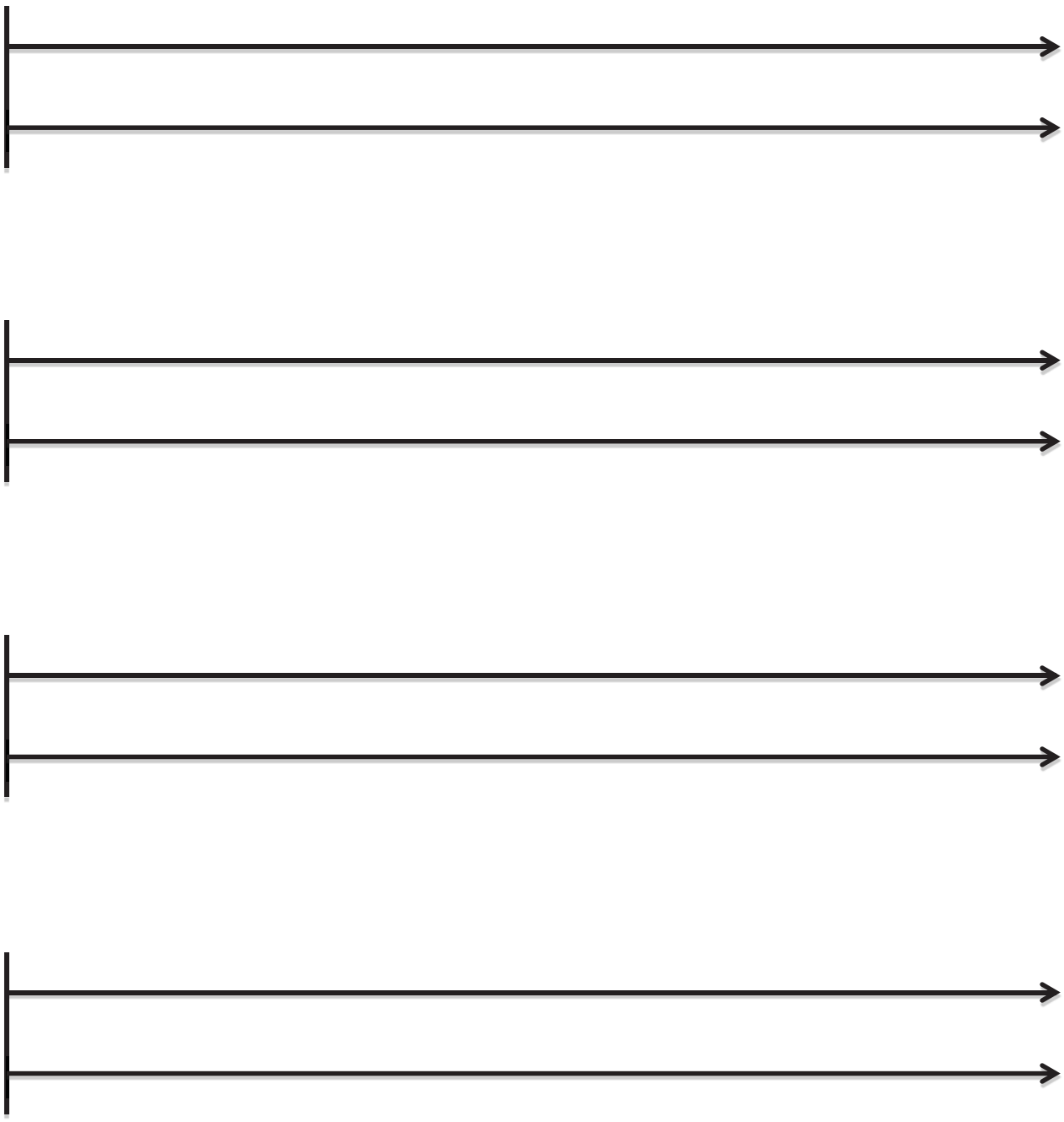
7 to 4	$28:16$	$3\frac{1}{2}$ to 2	$35:20$
3 to 8	$30:80$	6 to 16	$12:32$
5 to 1	$45:9$	15 to 3	$2\frac{1}{2}$ to $\frac{1}{2}$

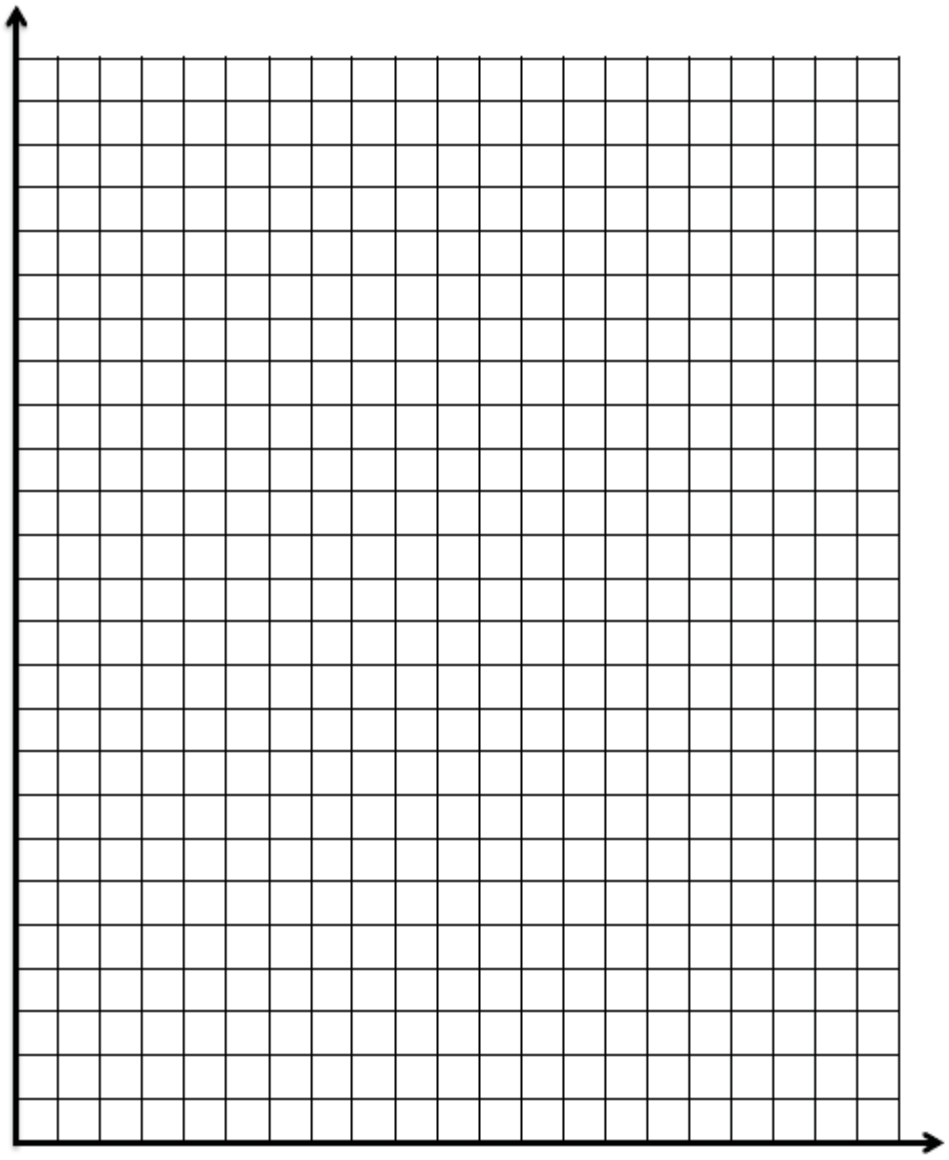
3 to 4	9: 16	$1\frac{1}{2}$ to 2	15: 20
3 to 6	30: 60	1 to 2	4: 8
2 to 1	44: 22	18: 9	1 to $\frac{1}{2}$

1 to 6	8: 48	6 to 36	5: 30
9 to 4	36: 16	3 to $\frac{4}{3}$	18: 8
7 to 6	42: 36	21 to 8	$3\frac{1}{2}$ to 3

Double Number Line Reproducible



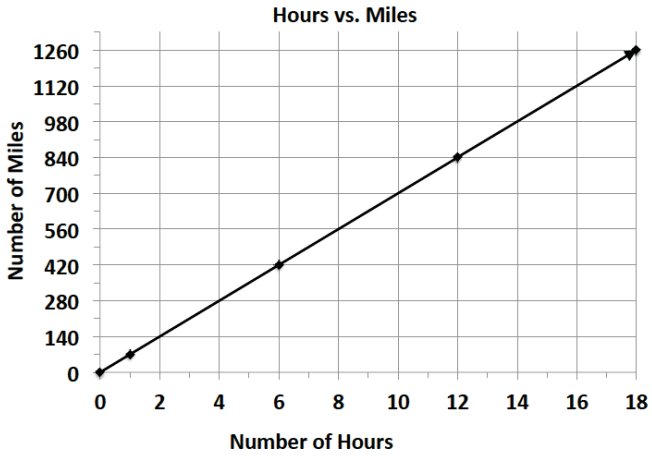
Graph Reproducible

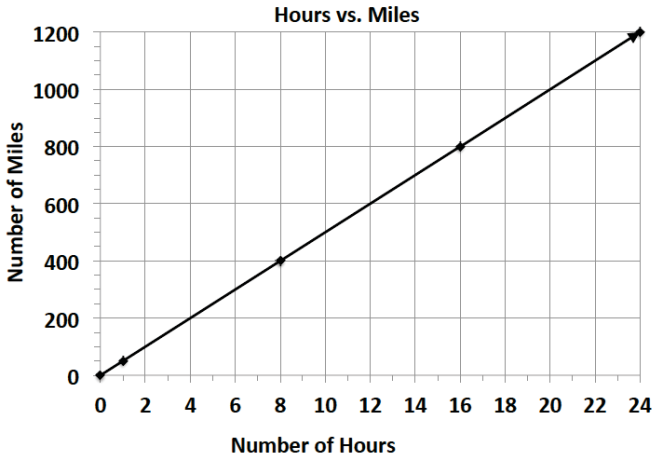


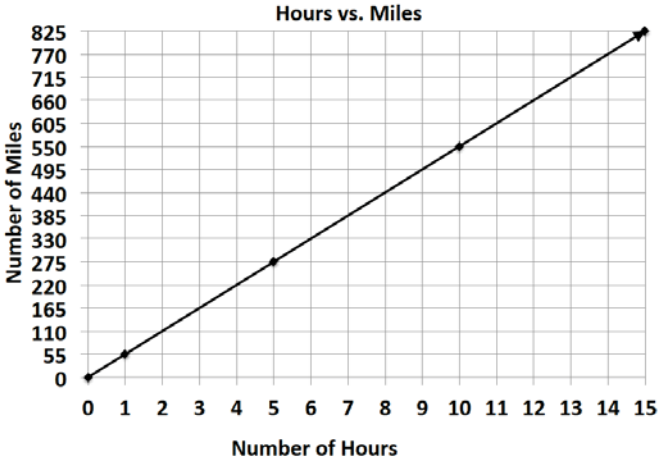
Example 3: Matching

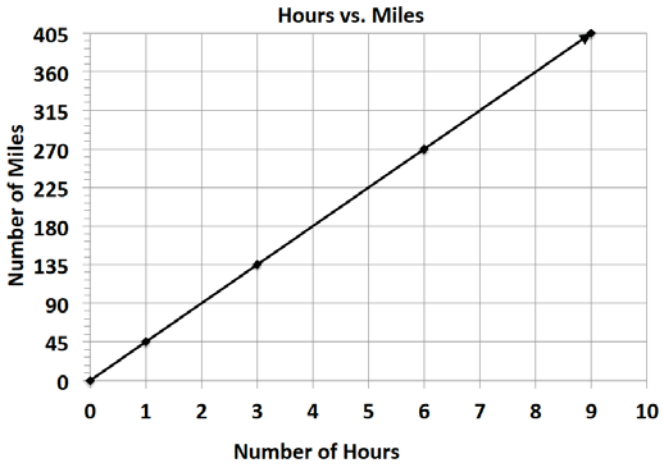
Match an equation, table, and graph that represent the same unit rate. Students work individually or in pairs.

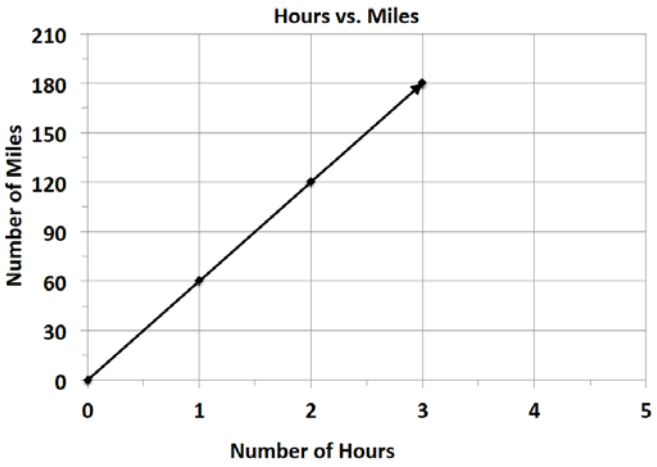
Cut apart the data representations below and supply each student-pair with a set.

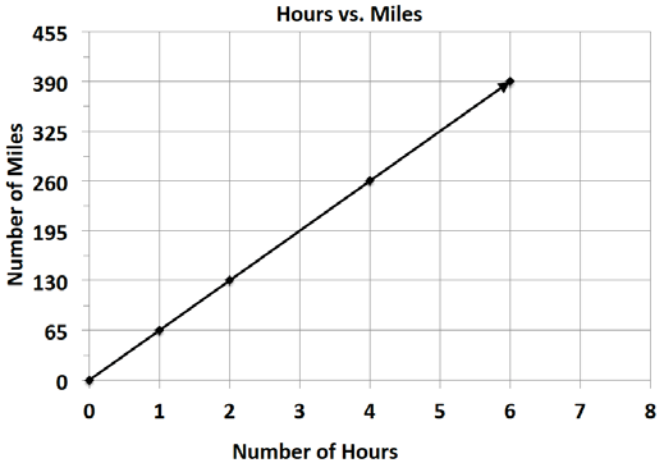












$m = 65h$	$m = 45h$	$m = 55h$
$m = 70h$	$m = 50h$	$m = 60h$
h: 0, 2, 4, 6 m: 0, 130, 260, 390	h: 0, 3, 6, 9 m: 0, 135, 270, 405	h: 0, 5, 10, 15 m: 0, 275, 550, 825
h: 0, 1, 2, 3 m: 0, 60, 120, 180	h: 0, 8, 16, 24 m: 0, 400, 800, 1200	h: 0, 6, 12, 18 m: 0, 420, 840, 1260

U.S. Customary Length	Conversion
Inch (in.)	1 in. $= \frac{1}{12}$ ft.
Foot (ft.)	1 ft. = 12 in.
Yard (yd.)	1 yd. = 3 ft. 1 yd. = 36 in.
Mile (mi.)	1 mi. = 1,760 yd. 1 mi. = 5,280 ft.

Metric Length	Conversion
Centimeter (cm)	1 cm = 10 mm
Meter (m)	1 m = 100 cm 1 m = 1,000 mm
Kilometer (km)	1 km = 1,000 m

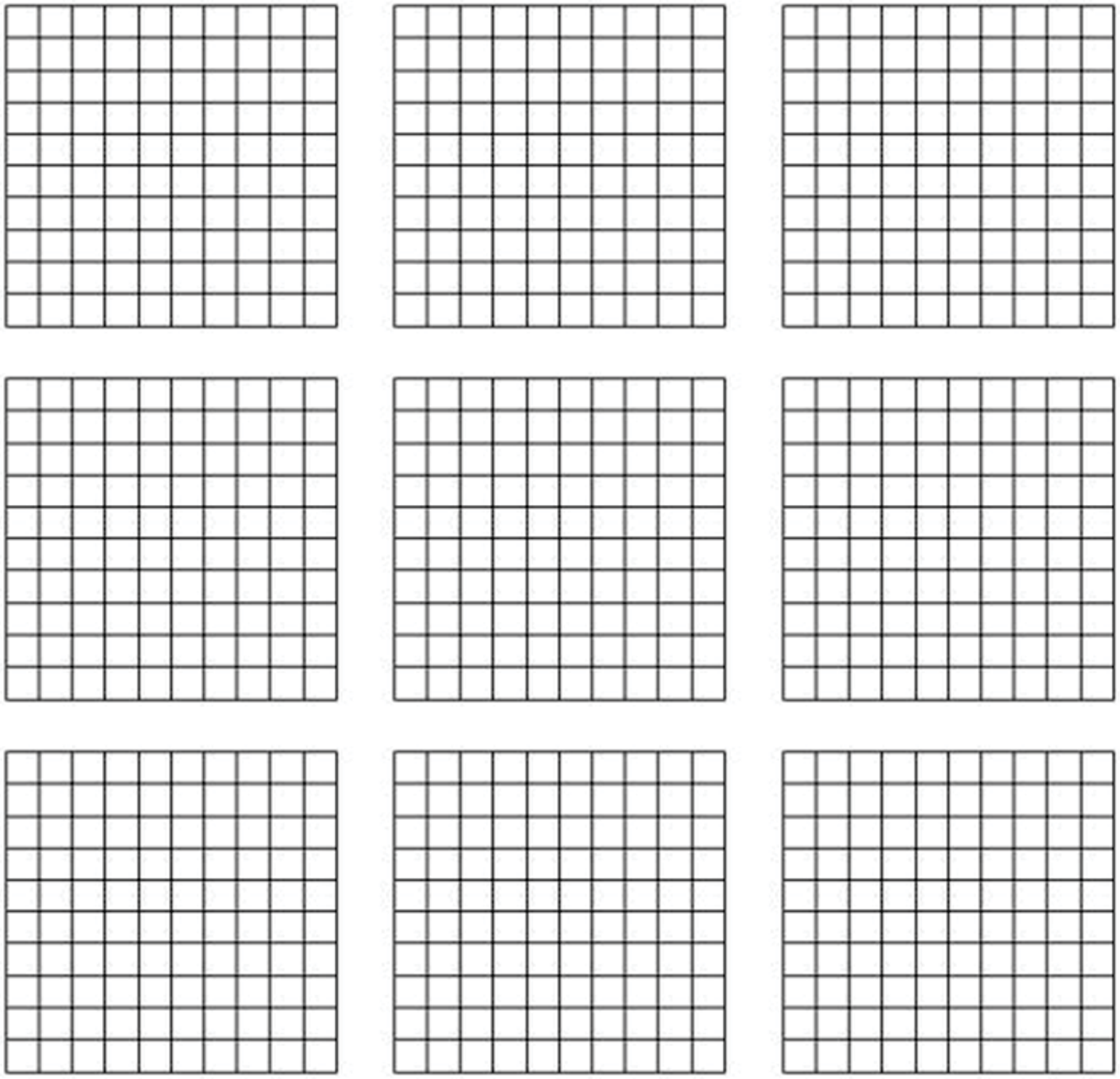
U.S. Customary Weight	Conversion
Pound (lb.)	1 lb. = 16 oz.
Ton (T.)	1 T. = 2,000 lb.

Metric Capacity	Conversion
Liter (L)	1 L = 1,000 ml
Kiloliter (kL)	1 kL = 1,000 L

U.S. Customary Capacity	Conversion
Cup (c.)	1 c. = 8 fluid ounces
Pint (pt.)	1 pt. = 2 c.
Quart (qt.)	1 qt. = 4 c. 1 qt. = 2 pt. 1 qt. = 32 fluid ounces
Gallon (gal.)	1 gal. = 4 qt. 1 gal. = 8 pt. 1 gal. = 16 c. 1 gal. = 128 fluid ounces

Metric Mass	Conversion
Gram (g)	1 g = 1,000 mg
Kilogram (kg)	1 kg = 1,000 g

10×10 Grid Reproducible



Fraction cards to use at the beginning of class:

$\frac{1}{2}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{2}{5}$
$\frac{3}{5}$	$\frac{4}{5}$	$\frac{1}{5}$	$\frac{2}{6}$
$\frac{1}{3}$	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$
$\frac{7}{8}$	$\frac{5}{8}$	$\frac{1}{8}$	$\frac{3}{8}$

1 whole unit											
$\frac{1}{2}$											$\frac{1}{2}$
$\frac{1}{3}$											$\frac{1}{3}$
$\frac{1}{4}$											$\frac{1}{4}$
$\frac{1}{5}$											$\frac{1}{5}$
$\frac{1}{6}$											$\frac{1}{6}$
$\frac{1}{8}$											$\frac{1}{8}$
$\frac{1}{9}$											$\frac{1}{9}$
$\frac{1}{10}$											$\frac{1}{10}$
$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$

Memory Game

A. $\frac{3}{4} \div 6\frac{2}{3}$	$\frac{9}{80}$	B. $\frac{1}{3} \div 4\frac{3}{4}$	$\frac{4}{57}$
C. $\frac{2}{5} \div 1\frac{7}{8}$	$\frac{16}{75}$	D. $7\frac{1}{2} \div \frac{5}{6}$	9
E. $3\frac{4}{7} \div \frac{5}{8}$	$5\frac{5}{7}$	F. $5\frac{5}{8} \div \frac{9}{10}$	$6\frac{1}{4}$
G. $\frac{1}{4} \div 10\frac{11}{12}$	$\frac{3}{131}$	H. $5\frac{3}{4} \div \frac{5}{9}$	$10\frac{7}{20}$
I. $3\frac{1}{5} \div \frac{2}{3}$	$5\frac{4}{5}$	J. $\frac{3}{5} \div 3\frac{1}{7}$	$\frac{21}{110}$
K. $\frac{10}{13} \div 2\frac{4}{7}$	$\frac{35}{117}$	L. $2\frac{1}{4} \div \frac{7}{8}$	$2\frac{4}{7}$

Player A

1. $15.5 \div 6.2$	Check:
2. $28.08 \div 7.8$	Check:
3. $44.888 \div 3.62$	Check:
4. $3{,}912.99 \div 15.9$	Check:
5. $865.1475 \div 47.25$	Check:

Player B

1. $32.4 \div 7.2$	Check:
2. $49.14 \div 6.3$	Check:
3. $39.321 \div 2.57$	Check:
4. $8{,}578.02 \div 24.6$	Check:
5. $439.0464 \div 35.18$	Check:

Player C

1. $25.9 \div 7.4$	Check:
2. $25.48 \div 5.2$	Check:
3. $61.962 \div 4.49$	Check:
4. $16{,}437.42 \div 31.8$	Check:
5. $1{,}238.8048 \div 52.76$	Check:

Player D

1. $63.7 \div 9.8$	Check:
2. $32.68 \div 8.6$	Check:
3. $142.912 \div 8.12$	Check:
4. $23{,}344.58 \div 57.4$	Check:
5. $2{,}498.743 \div 39.65$	Check:

Exploratory Challenge Reproducible

Station 1: Factors and GCF

Choose one of these problems that has not yet been solved. Solve it together on your student page. Then, use your marker to copy your work neatly on the chart paper. Use your marker to cross out your choice so that the next group solves a different problem.

Find the greatest common factor of one of these pairs: $30, 50$; $30, 45$; $45, 60$; $42, 70$; $96, 144$.

Next, choose one of these problems that has not yet been solved:

a. There are 18 girls and 24 boys who want to participate in a Trivia Challenge. If each team must have the same number of girls and boys, what is the greatest number of teams that can enter? How many boys and girls will be on each team?

b. The Ski Club members are preparing identical welcome kits for the new skiers. They have 60 hand warmer packets and 48 foot warmer packets. What is the greatest number of kits they can prepare using all of the hand and foot warmer packets? How many hand warmer packets and foot warmer packets will be in each welcome kit?

c. There are 435 representatives and 100 senators serving in the United States Congress. How many identical groups with the same number of representatives and senators could be formed from all of Congress if we want the largest groups possible? How many representatives and senators will be in each group?

d. Is the GCF of a pair of numbers ever equal to one of the numbers? Explain with an example.

e. Is the GCF of a pair of numbers ever greater than both numbers? Explain with an example.

Station 2: Multiples and LCM

Choose one of these problems that has not yet been solved. Solve it together on your student page. Then, use your marker to copy your work neatly on the chart paper. Use your marker to cross out your choice so that the next group solves a different problem.

Find the least common multiple of one of these pairs: $9, 12; 8, 18; 4, 30; 12, 30; 20, 50$.

Next, choose one of these problems that has not yet been solved:

a. Hot dogs come packed 10 in a package. Hot dog buns come packed 8 in a package. If we want one hot dog for each bun for a picnic, with none left over, what is the least amount of each we need to buy? How many packages of each item would we have to buy?

b. Starting at $6:00$ a.m., a bus makes a stop at my street corner every 15 minutes. Also starting at $6:00$a.m., a taxi cab comes by every 12 minutes. What is the next time there will be a bus and a taxi at the corner at the same time?

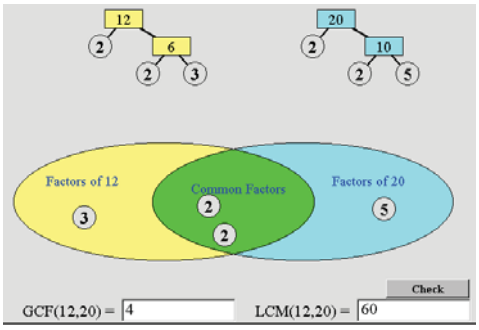
c. Two gears in a machine are aligned by a mark drawn from the center of one gear to the center of the other. If the first gear has 24 teeth, and the second gear has 40 teeth, how many revolutions of the first gear are needed until the marks line up again?

d. Is the LCM of a pair of numbers ever equal to one of the numbers? Explain with an example.

e. Is the LCM of a pair of numbers ever less than both numbers? Explain with an example.

Solve it together on your student page. Then, use your marker to copy your work neatly on this chart paper. Use your marker to cross out your choice so that the next group solves a different problem.

