given by the equation \( h = -2t^2 + 10t + 48 \). An equivalent factored form of this equation shows that the object:

A. starts at a point 2 units off the ground.
B. reaches a maximum height of 3 units.
C. reaches a maximum height of 8 units.
D. reaches the ground at 3 seconds.
E. reaches the ground at 8 seconds.

48. For all positive values of \( g \) and \( h \), which of the following expressions is equivalent to \( g^2 \sqrt{g^2 + h^2} \)?

F. \( g^3h^2\sqrt{g^2 + h^2} \)
G. \( g^2h\sqrt{g^2 + h^2} \)
H. \( g^3h^2\sqrt{g^2h} \)
J. \( g^6h^4\sqrt{g^2h} \)
K. \( g^7h^7 \)

49. The value of \( \log_2(5^\frac{1}{2}) \) is between which of the following pairs of consecutive integers?

A. 0 and 1
B. 4 and 5
C. 5 and 6
D. 6 and 7
E. 9 and 10

GO ON TO THE NEXT PAGE.
Use the following information to answer questions 50-52.

A storage facility is currently offering a special rate to customers who sign contracts for 6 months or more. According to this special rate, the first month's rent is $1, and for each month after the first month, customers pay the regular monthly rental rate. The table below shows the storage unit sizes available, the floor dimensions, and the regular monthly rental rate. All the units have the same height.

<table>
<thead>
<tr>
<th>Size</th>
<th>Floor dimensions, in meters</th>
<th>Regular monthly rental rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 x 4</td>
<td>$30</td>
</tr>
<tr>
<td>2</td>
<td>4 x 4</td>
<td>$60</td>
</tr>
<tr>
<td>3</td>
<td>4 x 8</td>
<td>$100</td>
</tr>
<tr>
<td>4</td>
<td>8 x 8</td>
<td>$150</td>
</tr>
<tr>
<td>5</td>
<td>8 x 16</td>
<td>$200</td>
</tr>
</tbody>
</table>

50. Daria will sign a contract to rent a Size 3 unit for 12 months at the current special rate. The amount Daria will pay for 12 months at the current special rate represents what percent decrease from the regular rental rate for 12 months?

F. 8.25%
G. 8.33%
H. 8.42%
J. 9.00%
K. 9.09%

51. Size 5 units can be subdivided to form other sizes of units. What is the greatest number of Size 1 units that can be formed from a single Size 5 unit?

A. 2
B. 4
C. 8
D. 10
E. 16

52. Janelle, the owner of the storage facility, is considering building new units that have floor dimensions larger than Size 5 units. She will use the floor area to determine the heating requirements of these larger units. For this calculation, Janelle will use the same relationship between the unit size number and the respective floor area for Sizes 1 through 5. Which of the following expressions gives the floor area, in square meters, of a Size x storage unit?

F. $2^x \cdot x$
G. $2^{2x}$
H. $2^{x+2}$
J. $(x + 1)^2$
K. $(x + 2)^2$
GEOMETRY

The purpose of the packet is to help you review and reinforce concepts/topics that are necessary for Geometry. This packet has been designed to provide a review of Algebra I skills that are essential for student success in Geometry. It also contains a review of Geometry concepts students should have previously learned. All work must be shown and final answers should be circled. Students must show work that supports their understanding. Students will be given a grade for completing the packet correctly. It may be necessary to seek assistance on some questions/concepts... that is fine! Websites that may be of assistance:
www.mathforum.org/dr.math Use this web site if you have a math questions that you need answered.

➢ www.k12math.com
This website will provide you with links to games, reference, general math help and resources. www.mathforum.com This online community includes teachers, students, researchers, parents and educators who have an interest in math and math education. The site includes Ask Dr. Math, Problems of the Week, discussion groups and much more.

➢ www.AAAMath.com
Customized by grade level and topic, AAA Math features explanations of various mathematical topics, practice problems and fun, challenging games. www.coolmath.com This fully interactive site and allows the user to sharpen basic math skills, play games and explore new math concepts.

