

Junior High Math League
Sample Questions by Meet and Topic
Meet 2

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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

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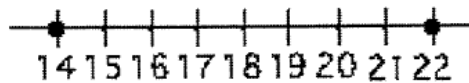
2.1 The Number Line

_____ 3. Evaluate: $-|-5 - |-3 + 1||$.

Oct 22-9:49 PM

2.1 The Number Line

_____ 1. Write the absolute value equation for this graph:



Oct 4-7:48 AM

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Oct 4-8:03 AM

2.1 The Number Line

_____ 4. 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 ?

Oct 4-8:10 AM

2.2 Understanding Exponents

_____1. Write in exponential form: $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$.

Oct 22-9:51 PM

2.2 Understanding Exponents

_____3. $2^3 \cdot 4^{-1} = ?$

Oct 22-9:51 PM

2.2 Understanding Exponents

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

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2.2 Understanding Exponents

_____ 1. Write 45600 in scientific notation.

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2.2 Understanding Exponents

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Oct 22-9:51 PM

2.2 Understanding Exponents

_____ 2. $4 \times 10^{-2} + 5.78 \times 10^1 = ?$

Oct 22-9:51 PM

2.3 Proportions

_____ 1. Solve for x: $\frac{3}{7} = \frac{18}{x}$

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2.3 Proportions

- _____ 4. 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?

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2.3 Proportions

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2.3 Proportions

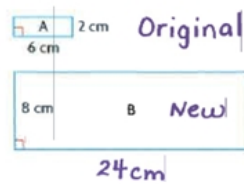
_____ % 8. A sale item was discounted by 25%. Two weeks later it was marked down 20%. What percent was the total discount?

Oct 22-9:51 PM

2.4 Proportional Scale Drawings (2-D)

(New Topic)

1. Two similar rectangles, A and B, are shown to the right.
- Determine the scale factor that produced the enlargement from rectangle A to rectangle B.
 - Determine the areas of rectangle A and rectangle B.
 - How many rectangles congruent to rectangle A would fit in rectangle B?

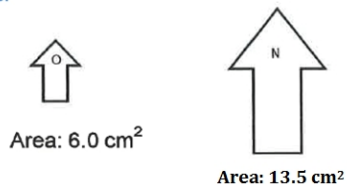


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2.4 Proportional Scale Drawings (2-D)

(New Topic)

Determine the scale factor that relates the two similar figures.



Oct 22-9:51 PM

2.4 Proportional Scale Drawings (2-D)

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The area of a trapezoid is 56 cm^2 . It is going to be enlarged by a scale factor of $3/2$. Determine the area of the enlarged trapezoid.



Oct 22-9:51 PM

2.5 Writing and Solving One-Variable Equations

_____ 5. Solve for x : $3(x+2) - 4(x-5) = 10(x-4)$.

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_____ 8. Solve for x : $3(x - 2) = 8x - 2(x + 4)$.

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2.5 Writing and Solving One-Variable Equations

$y =$ _____ 2. $y + a = bx$ Solve for y in terms of x .

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2.5 Writing and Solving One-Variable Equations

- _____ 5. 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.

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2.5 Writing and Solving One-Variable Equations

- _____ 4. Nancy earned \$60.00 for five hours of work. Write an equation for her earnings, E , in terms of her hours worked, h .

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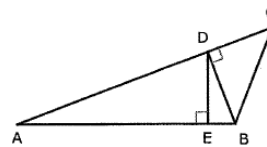
2.5 Writing and Solving One-Variable Equations

- _____ 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 .

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2.6 Similar Figures

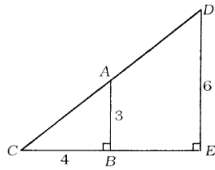
- _____ 5. There are 5 triangles in this figure. Which 3 are similar to each other?



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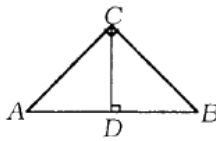
3. In the drawing for problem 2, if $\angle B = \angle E = 90^\circ$, $AB = 3''$, $BC = 4''$ and $DE = 6''$, what is BE ?



