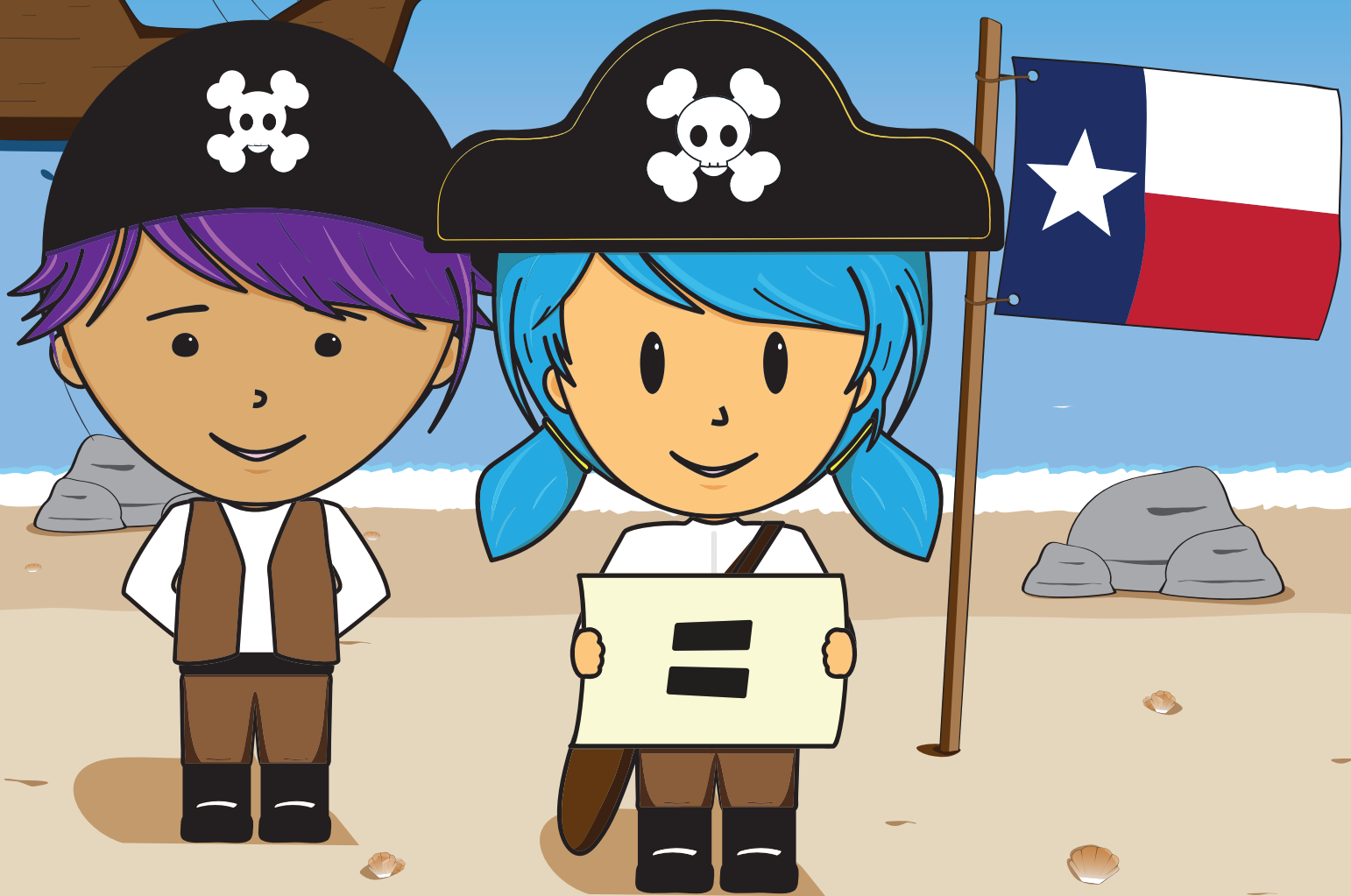


Pirate Math Equation Quest

Small-Group Tutoring

for Texas Word Problems in the Grade 3 State of
Texas Assessments of Academic Readiness (STAAR)

Student Materials



Sarah R. Powell, Ph.D., and Katherine A. Berry, Ed.D.
The University of Texas at Austin

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The Meadows Center
FOR PREVENTING EDUCATIONAL RISK

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**Small-Group Intervention
for Texas Word Problems
in the STAAR - Grade 3**