➢ www.figurethis.org
Created by the National Council of Teachers of Mathematics, this site helps families enjoy mathematics outside school through a series of fun and engaging challenges.
Algebra I Topics

Equations
Variables and Expressions
Solving Equations
Solving for a Variable
Rates, Ratios, and proportions

Polynomials
Special Products of Binomials
Multiplying Polynomials
Adding and Subtracting Polynomials

Functions
Graphing Relationships
Relations and Functions
Writing Functions
Graphing Functions
Scatter Plots and Trend Lines
Arithmetic Sequences

Factoring Polynomials
Factors and Greatest Common Factors
Factoring by GCF
Factoring $x^2 + bx + c$
Factoring Special Products

Quadratic Functions and Equations
Solving Quadratic Equations by Factoring
Solving Quad Equations by Using Square Roots
The Quadratic Formula
Completing the Square

Linear Functions
Identifying Linear Functions
Using Intercepts
Rate of Change and Slope
The Slope Formula
Direct Variation
Slope-Intercept Form
Point-Slope Form
Slopes of Parallel and Perpendicular Lines
Transforming Linear Functions

Geometry Topics

Angles
Angle Relationships
Triangle Angle Sum

Plane Figures
Area
Perimeter/Circumference
Similarity
Pythagorean Theorem

Solid Figures
Volume
Similarity
Solve each equation.

1. \(-x - 9 = x + 3\)
2. \(7r - 4 + 2r = 12 + 7r\)

3. \(-5 - 4(n + 3) = -19 - 3n\)
4. \(-3(3 - k) = 3(k + 3)\)

Solve for the indicated variable.

5. \(d = rt\) for \(r\)
6. \(ax + by + c = 0\) for \(y\)

7. \(A = \frac{e + f}{2}\) for \(e\)
8. \(3k + 7n = p\) for \(k\)

Use intercepts to graph the line described by the equation.

9. \(4x + 3y = -12\)
Find the slope of the line.

10. \[ \text{Diagram of a line on a graph} \]

11. \[ \text{Diagram of a line on a graph} \]

12. [Diagram of a grid]

13. [Diagram of a grid]

Find the slope of the line that contains each pair of points.

14. \((3,10) \text{ and } (2,5)\)

15. \((12,-2) \text{ and } (0,6)\)

Find the slope of the line described by each equation.

16. \(5x + 4y = 40\)

17. \(7x + 42 = 2y\)

Write the equation that describes each line in slope-intercept form.

18. \(\text{slope} = 8; \ y\text{-intercept} = -6\)

19. \(\text{slope} = -\frac{1}{2}, \ (8,-1) \text{ is on the line}\)
Write each equation in slope-intercept form. Then graph the line described by the equation.

20. \( y + x = 3 \)

21. \( 5x - 2y = 10 \)

Write an equation in point-slope form for the line with the given slope that contains the given point.

22. slope = 4; (5, 6)

23. slope = -3; (7, -2)

Graph the line described by each equation.

24. \( y - 3 = \frac{2}{3}(x + 1) \)

25. \( y + 4 = -3(x - 4) \)

Solve each system by graphing.

26. \( \begin{cases} y = 2x + 3 \\ y = -x + 9 \end{cases} \) Solution: __________

27. \( \begin{cases} y = -3x + 4 \\ y = 2x + 4 \end{cases} \) Solution: __________
Solve each system by substitution.

28. \[
\begin{align*}
  y &= 3x + 4 \\
  y &= 4x + 5
\end{align*}
\]

29. \[
\begin{align*}
  -2x + 2y &= 4 \\
  4x + 3y &= -15
\end{align*}
\]

Solve each system by elimination.

30. \[
\begin{align*}
  x + 6y &= -8 \\
  7x + 2y &= 24
\end{align*}
\]

31. \[
\begin{align*}
  9x + 6y &= 12 \\
  -18x - 8y &= -4
\end{align*}
\]

Evaluate each expression for the given value(s) of the variable(s).

32. \[(3t)^3 \text{ for } t = 2\]

33. \[4x^2y^0 \text{ for } x = 7 \text{ and } y = -4\]

Add or subtract.

34. \[12x^2 + 11y^2 - 5x^2\]

35. \[(-8k^2 + 5) - (3k^2 + 7k - 6)\]
### Multiply.

36. \(-4x(x^2 - 5x + 7)\)

37. \((y - 7)(y - 4)\)

38. \((x - 4)^2\)

39. \((5x + 2)^2\)

### Factor each polynomial. (GCF)

40. \(12c^3 - 5c\)

41. \(6x^2 - 18x + 6\)

### Factor each polynomial.

42. \(x^2 + 11x + 28\)

43. \(x^2 - 8x + 7\)

44. \(x^2 - 2x - 24\)

45. \(x^2 + 4x - 21\)

46. \(1 - 9x^2\)

47. \(64x^2 - 1\)
### Use the Zero Product Property to solve each equation. Check your answer.