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2.6 Similar Figures

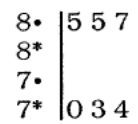
4. In the diagram for problem 2, $AC = 12$ cm, $BC = 10$ cm. Find the area of $\triangle ABC$.



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2.7 Data Displays

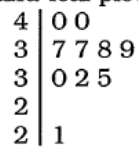
_____ 3. What is the mean value of the data in this stem and leaf plot?



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2.7 Data Displays

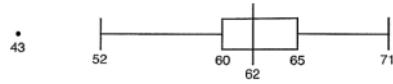
_____ 3. In this stem-and-leaf plot of quiz scores, which score is misplaced?



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2.7 Data Displays

_____ 1. In this box and whisker plot, is 62 defined as the mean, median, or mode?



_____ 2. In the box and whisker plot above, which of these is the interquartile range:
2, 3, 5, 6, 8, 19, or 23?

_____ 3. If the data for the box and whisker plot above were graphed as a histogram,
which interval is most likely to contain the peak (highest bar)?
52-60, 60-62, 62-65, 65-71

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2.1 The Number Line

_____ 3. Evaluate: $-|-5 - |-3 + 1||$.

Answer = -7

Work inside out:

Absolute value of $-3+1$ is 2

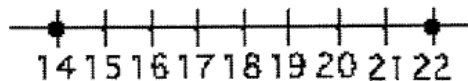
Absolute value of $-5-2$ is 7

Opposite of 7 is -7

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2.1 The Number Line

_____ 1. Write the absolute value equation for this graph:



Answer = $|x-18|=4$

Find the midpoint: 18

Find the distance from the midpoint to the endpoints: 4

The equation is x minus the midpoint equal to the distance: $|x-18|=4$

Oct 4-7:48 AM

2.1 The Number Line

_____ 3. Solve for both values of x : $|2x - 1| = 5$.

Answer = -2,3

Absolute value has two solutions; solve the equation for positive and negative:

$$2x-1=5; 2x=6; x=3$$

$$-(2x-1)=5; 2x-1=-5; 2x=-4; x=-2$$

Oct 4-7:49 AM

2.1 The Number Line

_____ 2: What is the midpoint between -4 and 8.5 ?

Answer = 2.25

Subtract the two points to determine the distance ($8.5 - -4 = 12.5$). Divide by 2 to determine the distance half way between the points ($12.5 / 2 = 6.25$). Add the distance to the first point or subtract the distance from the second point to get the midpoint ($-4 + 6.25 = 2.25$ or $8.5 - 6.25 = 2.25$).

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2.1 The Number Line

_____ 4. What is the coordinate of a point $\frac{3}{4}$ of the way from 3 to 15?

Answer = 12

Subtract the two points to determine the distance ($15 - 3 = 12$). Multiply by $\frac{3}{4}$ and add to the first point to determine the distance $\frac{3}{4}$ of the way ($12 * \frac{3}{4} = 9$; $3 + 9 = 12$).

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2.1 The Number Line

_____ 4. 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 ?

Answer = 12

B is the midpoint of 4 and 10 so B is 7. 4 is the midpoint of A and B (7) so A is 1. 10 is the midpoint of B (7) and C so C is 13. The distance from A to C is 12 ($13 - 1$).

Oct 4-8:10 AM

2.2 Understanding Exponents

_____1. Write in exponential form: $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$.

Answer = $2^3 \cdot 3^2$

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2.2 Understanding Exponents

_____3. $2^3 \cdot 4^{-1} = ?$

Answer = 2

$2^3 = 8$, $4^{-1} = 1/4$, $8/4 = 2$.

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2.2 Understanding Exponents

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

Answer = $2^2 (3^2 * 5)^0$

$2^2 = 4$. Raising the remaining values to the zero power is 1. $4 * 1 = 4$.

