

Junior High Math League

Sample Questions by Meet and Topic

Meet 2:

2.1 The Number Line

2.2 Understanding Exponents

2.3 Proportions

2.4 Proportional Scale Drawings (2-D)

2.5 Writing and Solving One-Variable Equations

2.6 Similar Figures

2.7 Data Displays

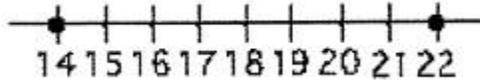
(All sample questions were taken from previous JH Math League meets. Please contact Bill Theisen at btheisen@isd2899.k12.mn.us with any questions regarding the sample questions and answers.)

2.1 The Number Line - Questions

1) Evaluate:

$$-|-5 - |-3 + 1||$$

2) Write the absolute value equation for this graph:



3) Solve for both values of x :

$$|2x - 1| = 5$$

4) What is the midpoint between -4 and 8.5 ?

5) What is the coordinate of a point $3/4$ of the way from 3 to 15 ?

6) If 4 is the midpoint of A and B , 10 is the midpoint of B and C , and B is the midpoint of 4 and 10 , what is the distance from A to C ?

7) Solve for x :

$$\frac{2}{3}(x - 21) = 10$$

8) On a number line, what is the midpoint of:

$$-|7 - 4^2| \text{ and } 3^3 ?$$

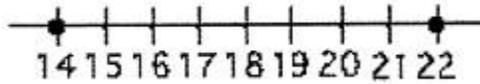
9) Last year, a cell phone company sold 5.8 million phones of a certain model. This year, the company predicts a 30% increase in sales for the upgraded version of the same model. How many cell phones of the upgraded version does the company anticipate selling this year? *Write your answer in scientific notation.*

2.1 The Number Line - Answers

1) Evaluate:

$$-|-5 - |-3 + 1|| \quad -7$$

2) Write the absolute value equation for this graph:



$$|x-18|=4$$

3) Solve for both values of x :

$$|2x - 1| = 5 \quad -2, 3$$

4) What is the midpoint between -4 and 8.5 ?

$$2.25$$

5) What is the coordinate of a point $3/4$ of the way from 3 to 15 ?

$$12$$

6) If 4 is the midpoint of A and B , 10 is the midpoint of B and C , and B is the midpoint of 4 and 10 , what is the distance from A to C ?

$$12$$

7) Solve for x :

$$\frac{2}{3}(x - 21) = 10 \quad 36$$

8) On a number line, what is the midpoint of:

$$-|7 - 4^2| \text{ and } 3^3 ? \quad 9$$

9) Last year, a cell phone company sold 5.8 million phones of a certain model. This year, the company predicts a 30% increase in sales for the upgraded version of the same model. How many cell phones of the upgraded version does the company anticipate selling this year? *Write your answer in scientific notation.*

$$7.54 \cdot 10^6$$

2.2 Understanding Exponents - Questions

- 1) Write in exponential form: $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$.

- 2) Put in parenthesis to make this a true statement: $2^2 3^2 5^0 = 4$

- 3) Write 45600 in scientific notation.

- 4) Write in scientific notation: 0.000205

- 5) Write 27 as a power that has a whole number base and a whole number exponent other than 1.

- 6) Evaluate:
 $8^3 \cdot 4^{-3} + 2^3$

2.2 Understanding Exponents - Answers

1) Write in exponential form: $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$.

$$2^3 \cdot 3^2$$

2) Put in parenthesis to make this a true statement: $2^2 3^2 5^0 = 4$

$$2^2 \cdot (3^2 \cdot 5)^0$$

3) Write 45600 in scientific notation.

$$4.56 \cdot 10^4$$

4) Write in scientific notation: 0.000205

$$2.05 \cdot 10^{-4}$$

5) Write 27 as a power that has a whole number base and a whole number exponent other than 1.

$$3^3$$

6) Evaluate:

$$8^3 \cdot 4^{-3} + 2^3$$

$$16$$

2.3 Proportions - Questions

1) Solve for x:

$$\frac{3}{7} = \frac{18}{x}$$

2) A recipe for orange aide calls for 3 cups of orange liquid concentrate to 5 cups of water. How much orange concentrate would you need to make 120 cups of orange aide?

3) Solve for x:

$$\frac{x+2}{5} = \frac{x-5}{3}$$

4) What is 110% of 80?