<table>
<thead>
<tr>
<th>48. ((x-4)(x-3)=0)</th>
<th>49. (x(x+13)=0)</th>
</tr>
</thead>
</table>

### Solve each quadratic equation by factoring. Check your answer.

<table>
<thead>
<tr>
<th>50. (x^2 + 2x - 15 = 0)</th>
<th>51. (x^2 - 5x - 6 = 0)</th>
</tr>
</thead>
</table>

### Solve using square roots. Check your answer.

<table>
<thead>
<tr>
<th>52. (x^2 = 64)</th>
<th>53. (x^2 = 900)</th>
</tr>
</thead>
<tbody>
<tr>
<td>54. (9x^2 + 20 = 189)</td>
<td>55. (0 = 49x^2 - 16)</td>
</tr>
</tbody>
</table>

### Solve by completing the square.

<table>
<thead>
<tr>
<th>56. (x^2 + 10x = -21)</th>
<th>57. (-x^2 + 6x - 3 = 0)</th>
</tr>
</thead>
</table>
Solve using the Quadratic Formula.

58. $x^2 + 7x - 6 = 0$

59. $2x^2 - x - 11 = 0$

Name the relationship(s): complementary, supplementary, vertical, or adjacent.

60.

61.

62.

63.

Find the measure of angle $b$.

64.

65.

Find the perimeter of each figure.

66.

67.
Find the area of each figure.

68.  
\[ \text{Area} = \frac{1}{2} \times \text{base} \times \text{height} \]
69.  
\[ \text{Area} = \text{length} \times \text{width} \]

70.  
\[ \text{Area} = \frac{1}{2} \times \text{base} \times \text{height} \]
71.  
\[ \text{Area} = \frac{1}{2} \times \text{base} \times \text{height} \]

Find the area and circumference of each circle.

72.  
\[ \text{Area} = \pi r^2 \]
\[ \text{Circumference} = 2\pi r \]
73.  
\[ \text{Area} = \pi r^2 \]
\[ \text{Circumference} = 2\pi r \]

Use the Pythagorean Theorem to find the missing length.

74.  
\[ a^2 + b^2 = c^2 \]
75.  
\[ a^2 + b^2 = c^2 \]

The polygons in each pair are similar. Find the scale factor of the smaller figure to the larger figure.

76.  
\[ \text{Scale Factor} = \frac{\text{Side of smaller figure}}{\text{Side of larger figure}} \]
77.  
\[ \text{Scale Factor} = \frac{\text{Side of smaller figure}}{\text{Side of larger figure}} \]
Find the volume of each figure – see formulas below.

<table>
<thead>
<tr>
<th>78.</th>
<th>79.</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Cube" /></td>
<td><img src="image" alt="Triangular Prism" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>80.</th>
<th>81.</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Cylinder" /></td>
<td><img src="image" alt="Sphere" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>82.</th>
<th>83.</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Triangular Pyramid" /></td>
<td><img src="image" alt="Cone" /></td>
</tr>
</tbody>
</table>

### Volume Formulas

<table>
<thead>
<tr>
<th>Prism</th>
<th>Pyramid</th>
<th>Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V = Bh$</td>
<td>$V = \frac{1}{3} Bh$</td>
<td>$V = \pi r^2 h$</td>
</tr>
<tr>
<td>Cube</td>
<td>Cone</td>
<td>Sphere</td>
</tr>
<tr>
<td>$V = s^3$</td>
<td>$V = \frac{1}{3} \pi r^2 h$</td>
<td>$V = \frac{4}{3} \pi r^3$</td>
</tr>
</tbody>
</table>
Part I: Simplifying Expressions and Combining Like Terms

Order of Operations Review:

When an expression contains more than one operation, the operations must be performed in a certain order.

I. Evaluate any expressions inside grouping symbols like ( ) or [ ]
II. Evaluate exponents
III. Perform multiplication and division in order from left to right
IV. Perform addition from left to right.