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2.2 Understanding Exponents

_____ 1. Write 45600 in scientific notation.

Answer = $4.56 * 10^4$

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2.2 Understanding Exponents

_____ 1. Write in scientific notation: 0.000205

Answer = 2.05×10^{-4}

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2.2 Understanding Exponents

_____ 2. $4 \times 10^{-2} + 5.78 \times 10^1 = ?$

Answer = 57.84

$4 \times 10^{-2} = .04$

$5.78 \times 10^1 = 57.8$

$.04 + 57.8 = 57.84$

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2.3 Proportions

_____ 1. Solve for x: $\frac{3}{7} = \frac{18}{x}$

Answer = 42

$$3x = 7 \cdot 18; 3x = 126; x = 42$$

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2.3 Proportions

_____ 4. 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?

Answer = 45 cups

$$3 + 5 = 8 \text{ cups total in recipe. Proportion is } \frac{3}{8} = \frac{x}{120}. 3 \cdot 120 = 8x. 360 = 8x. x=45.$$

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2.3 Proportions

_____ 9. Solve for x : $\frac{x+2}{5} = \frac{x-5}{3}$

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

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

$$3x+6 = 5x-25$$

$$-2x = -31$$

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

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2.3 Proportions

_____ 1. What is 110% of 80?

Answer = 88

$$1.10 * 80 = 88$$

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2.3 Proportions

_____ % 3. If shoes regularly priced at \$50 are sold for \$30, what percent is the discount?

Answer = 40%

$\$50 - \$30 = \$20$ discount.

$20/50 = 0.4 = 40\%$

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2.3 Proportions

_____ % 8. A sale item was discounted by 25%. Two weeks later it was marked down 20%. What percent was the total discount?

Answer = 40%

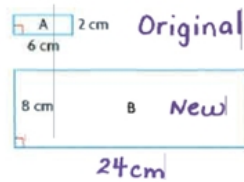
Imagine the original price was \$100. A 25% discount would reduce the price to \$75 ($100 \cdot .25 = 25$; $100 - 25 = 75$). An additional mark down of 20% would reduce the price to \$60 ($75 \cdot .20 = 15$; $75 - 15 = 60$). The total discount amount is \$40 ($100 - 60 = 40$). Discount percentage is 40% ($40/100 = .4 = 40\%$).

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2.4 Proportional Scale Drawings (2-D)

(New Topic)

1. Two similar rectangles, A and B, are shown to the right.
- Determine the scale factor that produced the enlargement from rectangle A to rectangle B.
 - Determine the areas of rectangle A and rectangle B.
 - How many rectangles congruent to rectangle A would fit in rectangle B?



Answers:

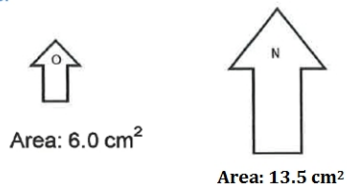
4. Compare sides of B to A ($8/2 = 4$ or $24/6 = 4$).
- Area of A = 12 cm^2 (2×6). Area of B = 192 cm^2 (8×24).
16. Divide the area of B by the area of A ($192/12$).

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2.4 Proportional Scale Drawings (2-D)

(New Topic)

Determine the scale factor that relates the two similar figures.



Answer = 1.5

Divide the Area of N by the Area of O ($13.5/6 = 2.25$). This represents the scale factor of the area (squared). Apply square root to determine the scale factor ($\sqrt{2.25} = 1.5$).

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2.4 Proportional Scale Drawings (2-D)

(New Topic)

The area of a trapezoid is 56 cm^2 . It is going to be enlarged by a scale factor of $3/2$. Determine the area of the enlarged trapezoid.



Answer = 126 cm^2

Square the scale factor for area $(3/2)^2$ and multiply by the original area 56 to determine the area of the enlarged trapezoid ($9/4 * 56 = 126$).