5) If shoes regularly priced at \$50 are sold for \$30, what percent is the discount?

6) A sale item was discounted by 25%. Two weeks later it was marked down 20%. What percent was the total discount?

7) Solve for x:

$$\frac{2(x-7)}{5} = \frac{3x}{4}$$

2.3 Proportions - Answers

1) Solve for x:

$$\frac{3}{7} = \frac{18}{x}$$

$$x = 42$$

2) A recipe for orange aide calls for 3 cups of orange liquid concentrate to 5 cups of water. How much orange concentrate would you need to make 120 cups of orange aide?

45 cups

3) Solve for x:

$$\frac{x+2}{5} = \frac{x-5}{3}$$

$$x = 15 \frac{1}{2}$$

4) What is 110% of 80?

88

5) If shoes regularly priced at \$50 are sold for \$30, what percent is the discount?

40%

6) A sale item was discounted by 25%. Two weeks later it was marked down 20%. What percent was the total discount?

40%

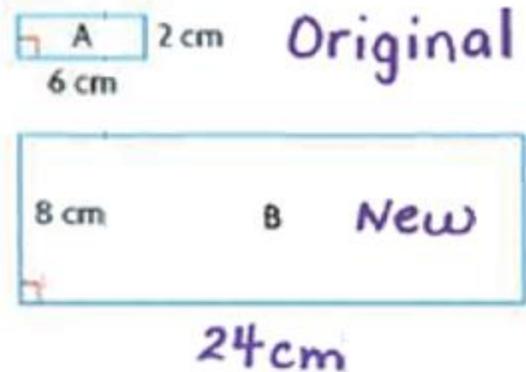
7) Solve for x:

$$\frac{2(x-7)}{5} = \frac{3x}{4}$$

$$x = -8$$

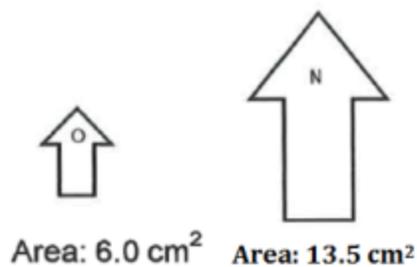
2.4 Proportional Scale Drawings (2-D) - Questions

1) Two similar rectangles, A and B , are shown.



- What is the scale factor of the enlargement from A to B ?
- What are the areas of rectangles A and B ?
- How many rectangles congruent to rectangle A would fit in rectangle B ?

2) Determine the scale factor that relates the two similar figures?

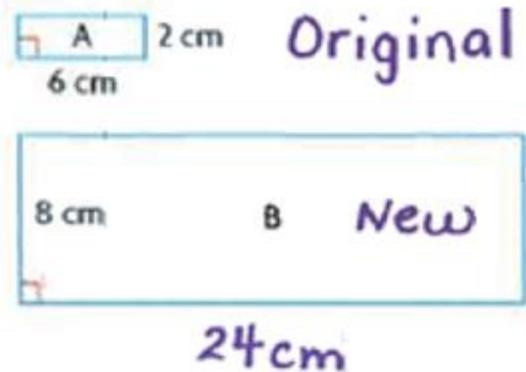


3) The area of a trapezoid is 56 cm^2 . It is going to be enlarged by a scale factor of $\frac{3}{2}$. What is the area of the enlarged trapezoid?



2.4 Proportional Scale Drawings (2-D) - Answers

1) Two similar rectangles, A and B , are shown.



a) What is the scale factor of the enlargement from A to B ?

4

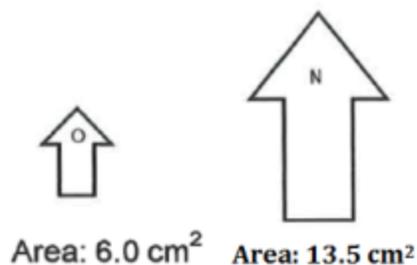
b) What are the areas of rectangles A and B ?

$$A = 12 \text{ cm}^2; B = 192 \text{ cm}^2$$

c) How many rectangles congruent to rectangle A would fit in rectangle B ?

16

2) Determine the scale factor that relates the two similar figures?



1.5

3) The area of a trapezoid is 56 cm^2 . It is going to be enlarged by a scale factor of $\frac{3}{2}$. What is the area of the enlarged trapezoid?