Station 3: Using Prime Factors to Determine GCF



Choose one of these problems that has not yet been solved. Solve it together on your student page. Then, use your marker to copy your work neatly on the chart paper. Use your marker to cross out your choice so that the next group solves a different problem.

Use Prime Factors to find the Greatest Common Factor of one of the following pairs of numbers:

$30, 50$ $30, 45$ $45, 60$ $42, 70$ $96, 144$

Next, choose one of these problems that has not yet been solved:

a. Would you rather find all the factors of a number or find all the prime factors of a number? Why?

b. Find the GCF of your original pair of numbers.

c. Is the product of your LCM and GCF less than, greater than, or equal to the product of your numbers?

d. Glenn's favorite number is very special because it reminds him of the day his daughter, Sarah, was born. The factors of this number do not repeat, and all of the prime numbers are less than 12. What is Glenn's number? When was Sarah born?

Station 4: Applying Factors to the Distributive Property

Study these examples of how factors apply to the distributive property.

$$8 + 12 = 4(2) + 4(3) = 4(2 + 3) = 20$$
$$4(2) + 4(3) = 4(5) = 20$$

$$15 + 25 = 5(3) + 5(5) = 5(3 + 5) = 40$$
$$5(3) + 5(5) = 5(8) = 40$$

$$36 - 24 = 4(9) - 4(6) = 4(9 - 6) = 12$$
$$4(9) - 4(6) = 4(3) = 12$$

Choose one of these problems that has not yet been solved. Solve it together on your student page. Then, use your marker to copy your work neatly on the chart paper. Use your marker to cross out your choice so that the next group solves a different problem.

Find the GCF from the two numbers, and rewrite the sum using the distributive property.

1. $12 + 18 =$

2. $42 + 14 =$

3. $36 + 27 =$

4. $16 + 72 =$

5. $44 + 33 =$

Next, add another new example to one of these two statements applying factors to the distributive property.

Choose any numbers for n, a, and b.

$n(a) + n(b) = n(a + b)$

$n(a) - n(b) = n(a - b)$

Name _____ Date_____

Exploratory Challenge Station Record Sheet

Poster # _____

Integers: _____

Number Line Scale: _____

Poster # _____

Integers: _____

Number Line Scale: _____

Poster # _____

Integers: _____

Number Line Scale: _____

Poster # _____

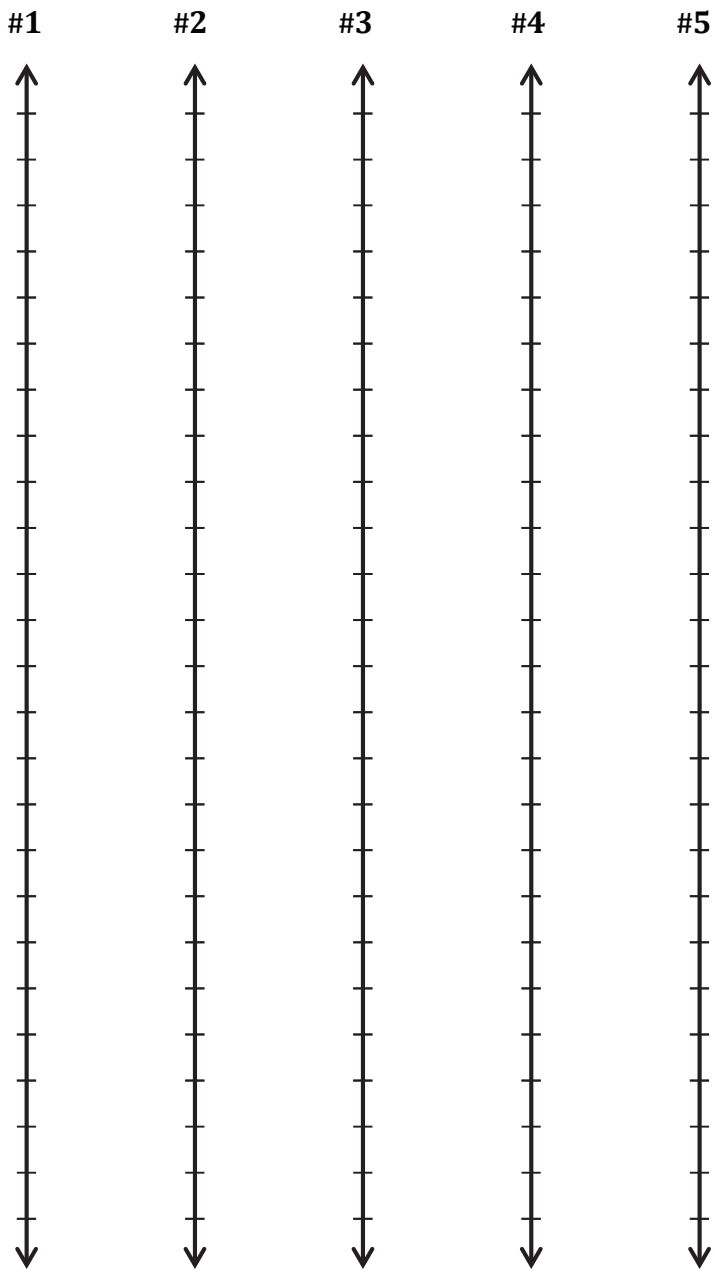
Integers: _____

Number Line Scale: _____

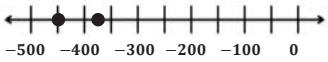
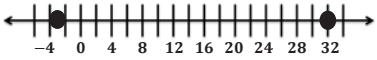
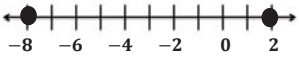
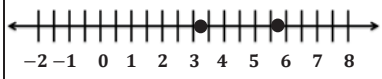
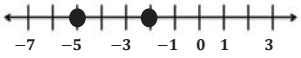
Poster # _____

Integers: _____

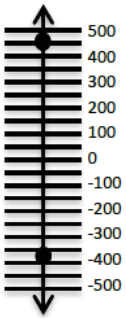
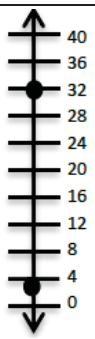
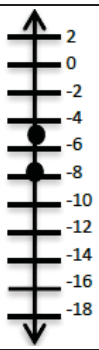
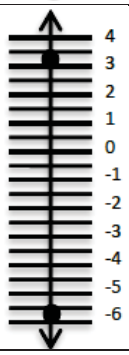
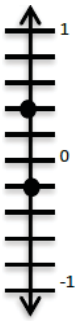
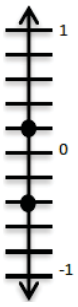
Number Line Scale: _____

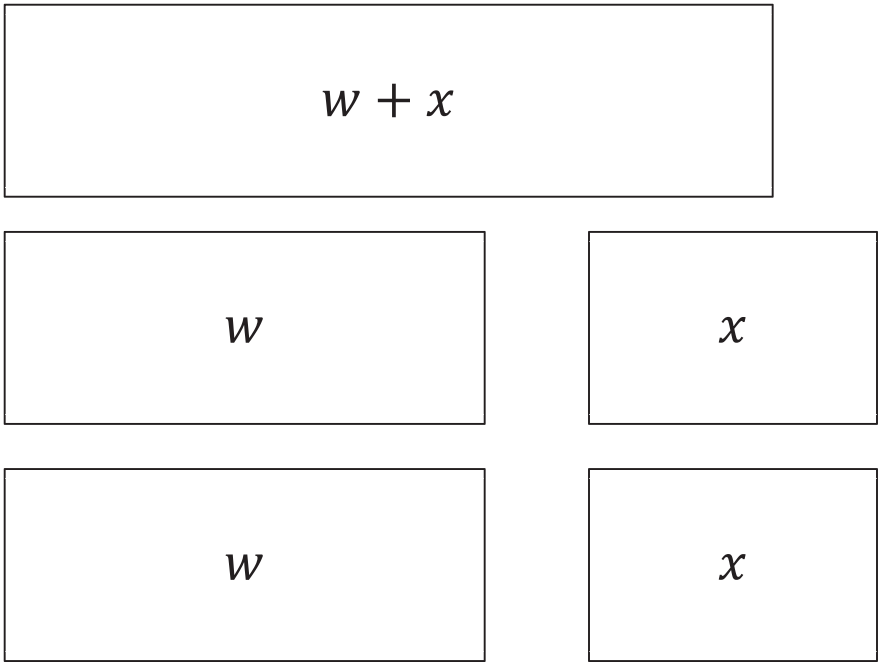


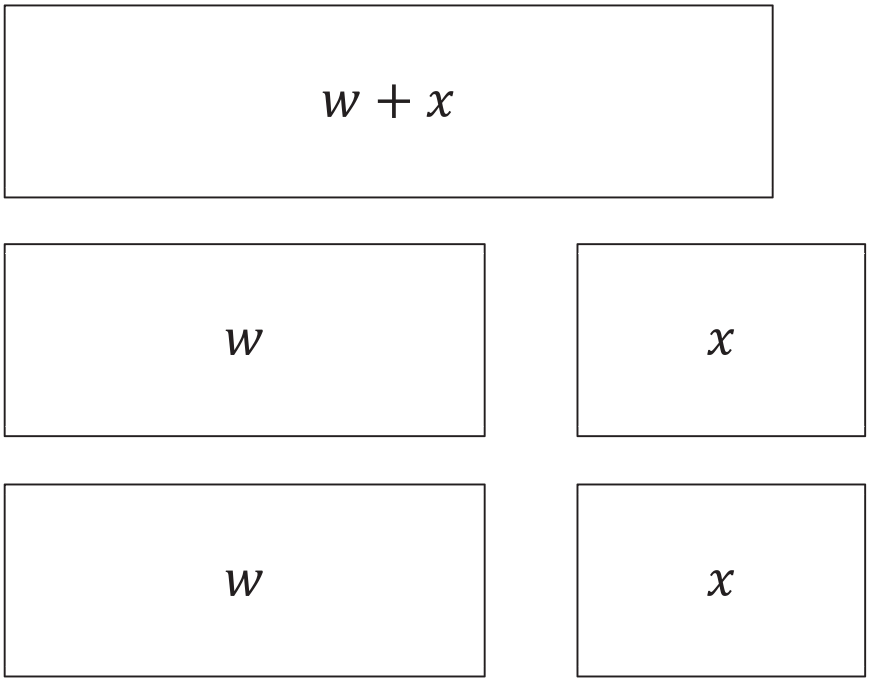
Activity Cards – Page 1

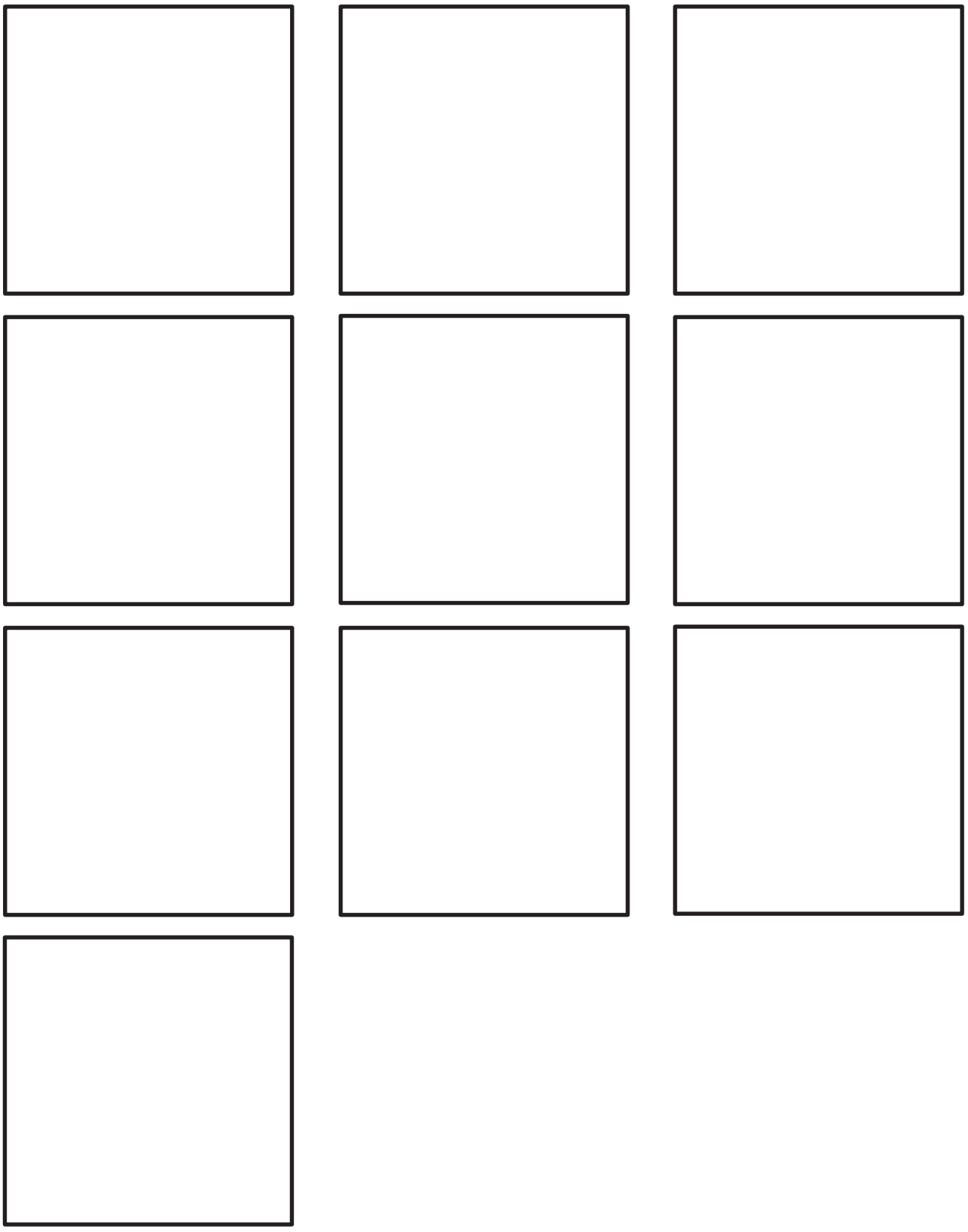
The Navy Seals are practicing new techniques. The blue submarine is 450 ft. below sea level, while the red submarine is 375 ft. below sea level.		Dolphins love to jump out of the water. Dolly, the dolphin, can jump 5 meters above the water and swim 450 meters below the surface of the water.	
Colorado is known for drastic changes in temperatures. Tuesday morning the temperature was 32°F, but Tuesday night the temperature was −3°F.		The high school football team lost 8 yards on first down. On second down, the team gained 2 yards.	
Holly sold lemonade two days in a row. On Saturday, Holly earned $5.75. On Sunday, Holly earned $3.25.		In golf, the lowest score wins. Pete's final score was −2 and Andre's final score was −5.	

Activity Cards – Page 2

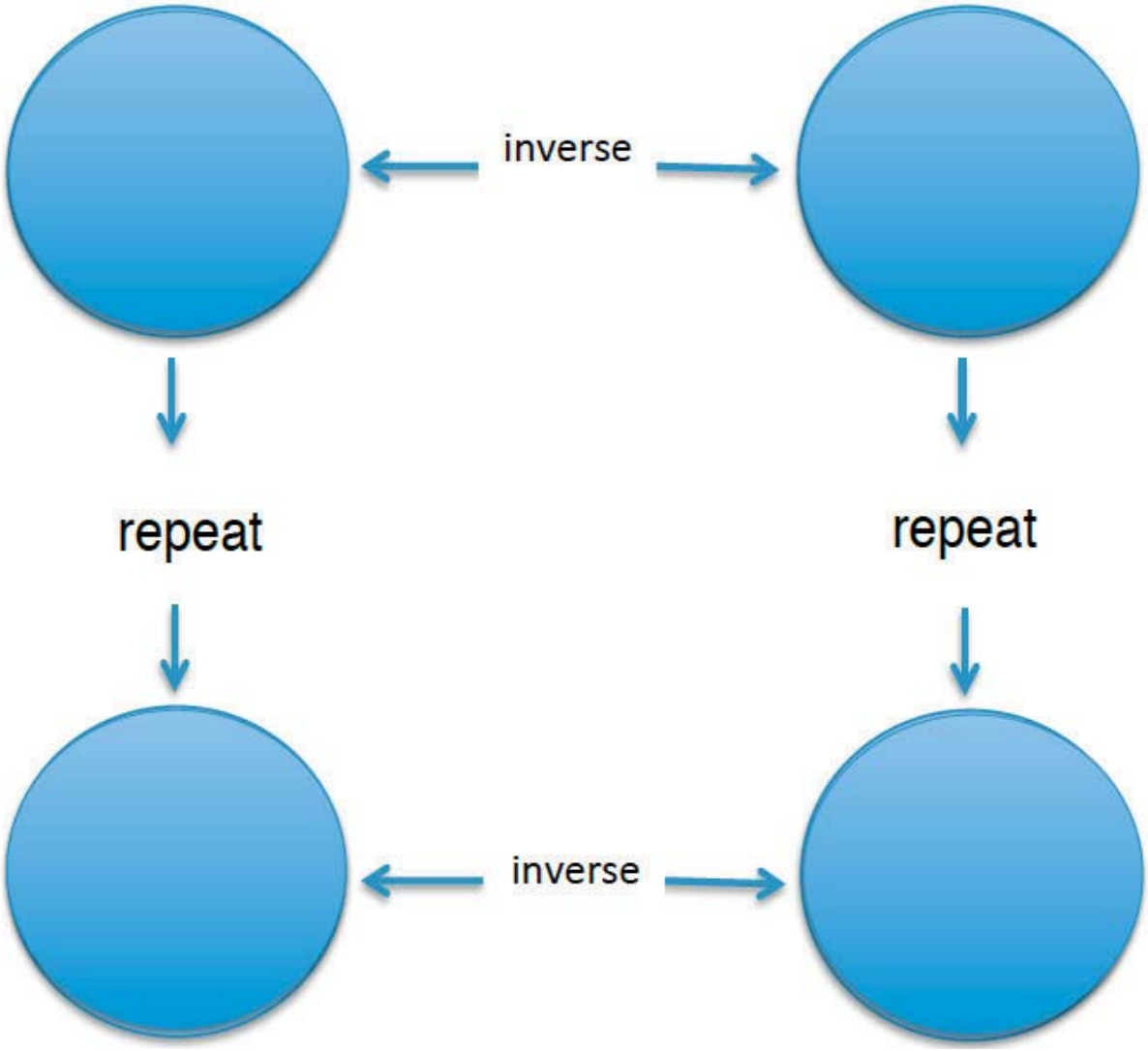
Teagon earned \$450 last month cutting grass. Xavier spent \$375 on a new computer.		Jayden has earned 3 bonus points completing math extra credit assignments, while Shontelle has earned 32 bonus points.	
Kim and her friend Stacey went to the book store. Stacey spent \$8 on notebooks. Kim spent \$5 on snacks and pencils.		Last month, the stock market dropped $5\frac{3}{4}$ points overall. So far this month, the stock market rose $3\frac{1}{4}$ points.	
At a beach in California, if a person stands in the water, he or she is $\frac{1}{5}$ ft. below sea level. If the person walks onto the beach, he or she is $\frac{2}{5}$ ft. above sea level.		Brittany went to an office supply store twice last week. The first time she made 2 copies that cost \$0.20 each. The second time she did not buy anything, but found 2 dimes in the parking lot.	







Graphic Organizer Reproducible



$2 \bullet 5 \bullet m$				$35mpt$
$45mp$	$40p$		$24m$	$2 \bullet 3 \bullet 3 \bullet p \bullet t$
	$2 \bullet 7 \bullet m \bullet p$			$11mp$
$28pt$			$22mp$	$2 \bullet 2 \bullet 3 \bullet 3 \bullet m$
$27mp$		$5mpt$		$45mpt$

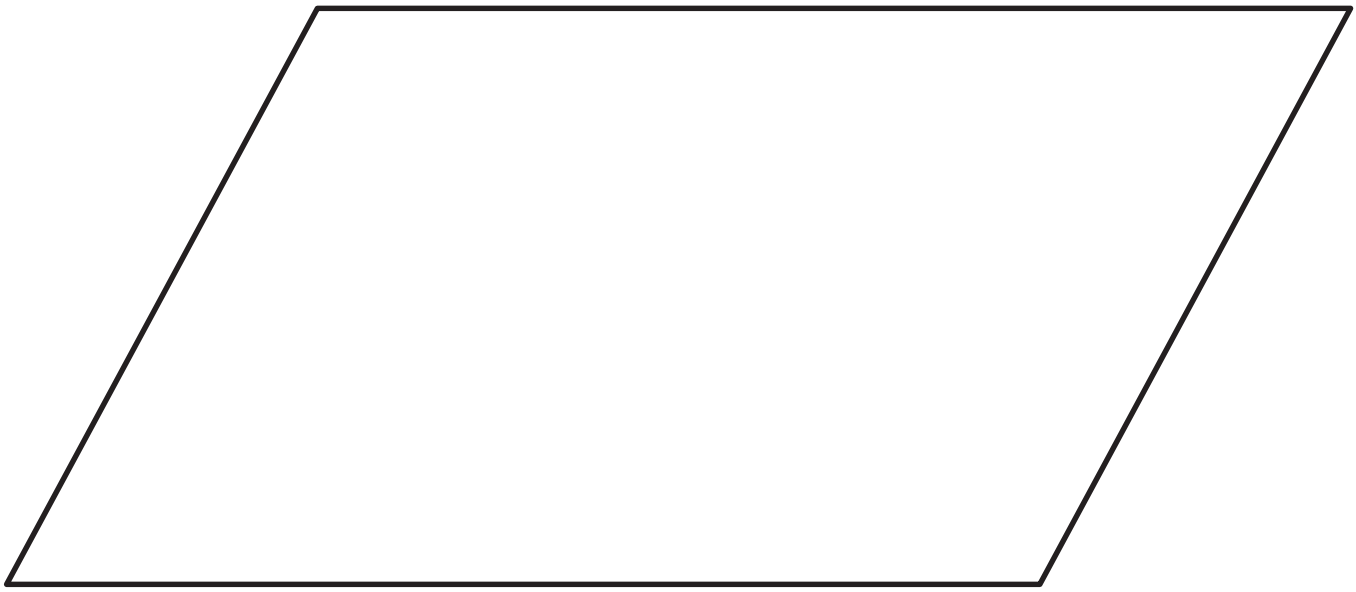
$22mp$		$40p$		
	$28pt$		$2 \bullet 5 \bullet m$	$2 \bullet 2 \bullet 3 \bullet 3 \bullet m$
	$45mp$			$35mpt$
$24m$			$45mpt$	$27mp$
$2 \bullet 7 \bullet m \bullet p$	$5mpt$		$11mp$	$2 \bullet 3 \bullet 3 \bullet p \bullet t$

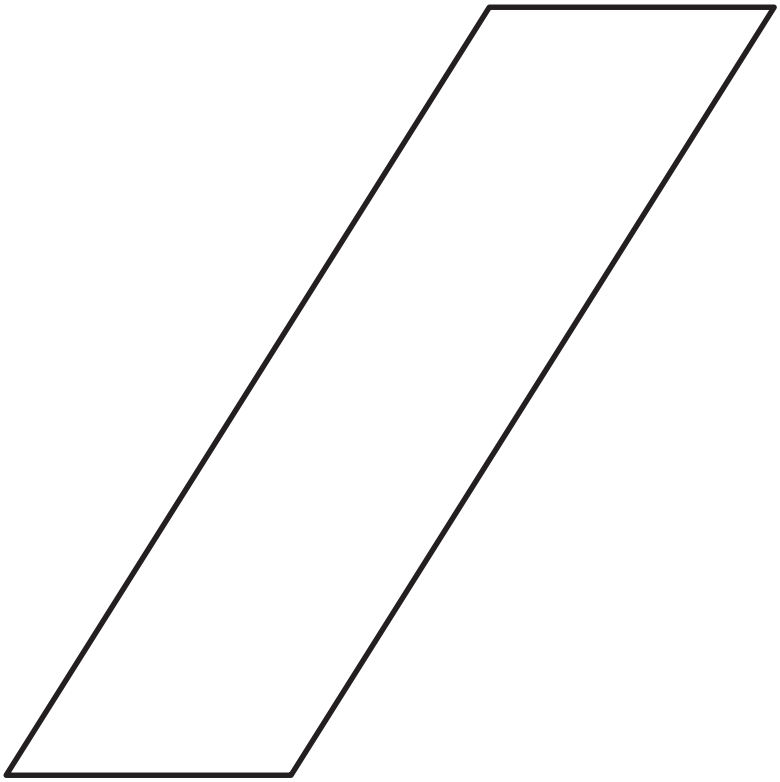
$45mp$	$40p$			$24m$
$2 \bullet 3 \bullet 3 \bullet p \bullet t$	$5mpt$	$22mp$		
$11mp$			$45mpt$	$2 \bullet 2 \bullet 3 \bullet 3 \bullet m$
	$27mp$	$2 \bullet 7 \bullet m \bullet p$		$28pt$
	$2 \bullet 5 \bullet m$		$35mpt$	