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2.5 Writing and Solving One-Variable Equations

_____ 5. Solve for x : $3(x+2) - 4(x-5) = 10(x-4)$.

Answer = 6

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

$$3x + 6 - 4x + 20 = 10x - 40$$

$$-x + 26 = 10x - 40$$

$$-11x = -66$$

$$x = 6$$

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2.5 Writing and Solving One-Variable Equations

_____ 8. Solve for x : $3(x - 2) = 8x - 2(x + 4)$.

Answer = $2/3$

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

$$3x - 6 = 8x - 2x - 8$$

$$3x - 6 = 6x - 8$$

$$-3x = -2$$

$$x = 2/3$$

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2.5 Writing and Solving One-Variable Equations

$y =$ _____ 2. $y + a = bx$ Solve for y in terms of x .

Answer: $y = bx - a$

$$y + a = bx$$

$$- a \quad - a$$

$$y = bx - a$$

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2.5 Writing and Solving One-Variable Equations

- _____ 5. 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.

Answer: $P = 96c$ or $P = 96c$

$$P = \$1(144c) - 48c$$

$$P = 144c - 48c$$

$$P = 96c$$

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2.5 Writing and Solving One-Variable Equations

- _____ 4. Nancy earned \$60.00 for five hours of work. Write an equation for her earnings, E , in terms of her hours worked, h .

Answer: $E = 12h$

$$\$60 / 5 = \$12 \text{ per hour}$$

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2.5 Writing and Solving One-Variable Equations

_____ 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 .

Answer: $C = 30n + 15$

$C = 45 + 30(n-1)$

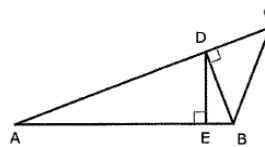
$C = 45 + 30n - 30$

$C = 30n + 15$

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2.6 Similar Figures

_____ 5. There are 5 triangles in this figure. Which 3 are similar to each other?

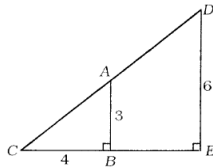


Answer = $\triangle AED$ $\triangle DEB$ $\triangle ADB$

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2.6 Similar Figures

3. In the drawing for problem 2, if $\angle B = \angle E = 90^\circ$, $AB = 3''$, $BC = 4''$ and $DE = 6''$, what is BE ?



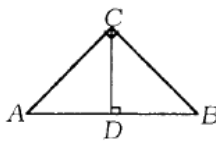
Answer = 4 in.

Triangles ABC and DEC are similar. Let $CE = x$. $3/6 = 4/x$. $3x = 24$. $x = 8$. $CE - CB = BE$; $8 - 4 = 4$.

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2.6 Similar Figures

4. In the diagram for problem 2, $AC = 12$ cm, $BC = 10$ cm. Find the area of $\triangle ABC$.



Answer = 60 cm²

$$A = 1/2bh$$

$$A = 1/2(12)(10)$$

$$A = 60$$

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2.7 Data Displays

_____ 3. What is the mean value of the data in this stem and leaf plot?

8•	5 5 7
8*	
7•	
7*	0 3 4

Answer = 79

$$85 + 85 + 87 + 70 + 73 + 74 = 474 / 6 = 79$$

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2.7 Data Displays

_____ 3. 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

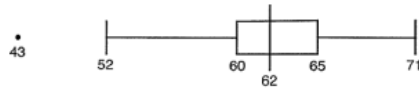
Answer = 35

The stem leaves are 0-4 and 5-9 so the 5 for 35 belongs with the 7 7 8 9 leaves.

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2.7 Data Displays

_____ 1. In this box and whisker plot, is 62 defined as the mean, median, or mode?



_____ 2. In the box and whisker plot above, which of these is the interquartile range: 2, 3, 5, 6, 8, 19, or 23?

_____ 3. If the data for the box and whisker plot above were graphed as a histogram, which interval is most likely to contain the peak (highest bar)?
52-60, 60-62, 62-65, 65-71

Answers:

1. Median. The data is divided into quartiles.
2. 5. Quartile 1 is 60, quartile 3 is 65, interquartile range is $65 - 60 = 5$.
3. 60-62. Since each quartile has an equal number of data elements, the smallest quartile range will have the highest peak.

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