1. Circle all of the rational numbers.

\[ \pi \quad \sqrt{3} \quad 0.8 \]
\[ 3 \quad \frac{1}{3} \quad \sqrt{2} \]

2. Change to a fraction, reduce if possible.

\[ 0.1\overline{8} \]

3. If the volume of a cube equals 125 cm\(^3\), what is the length of one of the edges of the cube?

4. Estimate to the nearest whole number, without using a calculator, the square root of 161.

5. Estimate the locations of each number on the number line.

\[ \pi \quad \sqrt{3} \quad 5.8 \quad \frac{1}{3} \quad -\sqrt{4} \]

6. Determine whether the properties of exponents are used correctly to simplify the expressions

a. \[ \frac{6^{10}}{6^5} = 6^4 \quad \text{Yes} \quad \text{No} \]

b. \[ (5^8)^3 = 5^{24} \quad \text{Yes} \quad \text{No} \]

c. \[ 10^{-3} = \frac{1}{3^{10}} \quad \text{Yes} \quad \text{No} \]

d. \[ 4^6 \cdot 4^4 = 4^{24} \quad \text{Yes} \quad \text{No} \]

e. \[ (7^1)^0 = 1 \quad \text{Yes} \quad \text{No} \]

7. Solve and determine the number of solutions.

\[ -10(x - 1) = 10 - 10x \]

Select the number of Solutions:

- □ No Solution
- □ One Solution
- □ All Real Numbers

8. The population of Florida was \(6.7 \times 10^6\) in 1970. The population increased to \(2 \times 10^7\) in 2010. To the nearest whole number, how many times greater was the population in 2010 then in 1970?
9. Circle all of the expressions equivalent to \( \frac{1}{x^4} \).

\[
\begin{align*}
&x^2 \cdot x^2 \\
&(x^{-2})(x^2) \\
&(x^1)^{-4} \\
&\frac{x^0}{(x^3)^1} \\
&x^{-6} \cdot x^2
\end{align*}
\]

10. Solve: \( x^2 = 144 \)

11. Match the situation with the correct equation.

___ Alex’s father is thinking of buying his son a six-month movie pass for $35. With the pass, movies cost $1.00 each.

___ Buzz Electric charges $55 for a service call plus $70 per hour of service.

___ Cosmo Catering charges $70 to cater a party for 10 people and $55 for each additional person.

___ Black Box charges a $6 membership fee and $3 for each DVD rented.

12. a. Which triangles can be used to find the slope of \( \overline{AC} \)?

b. Which triangles cannot be used to find the slope of \( \overline{AC} \)?

c. What is the slope of \( \overline{AC} \)?

13. Find \( a \) if \( b = 5 \) cm and \( c = 8 \) cm.

14. Solve and determine the number of solutions.

\[
7x - 11 = 5(x - 2) + 2x - 1
\]

Select the number of Solutions:

- No Solution
- One Solution
- Infinitely Many Solutions
15. Match the story with the correct graph.

___ Airplane 1 left Orlando at 8 am, flew to Miami, had a two hour wait and flew back to Orlando.

___ Airplane 2 left Orlando, after a two hour delay at 10:00 am, and stayed in Miami.

___ Airplane 3 left Orlando for Miami, after an hour delay at 9:00 am, had an hour wait in Miami and flew back to Orlando.

16. Find the rate of change for each function, then compare the rates of change.

### Function 1

-5  | -4
0   | -2
10  | 0

- Graph A

### Function 2

- Graph B

- Graph C

- Graph D

17. Preform two consecutive transformations on the given polygon:

Move 1: Translate 4 units right and 3 units down.
Move 2: Rotate 90° clockwise around the origin.

Are the original figure and the image congruent?

18. Graph: \( y = -\frac{1}{2}x + 3 \)

19. If \( \angle D = 166° \) and \( \angle B = 47° \), find the measures of the remaining angles.

\( \angle A = \underline{____} \quad \angle C = \underline{____} \)
20. Describe a series of transformations that would prove Rectangle A is congruent to Rectangle B.