Many people remember this using either of the following acronyms:

- **PEMDAS**
  
  (Parenthesis, Exponents, Multiplication, Division, Addition Subtraction)
  
  Some people use this saying to remember PEMDAS:
  
  **Please Excuse My Dear Aunt Sally**

- **GEMS**
  
  (Grouping Symbols, Exponents, Multiplication & Division, Subtraction & Addition)

Examples:

<table>
<thead>
<tr>
<th>Expression</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>$4^2 - 7 - 2 \cdot 5 + 3$</td>
<td>Identify powers: $4^2$, Identify multiplication and division: $2 \cdot 5$, Start at the left and perform each addition and subtraction in order. $16 - 7 - 10 - 3$ + $13 + 3$ = 16</td>
</tr>
<tr>
<td>$6^2 - 3(5 - 1) - 2$</td>
<td>Evaluate $6^2$, Evaluate $5 - 1$, Evaluate $3 \cdot 4$, Add and subtract from left to right. $36 - 3 \cdot 4 - 2$, $36 - 12 - 2$, $24 - 2$, $26$</td>
</tr>
</tbody>
</table>

The following symbols are also considered as grouping symbols when using the order of operations.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute-value</td>
<td>$[2 - 3]$</td>
</tr>
<tr>
<td>Radical</td>
<td>$\sqrt{3 + 6}$</td>
</tr>
<tr>
<td>Fraction Bar</td>
<td>$\frac{2 \times 7}{4 - 1}$</td>
</tr>
</tbody>
</table>
Evaluate each expression.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(1 + 4 \cdot 6 - 3)</td>
<td>2</td>
<td>(2 + (10 - 1) + 3)</td>
</tr>
<tr>
<td>3</td>
<td>(\frac{15+3}{9} \cdot -5 - (-2))</td>
<td>4</td>
<td>((-8 + 3) \cdot 2 - (-2))</td>
</tr>
<tr>
<td>5</td>
<td>((10 - 7)^2 - \frac{-18}{-3})</td>
<td>6</td>
<td>(-\frac{27-8}{5(10-9)})</td>
</tr>
<tr>
<td>7</td>
<td>(-9 \cdot 5 - (10 - (-7)^2))</td>
<td>8</td>
<td>(-4\left(\frac{5 \cdot -30}{6} + 9\right))</td>
</tr>
</tbody>
</table>

Evaluate each expression using the values given.

9. \(z + y^2 - \frac{x}{3}\) use \(x = -9, y = -3,\) and \(z = -4\)

10. \(y - z + \frac{z^2}{4}\) use \(y = -9\) and \(z = 2\)
Combining like terms:
- Terms may only be combined (added/subtracted) if they are like terms.
  Like terms may have different coefficients (the number multiplied in front of the variable) but must have all of the same variable(s) and all of the same exponents.
  - **Examples**
    - Simplify $24x^2 - 4x^2$.
      \[
      24x^2 - 4x^2 = 20x^2
      \]
      Subtract the coefficients only.

In order to combine like terms, you might use some of the following properties:
- **Associative Property of Addition/Multiplication:**
  - If all terms share the same operation, the operation may be applied in any order with the same result.
  - **Examples:**
    - $2x + 5 + 3x + 7 = 2x + 3x + 5 + 7$
    - $(6 \cdot 2) \cdot \frac{1}{2} = 6 \cdot (2 \cdot \frac{1}{2})$

- **Distributive Property:**
  - If there is a single term multiplied (outside parenthesis) to an expression inside parenthesis, the term may be distributed and multiplied separately to each term inside the parenthesis.
  - **Don't forget that when a negative is outside of the parenthesis, it is equivalent to distributing a -1 to the expression inside the parenthesis**
  - **Examples:**
    - Simplify $4(x + y) + 5x - 9$.
      \[
      4x + 4y + 5x - 9 = 9x + 4y - 9
      \]
      Use the Commutative Property.
    - Simplify $3(2x + 7)$
      \[
      3 \cdot 2x + 3 \cdot 7 = 6x + 21
      \]
    - Simplify $4 - (7 - 6x)$
      \[
      4 - 7 + 6x = 6x - 3
      \]
    - Simplify $2x(3x^2 + 5x - 4 + 6x)$
      \[
      2x(3x^2 + 5x - 4 + 6x) = 6x^3 + 10x^2 - 8x + 12x^2
      \]
      Add the like terms $4x$ and $5x$.