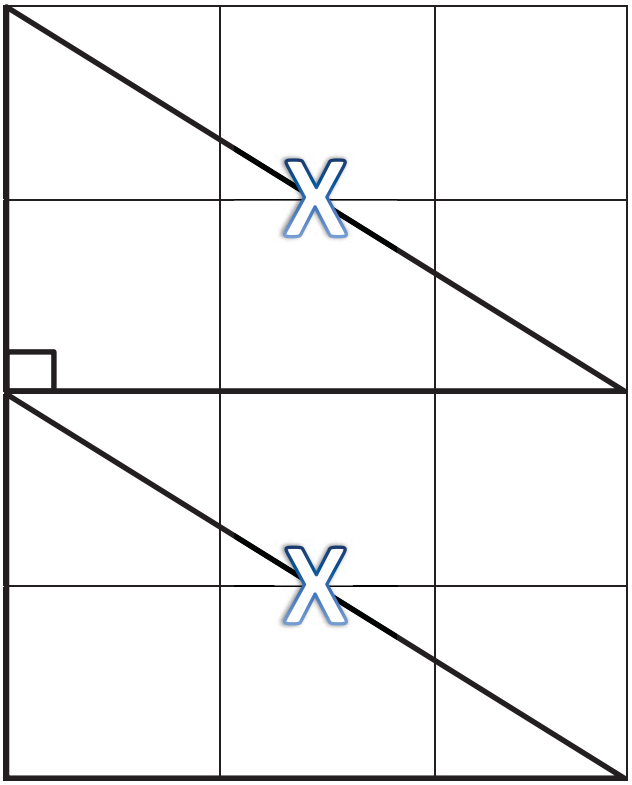
$a + 14 = 36$	22	$3^3 = b$
27	$\frac{c}{5} = 3$	15
$d - 10 = 32$	42	$24 = e + 11$
13	$32 = 4 \cdot f$	8
$9 = \frac{45}{g}$	5	$43 = h - 17$

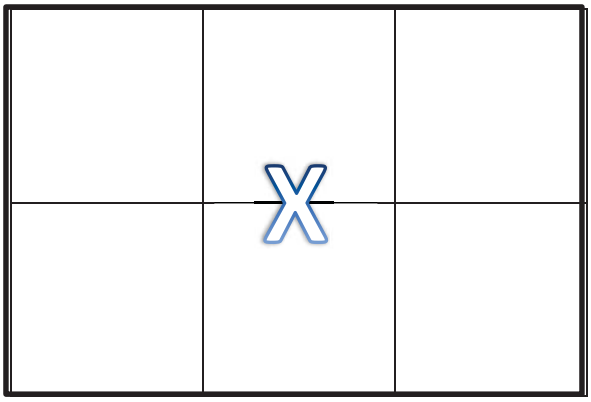
60	$1.5 + 0.5 = j$	2
$9 \cdot \frac{1}{3} = k$	3	$m = \frac{56}{8}$
7	$n = 35.5 - 9.5$	26
$p + 13\frac{3}{4} = 32\frac{3}{4}$	19	$4 = \frac{1}{4}q$
16	$\frac{63}{r} = 7$	9

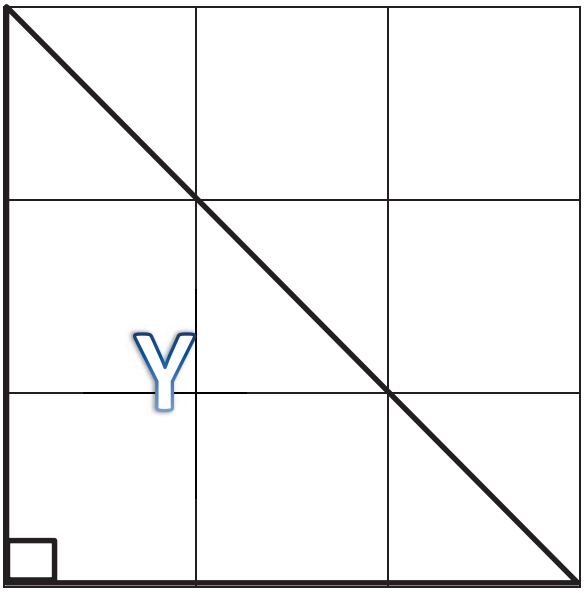
$99 - u = 45$	54

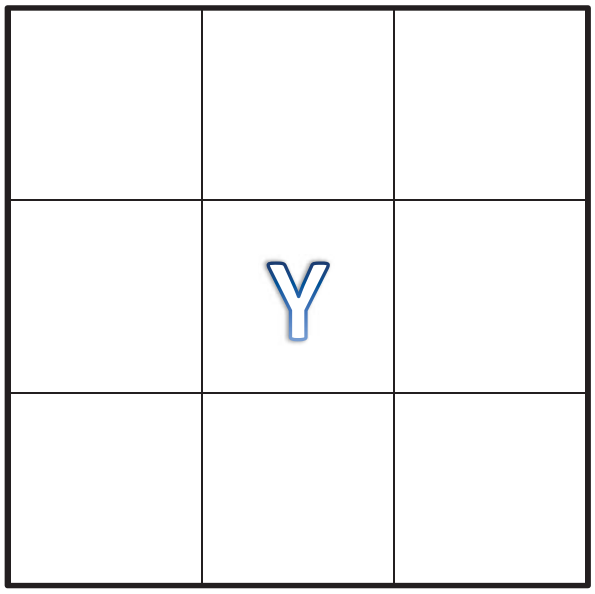


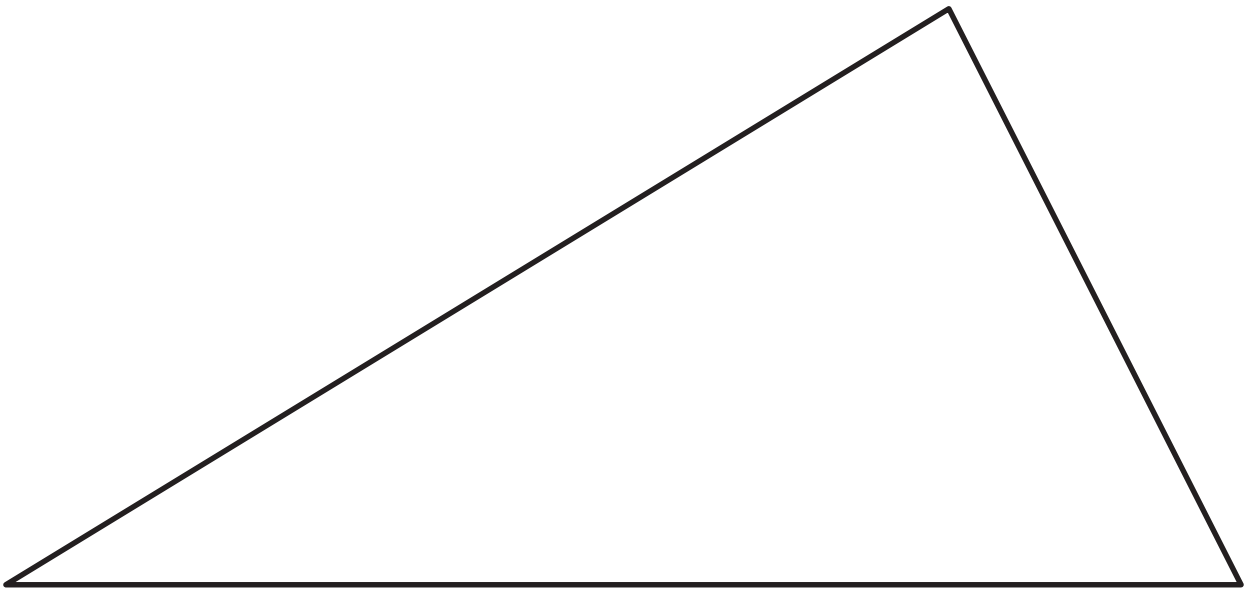


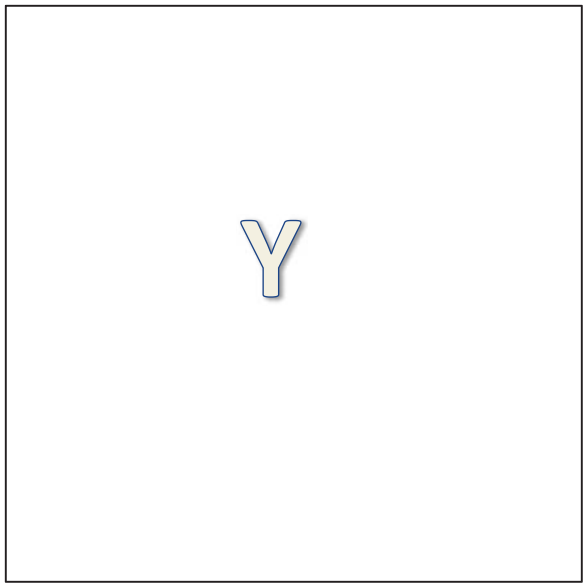


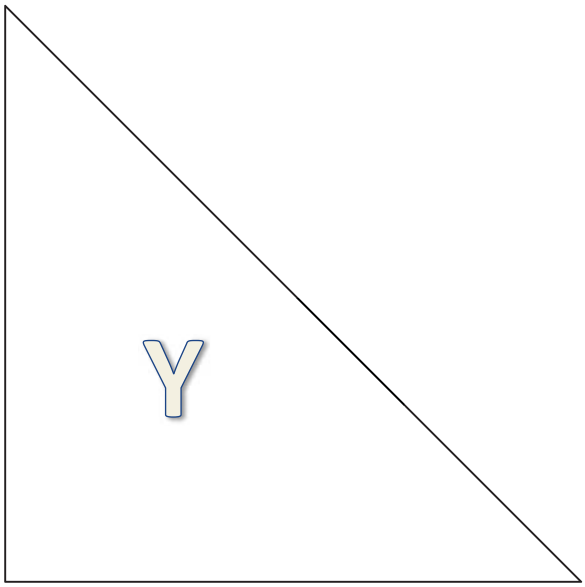


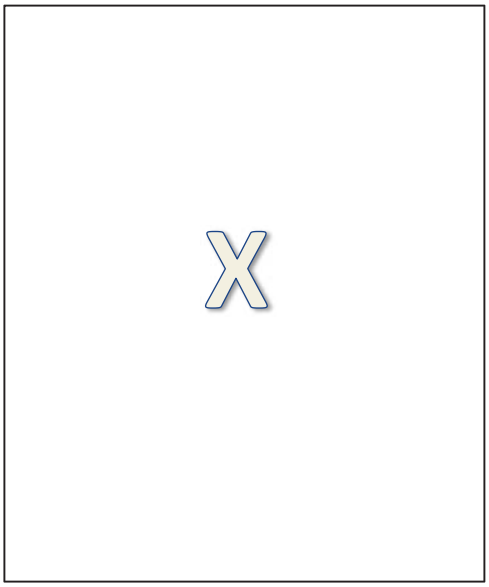


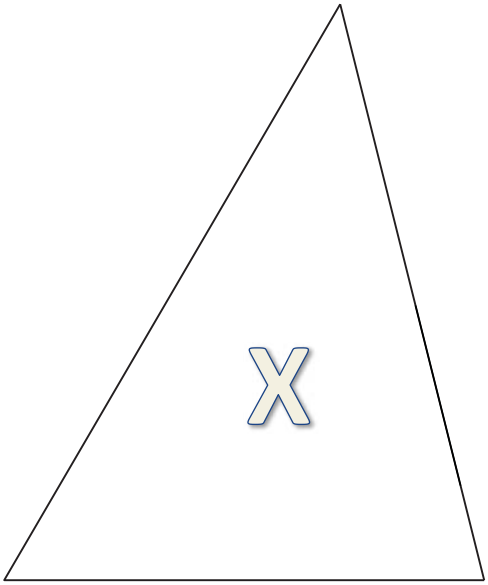


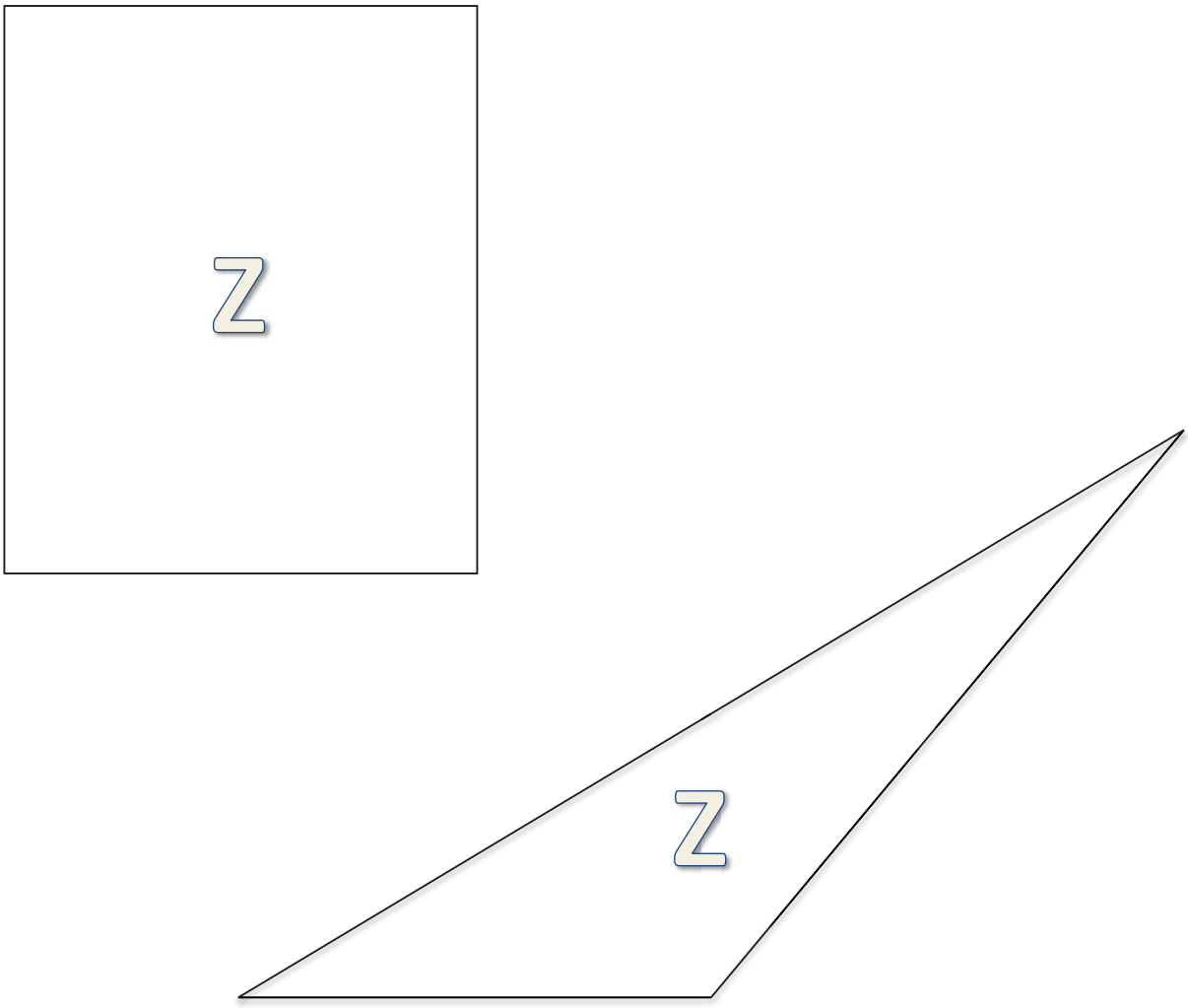


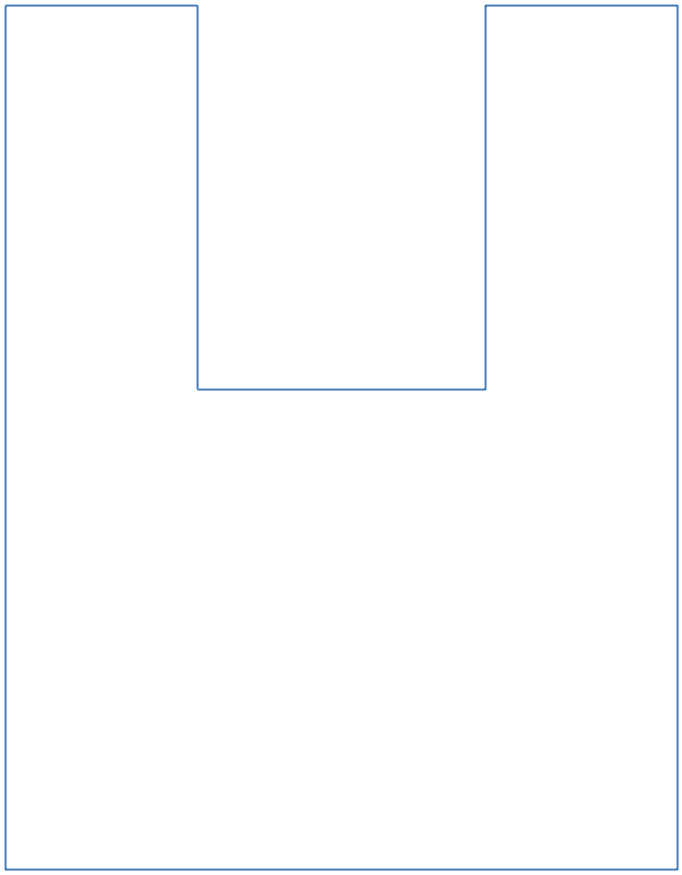


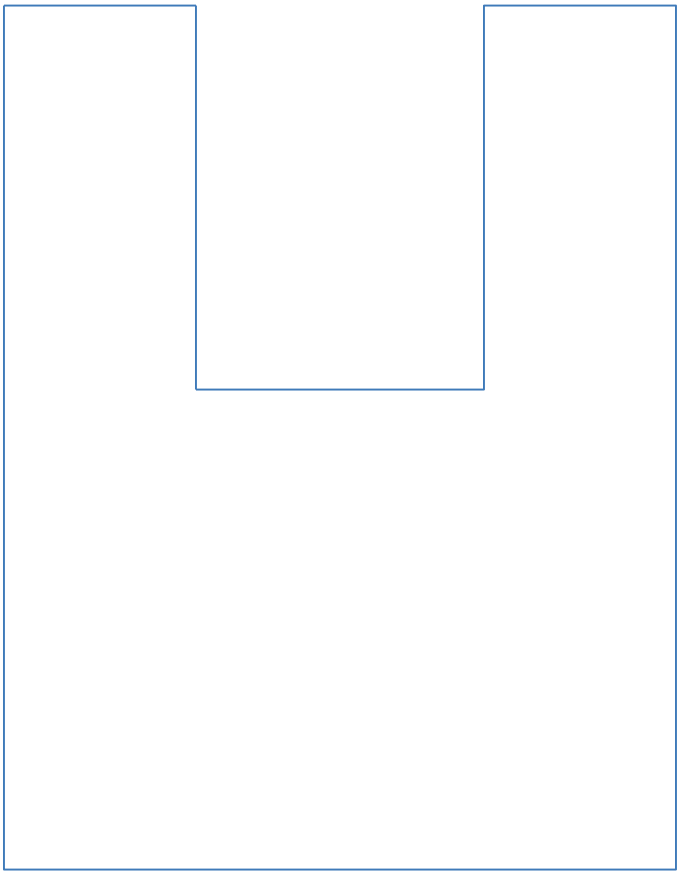


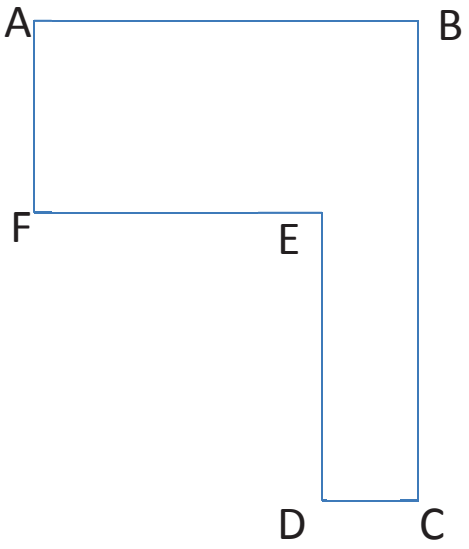


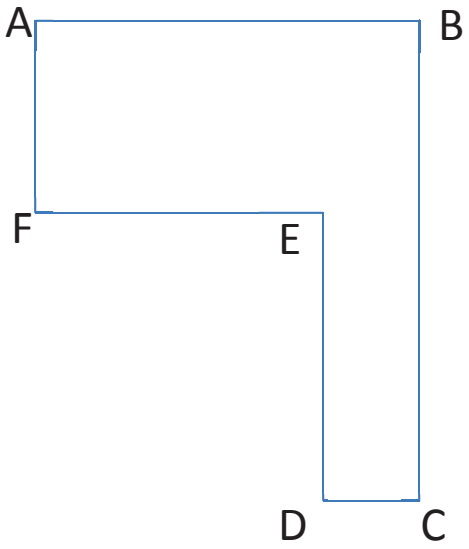


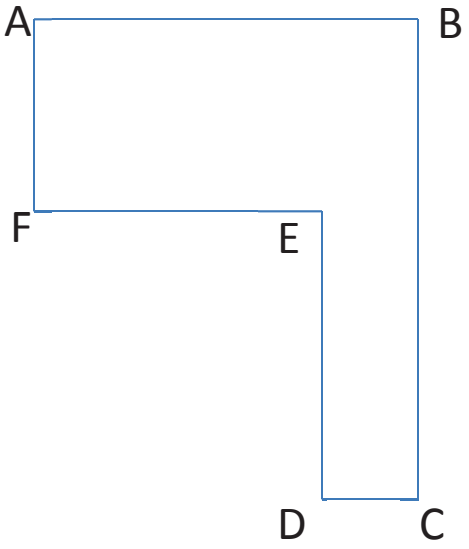


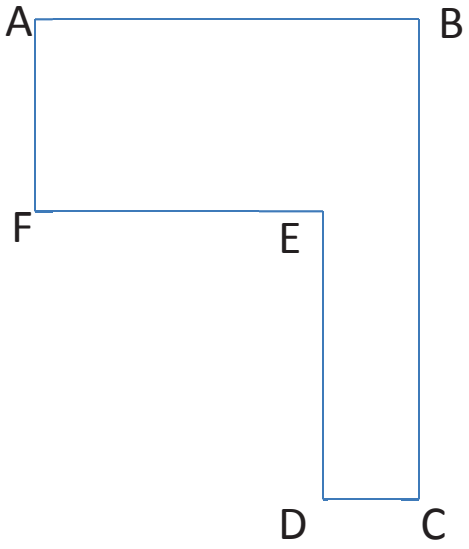


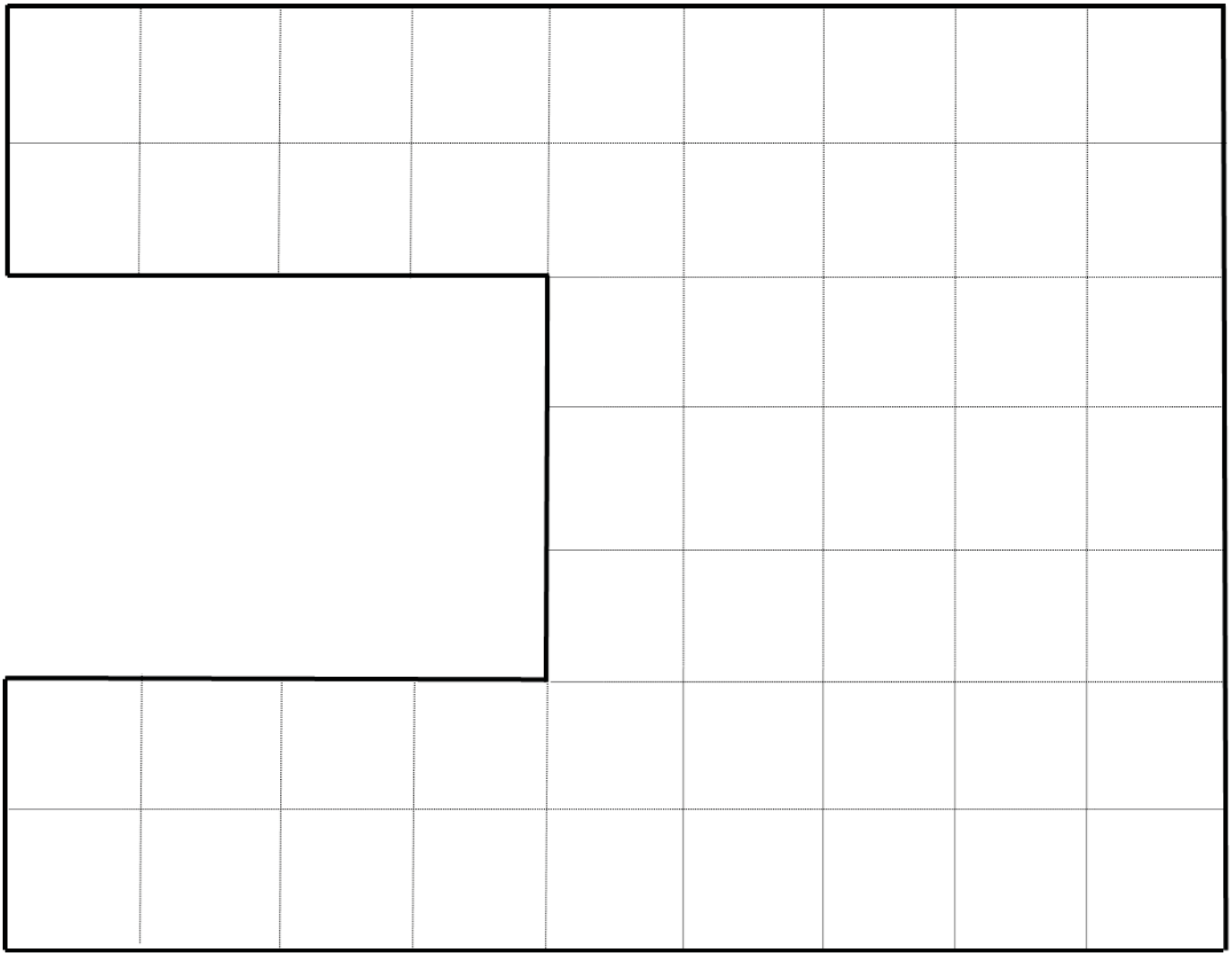


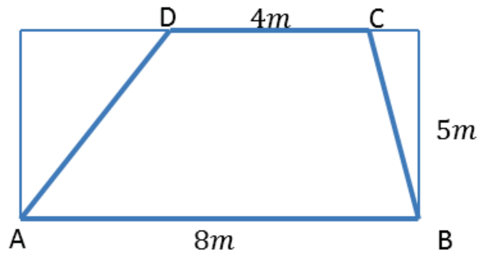


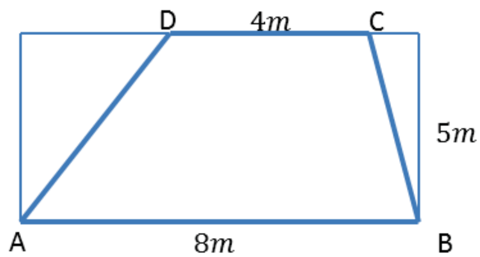


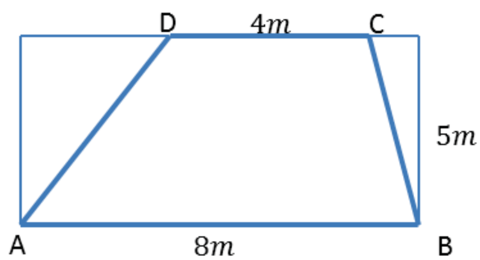


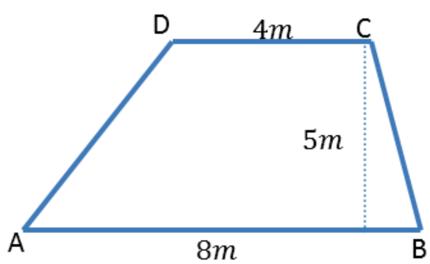


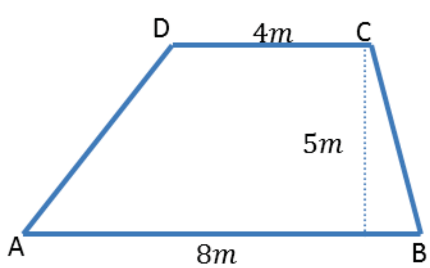


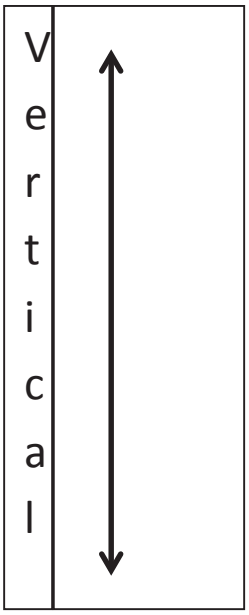












Station A

Make a sketch of the figure. Then, calculate the volume.