![Diagram of rectangles A and B](image)

21. Determine which are functions.

Yes / No \{(2,1), (3,4), (5, 7) (3,2)\}

Yes / No \{(5,-2), (6,-7), (8, 4) (2,8)\}

22. The distance to fly a direct route from Jacksonville to Panama City is 277 miles and the distance from Panama City to Fort Meyers is 377 miles. To the nearest mile, how far is it from Jacksonville to Fort Meyers?

![Map of Florida with routes](image)

23. If \(< \text{E} = 59^\circ \) and \(< \text{D} = 141^\circ \), find the measures of the remaining angles.

\(< \text{A} = \_\_\_ \) \(< \text{B} = \_\_\_ \) \(< \text{C} = \_\_\_ \)

24. Cone B is filled with water and dumped into cylinder A. How many cones of water will it take to completely fill the cylinder two times?

![Diagram of cone and cylinder](image)
25. Find the rate of change for each function, then compare the rates of change.

Function 1  Function 2
(2,1), (4,2), (6,3)  \( y = \frac{5}{6}x + 3 \)

□ Function 1 has the greatest rate of change.
□ Function 2 has the greatest rate of change.
□ Function 1 and Function 2 have the same rate of change.

26. Solve for \( x \) and \( y \). Round to the nearest tenth.

\[
\begin{align*}
\triangle & \quad \text{15} \\
\text{6} & \quad \text{8} \\
x & \quad \text{20}
\end{align*}
\]

\( x = \), \( y = \)

27. Solve for \( x \).

\[
\frac{3}{4} x - \frac{1}{2} x - 4 = 12
\]

28. Find the distance between the two points, round to the nearest tenth.

29. A street vendor wants a license to sell ice cream cones in Mathville. The requirements to sell ice cream is that each cone is 5 inches high and has a diameter of 2 inches. Each cone is filled completely with ice cream and has a perfect hemisphere (half of a sphere) on top.

a) Find the volume of cylinder “A” to the nearest whole number. 

b) Find the volume of cylinder “B” to the nearest whole number.

How many times larger is cylinder “A”, then cylinder “B”? 

30. A street vendor wants a license to sell ice cream cones in Mathville. The requirements to sell ice cream is that each cone is 5 inches high and has a diameter of 2 inches. Each cone is filled completely with ice cream and has a perfect hemisphere (half of a sphere) on top.

How much ice cream would be needed, for every one ice cream cone sold? Round to the nearest hundredth.

Answer:
31. Determine which are linear.

a) [Graph showing a linear relationship]
   Linear / Non-Linear

b) \( y = 5x - 2 \)
   Linear / Non-Linear

c) [Graph showing a linear relationship]
   Linear / Non-Linear

d) The population of gremlins in Mathville was 5 a year ago, but has doubled every day since.
   Linear / Non-Linear

32. Find the height and the volume of the cylinder.

![Cylinder diagram]

Height: ___
Volume: ___

33. Complete the table and graph the linear equation: \( x + y = 5 \)

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

34. Find the volume of the composite figure. Round to the nearest whole number.

![Composite figure diagram]

Height: ___
Volume: ___

35. Line \( m \) is parallel to line \( n \). \(< E = 48^\circ \), find the missing measures.

\(< A = \_\_\_ < B = \_\_\_ < C = \_\_\_ < D = \_\_\_ < F = \_\_\_\)
36. Two taxi cab company's charge an initial fee and a cost per mile driven. Yellow cab fees are shown using a dashed line and red cab fee are shown with a solid line below.

37. What is the initial fee for the yellow cab?

38. Find the slope of the yellow cab. Use the point (4,7), and the coordinate for the y-intercept, to find the slope.

39. What is the cost ($) per mile for the yellow cab?

40. What does each mile cost for the red cab? The points (0,6),(4,7), are on the red line.

41. Use the slope and y-intercept to write an equation for the red cab.

42. Use the equation from the previous problem to find the cost of taking a red taxi 25 miles.

43. When are the costs of both Taxi Cabs the same?

44. Which Taxi cost less for a 3 mile ride?

45. Seventy students of Mathville High School were asked who was the best math teacher. Complete the two way table based on the data given.