STUDENT MATERIALS

Sarah R. Powell & Katherine A. Berry

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For more information, please contact:

Sarah R. Powell, Ph.D.
srpowell@austin.utexas.edu

Katherine A. Berry, Ed.D.
kberry@austin.utexas.edu



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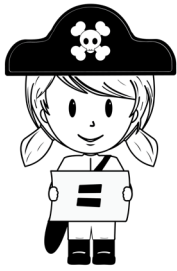
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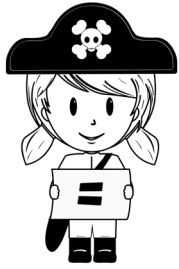
Introduction

Welcome to *Pirate Math Equation Quest*!

We designed this version of *Pirate Math Equation Quest* as a small-group intervention to help students at the third-grade instructional level to solve word problems presented on the Texas standardized test, called the State of Texas Assessments of Academic Readiness (STAAR). This version of the program was developed to offer support to any students who require supplemental mathematics remediation in the area of word-problem solving. The focus of the *Pirate Math Equation Quest* small-group intervention for Texas word problems in the STAAR - Grade 3 is single-digit and double-digit additive and multiplicative word problems that include four schemas: Total, Difference, Change, and Equal Groups.

This manual includes the Student Lesson Packets and accompanying Supplemental Materials (i.e., posters, maps, cards, graphs, and mats) necessary to implement *Pirate Math Equation Quest* with small groups of 3-4 students. A separate Teacher Manual includes the teacher materials, including the Teacher STAAR Guides and Teacher Activity Guides, needed to implement *Pirate Math Equation Quest*.

Scientific evaluations of *Pirate Math Equation Quest* indicated that at-risk third-grade students (with and without mathematics disabilities) who performed in the lowest 13th percentile of their classes demonstrated improved word-problem performance with *Pirate Math Equation Quest* compared to students who did not participate in *Pirate Math Equation Quest* (Powell, Berry, & Barnes, 2019).



In This Manual

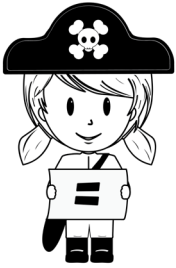
This Student Manual includes the following:

Introduction

- Basic information about implementing *Pirate Math Equation Quest*
- Explanation of Student Materials
- Explanation of Supplemental Materials
- Explanation of Other Materials

Student Lesson Packets 1-18

- Student Lesson Packets include all of the materials the students will need for each lesson. Each Lesson Packet includes 2 pages (1) front-side of STAAR Problems worksheet (page 1) and (2) back-side of STAAR Problems worksheet (page 2).




Student Materials


The Student Materials needed for each lesson are organized in a packet by lesson. For example, the Student Lesson Packet for Lesson 6 is labeled Lesson 6 STAAR Student Lesson Packet.

Student Lesson Packets include the following 2 pages:
(1) STAAR problems (pages 1-2)

Pictured below is the front side of the STAAR Problems worksheet, page 1, in the Lesson 6 STAAR Student Lesson Packet.

STAAR PROBLEMS: LESSON 6 

A. A pair of three-dimensional figures is shown below.



What is the difference between the number of edges on these two figures?

B. Rob had 345 concert tickets to sell. He sold 127 of these tickets on Monday. How many tickets does Rob have left to sell?

Page 2, the back side of the STAAR Problems worksheet in the Lesson 6 STAAR Student Lesson Packet, is displayed below.

C. Mr. Garcia grew a vegetable garden last year. The list below shows the number of three vegetables he grew.

- 718 onions
- 344 potatoes
- 187 cucumbers

What is the difference between the number of potatoes and the number of cucumbers Mr. Garcia grew in his garden?

The STAAR problems follow an “I do, we do, you do” sequence. The teacher models Problem A as students follow along. The teacher and students complete Problem B together as a guided practice activity. Students complete Problem C independently as the teacher monitors and provides feedback.

All Student Lesson Packets include 2 pages, so the packets can be printed for students in a set prior to the lesson. Teachers should print the Student Lesson Packets double-sided. The Student Lesson Packets for all 18 lessons are included in this manual.

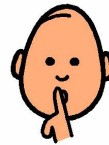


Supplemental Materials

Pirate Math Equation Quest includes six posters for teachers to display throughout the lessons. Templates for the posters are included in this manual. In the beginning lessons, teachers should display the Pirate Math Rules and Counting Up Addition and Subtraction posters pictured on this page and the following page.