- If there are expressions being multiplied that both have more than one term, you must be sure to distribute every term in the first expression to every term in the second expression.
  - When multiplying two binomials (expressions that each have two terms) many use the acronym F.O.I.L. (first, outer, inner, last) to remember to multiply all terms.

\[
(x + 9)(x + 1) = x^2 + 10x + 9
\]

- **Examples:**
  - Simplify $(x + 3)(2x - 7)$
    \[
    (x + 3)(2x - 7) = 2x^2 - 7x + 6x - 21
    \]
    \[
    2x^2 - x - 21
    \]
  - Simplify $(2x + 1)(3x^2 + 2x - 3)$
    \[
    (2x + 1)(3x^2 + 2x - 3) = 6x^3 + 4x^2 - 6x + 3x^2 + 2x - 3
    \]
    \[
    6x^3 + 7x^2 - 4x - 3
    \]
Simplify each of the following expressions.

<table>
<thead>
<tr>
<th>Expression 1</th>
<th>Expression 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$7m + 1 + 7m + 4$</td>
<td>$10 - 7p + p - 5$</td>
</tr>
<tr>
<td>$6(5x + 7) - 7$</td>
<td>$-6(-8a + 9) + 4a$</td>
</tr>
<tr>
<td>$-2(-1 + 6m) + 8m$</td>
<td>$-3k - 3(5k + 7)$</td>
</tr>
<tr>
<td>$-7k(1 - 8k) + 5k(-3 - 2k)$</td>
<td>$7a(1 + 8a) - 8a(a + 9)$</td>
</tr>
<tr>
<td>$(6 + 5n) + (4n - 8)$</td>
<td>$(5x - 3x^2) - (7x + 8x^2)$</td>
</tr>
<tr>
<td>$(k + 5k^2) + (k + 4 - 7k^2)$</td>
<td>$(5v^2 + 7v^3) - (6v^3 - 2v^2 - 8)$</td>
</tr>
<tr>
<td>$(3n - 2 - 8n^2) + (7 - 8n - 7n^2)$</td>
<td>$(1 - 4a - 5a^3) - (6 + a^3 + 4a)$</td>
</tr>
<tr>
<td>$(2x - 7)(x + 6)$</td>
<td>$(2x - 6)(8x - 1)$</td>
</tr>
<tr>
<td>$(x + 6)(8x - 3)$</td>
<td>$(b + 1)(3b - 8)$</td>
</tr>
<tr>
<td>$(7x + 8y)(8x + y)$</td>
<td>$(7x - 6y)(2x + 8y)$</td>
</tr>
<tr>
<td>$(5p + 6)(3p^2 + p + 6)$</td>
<td>$(7x + 5)(4x^2 + 8x + 5)$</td>
</tr>
</tbody>
</table>
## Simplifying Exponential Expressions

### Exponent Rules:

To simplify expressions with exponents, you must follow these exponent rules:

<table>
<thead>
<tr>
<th>Rule:</th>
<th>Rule:</th>
<th>Example:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Rule:</strong></td>
<td>when terms with the same base are multiplied, you add the exponents</td>
<td>(a^x \cdot a^y = a^{x+y})</td>
</tr>
<tr>
<td><strong>Quotient Rule:</strong></td>
<td>When terms with the same base are divided, you subtract the exponents</td>
<td>(\frac{a^x}{a^y} = a^{x-y})</td>
</tr>
<tr>
<td><strong>Power Rule:</strong></td>
<td>When a term is raised to another exponent, you multiply the exponents</td>
<td>((a^x)^y = a^{x \cdot y})</td>
</tr>
<tr>
<td><strong>Power of a Product/Quotient Rule:</strong></td>
<td>When a group of variables being multiplied or divided is being raised to a power, you may distribute the exponent and use power rule for each variable.</td>
<td>((a^x b^y)^z = a^{x \cdot z} \cdot b^{y \cdot z})</td>
</tr>
<tr>
<td><strong>Zero Exponent:</strong></td>
<td>Anything raised to the zero power is equal to one.</td>
<td>(a^0 = 1)</td>
</tr>
<tr>
<td><strong>Negative Exponents:</strong></td>
<td>A negative exponent is equivalent to taking the reciprocal of the base of the exponent and applying the absolute value of the exponent.</td>
<td>(\left(\frac{a}{b}\right)^{-x} = \left(\frac{b}{a}\right)^x)</td>
</tr>
</tbody>
</table>