126 cm^2

2.5 Writing and Solving One-Variable Equations - Questions

1) Solve for x :

$$3(x + 2) - 4(x - 5) = 10(x - 4)$$

2) Solve for x :

$$3(x - 2) = 8x - 2(x + 4)$$

3) Solve for y in terms of x :

$$y + a = bx$$

4) If Jason bought c cases of 144 candy bars each for \$48 per case, and he sold the candy bars for \$1.00 each, write an equation for his profit, P , in simplest form.

5) Nancy earned \$60.00 for five hours of work. Write an equation for her earnings, E , in terms of her hours worked, h .

6) A tutor charges \$45 for a first lesson and \$30 per lesson after that. Write an equation for the cost, C , in terms of the lessons, n .

7) Thirty-two times the difference of n and 6 is equal to the sum of 48 and twice n . What is n ?

2.5 Writing and Solving One-Variable Equations - Answers

1) Solve for x :

$$3(x + 2) - 4(x - 5) = 10(x - 4)$$

$$\mathbf{x = 6}$$

2) Solve for x :

$$3(x - 2) = 8x - 2(x + 4)$$

$$\mathbf{x = 2/3}$$

3) Solve for y in terms of x :

$$y + a = bx$$

$$\mathbf{y = bx - a}$$

4) If Jason bought c cases of 144 candy bars each for \$48 per case, and he sold the candy bars for \$1.00 each, write an equation for his profit, P , in simplest form.

$$\mathbf{P = 96c}$$

5) Nancy earned \$60.00 for five hours of work. Write an equation for her earnings, E , in terms of her hours worked, h .

$$\mathbf{E = 12h}$$

6) A tutor charges \$45 for a first lesson and \$30 per lesson after that. Write an equation for the cost, C , in terms of the lessons, n .

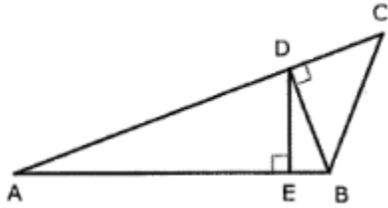
$$\mathbf{C = 30n + 45}$$

7) Thirty-two times the difference of n and 6 is equal to the sum of 48 and twice n . What is n ?

$$\mathbf{n = 8}$$

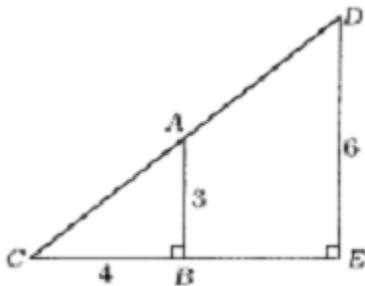
2.6 Similar Figures - Questions

- 1) There are 5 triangles in this figure. Which 3 are similar to each other?

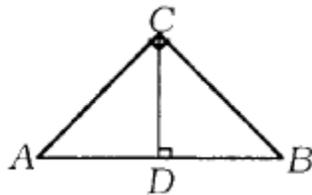


- 2) In the drawing, if

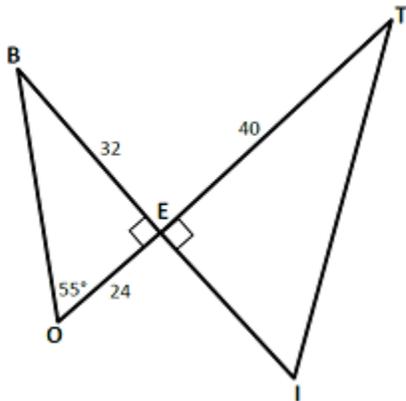
$\angle B = \angle E = 90^\circ$, $AB = 3$ ", $BC = 4$ ", $DE = 6$ ",
what is BE ?



- 3) In the diagram, $AC = 12$ cm and $BC = 10$ cm. Find the area of $\triangle ABC$.



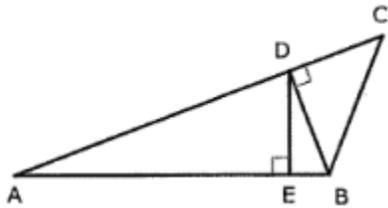
- 4) Use the diagram to answer the following?



