1. Kiran and Clare live 24 miles away from each other along a rail trail. One Saturday, the two friends started walking toward each other along the trail at 8:00 am with a plan to have a picnic when they meet.

Danvers Rail Trail Copyright
Owner: massmatt License:
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Kiran walks at a *speed* of 3 miles per hour while Clare walks 3.4 miles per hour.

a) After one hour, how far apart will they be?

b) Make a table showing how far apart the two friends are after 0 hours, 1 hour, 2 hours, and 3 hours.

c) At what time will the two friends meet and have their picnic?

d) Kiran says "If I walk 3 miles per hour toward you, and you walk 3.4 miles per hour toward me, it's the same as if you stay put and I jog 6.4 miles per hour." What do you think Kiran means by this? Is he correct?

e) Several months later, they both set out at 8:00 am again, this time with Kiran jogging and Clare still walking at 3.4 miles per hour. This time, they meet at 10:30 am How fast was Kiran jogging?

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2. A school held several evening activities last month—a music concert, a basketball game, a dramatic play, and literacy night. The music concert was attended by 250 people. How many people came to each of the other activities?

1. Attendance at a basketball game was 30% of attendance at the concert.

2. Attendance at the dramatic play was 140% of attendance at the concert.

3. Attendance at literacy night was 44% of attendance at the concert.

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3. A bag of chocolates is labeled to contain 0.384 pound of chocolates. The actual weight of the chocolates is 0.3798 pound.

a) Are the chocolates heavier or lighter than the weight stated on the label? Explain how you know.

b) How much heavier or lighter are the chocolates than stated on the label? Show your reasoning.

4.
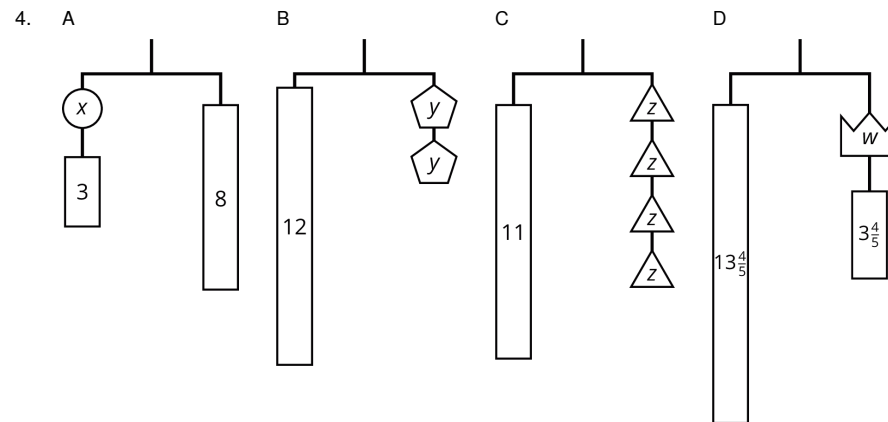
Here are some balanced hangers where each piece is labeled with its weight. For each diagram:

a) Write an equation.

b) Explain how to figure out the weight of a piece labeled with a letter by reasoning about the diagram.

c) Explain how to figure out the weight of a piece labeled with a letter by reasoning about the equation.

5. Here is a diagram of an unbalanced hanger.
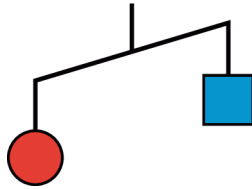
a) Write an inequality to represent the relationship of the weights. Use s to represent the weight of the square in grams and c to represent the weight of the circle in grams.

b) One red circle weighs 12 grams. Write an inequality to represent the weight of one blue square.

c) Could 0 be a value of s? Explain your reasoning.

6. Two sixth-grade classes, A and B, voted on whether to give the answers to their math problems in poetry. The "yes" choice was more popular in both classes.

Was one class more in favor of math poetry, or were they equally in favor?

Find three or more ways to answer the question.

|	yes	no
class A	24	16
class B	18	9

7. The students in art class are designing a stained-glass window to hang in the school entryway. The window will be 3 feet tall and 4 feet wide. Here is their design.
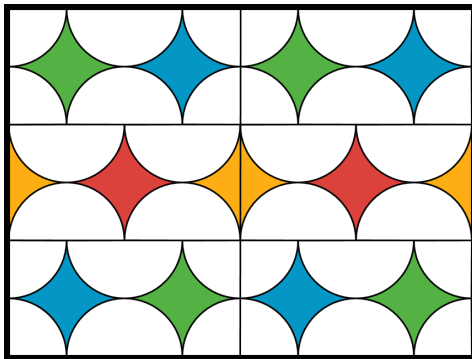
They have raised $100 for the project. The colored glass costs $5 per square foot and the clear glass costs $2 per square foot. The material they need to join the pieces of glass together costs 10 cents per foot and the frame around the window costs $4 per foot.