Pirate Math Rules

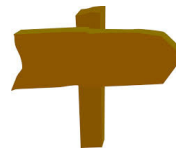
1. Use inside voice.



2. Stay seated.



3. Follow directions.



4. Try your best.



COUNTING UP Addition

1. Put the greater number in your fist and say it.
2. Count up the number that's less on your fingers.
3. The sum is the last number you say.

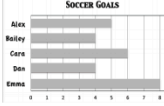
COUNTING UP Subtraction

1. Put the minus number in your fist and say it.
2. Count up your fingers to the number you start with.
3. The difference is the number of fingers you have up.

As teachers introduce the four schemas, Total, Difference, Change, and Equal Groups, they need to display the RUN poster, pictured below, and the corresponding schema posters for students to reference. The RUN poster provides an attack strategy for students to use as they solve word problems.

RUN

If needed, number the graph



Player	Goals
Alex	4
Kelly	5
Carl	6
Dan	7
Emma	8

1. Read the problem
2. Underline the label and **cross-out irrelevant info**
3. Name the problem type


Total
Difference
Change
Equal Groups

The schema posters, pictured below and on the following page, provide specific steps for setting up and solving a word problem after identifying the correct schema. Total problems are introduced during Lesson 1, Difference problems are introduced during Lesson 4, Change problems are introduced during Lesson 7, and Equal Groups problems are introduced during Lesson 11.

TOTAL

- 1. Write $P1 + P2 = T$**
- 2. Find T**
- 3. Find P1 and P2**
- 4. Write the signs**
- 5. Find X**

$P1 + P2 = T$



DIFFERENCE

1. Write $G - L = D$
 2. [Compare sentence] and label G and L
 3. Find D
 4. Find G and L
 5. Write the signs
 6. Find X
- $G - L = D$



CHANGE

1. Write $ST +/- C = E$
 2. Find ST
 3. Find C
 4. Find E
 5. Write the signs
 6. Find X
- $ST +/- C = E$



EQUAL GROUPS

1. Write $GR \times N = P$
2. Find P
3. Find GR and N
4. Write the signs
5. Find X

$GR \times N = P$



After teachers have introduced the Total, Difference, Change, and Equal Groups problems, they should display the What Do You Ask Yourself? poster, featured below. The What Do You Ask Yourself? poster, introduced during Lesson 10, provides a prompt for students to ask questions and gesture to determine the correct schema. We encourage teachers to use gestures to help students recall the four schemas. The Total gesture is introduced in Lesson 1. The Difference gesture is introduced in Lesson 4. The Change gesture is introduced in Lesson 7. The Equal Groups gesture is introduced in Lesson 11. Teachers can refer to the STAAR Guides to learn the specific schema gestures to model for students. Students often struggle to identify the correct problem type after all four schemas have been introduced. This poster helps students to distinguish between the Total, Difference, Change, and Equal Groups schemas.

??? **What Do You Ask Yourself?** **???**

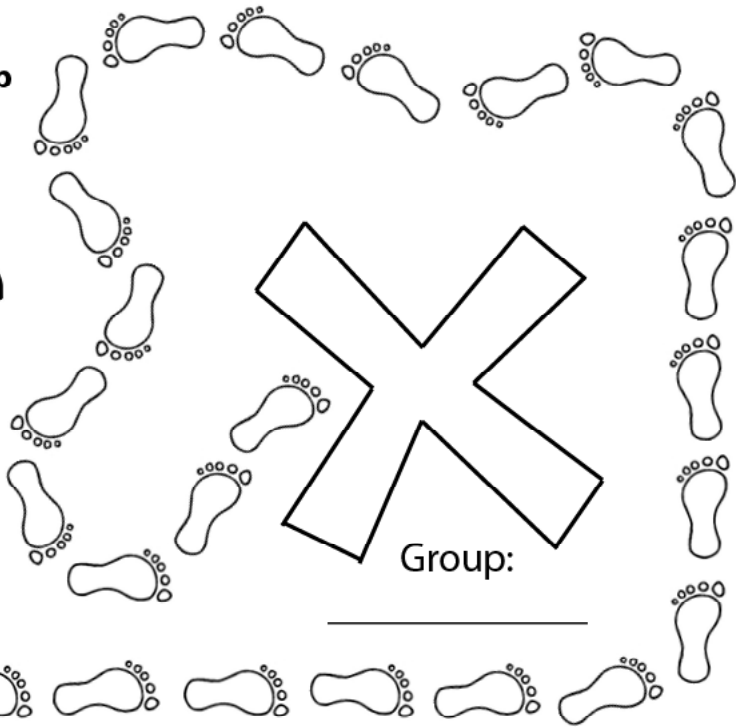
T <small>otal</small>	Are parts put together into a total?
D <small>ifference</small>	Are two amounts compared for a difference?
C <small>hange</small>	Is there a start amount that increases or decreases to a new amount?
E <small>qual</small> G <small>roups</small>	Are there groups with an equal number in each group?