**Remember that the Order of Operations still applies here – parenthesis must always be taken care of first**
Simplify each of the following expressions. Your answers should include only positive exponents.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>((4xy)^2)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>(\frac{y^3}{4x^2y^{-1}})</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>(4u^{-2}v^02u^{-2})</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>((y^4)^{-1})</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>((x^3) \cdot (2x^{-1})^0)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(\left(\frac{2x^3}{2x^{-4}y^{-4}}\right)^2)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>(\frac{(b^2)^3}{a^0 \cdot 2a^{-3}b^2})</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>(\frac{(2ab)^3}{2a^2b^4 \cdot a^3b^3})</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>(a^{-2}b^3 \cdot (2b)^4)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>(\frac{4x^4}{3x^4y^{-3}})</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>(\frac{(a^4b^{-3})^0}{2ba^{-2}})</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>(x^{-4}y^2 \cdot (x^0y^0)^{-3})</td>
<td></td>
</tr>
</tbody>
</table>
Find the slope of the line.

10. [Diagram]
11. [Diagram]

12. [Diagram]
13. [Diagram]

Find the slope of the line that contains each pair of points.
14. \((3, 10)\) and \((2, 5)\)
15. \((12, -2)\) and \((0, 6)\)

Find the slope of the line described by each equation.
16. \(5x + 4y = 40\)
17. \(7x + 42 = 2y\)

Write the equation that describes each line in slope-intercept form.
18. slope = 8; \(y\)-intercept = -6
19. slope = \(-\frac{1}{2}\), \((8, -1)\) is on the line
Write each equation in slope-intercept form. Then graph the line described by the equation.

20. \( y + x = 3 \)

21. \( 5x - 2y = 10 \)

Write an equation in point-slope form for the line with the given slope that contains the given point.

22. slope = 4; (5, 6)

23. slope = -3; (7, -2)

Graph the line described by each equation.

24. \( y - 3 = \frac{2}{3}(x+1) \)

25. \( y + 4 = -3(x-4) \)

Solve each system by graphing.

26. \[
\begin{align*}
    y &= 2x + 3 \\
    y &= -x + 9
\end{align*}
\]
Solution: __________

27. \[
\begin{align*}
    y &= -3x + 4 \\
    y &= 2x + 4
\end{align*}
\]
Solution: __________
Solve each system by substitution.

28. \[
\begin{aligned}
y &= 3x + 4 \\
y &= 4x + 5
\end{aligned}
\]

29. \[
\begin{aligned}
-2x + 2y &= 4 \\
4x + 3y &= -15
\end{aligned}
\]

Solve each system by elimination.

30. \[
\begin{aligned}
x + 6y &= -8 \\
7x + 2y &= 24
\end{aligned}
\]

31. \[
\begin{aligned}
9x + 6y &= 12 \\
-18x - 8y &= -4
\end{aligned}
\]

Evaluate each expression for the given value(s) of the variable(s).

32. \[(3t)^3\] for \(t = 2\)

33. \[4x^{-2}y^0\] for \(x = 7\) and \(y = -4\)

Add or subtract.

34. \[12x^2 + 11y^2 - 5x^2\]

35. \[(-8k^2 + 5) - (3k^2 + 7k - 6)\]
### Multiply

36. \(-4x(x^2 - 5x + 7)\)   
37. \((y - 7)(y - 4)\)

38. \((x - 4)^2\)   
39. \((5x + 2)^2\)

### Factor each polynomial. (GCF)

40. \(12c^3 - 5c\)   
41. \(6x^2 - 18x + 6\)

### Factor each polynomial.

42. \(x^2 + 11x + 28\)   
43. \(x^2 - 8x + 7\)

44. \(x^2 - 2x - 24\)   
45. \(x^2 + 4x - 21\)

46. \(1 - 9x^2\)   
47. \(64x^2 - 1\)
### Use the Zero Product Property to solve each equation. Check your answer.

48. $(x - 4)(x - 3) = 0$

49. $x(x + 13) = 0$

### Solve each quadratic equation by factoring. Check your answer.

50. $x^2 + 2x - 15 = 0$

51. $x^2 - 5x - 6 = 0$

### Solve using square roots. Check your answer.

52. $x^2 = 64$

53. $x^2 = 900$

54. $9x^2 + 20 = 189$

55. $0 = 49x^2 - 16$

### Solve by completing the square.

56. $x^2 + 10x = -21$

57. $-x^2 + 6x - 3 = 0$
Solve using the Quadratic Formula.