Rectangular prism:

Area of the base = $4\frac{3}{8}$ ft^2

Height = $2\frac{1}{2}$ ft.

Station B

Make a sketch of the figure. Write the length, the width, and height in feet. Then, calculate the volume.

Rectangular prism:

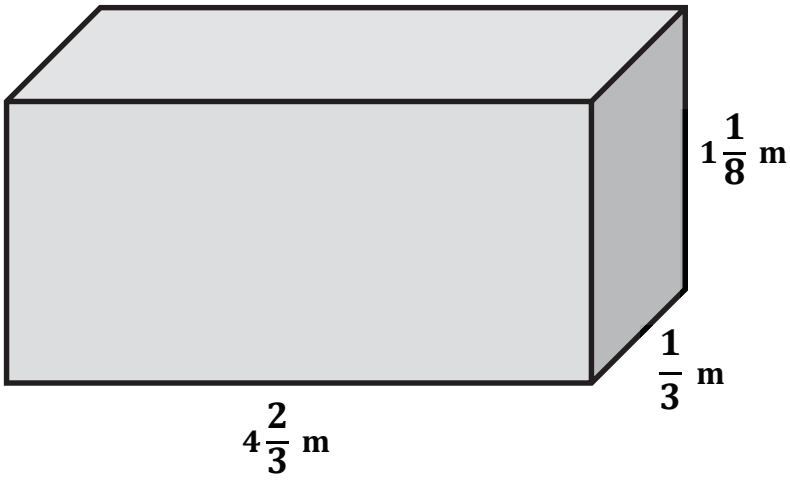
Length is $2\frac{1}{2}$ times the height.

Width is $\frac{3}{4}$ as long as the height.

Height = 3 ft.

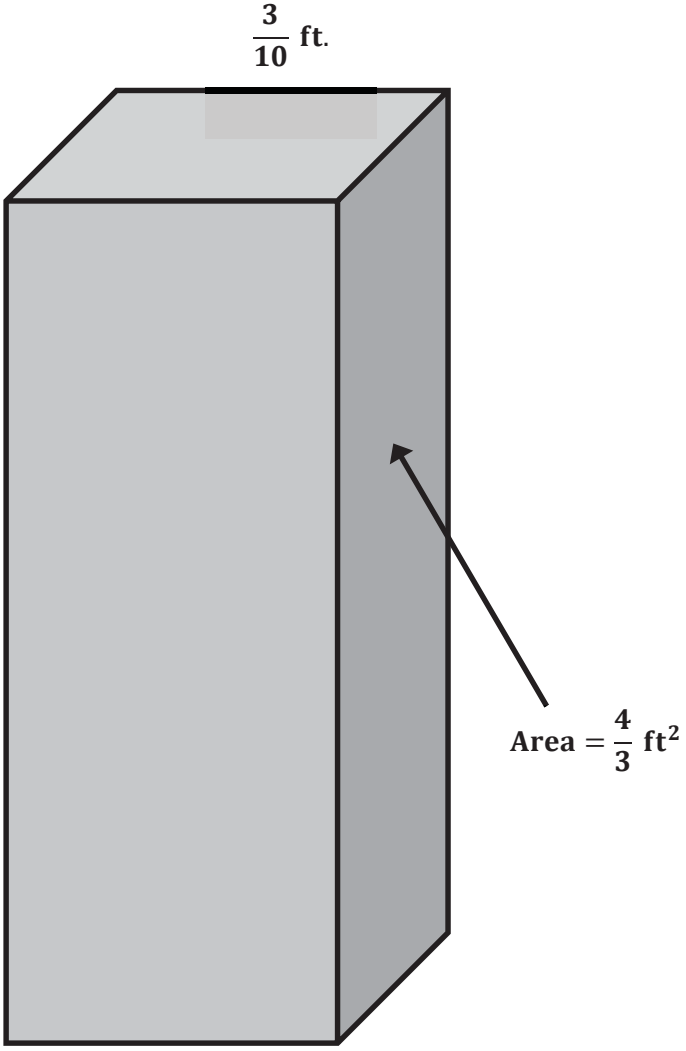
Station C

Write two different expressions to represent the volume, and explain what each expression represents.



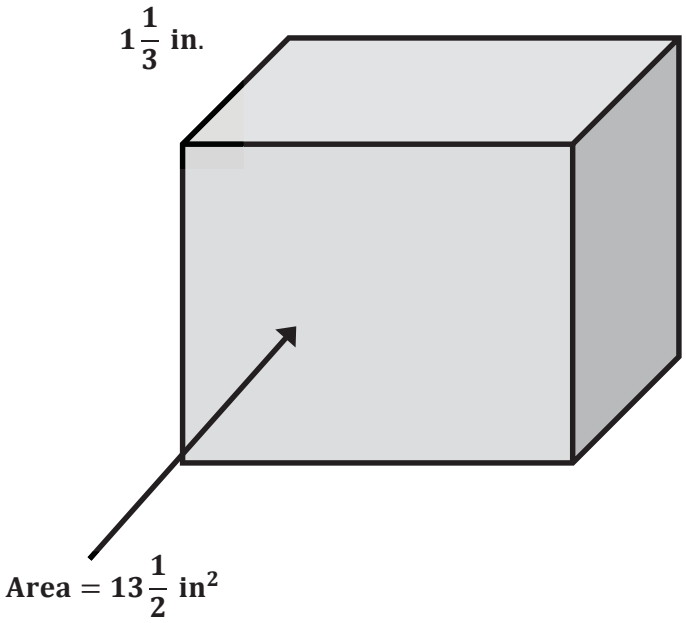
Station D

Calculate the volume.



Station E

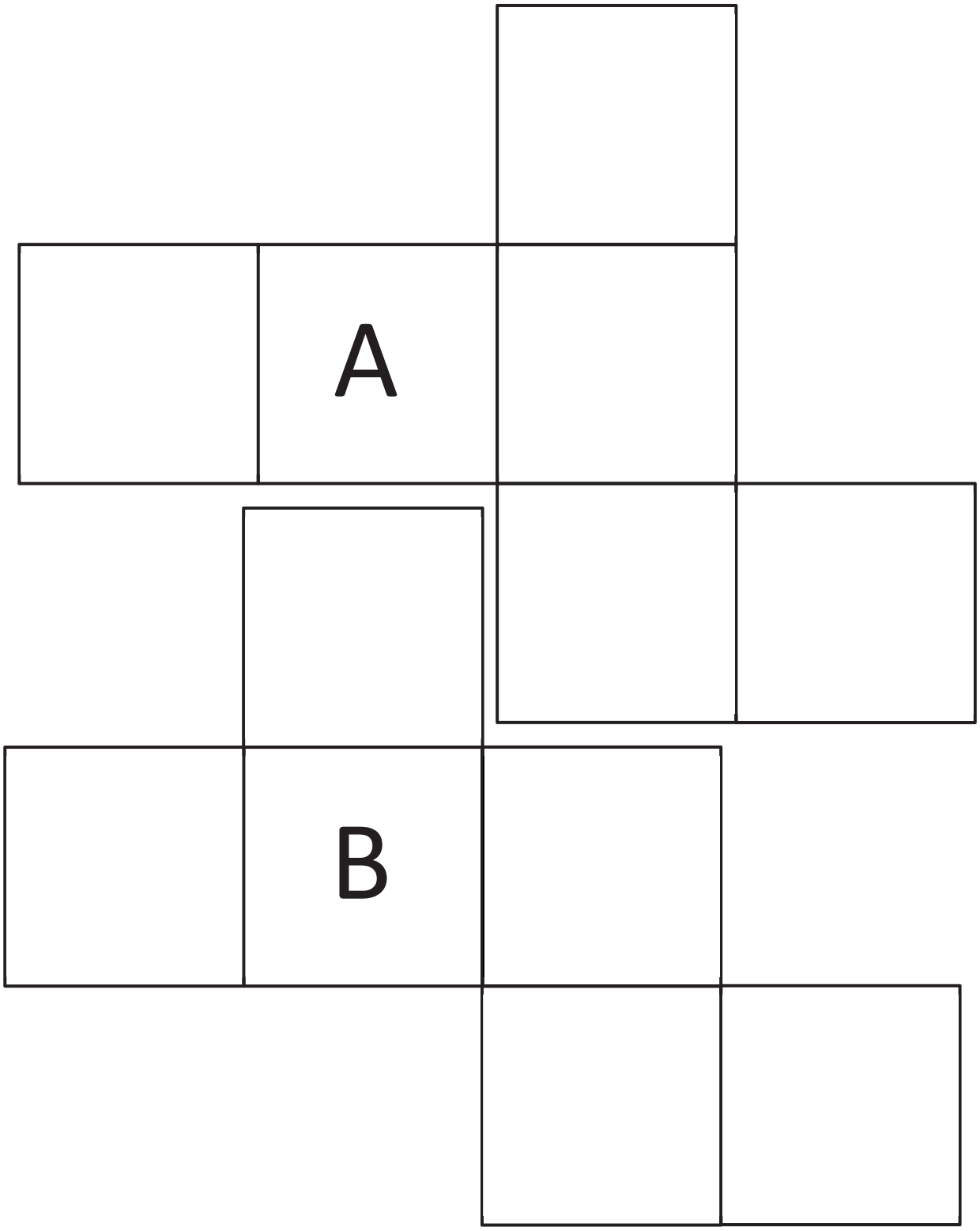
Calculate the volume.

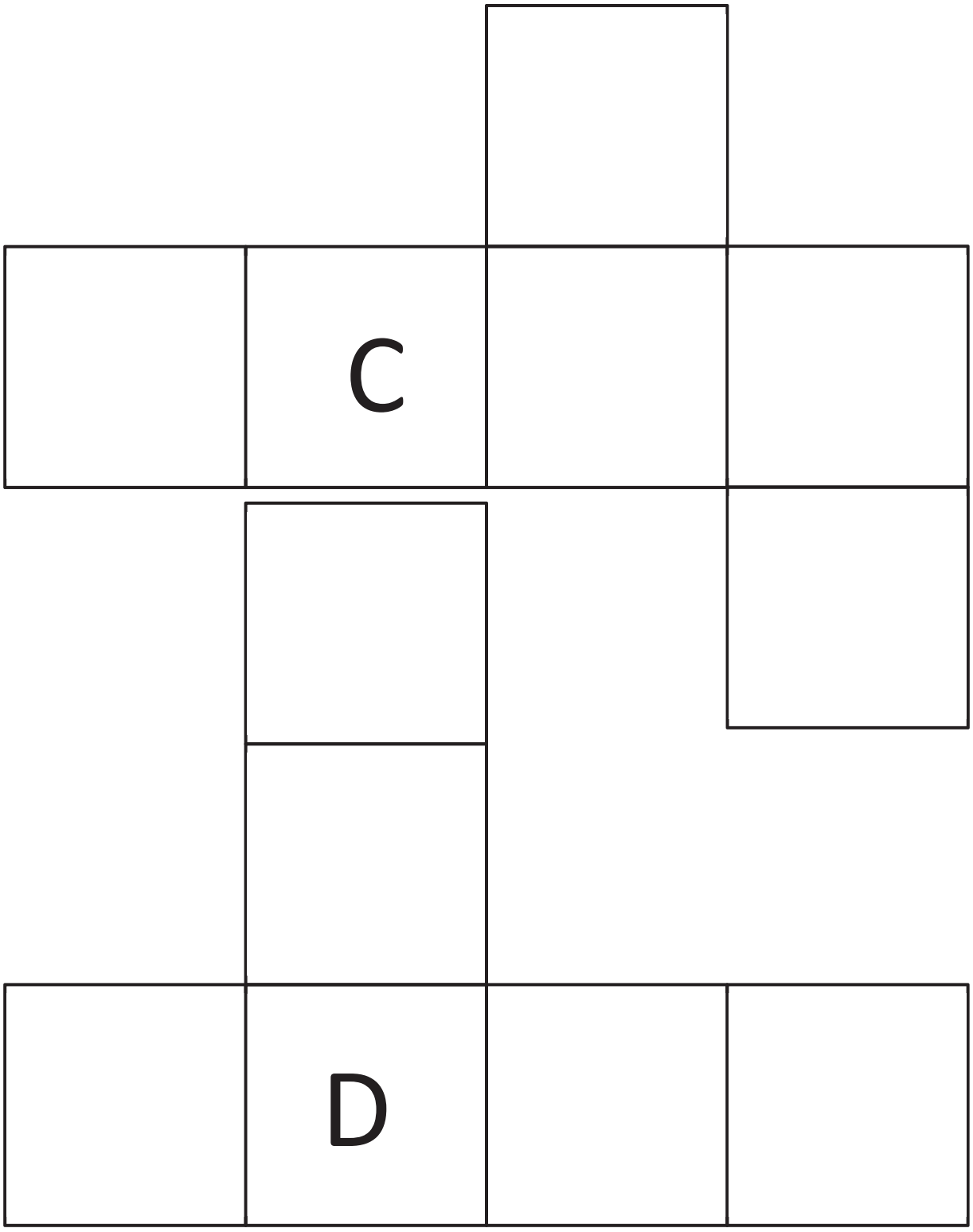


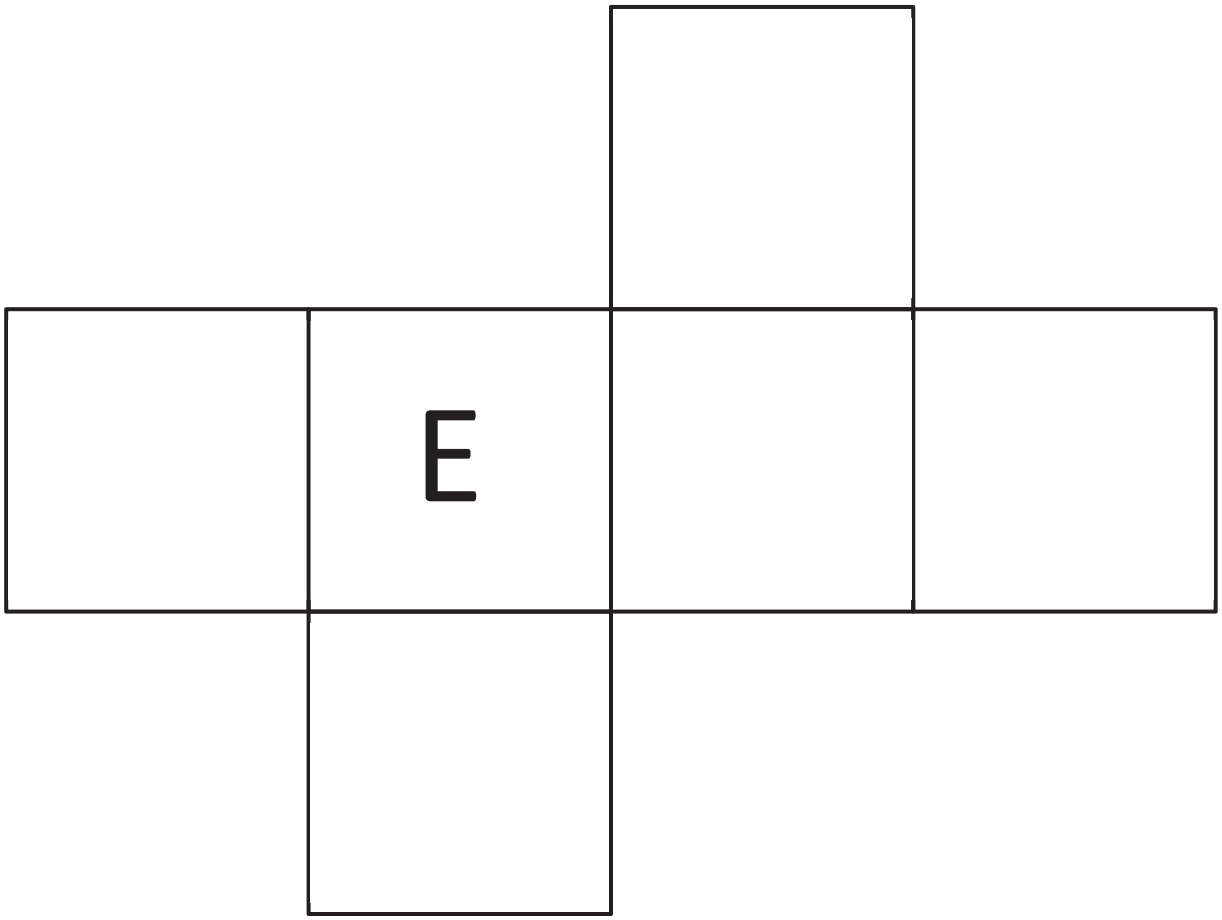
Station F

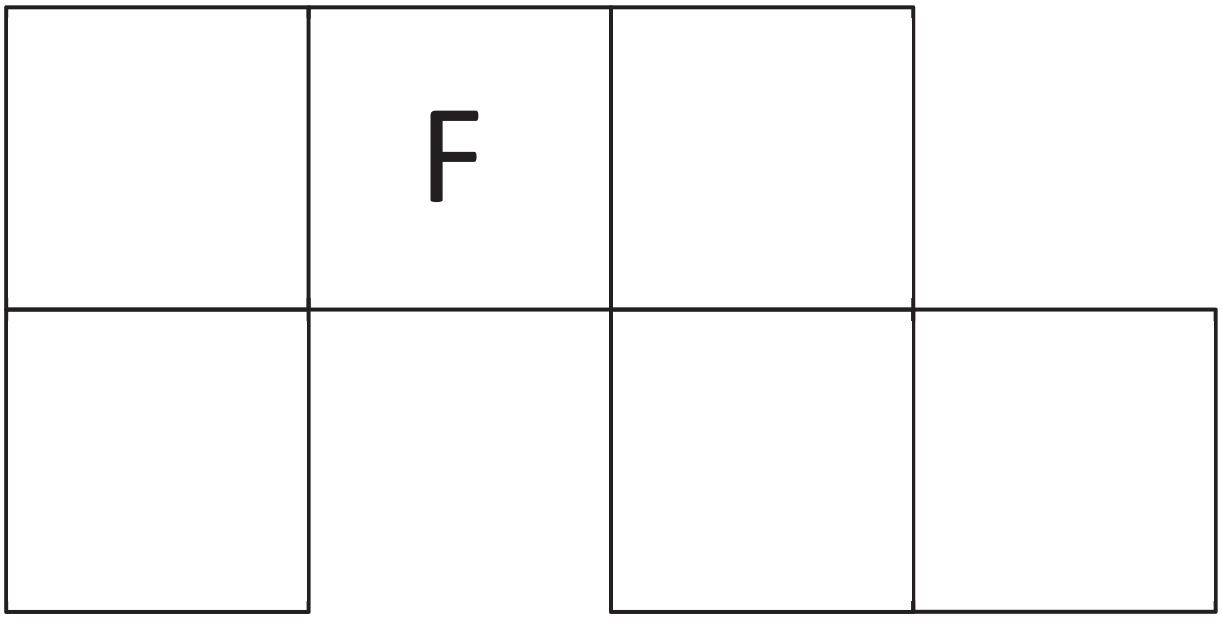
Challenge:

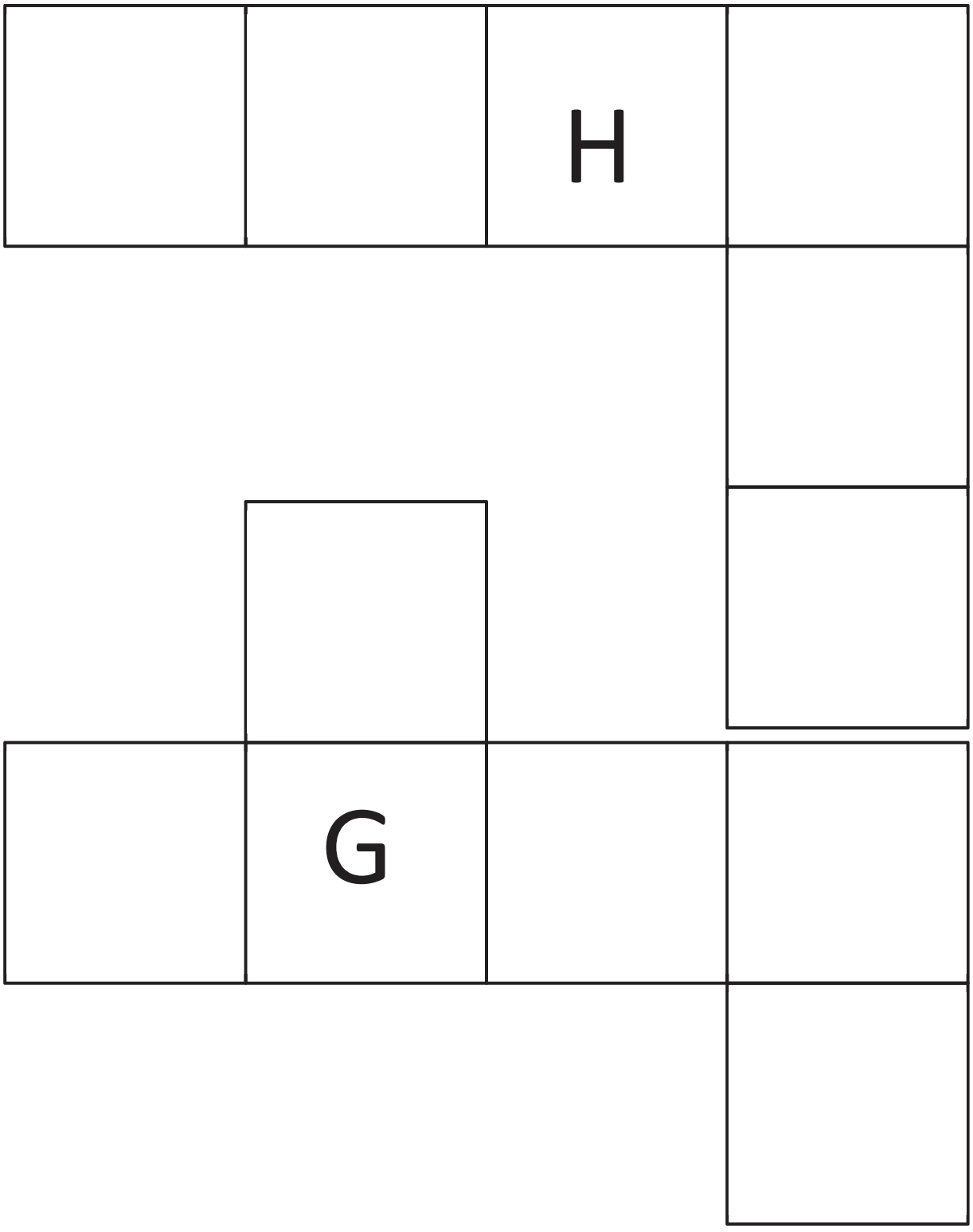
Determine the volume of a rectangular prism whose length and width are in a ratio of $3:1$. The width and height are in a ratio of $2:3$. The length of the rectangular prism is 5 ft.