During every lesson, teachers also display the Treasure Map. Throughout each lesson, students can earn coins for their Treasure Map for following the Pirate Math rules. When students reach the end of their Treasure Map, they earn a novelty prize from a treasure box.

If teachers do not have coins, they can use stamps, stickers, or colored pencils to color the designated number of spaces on the Treasure Map. Similarly, teachers can use any prize bag or box if they do not have a treasure box.

On the following pages are four different variations of the Treasure Map. Teachers can choose one map or alternate maps depending on students' preferences. All four Treasure Map templates are included in this manual.

**Pirate Math
Treasure Map**



**Pirate Math
Treasure Map**

Group:

Group: _____

**Pirate Math
Treasure Map**

**Pirate Math
Treasure Map**

Group: _____

For the Math Fact Flashcards Activity, teachers need to cut and print the Math Fact Flashcards and print the Math Fact Flashcards graph. Templates for the Math Fact Flashcards and the Math Fact Flashcards graph are included in this manual.

There are two sets of Math Fact Flashcards for the small group intervention for Texas word problems in the STAAR - Grade 3. The first set includes an addition or subtraction problem on the front side of the card and the correct answer on the back side of the card. The second set includes a multiplication or division problem on the front side of the card and the correct answer on the back side of the card. It is recommended that teachers print these cards double-sided on cardstock. There are four problems per page; teachers should cut each page into fourths using a paper cutter.

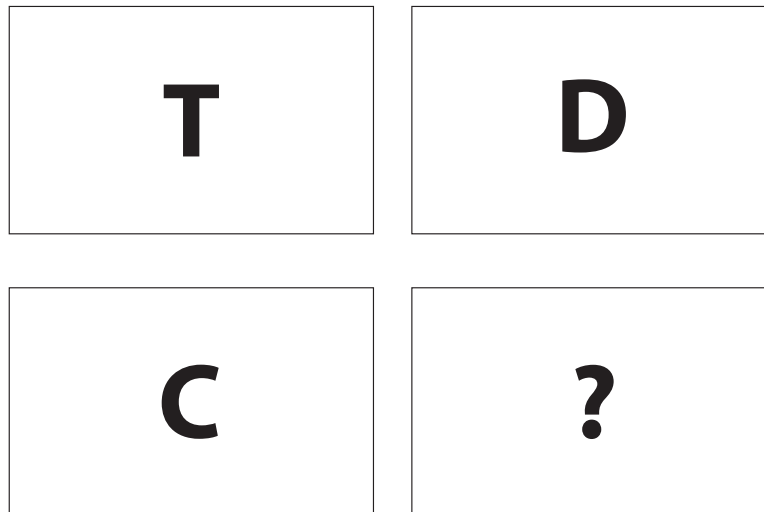
$\begin{array}{r} 0 \\ + 0 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ + 1 \\ \hline \end{array}$
$\begin{array}{r} 0 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ + 3 \\ \hline \end{array}$

$\begin{array}{r} 2 \\ \times 2 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ \times 3 \\ \hline \end{array}$
$\begin{array}{r} 2 \\ \times 4 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ \times 5 \\ \hline \end{array}$

Teachers also need to print the Math Fact Flashcard Graph, pictured below, in advance of the lesson. At the end of the Math Fact Flashcards activity, students graph their higher score from the two trials on the graph below. Teachers should plan to copy extra graphs for easy access after students complete the first graph.

During Shipshape Sorting, which begins in Lesson 2, students participate in schema sorting practice using sorting cards and the sorting mat, displayed below. Templates for the Shipshape Sorting Mat and accompanying cards are included in this manual.