Do they have enough money to cover the cost of making the window?

8. The picture shows a circle divided into 8 equal wedges which are rearranged.
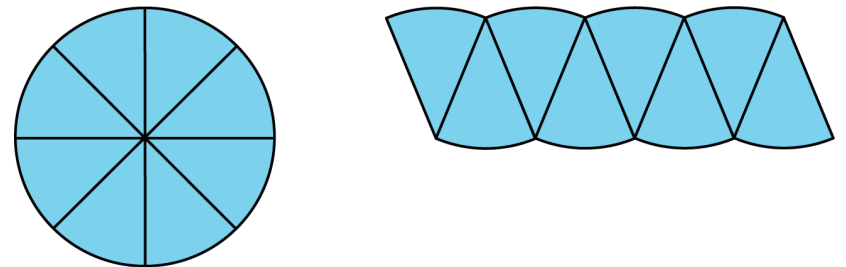
The radius of the circle is r and its circumference is $2\pi r$. How does the picture help to explain why the area of the circle is πr^2?

9. Two students are solving the same problem: At a hardware store, they can cut a length of rope off of a big roll, so you can buy any length you like. The cost for 6 feet of rope is $7.50. How much would you pay for 50 feet of rope, at this rate?

a) Kiran knows he can solve the problem this way.

length of rope (feet)	price of rope (dollars)
6	7.50
1	1.25
50	

$\cdot \frac{1}{6}$ $\cdot \frac{1}{6}$
$\cdot 50$ $\cdot 50$

What would be Kirans' answer?

b) Kiran wants to know if there is a more efficient way of solving the problem. Priya says she can solve the problem with only 2 rows in the table.

length of rope (feet)	price of rope (dollars)
6	7.50
50	

What do you think Priya's method is?

10. a) For each situation, do you think the result is surprising or not? Is it possible? Be prepared to explain your reasoning.

 1. You flip the coin once, and it lands heads up.

 2. You flip the coin twice, and it lands heads up both times.

 3. You flip the coin 100 times, and it lands heads up all 100 times.

b) If you flip the coin 100 times, how many times would you expect the coin to land heads up? Explain your reasoning.

c) If you flip the coin 100 times, what are some other results that would not be surprising?

d) You've flipped the coin 3 times, and it has come up heads once. The cumulative fraction of heads is currently $\frac{1}{3}$. If you flip the coin one more time, will it land heads up to make the cumulative fraction $\frac{2}{4}$?

11. Your teacher will assign you to work with either means or medians.

a) A young artist has sold 10 paintings. Calculate the measure of center you were assigned for each of these samples:

 1. The first two paintings she sold were for $50 and $350.

 2. At a gallery show, she sold three paintings for $250, $400, and $1,200.

 3. Her oil paintings have sold for $410, $400, and $375.

b) Here are the selling prices for all 10 of her paintings:

| $50 | $200 | $250 | $275 | $280 | $350 | $375 | $400 | $410 | $1,200 |

Calculate the measure of center you were assigned for all of the selling prices.

c) Compare your answers with your partner. Were the measures of center for any of the samples close to the same measure of center for the population?

12. Jada wants to know if there is a meaningful difference in the mean number of friends on social media for teens and adults. She looks at the friend count for the 10 most popular of her friends and the friend count for 10 of her parents' friends. She then computes the mean and MAD of each sample and determines there is a meaningful difference.

Jada's dad later tells her he thinks she has not come to the right conclusion. Jada checks her calculations and everything is right. Do you agree with her dad? Explain your reasoning.

13. Here is an unlabeled polygon, along with its scaled copies Polygons *A–D*. For each copy, determine the scale factor. Explain how you know.
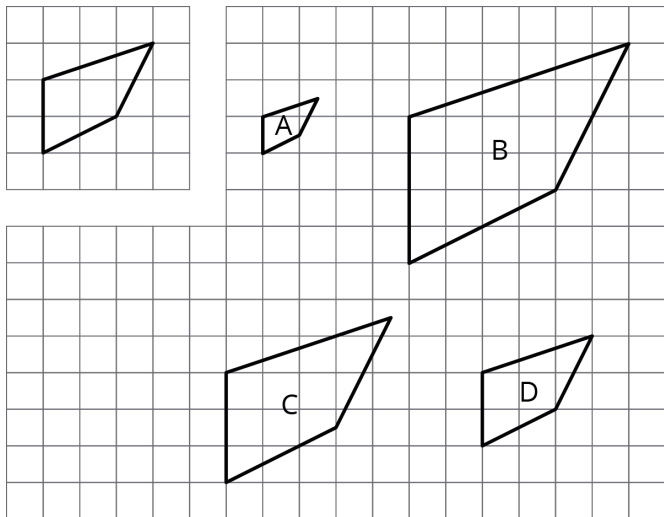
14. Decide whether each equation is true for all, one, or no values of x.

   a) $6x - 4 = -4 + 6x$

   b) $4x - 6 = 4x + 3$

   c) $-2x + 4 = -3x + 4$

15. Kiran and his cousin work during the summer for a landscaping company. Kiran's cousin has been working for the company longer, so his pay is 30% more than Kiran's. Last week his cousin worked 27 hours, and Kiran worked 23 hours. Together, they earned $493.85. What is Kiran's hourly pay? Explain or show your reasoning.