58. \( x^2 + 7x - 6 = 0 \)  
59. \( 2x^2 - x - 11 = 0 \)

Name the relationship(s): complementary, supplementary, vertical, or adjacent.

60.  
61.  

62.  
63.  

Find the measure of angle \( b \).

64.  
65.  

Find the perimeter of each figure.

66.  
67.  

\[
\text{14 m} \quad \text{7 m} \quad \text{y m} \\
\text{16 m}
\]  

\[
\text{13.6 km} \\
\text{6.7 km} \quad \text{5.2 km} \quad \text{6 km} \\
\text{6.4 km}
\]
Find the area of each figure.

68. 

69. 

70. 

71. 

Find the area and circumference of each circle.

72. 

73. 

Use the Pythagorean Theorem to find the missing length.

74. 

75. 

The polygons in each pair are similar. Find the scale factor of the smaller figure to the larger figure.

76. 

77.
Find the volume of each figure – see formulas below.

**Volume Formulas**

<table>
<thead>
<tr>
<th>Prism</th>
<th>Pyramid</th>
<th>Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V = Bh$</td>
<td>$V = \frac{1}{3}Bh$</td>
<td>$V = \pi r^2 h$</td>
</tr>
<tr>
<td>Cube</td>
<td>Cone</td>
<td>Sphere</td>
</tr>
<tr>
<td>$V = s^3$</td>
<td>$V = \frac{1}{3}\pi r^2 h$</td>
<td>$V = \frac{4}{3}\pi r^3$</td>
</tr>
</tbody>
</table>
PART I: What is Science? For this section, you must do research to answer the questions. You can simply Google some of this information.

What is your definition of science?

Define science.

What is technology?

Technology is often advancing. What are some examples of advances in technology?

Science and technology are interdependent. Advances in one lead to advances in the other. Give an example of this phenomenon.

What is physical science?

Branches of Science:

1. Natural Science
   a. Physical Science
      i. Physics - is the study of
      ii. Chemistry - is the study of
   b. Earth & Space Science
i. Geology - is the study of

ii. Astronomy - is the study of

c. Life Science
   i. Biology – is the study of
   
   ii. Zoology – is the study of

2. Social Science

**PART II: The Scientific Approach**

*Put the following items in order of the scientific method.*

- Develop a theory.
- Ask a question.
- Draw conclusions.
- Analyze data.
- Develop a hypothesis.
- Experiment or test idea.
- Make an observation.

1. 

2. 

3. 

4. 

5. 

6. 

7. 

Define the following terms used in the scientific method.

8. Independent variable:


9. Dependent variable:


10. Control group:


11. Scientific law:


Read the following experiment and identify the steps in the scientific method.

Last year, Wendy planted seeds in a garden. She noticed that not all of the seeds became plants. This year, she asked herself, "On average, how many of the seeds in a package will grow?" She thought maybe 25% of the seeds in a package would not grow. She bought three packages containing twenty-five seeds each. She planted each package of seeds in separate boxes so she could keep careful count of the number of seeds that would grow. She drew a diagram of the boxes and indicated where each seed was planted. As the seeds sprouted, she put a green X on the place in her diagram where the seed was planted. If the seed did not grow, she put a red X on the place in her diagram where the seed was planted. At the end of her investigation, she noticed that four seeds in
the first box did not grow. The second box had six seeds that did not grow. In the third box, only five of the seeds did not grow. Wendy concluded that an average of five seeds in each package did not grow. For future gardens, Wendy assumed that eighty percent of the seeds in a package would grow.

12. What is the observation?

13. State the question.

14. What was her hypothesis?

15. Explain her experiment to test the hypothesis.

16. How did she collect her data?

17. What was Wendy’s conclusion?

18. State the prediction she made.
PART III: Measurement and Conversions (You will need a calculator for this section).

**SI Units and SI Prefixes:**

Scientists use a set of measuring units called SI, or the International System of Units. The abbreviation SI derives from the French name *System International d’Unités*. The SI Unit system is used as a universal way to readily interpret data.

The following table depicts the **SI base units**.

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Unit</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Meter</td>
<td>m</td>
</tr>
<tr>
<td>Mass</td>
<td>Kilogram</td>
<td>kg</td>
</tr>
<tr>
<td>Temperature</td>
<td>Kelvin</td>
<td>K</td>
</tr>
<tr>
<td>Time</td>
<td>Second</td>
<td>s</td>
</tr>
</tbody>
</table>

You are required to **know** the SI measuring base units and prefixes.