Shipshape Sorting



The Shipshape Sorting cards include a word problem on the front side of the card and the correct schema (i.e., T for Total, D for Difference, and C for Change) on the back side of the card. It is recommended that teachers print the Shipshape Sorting cards double-sided on cardstock. There are four word problems per page; teachers should cut each page into fourths using a paper cutter. There are no sorting cards for Equal Groups problems. If desired, teachers can create their own Equal Groups sorting cards and a new sorting mat that includes an EG box.

Jerry saw 3 sharks at the aquarium. He saw 2 turtles. How many sharks and turtles did Jerry see?	Dante's mom planted 8 trees and rose bushes in the yard. She planted 4 rose bushes. How many trees did she plant?
Ann and Elise sold 7 boxes of Girl Scout cookies. Elise sold 3 boxes. How many boxes of cookies did Ann sell?	Mrs. Towns spent \$4 at the grocery store and \$5 at the pet store. How much money did she spend in all?



Other Materials

Other Materials

The following materials are used throughout the program but are not included in this manual.

- Timer
- Gold coins
- Treasure box
- Dry erase board
- Dry erase markers
- Dry erasers
- Blue painter's tape

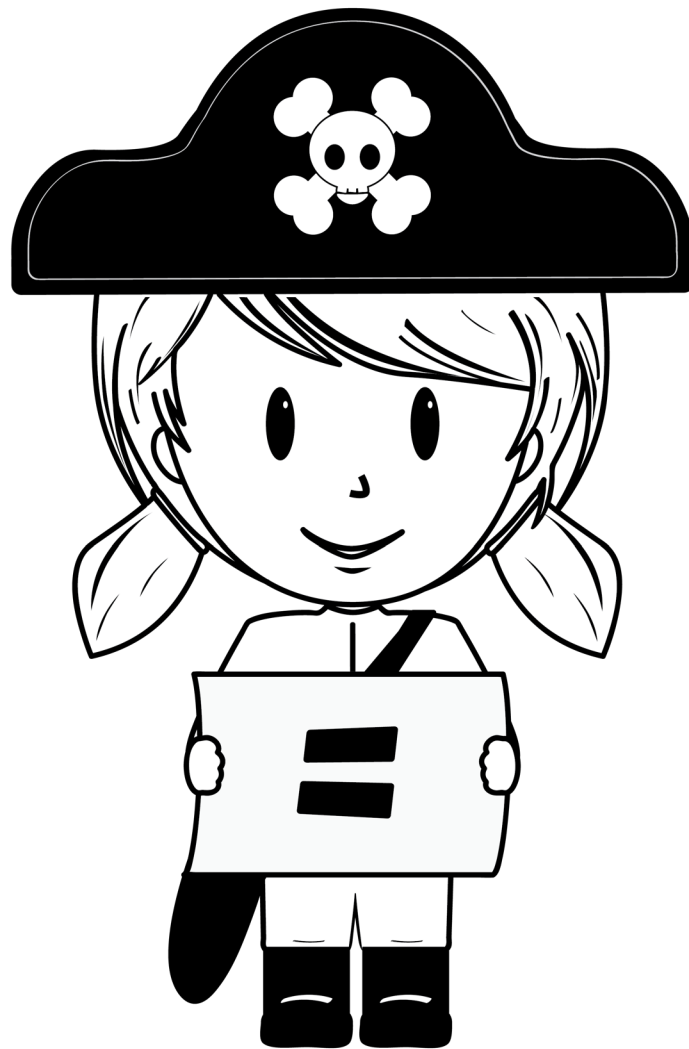
The timer is used during the timed activities: Math Fact Flashcards and Shipshape Sorting. The timer can be purchased from a teacher supply store or a mathematics manipulatives company.

The gold coins and treasure box are used throughout each lesson to reward students for following the Pirate Math rules. As previously mentioned, stamps, stickers, or colored pencils can substitute for gold coins. Teachers can use any prize bag or box if they do not have a treasure box.

The dry erase board, dry erase markers, dry erasers, and blue painter's tape are used during lessons that include Equal Groups problems (i.e., Lessons 10-18) to help students understand the concept of Equal Groups. Students use these materials to illustrate groups with an equal number in each group. Teachers can purchase these materials from a teacher or office supply store.

For all lessons, teachers and students also need pencils.

Student Lesson Packets



STAAR PROBLEMS: LESSON 1



A. The table shows the number of puzzle pieces in four puzzles. Derek put together the two puzzles that had the greatest number of pieces.