<table>
<thead>
<tr>
<th></th>
<th>Mr. X</th>
<th>Mrs. Y</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>12</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Girls</td>
<td>44</td>
<td>12</td>
<td>56</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>24</td>
<td>80</td>
</tr>
</tbody>
</table>

46. Use the information from the two way table above to make a relative frequency table.

<table>
<thead>
<tr>
<th></th>
<th>Mr. X</th>
<th>Mrs. Y</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a) What percent of girls voted Mr. X as their best.

b) How many more girls than boys voted Mrs. Y as their best?

c) What is the relative frequency of boys that voted for Mrs. Y.

d) What percent of boys voted Mr. X as their best.

e) What is the relative frequency of students that were boys and voted for Mr. X.

f) How many girls voted?

g) How many votes did Mr. X receive?
47. Some 8th grade students were selected from Mathville Middle School to compare the grade in their math class grade and their score from Florida Standards Assessment (F.S.A.). Their scores are shown on the table below.

<table>
<thead>
<tr>
<th>Math Grade</th>
<th>F.S.A. Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>4</td>
</tr>
<tr>
<td>95</td>
<td>5</td>
</tr>
<tr>
<td>80</td>
<td>5</td>
</tr>
<tr>
<td>65</td>
<td>2</td>
</tr>
<tr>
<td>60</td>
<td>1</td>
</tr>
<tr>
<td>75</td>
<td>3</td>
</tr>
<tr>
<td>80</td>
<td>3</td>
</tr>
<tr>
<td>65</td>
<td>1</td>
</tr>
</tbody>
</table>

Make a scatter plot of the data on the coordinate plane provided.

48. Consider each series of transformations and determine if the original figure and the image are congruent or similar.

a) Equilateral ΔOMG is rotated 90° clockwise and dilated using a scale factor of ¼ producing ΔXTZ.
   Congruent / Similar

b) Line segment EF is reflected over the x-axis producing Line segment CD.
   Congruent / Similar

c) Equilateral ΔNOP is translated 6 units to the right and rotated 180° about the origin producing ΔXYZ.
   Congruent / Similar

49. Given line \( m \) is parallel to line \( n \) and the measure of \( < 3 \) equals 116°, find the measures of the remaining angles.

a) \( m < 1 = \)

b) \( m < 2 = \)

c) \( m < 4 = \)

 d) \( m < 5 = \)

e) \( m < 6 = \)

 f) \( m < 7 = \)

g) \( m < 8 \)
50. If I had a triangle with the given vertices: (0,2), (6,2), (3,4). What are the new vertices after a dilation of k = 4 about the origin?

51. Write and solve an equation based on the relationship of the vertical angles shown. Then find the measure of all four angles.

\[(10x + 60)^\circ\]
\[(30x - 20)^\circ\]

52.

a) Which line has a greater y-intercept?

b) Which line has a greater slope?

c) Write the equation represented by line n.

53. Solve the systems of equations.

\[2x + y = 12\]
\[x = 2\]

\[x = ___ \quad y = ___\]

54. Which is larger? Explain your reason.

\[(3 \times 10^6) - (5 \times 10^5)\]

OR

\[(9 \times 10^2) \times (4 \times 10^2)\]

55. State the solution to each system of equations based on the graphs of their lines.

a) The graphs of Line A and Line C.

b) The graphs of Line A and Line B.

c) The graphs of Line B and Line C.
56. Write a linear equation given the table.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-2</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>7</td>
</tr>
</tbody>
</table>

57. Determine which measures could form a right triangle? Select all correct answers.

I 20 m, 21 m, 29m
II 7 cm, 8 cm, 9 cm
III 9 ft., 15 ft., 12 ft.
IV 5 m, 9m, 6m

58. Solve for $x$ and determine the number of solutions if possible.

$$5x + 4 = 7(x + 1) - 2x$$

59. A system of two equations is shown.

$$y = 3(x + 5)$$
$$y = 3(x - 5)$$

How many solutions does the system have?

60. A system of two equations is shown.

$$5x + 6y = -8$$
$$2x + 3y = -5$$

What is the solution of the system?

$x = ___$  $y = ___$

61. Two similar triangles are shown

What is the measure of $< Z$?

Select the number of Solutions:

- □ No Solution
- □ One Solution
- □ All Real Numbers

Mr. Slope Guy in Mathville, Florida ©