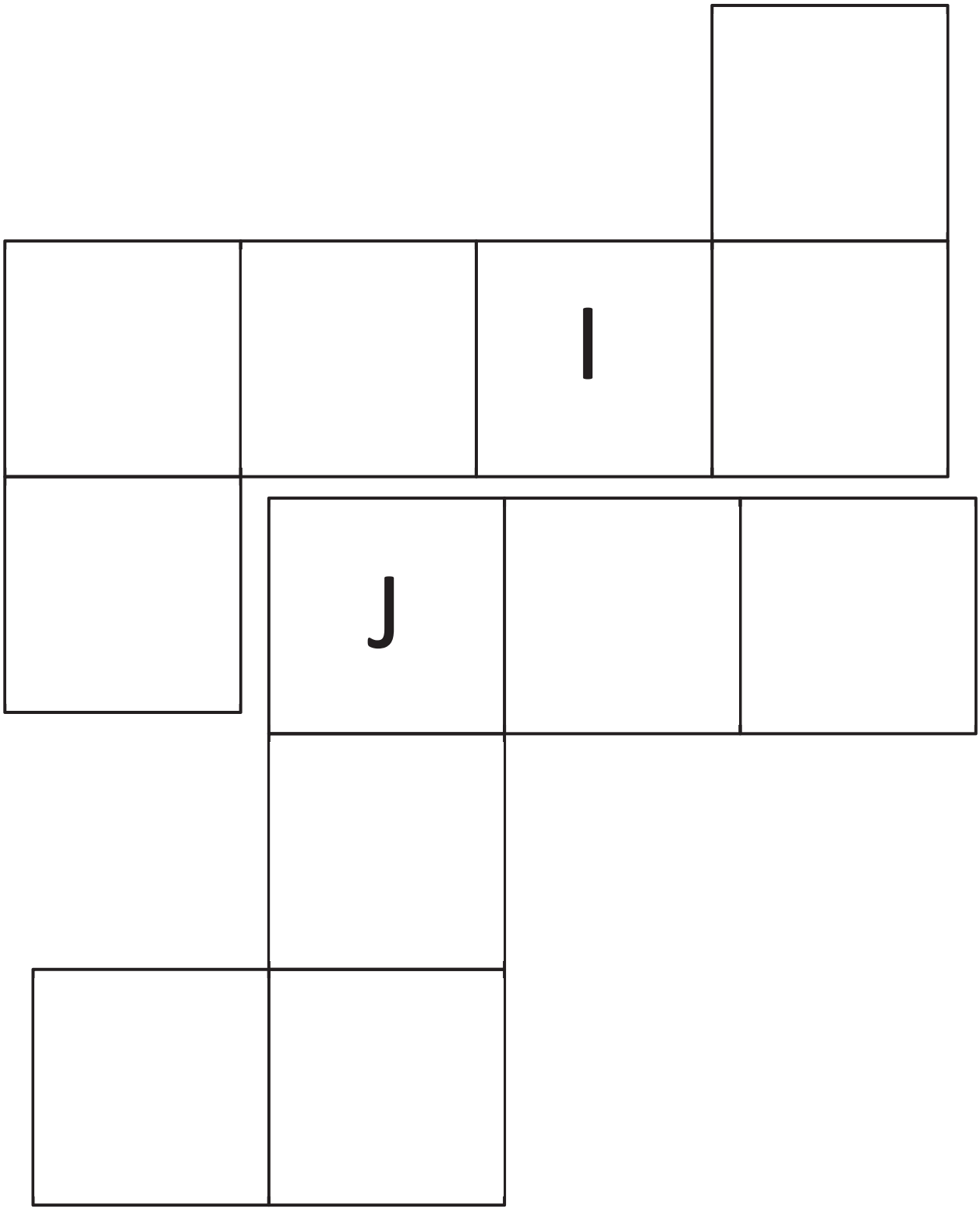


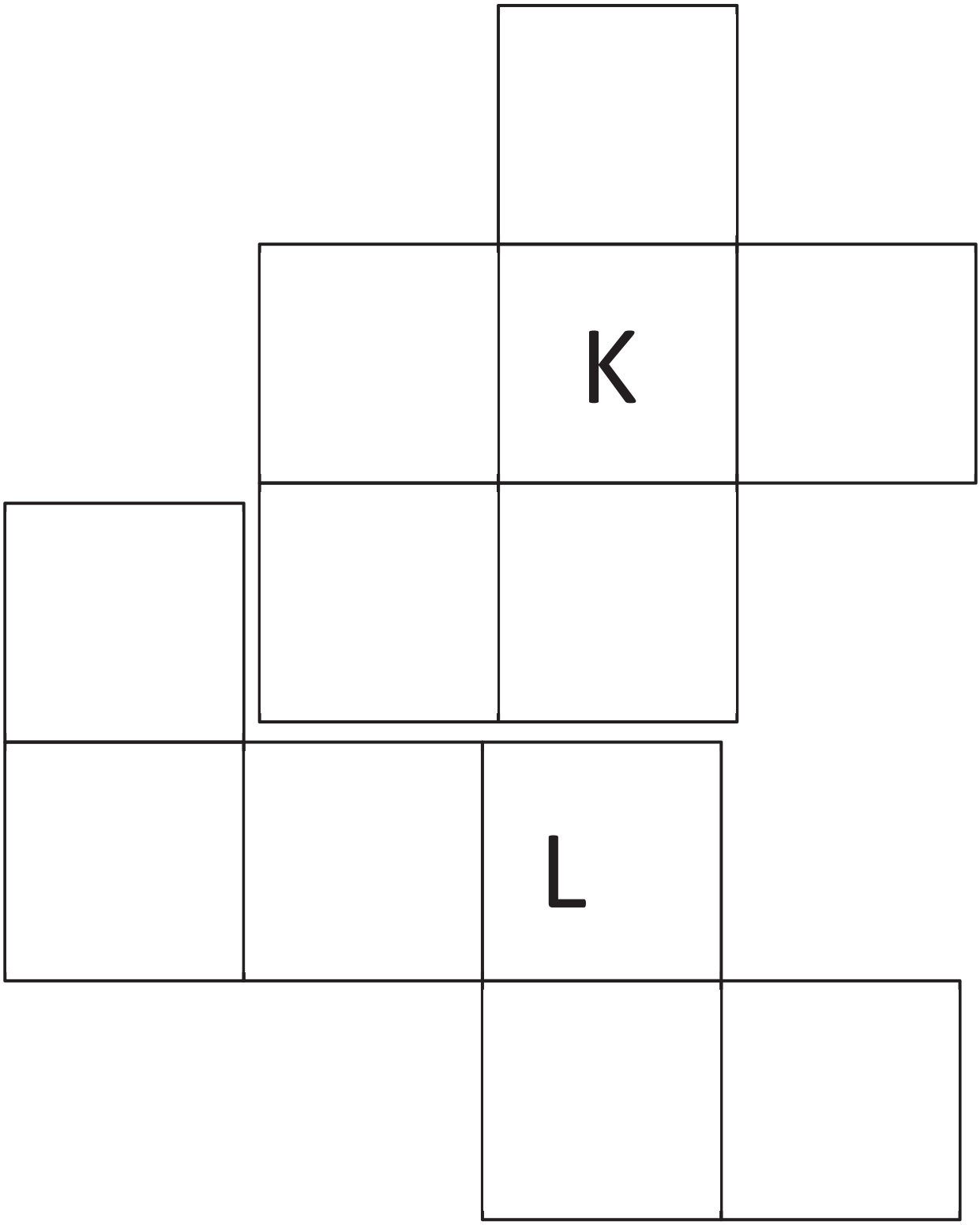


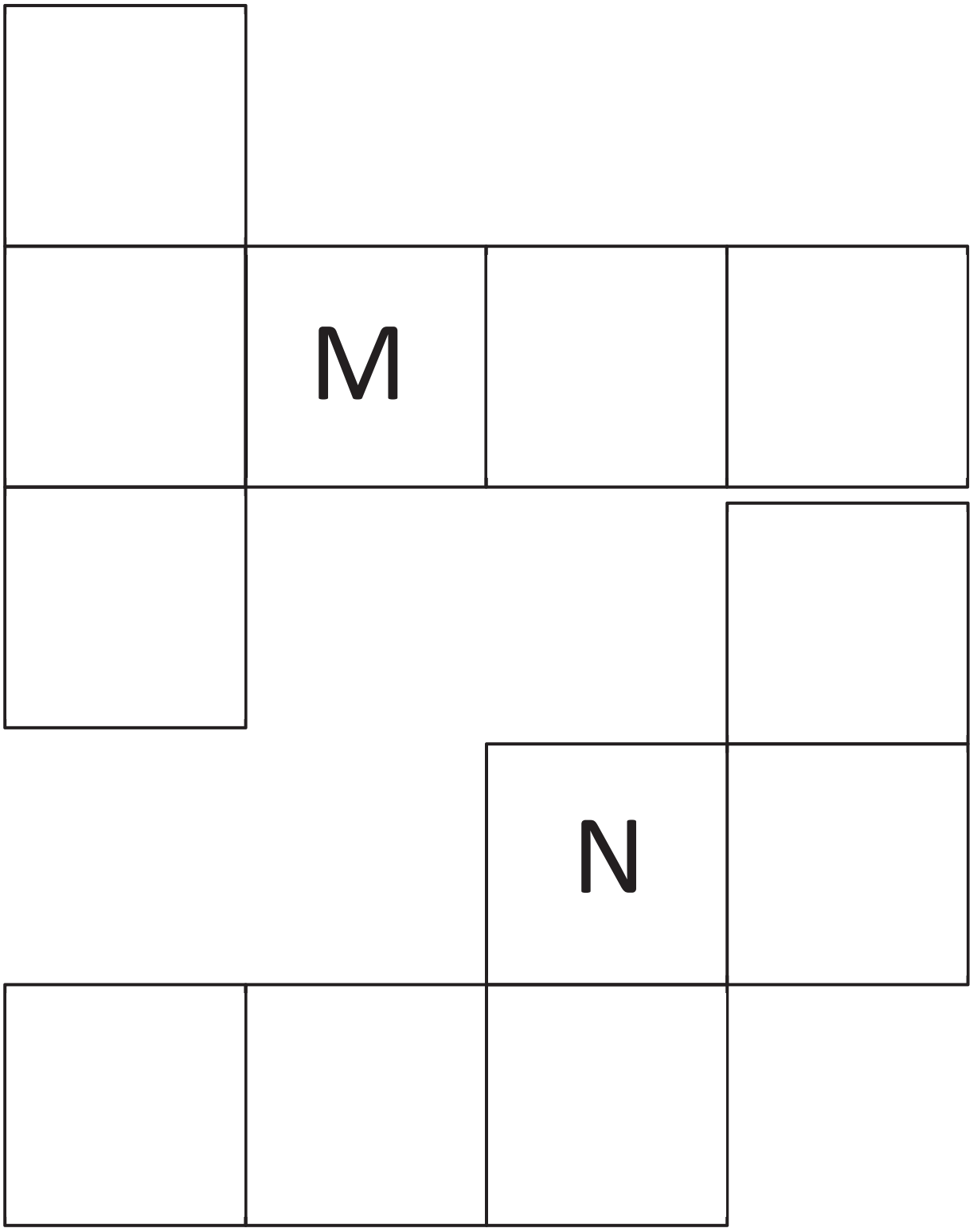


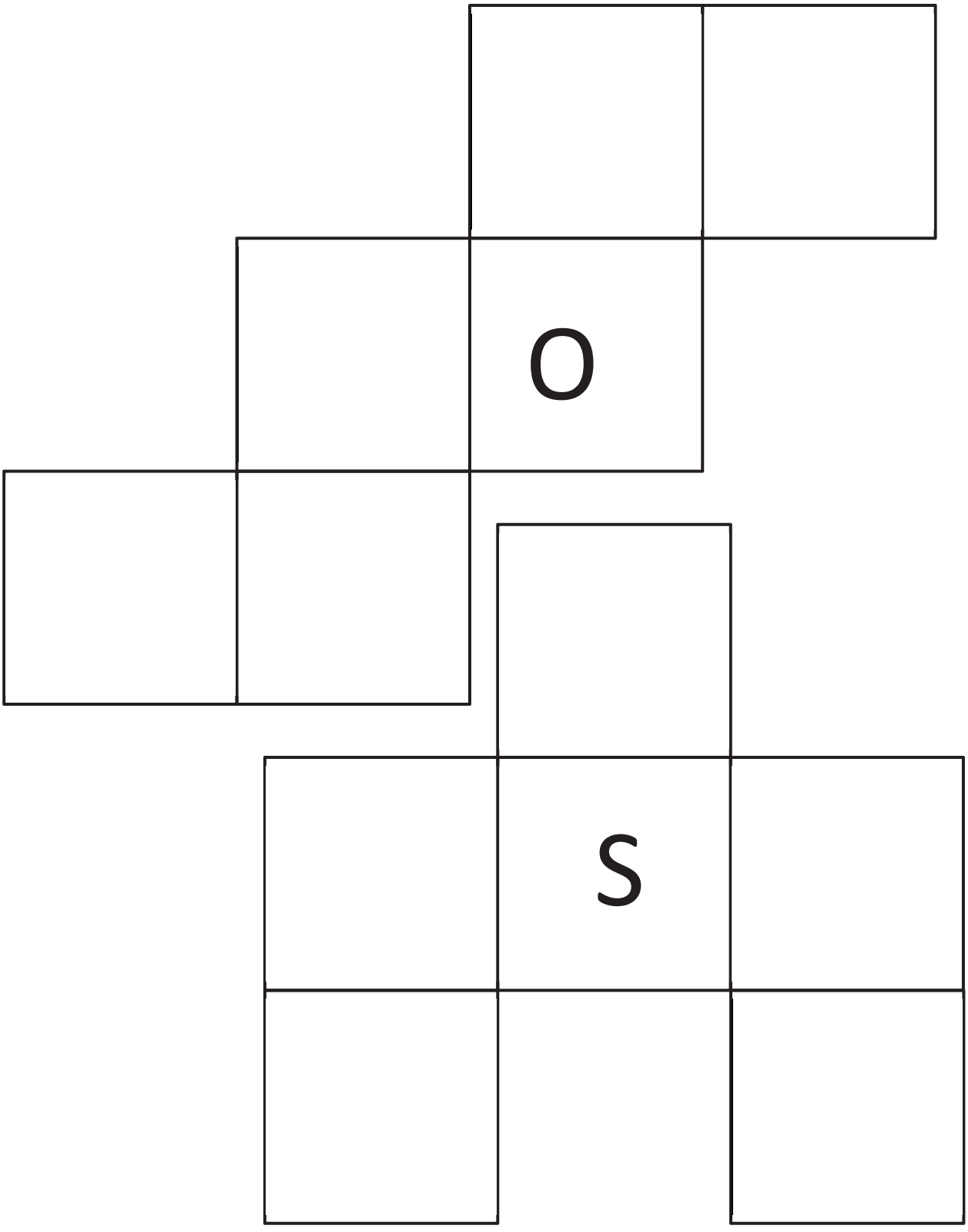


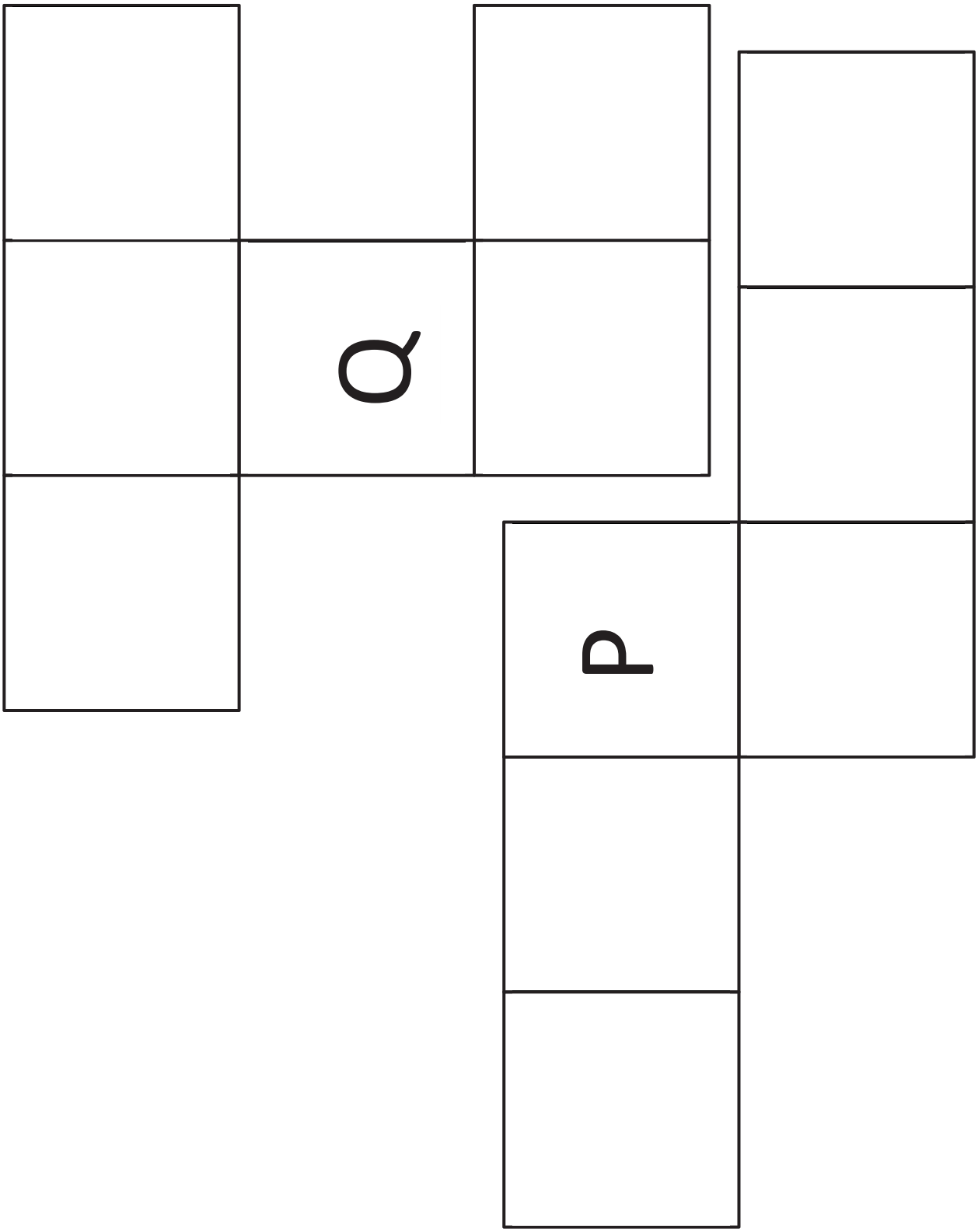


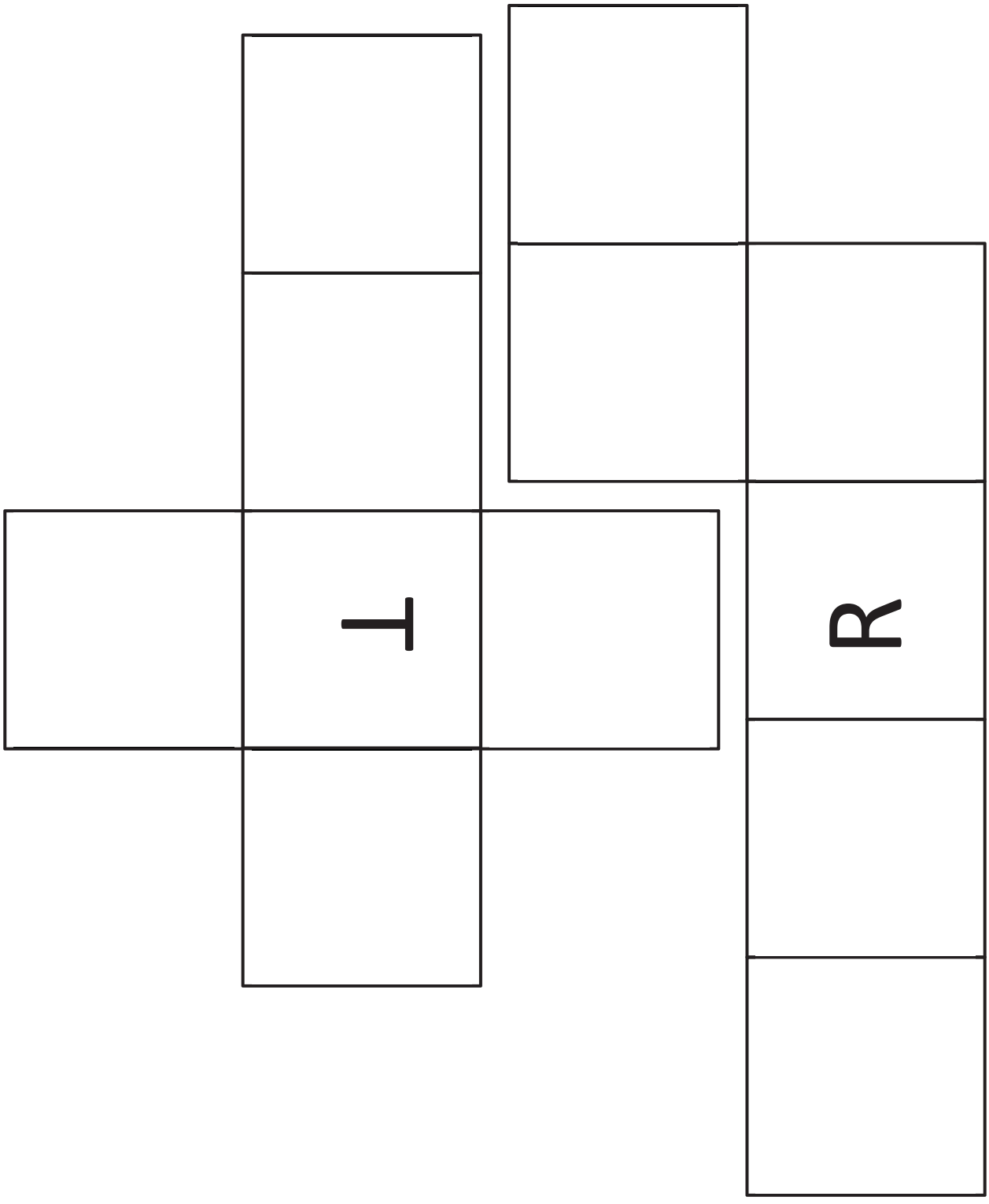


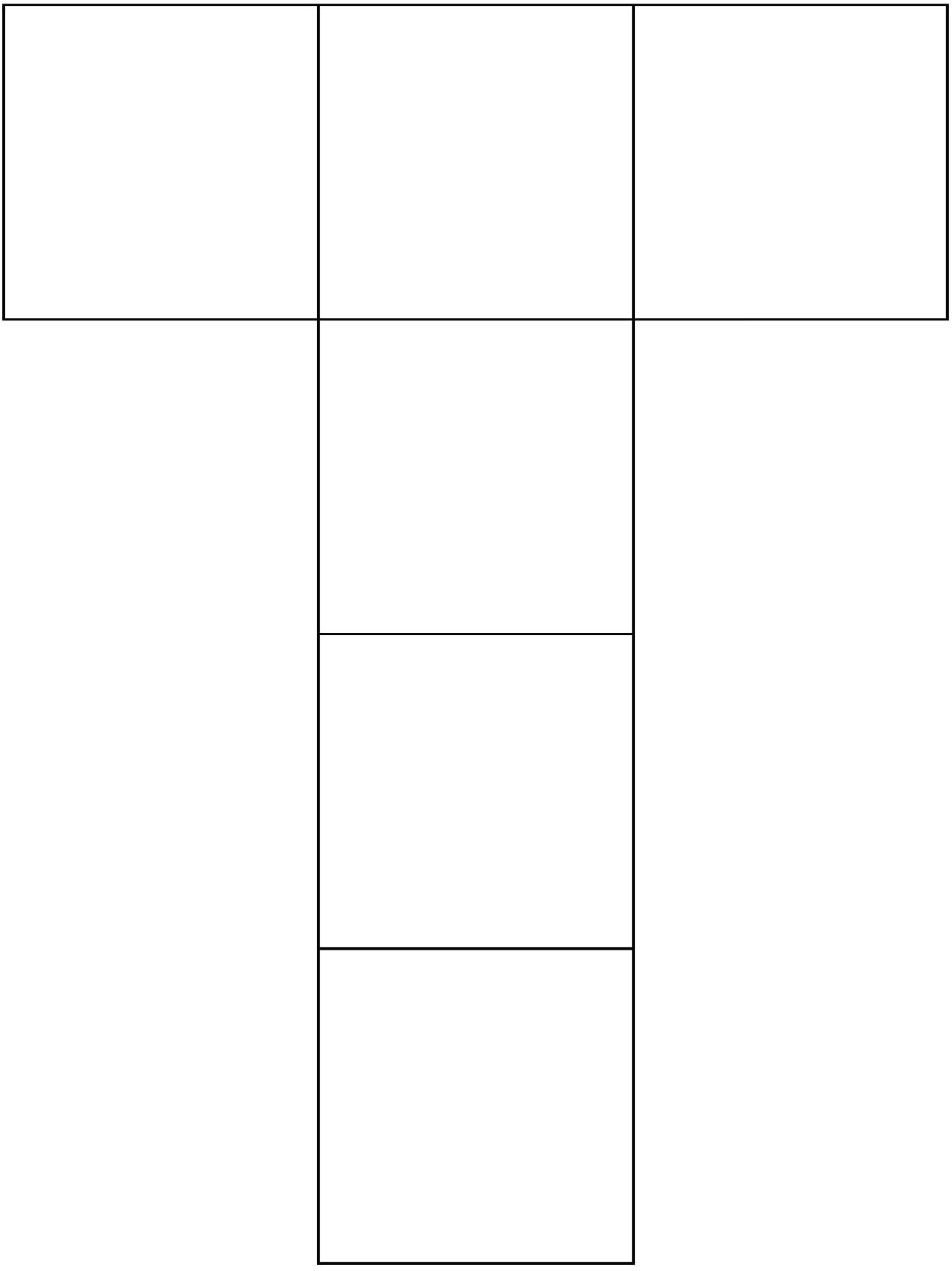


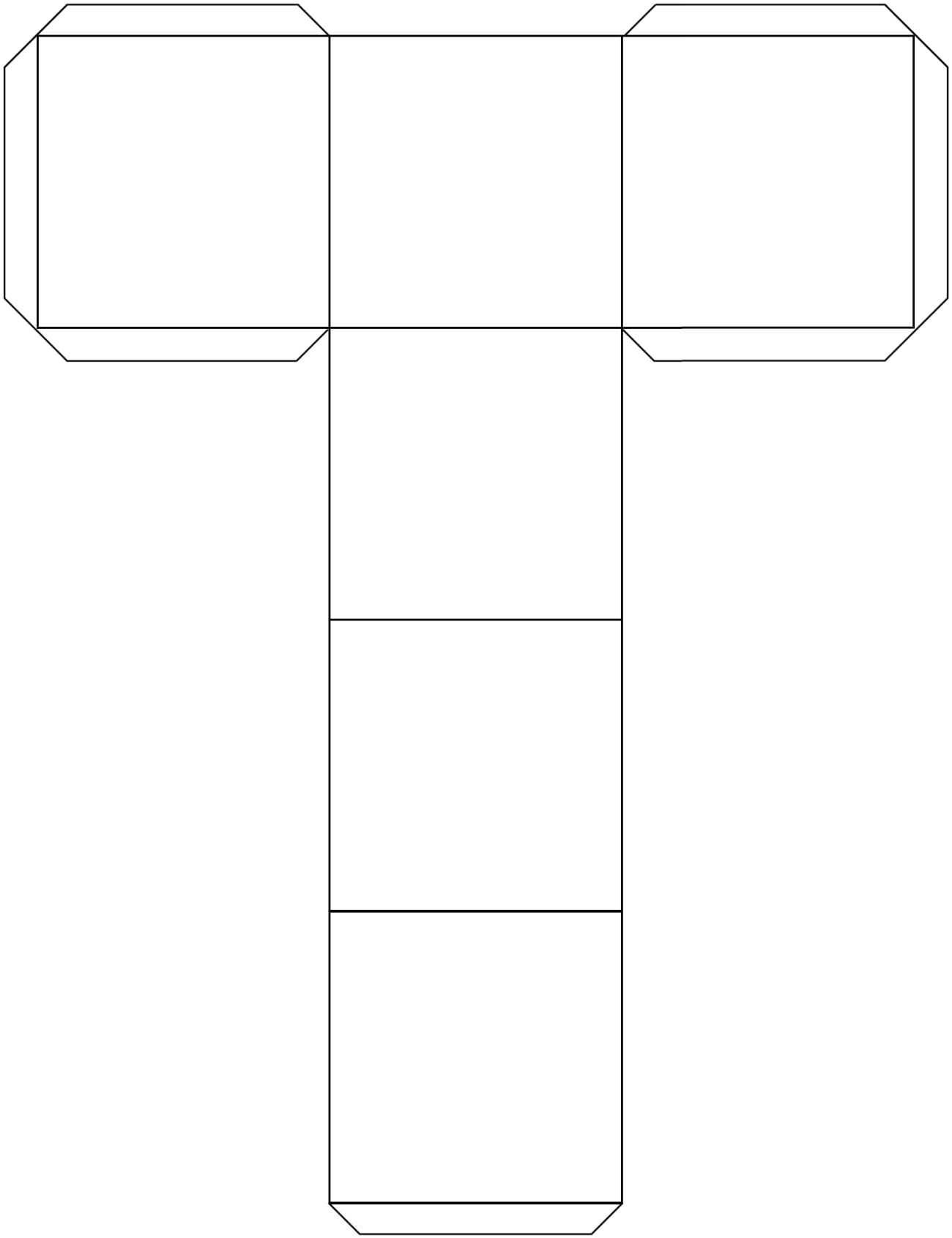




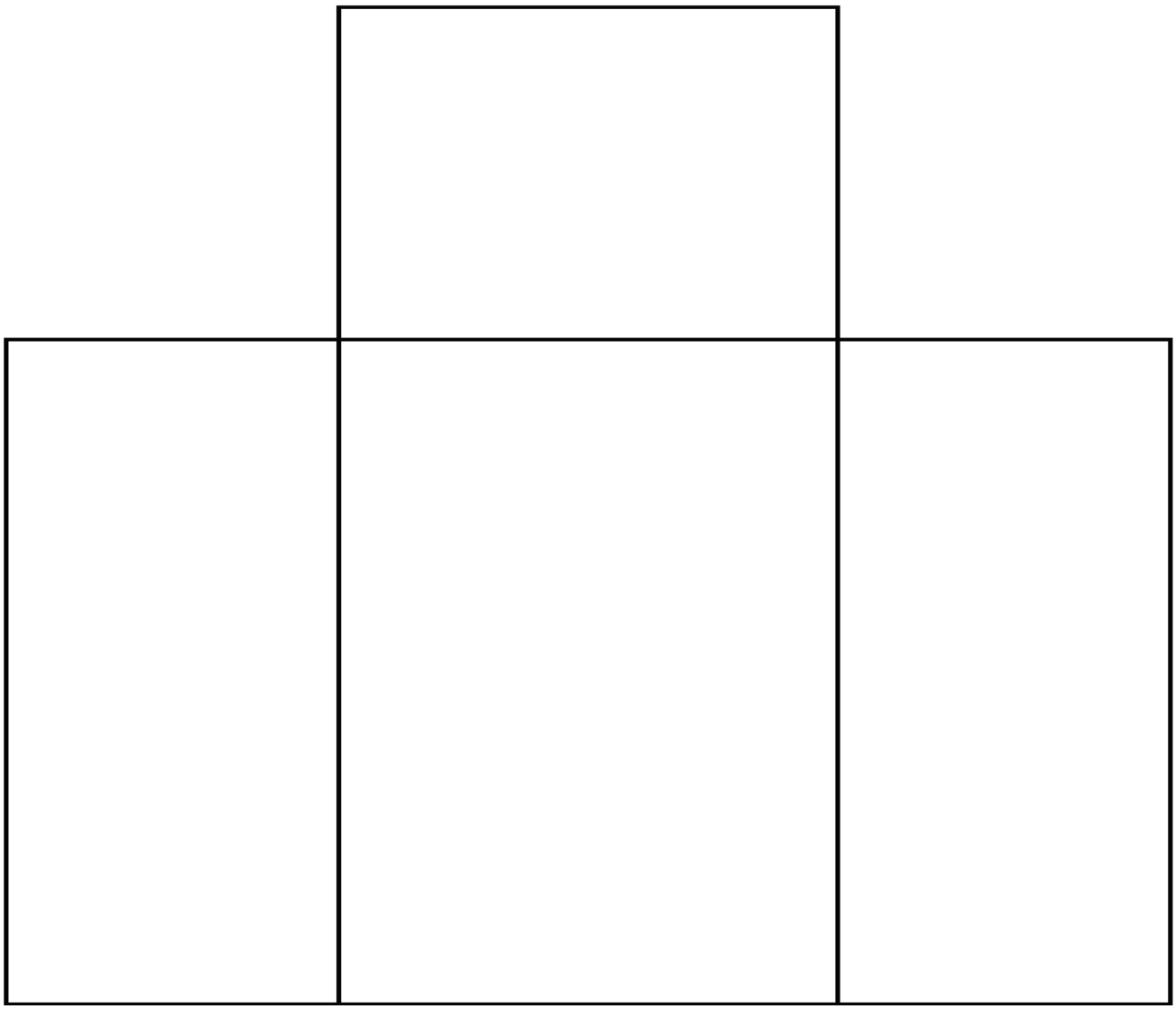




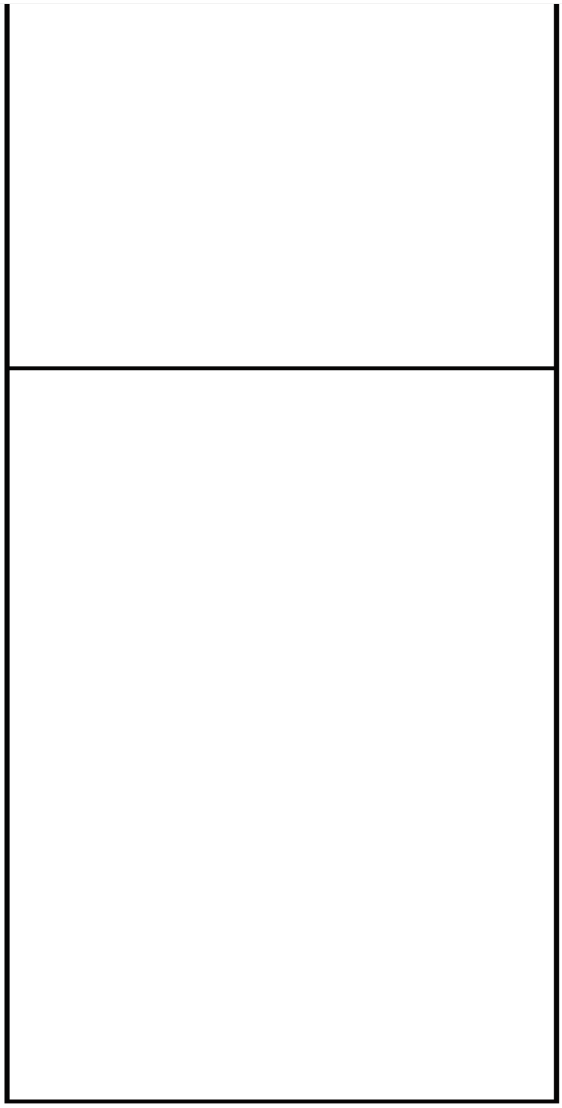




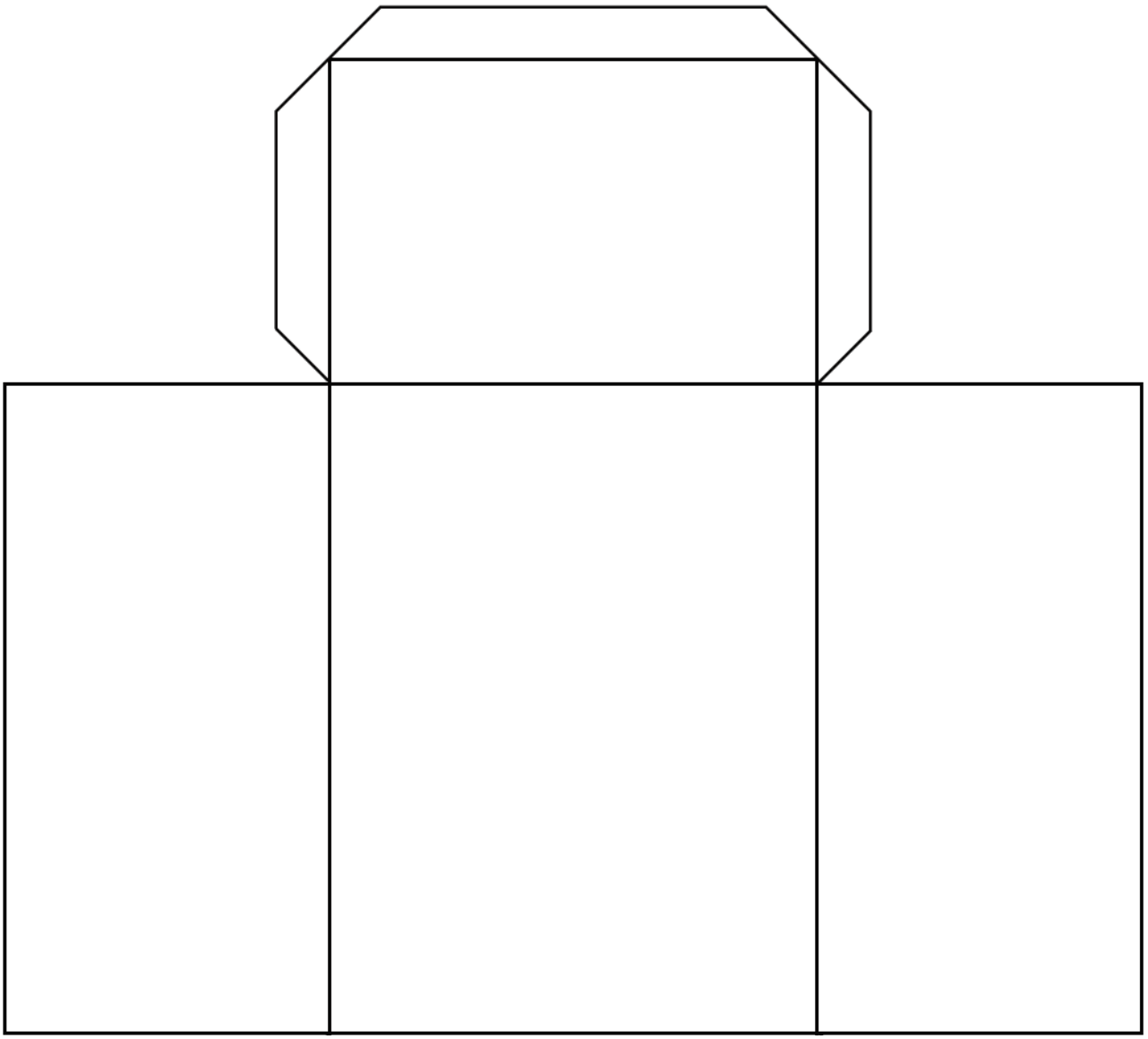
Part 1 of 2



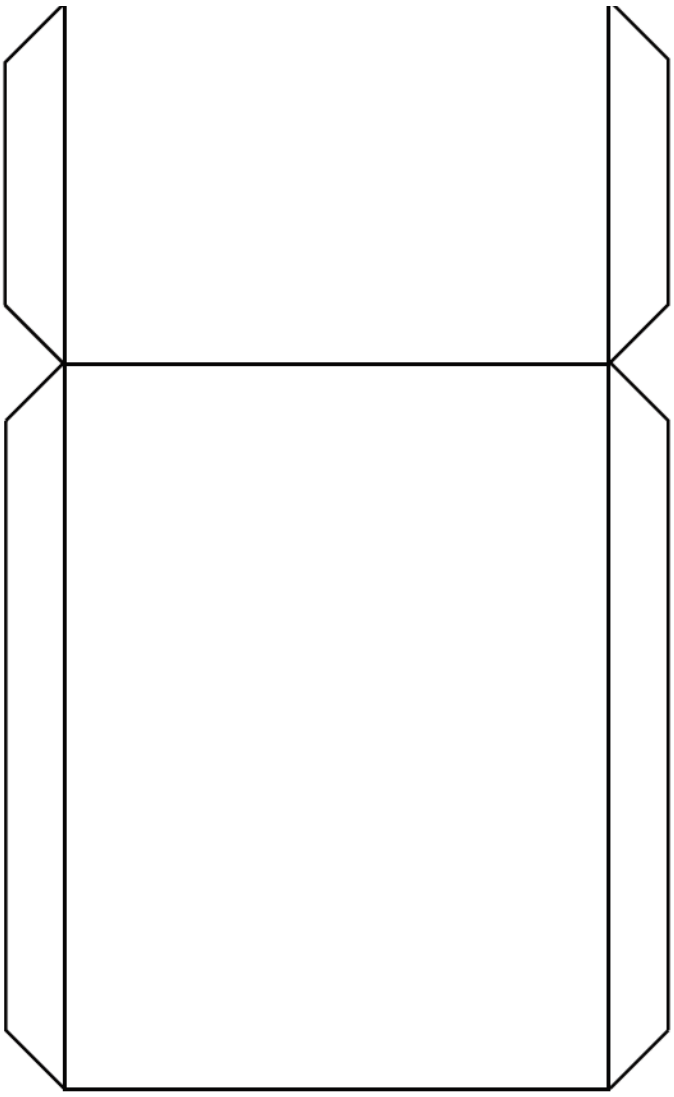
Part 2 of 2

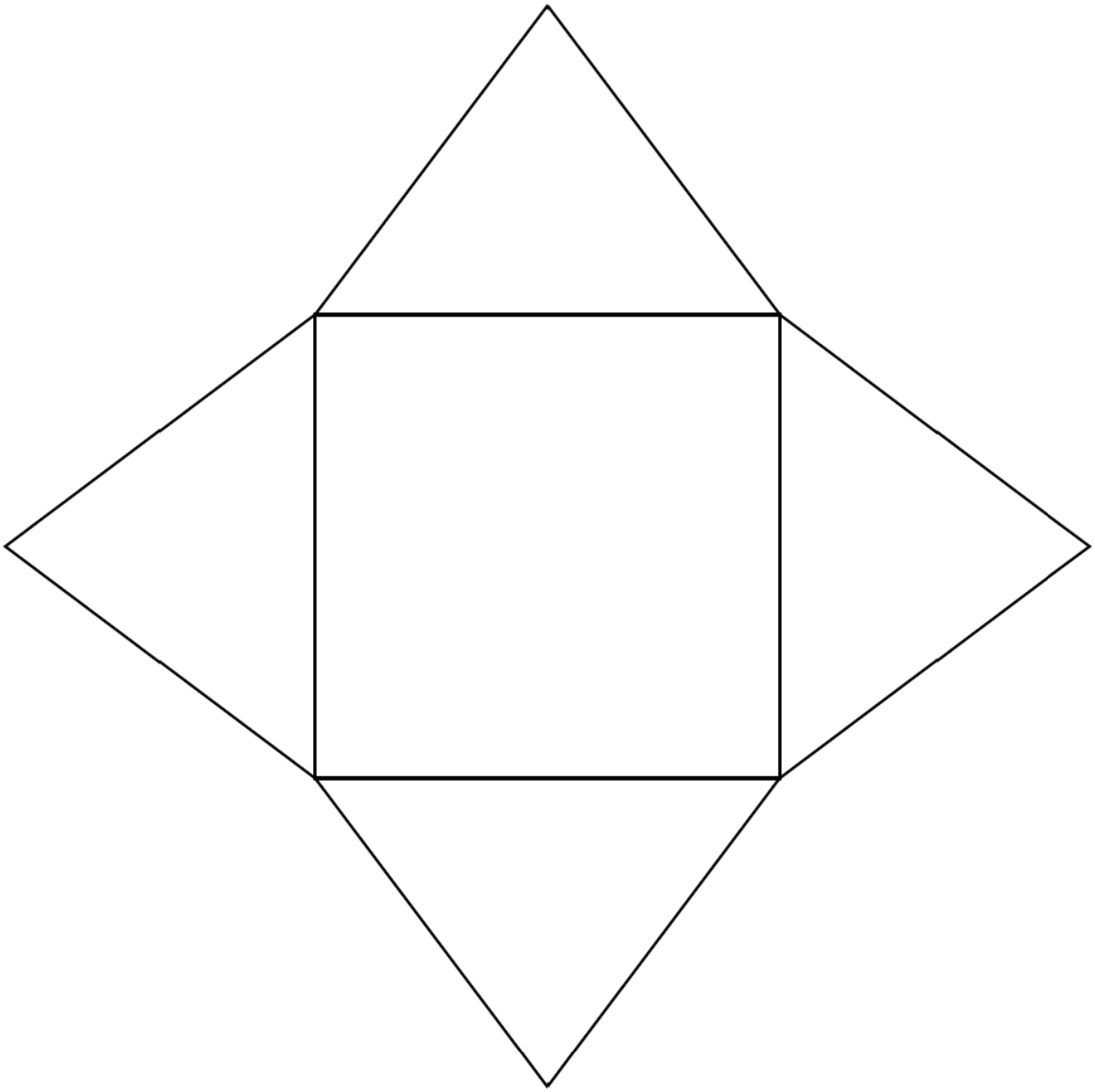


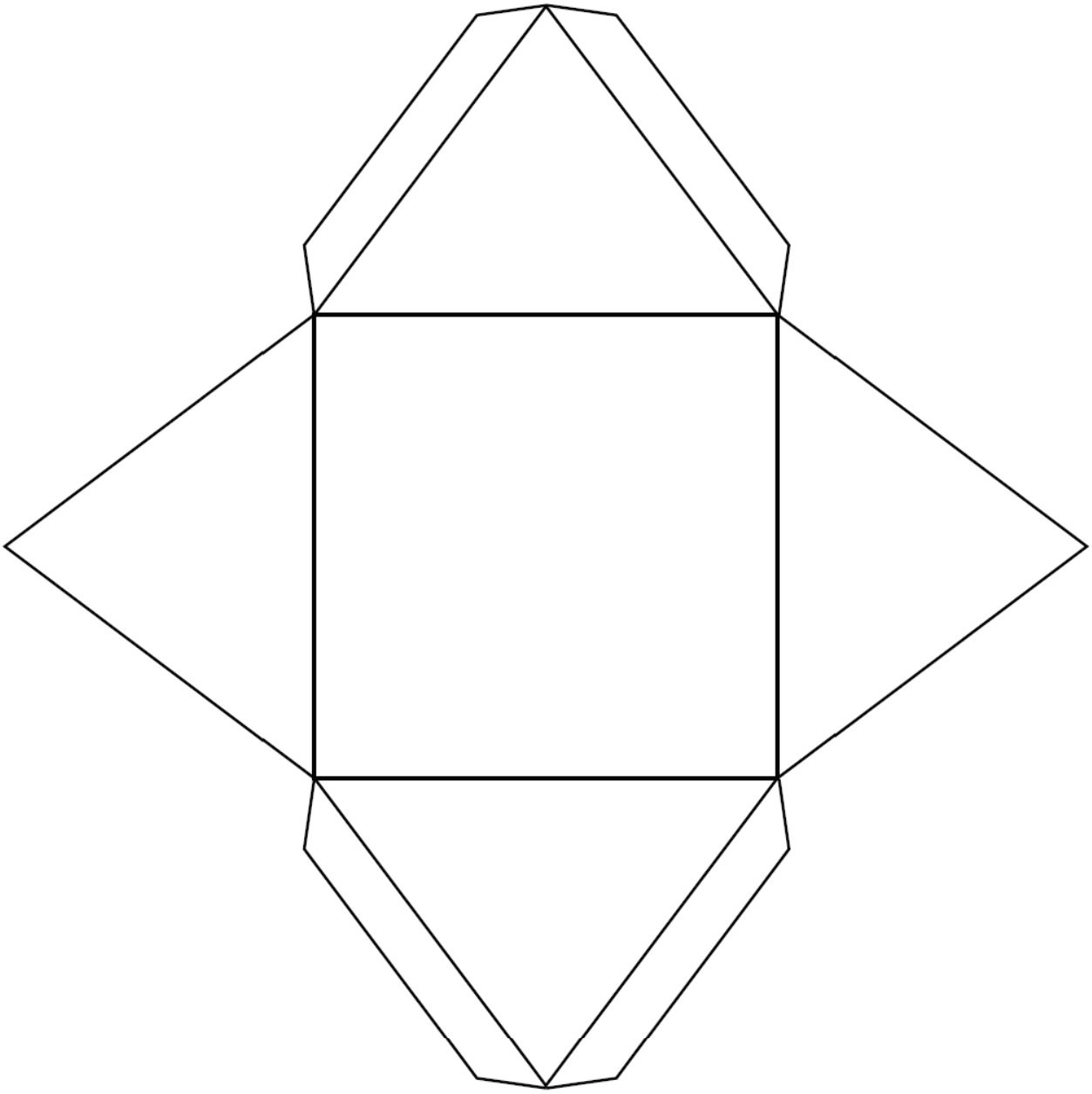
Part 1 of 2

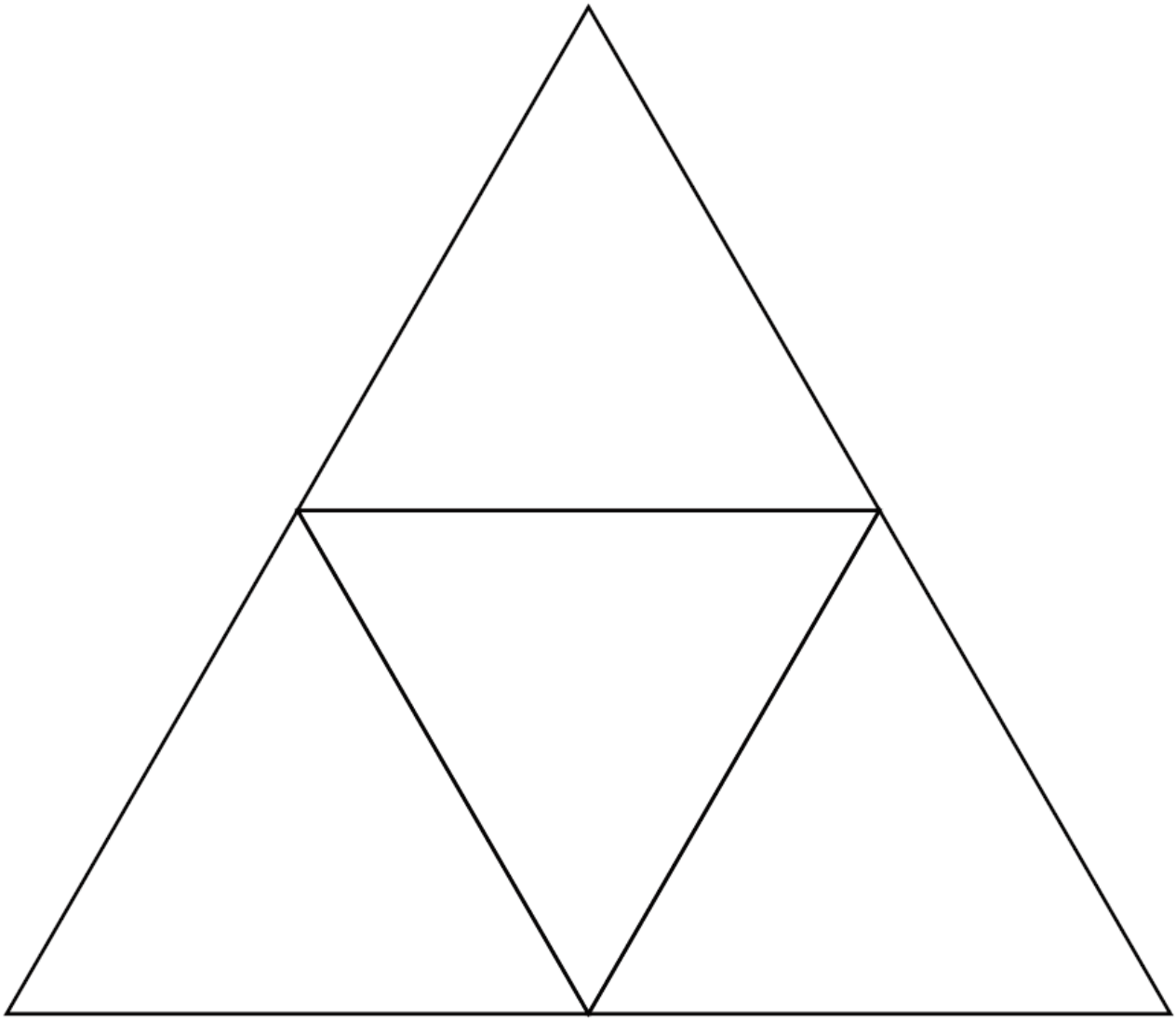


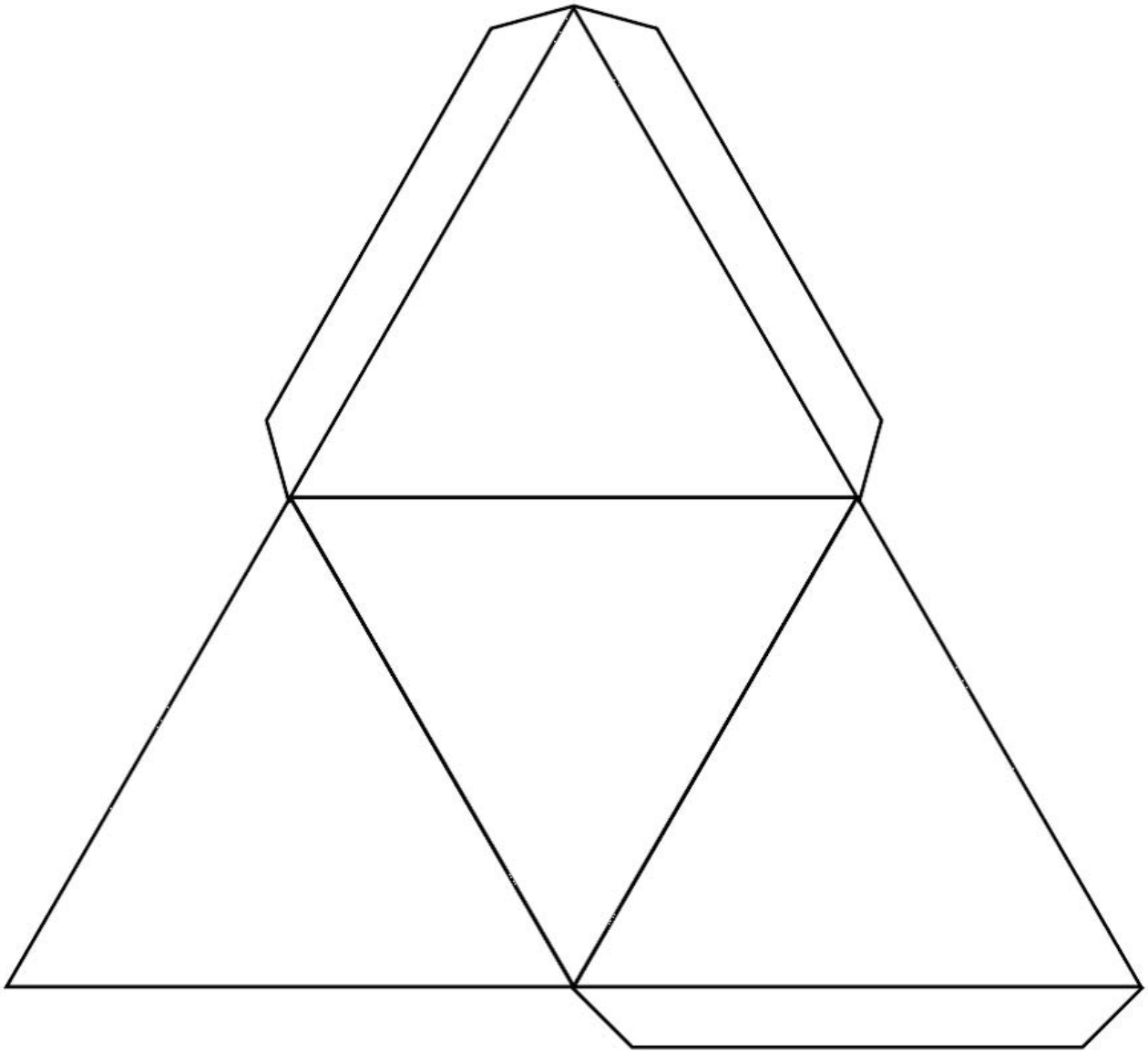
Part 2 of 2

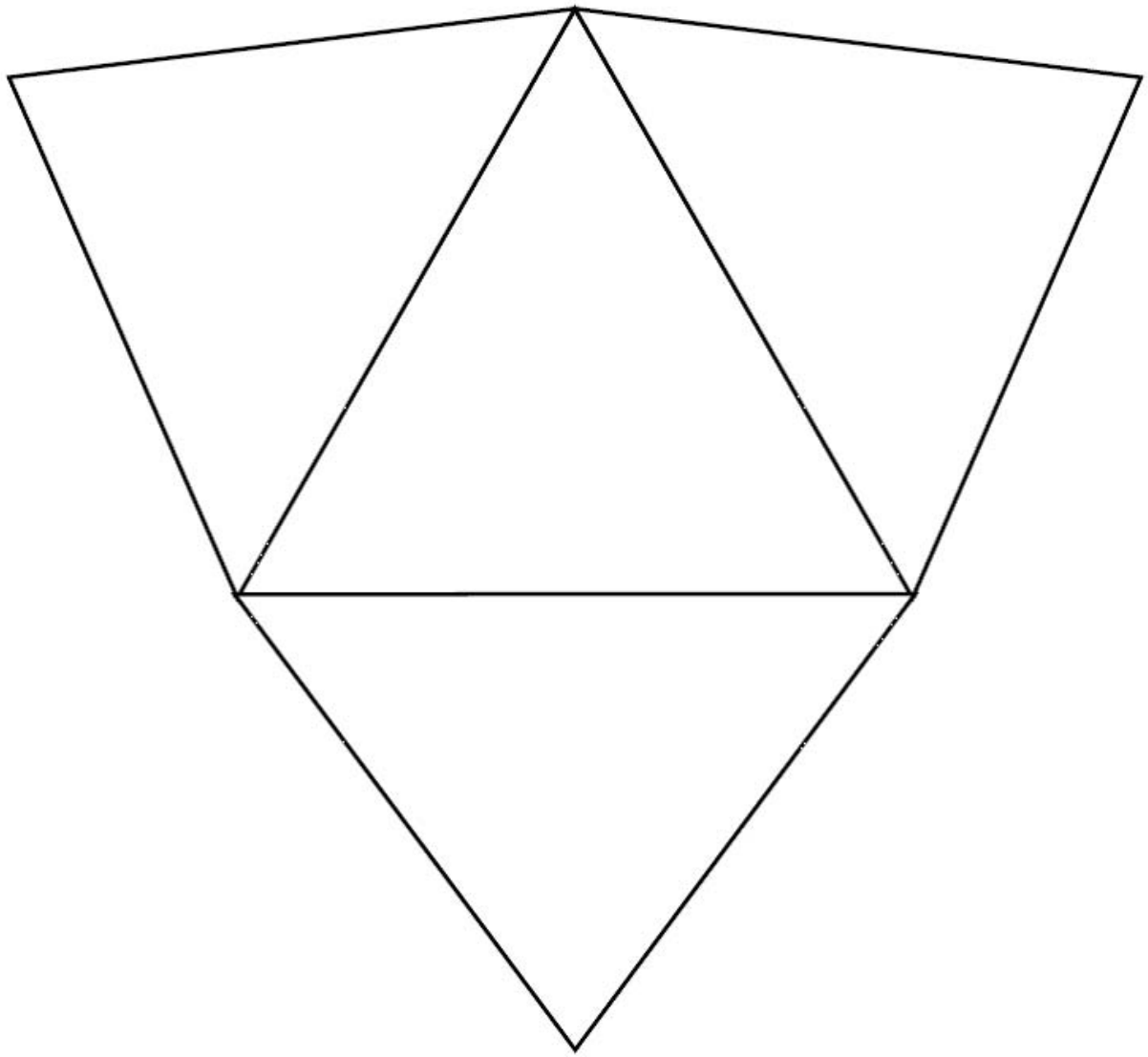