- What is the measure of angle T?
- What is the area of $\triangle TIE$?

2.6 Similar Figures - Answers

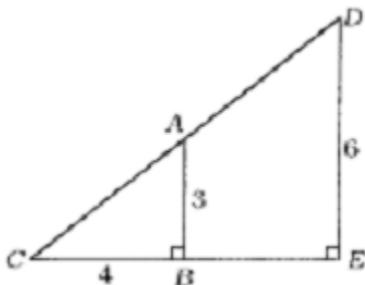
- 1) There are 5 triangles in this figure. Which 3 are similar to each other?



$\Delta AED, \Delta DEB, \Delta ADB$

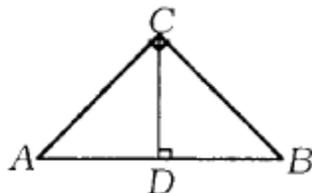
- 2) In the drawing, if

$\angle B = \angle E = 90^\circ, AB = 3", BC = 4", DE = 6"$,
what is BE ?



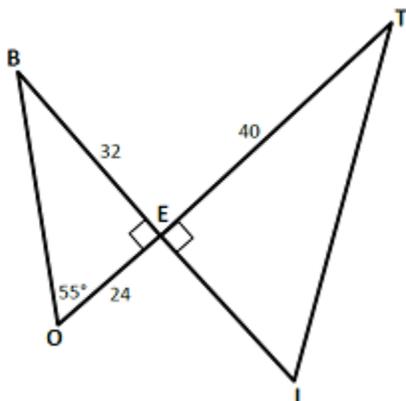
4 in

- 3) In the diagram, $AC = 12$ cm and $BC = 10$ cm. Find the area of ΔABC .



60 cm^2

- 4) Use the diagram to answer the following?

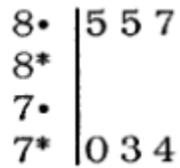


- a. What is the measure of angle T? 35°

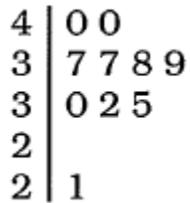
- b. What is the area of ΔTIE ? 600 units^2

2.7 Data Displays - Questions

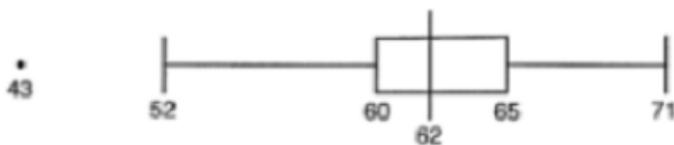
1) What is the mean value of the data in this stem and leaf plot?



2) In this stem-and-leaf plot of quiz scores, which score is misplaced?



3) Use this box and whisker plot to answer the following:



a. Is 62 defined as the mean, median, or mode?

b. What is the interquartile range?

4) Use the line plot to answer the following:



a. What is the mean of the data set?

b. What is the median of the data set?

2.7 Data Displays - Answers

1) What is the mean value of the data in this stem and leaf plot?

```
8• | 5 5 7
8* |
7• |
7* | 0 3 4
```

79

2) In this stem-and-leaf plot of quiz scores, which score is misplaced?

```
4 | 0 0
3 | 7 7 8 9
3 | 0 2 5
2 |
2 | 1
```

35

3) Use this box and whisker plot to answer the following:



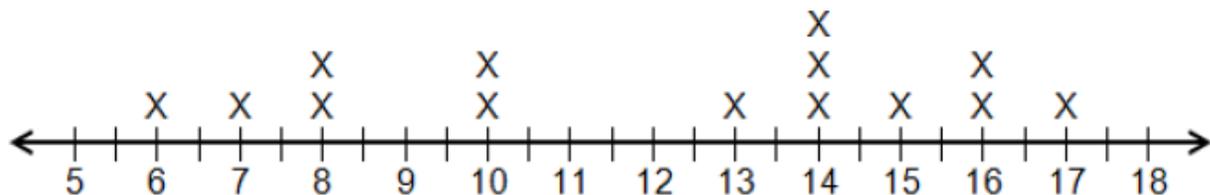
a. Is 62 defined as the mean, median, or mode?

Median

b. What is the interquartile range?

5

4) Use the line plot to answer the following:



a. What is the mean of the data set? **12**

b. What is the median of the data set? **13.5**