**SI Prefixes** are metric prefixes that allow for a more convenient way to express SI base units.

The following table depicts the **SI prefixes**.

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Symbol</th>
<th>Meaning</th>
<th>Multiply unit by</th>
</tr>
</thead>
<tbody>
<tr>
<td>giga-</td>
<td>G</td>
<td>Billion (10^9)</td>
<td>1,000,000,000</td>
</tr>
<tr>
<td>mega-</td>
<td>M</td>
<td>Million (10^6)</td>
<td>1,000,000</td>
</tr>
<tr>
<td>kilo-</td>
<td>k</td>
<td>Thousand (10^3)</td>
<td>1,000</td>
</tr>
<tr>
<td>deci-</td>
<td>d</td>
<td>Tenth (10^{-1})</td>
<td>0.1</td>
</tr>
<tr>
<td>centi-</td>
<td>c</td>
<td>Hundredth (10^{-2})</td>
<td>0.01</td>
</tr>
<tr>
<td>milli-</td>
<td>m</td>
<td>Thousandth (10^{-3})</td>
<td>0.001</td>
</tr>
<tr>
<td>micro-</td>
<td>µ</td>
<td>Millionth (10^{-6})</td>
<td>0.000001</td>
</tr>
<tr>
<td>nano-</td>
<td>n</td>
<td>Billionth (10^{-9})</td>
<td>0.00000001</td>
</tr>
</tbody>
</table>

**Conversions:**

A conversion factor is a ratio of equivalent measurements that is used to convert a quantity expressed in one unit to another unit.

*Example: Convert 12 dozen to eggs. (Conversion factor 1 dozen = 12 eggs)*

\[
2\text{ dozen} \times \frac{12\text{ eggs}}{1\text{ dozen}} = 24\text{ eggs}
\]
Common Conversions:
- There are 5280 feet in 1 mile
- There are 0.034 ounces in 1 milliliter
- There are 0.454 kg in 1 pound
- There are 1.6 kilometers in 1 mile
- There are 73 gallons in 2 barrels
- There are 1.05 quarts in 1 liter
- There are 4 quarts in 1 gallon

Do the following one-step unit conversions:

1. Convert 0.347 kilometers to miles.

2. Convert 870 kilograms to pounds.

3. Convert 84 ounces to milliliters.

4. Convert 82 miles to feet.

5. Convert 4 gallons to barrels.

6. Convert 45 quarts to gallons.
Do the following multi-step unit conversions:

7. Convert 746 days to centuries.

8. Convert 56 kilometers to inches (there are 12 inches in one foot).

9. Convert 120 barrels to quarts.

10. Convert 37 quarts to gallons

Unit conversions:

Example: 25g = _______ kg

\[
25 \text{ g} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 0.025 \text{ kg}
\]

Therefore, 25 g = 0.025 kg

Convert the following units.

11. 3470 mL = _______ L

12. 13.5 cm = _______ m
13. 0.65 L = _____ mL

14. 234 mL = _____ L

15. 238 g = _____ cg

16. 535.50 g = _____ kg

17. 542 L = _____ kL

18. 0.094 kg = _____ g

19. 125.4 mg = _____ g

20. 149 cm = _____ m
21. 450 cm = ______ m

22. 17 mm = ______ m

23. 22 Mg = ______ g

24. 22 Mg = ______ ng

**Temperature Conversions:**

Kelvin is the SI base unit for temperature. A thermometer is an instrument used to measure temperature. Temperature is measured in Fahrenheit (°F), Celsius (°C), or Kelvin (K). Below are the formulas used to convert from one scale of temperature to another.

$\text{°C} = \frac{5}{9} (\text{°F} - 32.0^\circ) \quad \text{°F} = \frac{9}{5} (\text{°C}) + 32.0^\circ \quad K = \text{°C} + 273$

**Convert the following temperatures to the desired unit.**

*Example: Convert 22 °C into °F.*

$\text{°F} = \frac{9}{5} (22^\circ\text{C}) + 32.0^\circ = 71.6^\circ\text{F}$
25. 11 °C into °F.

26. 0 °C into °F.

27. 27 °F into °C.

28. 137 °F into °C.

29. 15 °C into K

30. 300 °F into K