16. a) Graph a system of linear equations with no solutions.
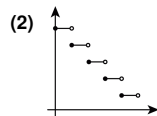
    b) Write an equation for each line you graph.
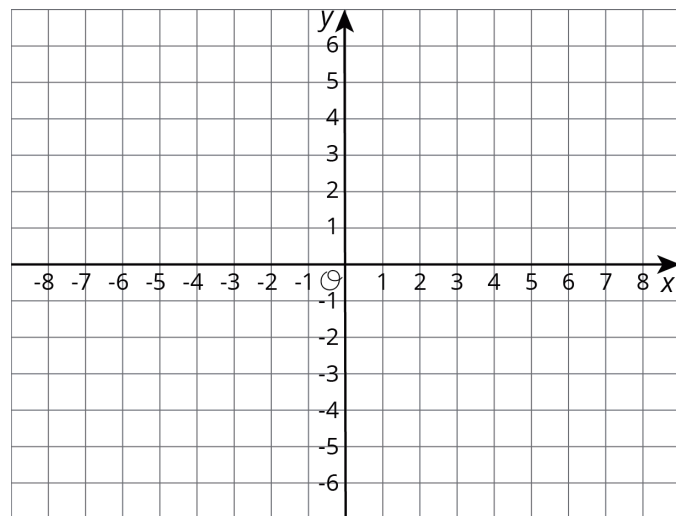
17. Match the graph to the following situations (you can use a graph multiple times). For each match, name possible independent and dependent variables and how you would label the axes.
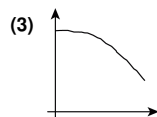
   (A) Tyler pours the same amount of milk from a bottle every morning.

   (1)
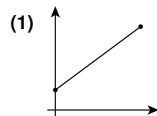
   (B) A plant grows the same amount every week.

   (2)

   (C) The day started very warm but then it got colder.

   (3)

   (D) A carnival has an entry fee of $5 and tickets for rides cost $1 each.

18. Here is a table of data. Each row shows two measurements of an isosceles right triangle.

length of short sides (cm)	length of perimeter (cm)
0.25	1
2	7.5
6.5	22
3	9.5
0.5	2
1.25	3.5
3.5	12.5
1.5	5
4	14
1	2.5

What do you notice? What do you wonder?

19. Both figures shown here are squares with a side length of $a + b$. Notice that the first figure is divided into two squares and two rectangles. The second figure is divided into a square and four right triangles with legs of lengths a and b. Let's call the hypotenuse of these triangles c.
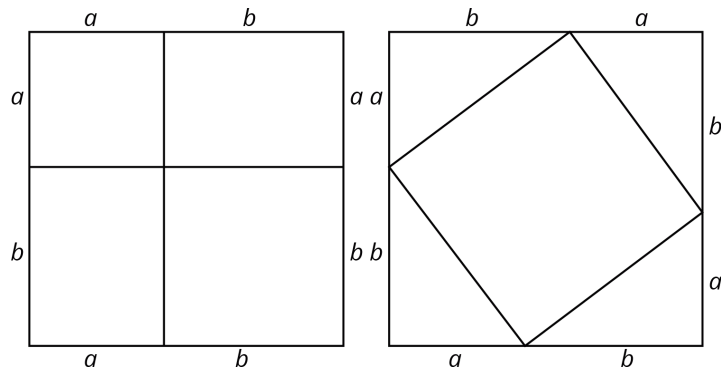
a) What is the total area of each figure?

b) Find the area of each of the 9 smaller regions shown the figures and label them.

c) Add up the area of the four regions in Figure F and set this expression equal to the sum of the areas of the five regions in Figure G. If you rewrite this equation using as few terms as possible, what do you have?

20. Andre and Jada are discussing how to write $\frac{17}{20}$ as a decimal.

   Andre says he can use long division to divide 17 by 20 to get the decimal.

   Jada says she can write an equivalent fraction with a denominator of 100 by multiplying by $\frac{5}{5}$, then writing the number of hundredths as a decimal.

   a) Do both of these strategies work?

   b) Which strategy do you prefer? Explain your reasoning.

   c) Write $\frac{17}{20}$ as a decimal. Explain or show your reasoning.