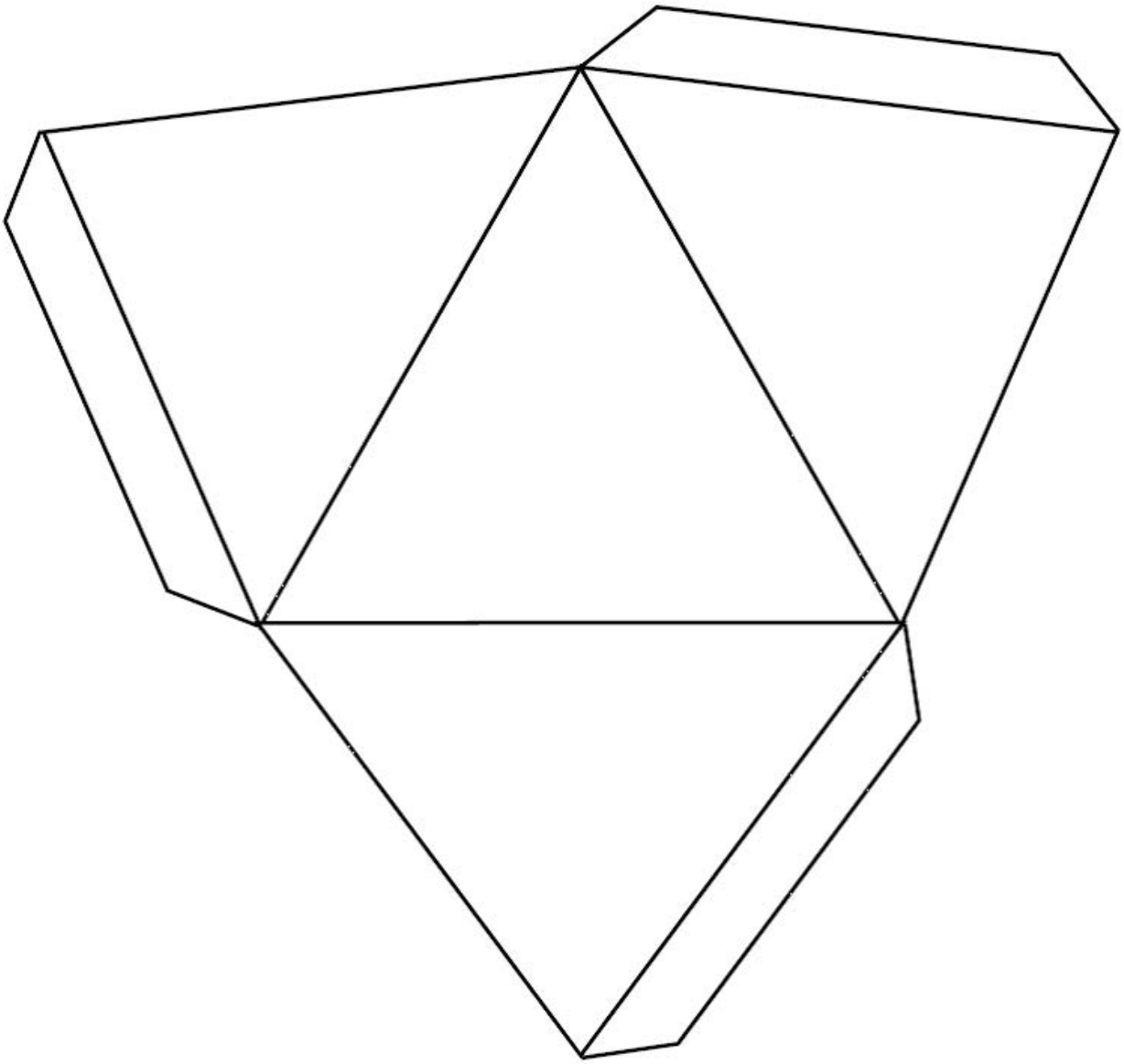


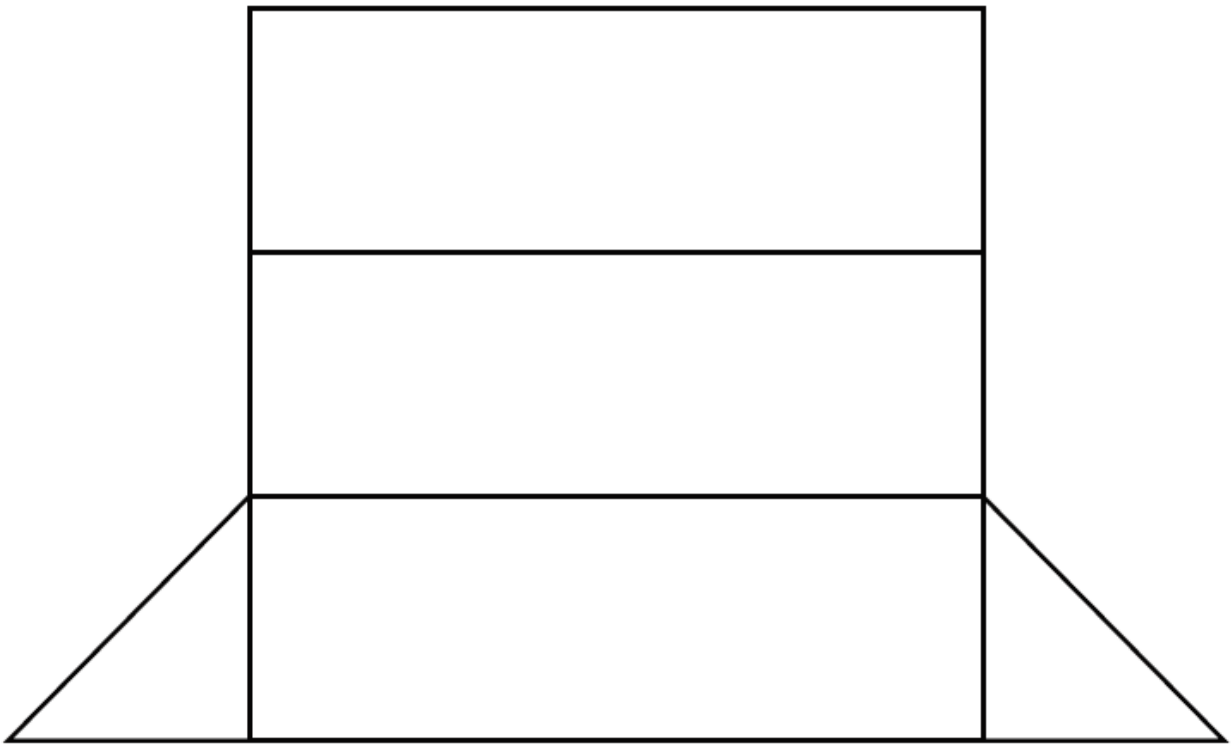


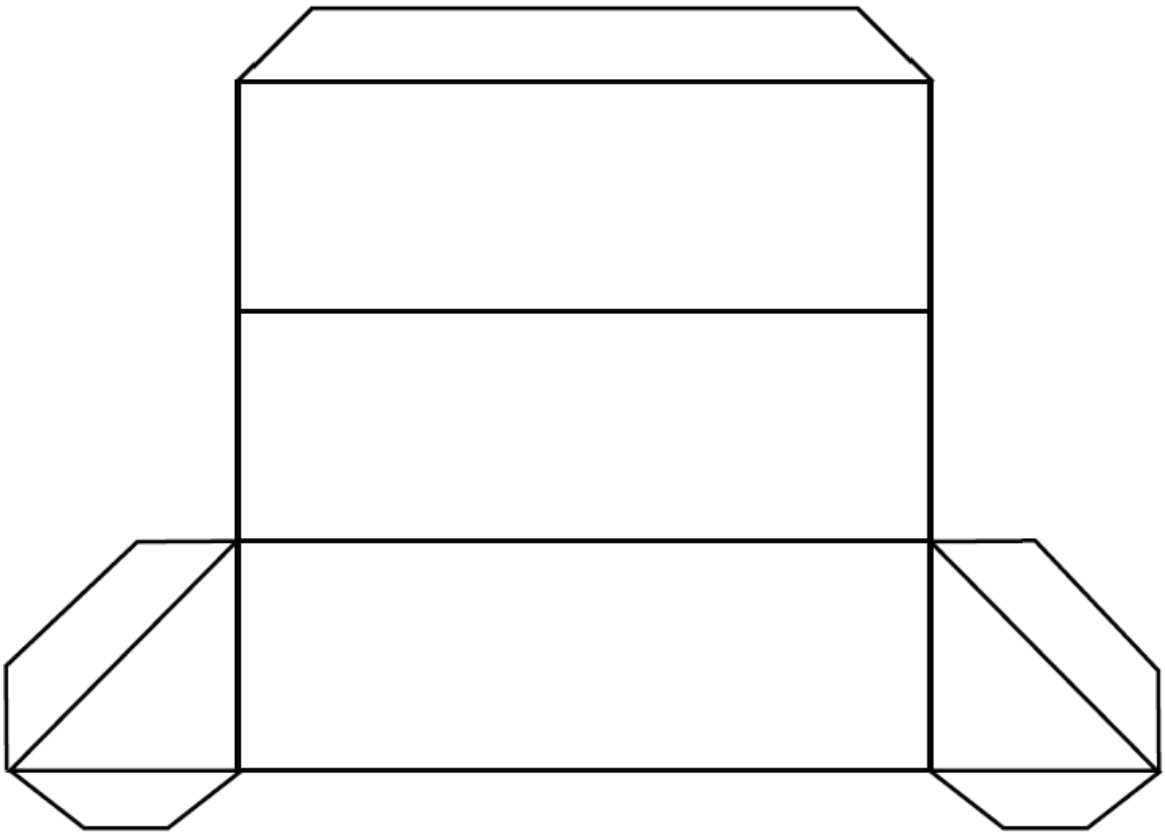


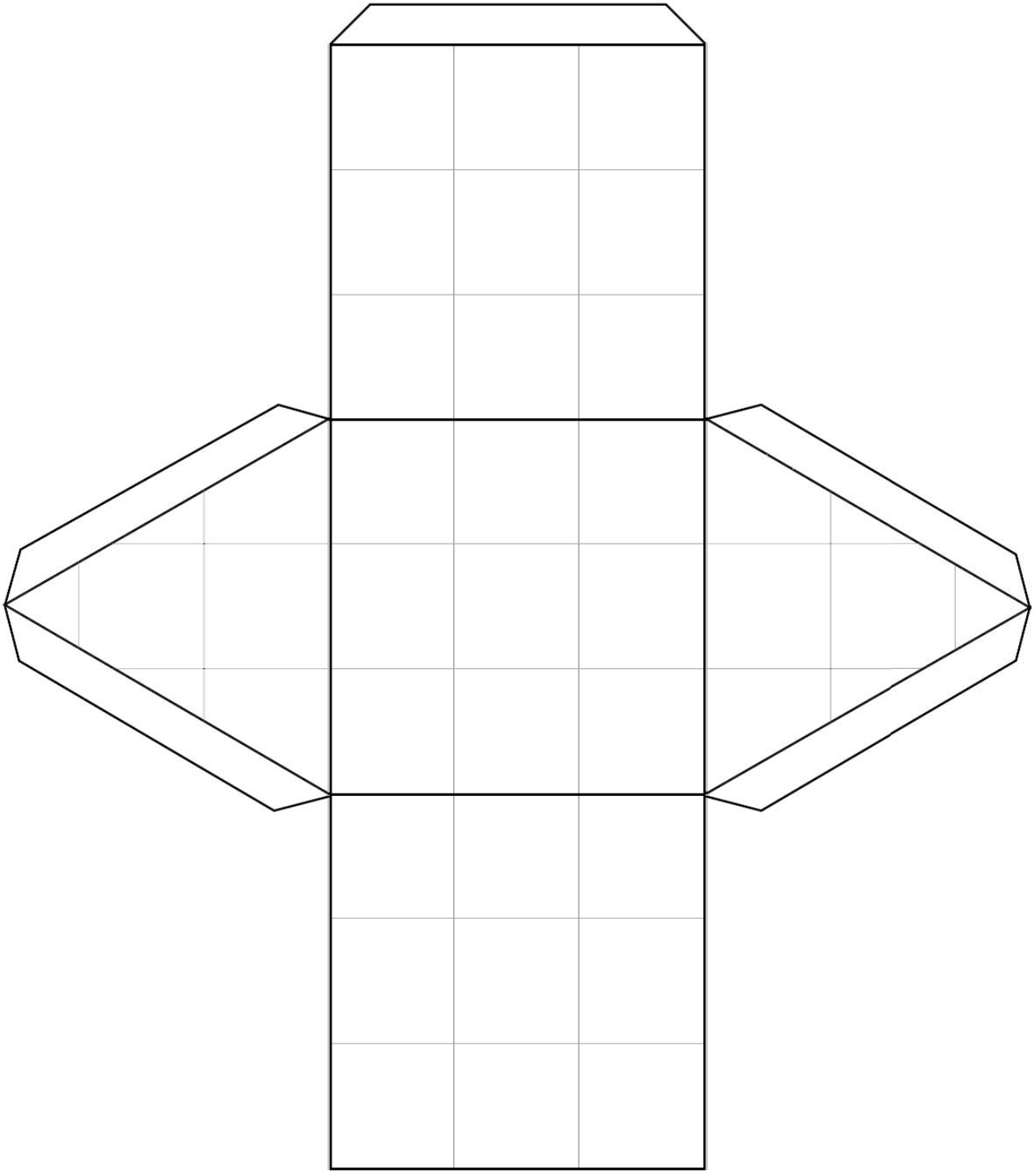




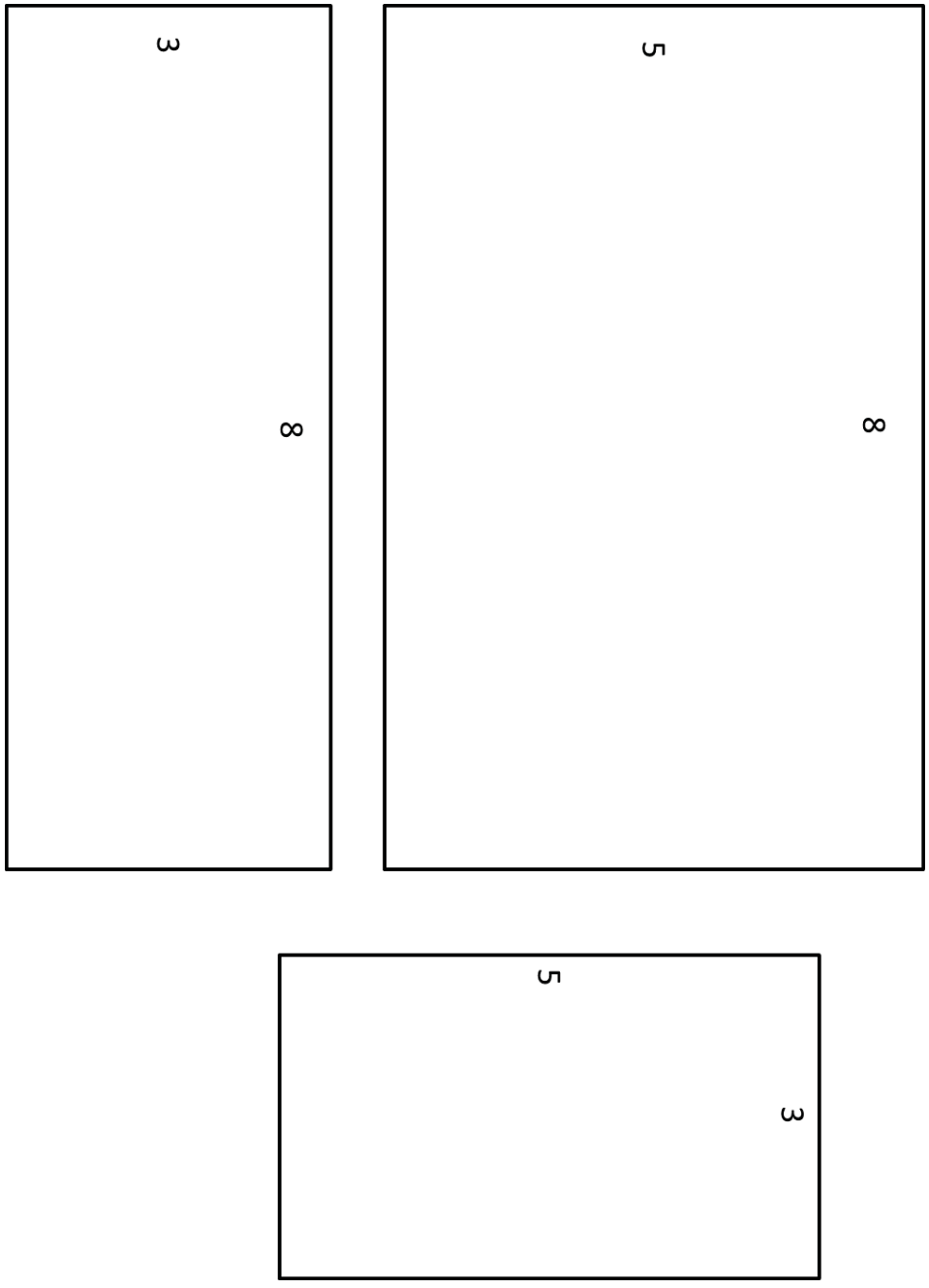




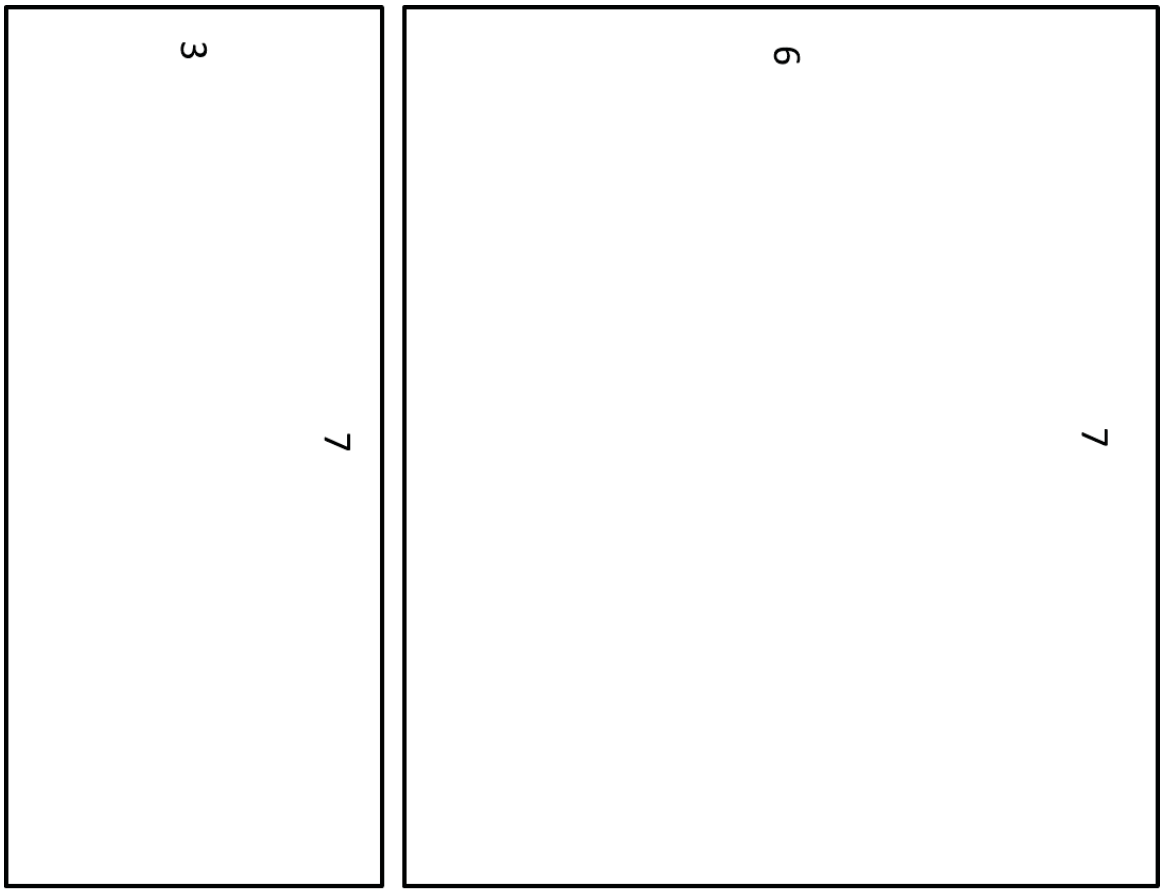


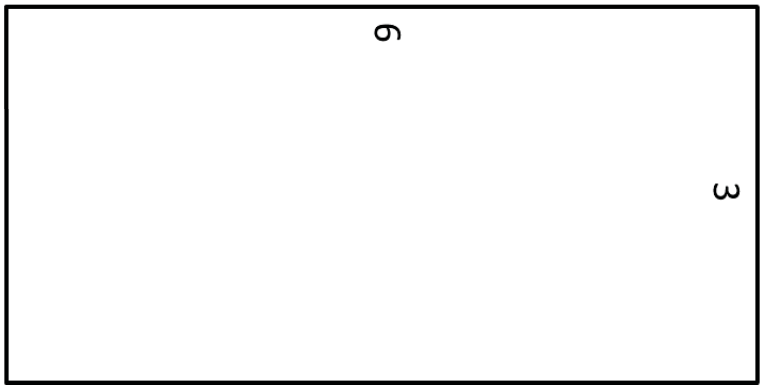


Rectangles for Opening Exercise

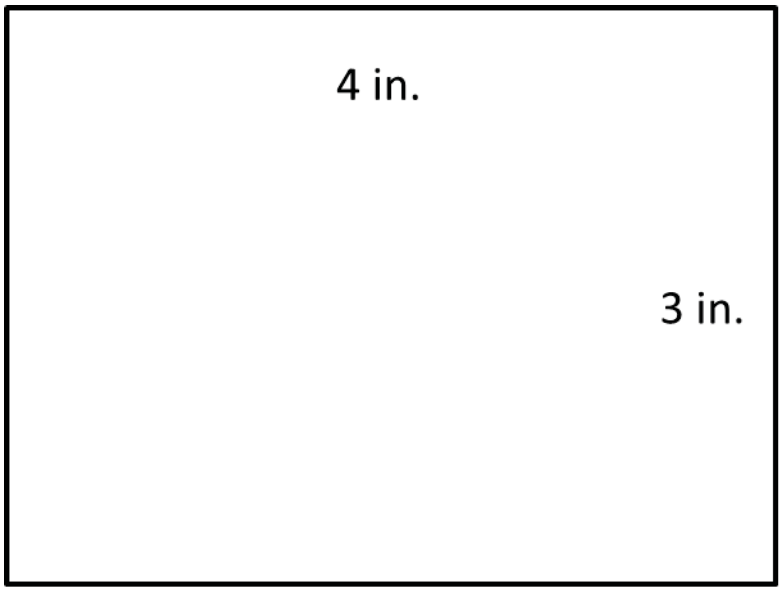


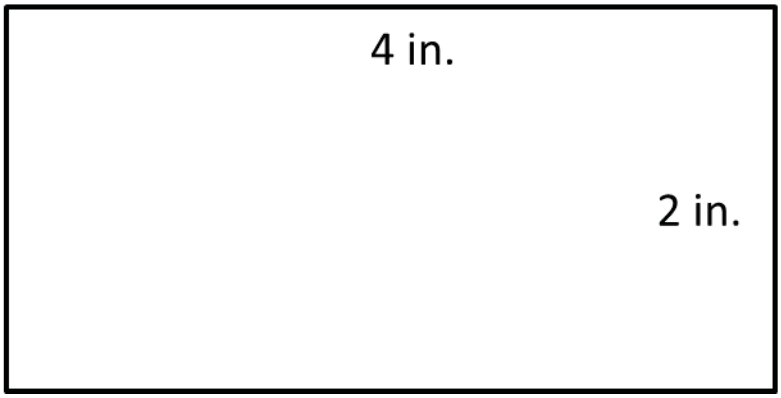
Rectangles for Exercise 1, part (a)

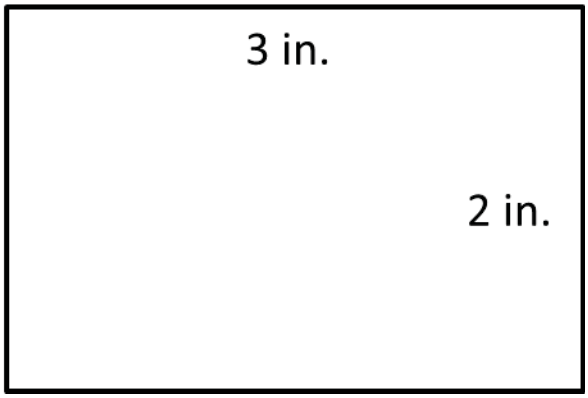




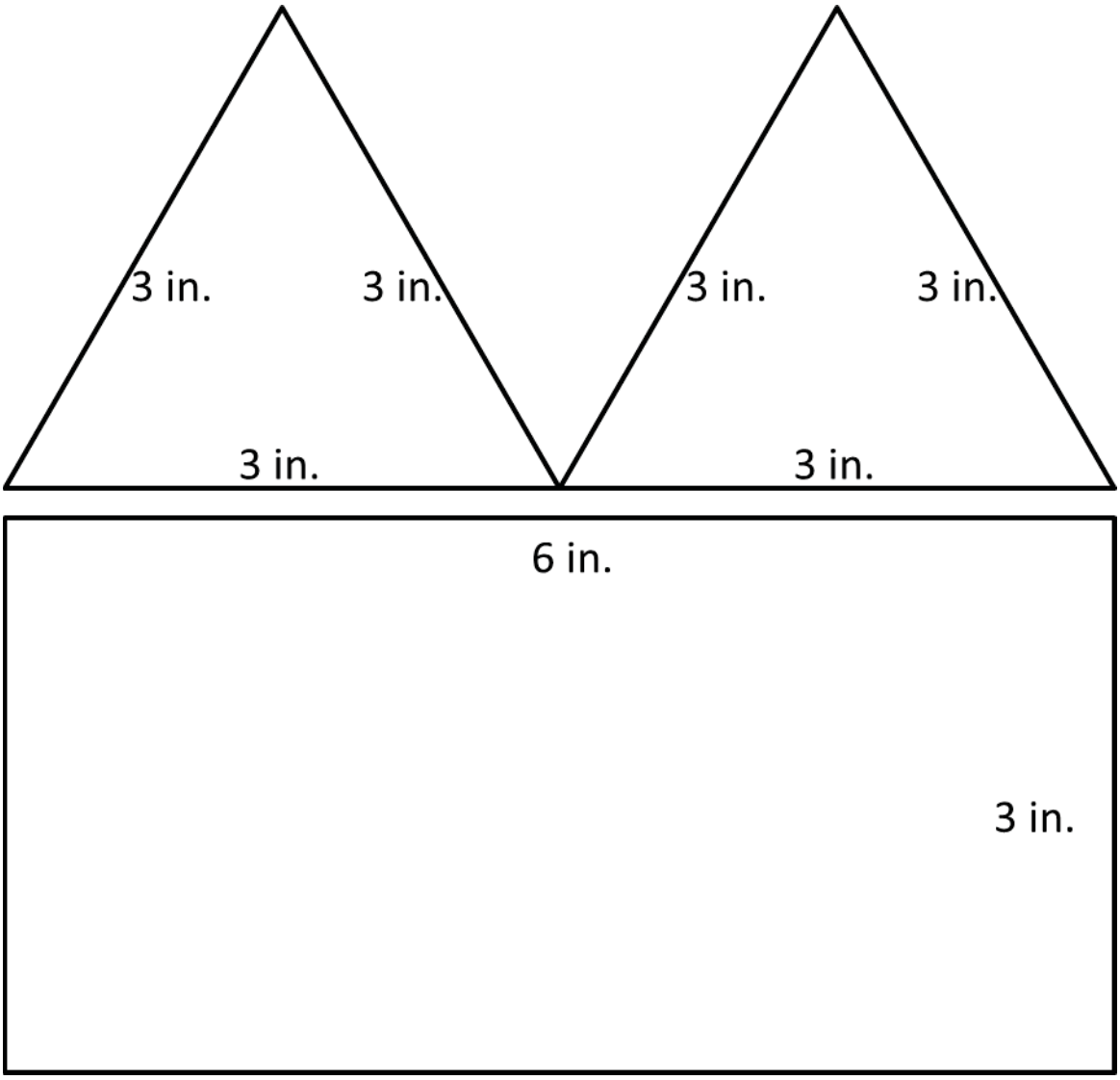
Rectangles for Exercise 1, part (b)



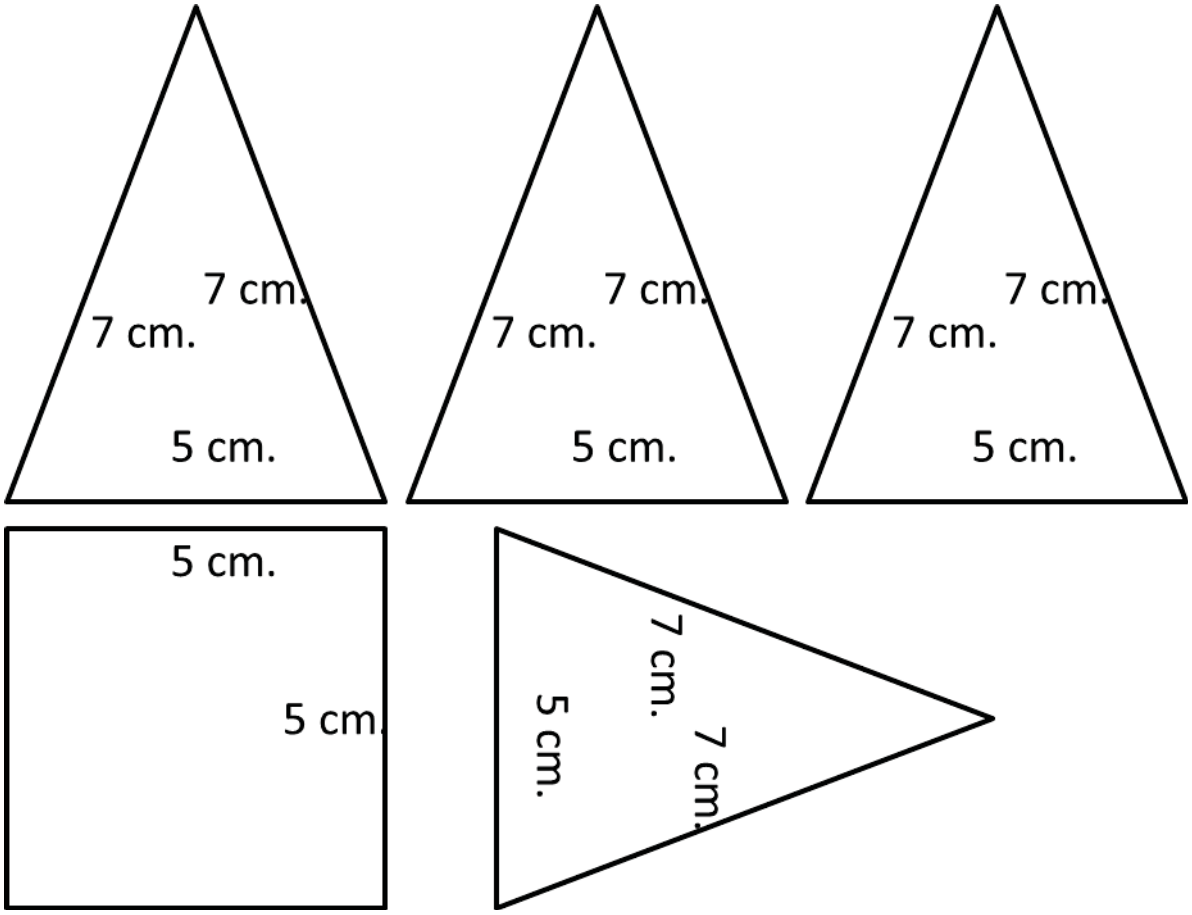




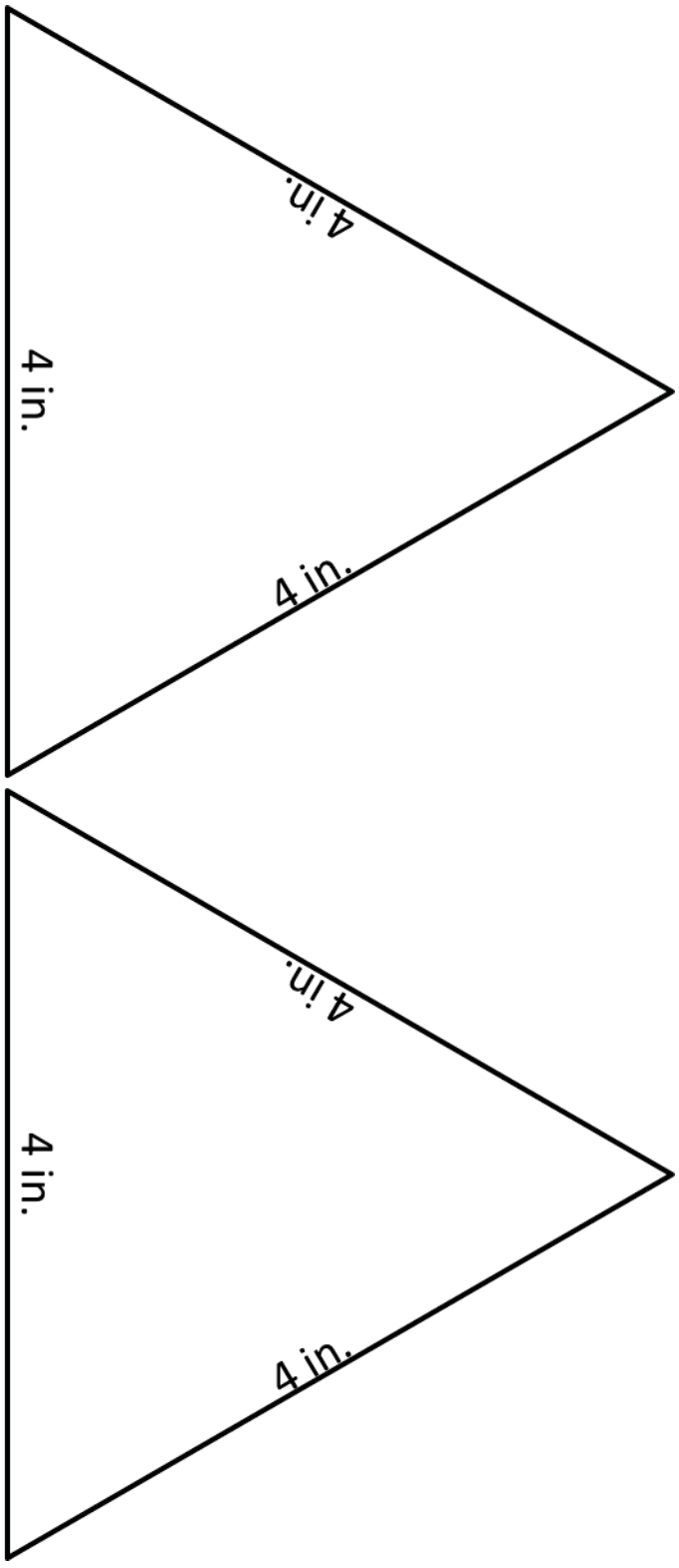
Polygons for Exercise 2

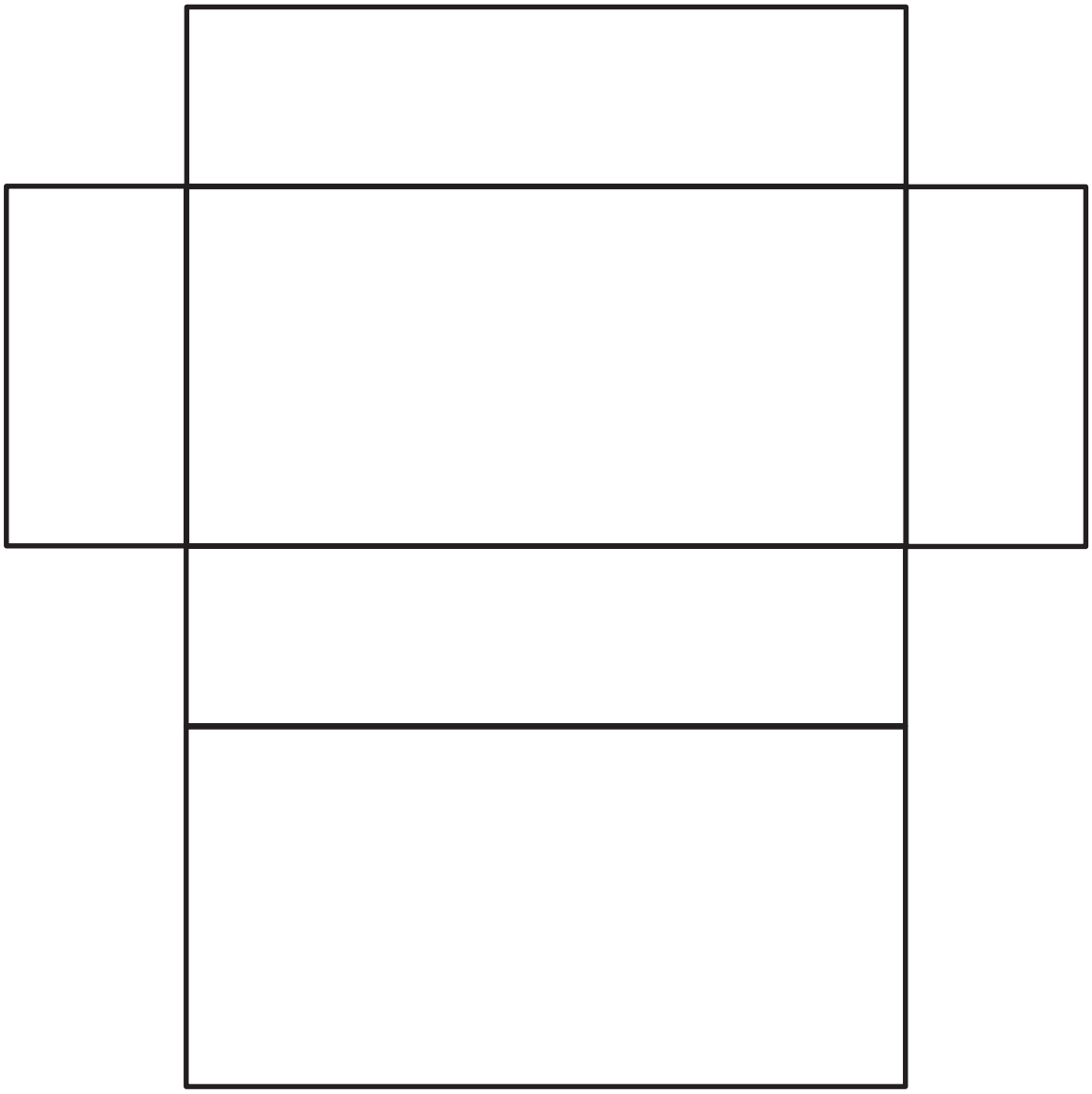


Polygons for Exercise 3, part (a)



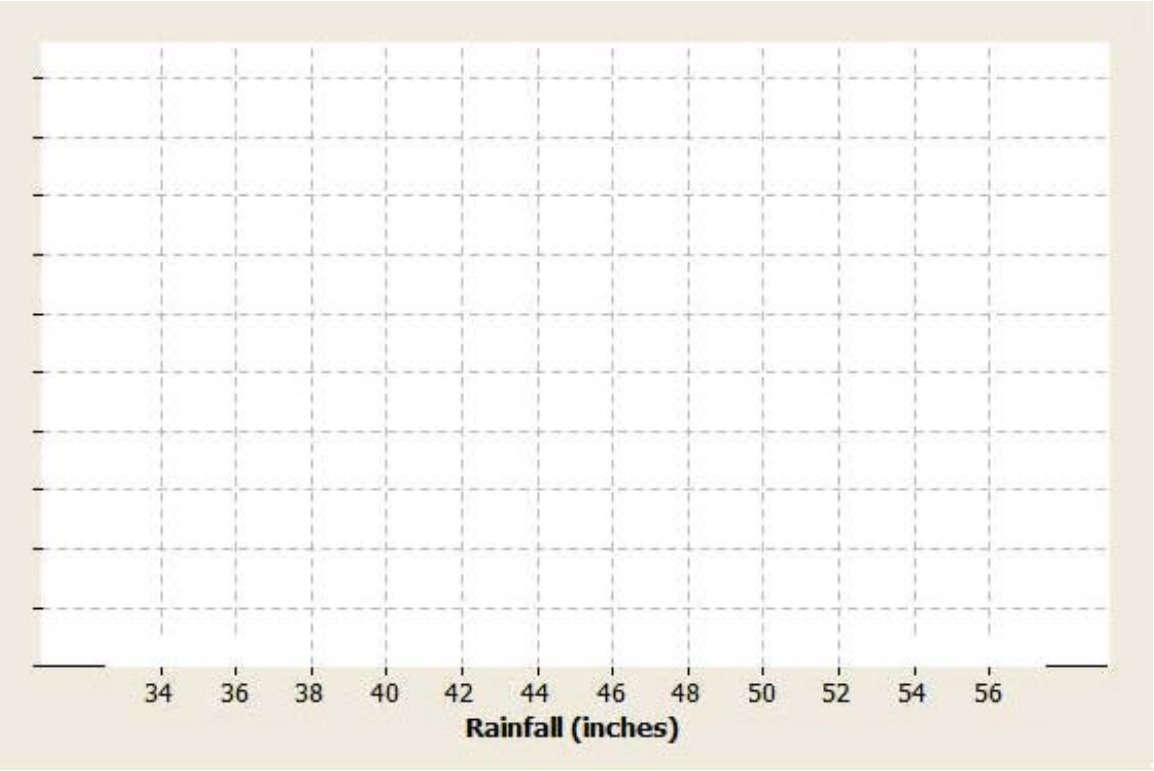
Triangles for Exercise 3, part (b)





Additional Resource Materials

The following could be used to provide structure in constructing a dot plot, histogram, or box plot of the rainfall data. A similar type of grid (or graph paper) could be prepared for students as they complete the Problem Set. The grid provided for students should not include the units along the horizontal axis since that is part of what they are expected to do in preparing their summaries.



The following table could be used for students requiring some structure in calculating the mean absolute deviation, or MAD.

Data Value	Deviation from the Mean	Result	Absolute Value (Absolute Deviations)
45			
42			
39			
44			
39			
35			
42			
49			
37			
42			
41			
42			
37			
50			
39			
41			
38			
46			
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48			
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49			
43			
44			
54			
40			

Template for Lesson 22: Summarizing a Poster

Step 1: What was the statistical question presented on this poster?

Step 2: How was the data collected?

Step 3: What graphs and calculations were used to summarize data?

Summarize at least one graph presented on the poster. (For example, was it a dot plot? What was represented on the scale?) Summarize any appropriate numerical summaries of the data (for example, the mean or the median). Also indicate why these summaries were selected.

Step 4: Summarize the answer to the statistical question.