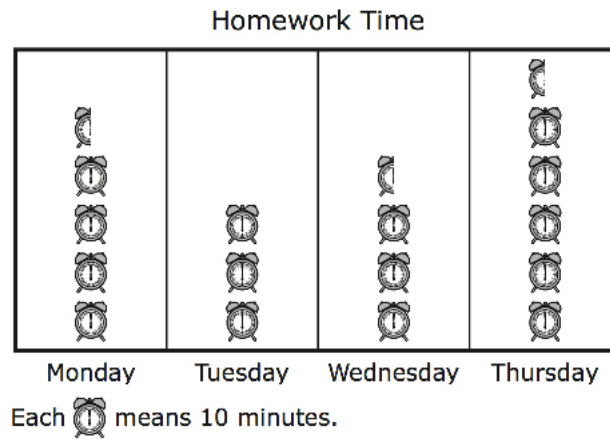
Puzzle Pieces

Puzzle	Number of Pieces
Lion	402
Boat	498
Garden	419
Waterfall	473

What is the total number of pieces in these two puzzles?

B. There are 27 large t-shirts and 15 small t-shirts in a box. Each t-shirt costs \$9. How many t-shirts are in the box?

C. The graph shows the number of minutes Diego spent doing homework during four nights.



How many minutes did Diego spend doing homework on Tuesday and Thursday combined?

STAAR PROBLEMS: LESSON 2

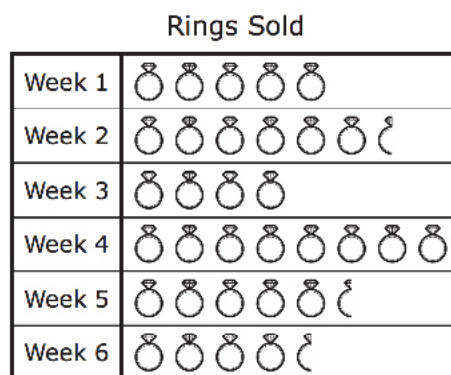



A. Vincent hung three posters in his bedroom.

- The first poster had a length of 59 centimeters.
- The second poster had a length of 92 centimeters.
- The third poster had a length of 127 centimeters.

What is the total length of these three posters in centimeters?

B. The graph shows the number of rings Mrs. Adams sold during six weeks at her jewelry show.



Each  means 6 rings sold.

What is the total number of rings Mrs. Adams sold during weeks 4, 5, and 6?

C. Felix drew the figures shown below.

Figure 1

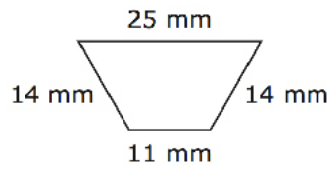


Figure 2

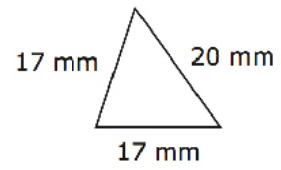


Figure 3

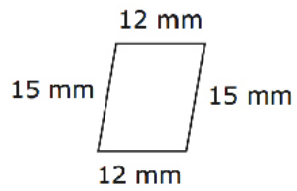
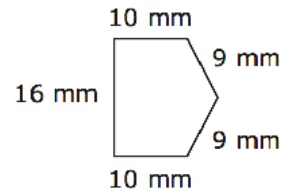


Figure 4



What is the perimeter of Figure 3?

STAAR PROBLEMS: LESSON 3



A. Ramon has a total of 815 sheep in two fields. He has 348 sheep in one of the fields. How many sheep does Ramon have in the other field?

B. A triangular sign has a perimeter of 44 centimeters. Two of the sides are each 14 centimeters long. What is the length of the third side in centimeters?

C. The table shows the number of towns in five Texas counties.

Texas Counties

County	Number of Towns
Brown	21
Galveston	37
Hill	29
Dallas	72
Montgomery	46

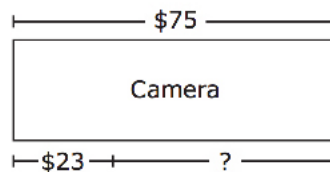
What is the total number of towns in Galveston, Dallas, and Montgomery counties?

STAAR PROBLEMS: LESSON 4



A. Mr. Thompson sold 247 meals on Tuesday at his restaurant. He sold 516 meals on Wednesday. What is the difference between the number of meals Mr. Thompson sold on these two days?

B. Timothy wants to buy a camera that costs \$75. He has saved \$23, as shown in the model.



How much more money does Timothy need in order to buy the camera?

C. The table below shows the number of textbooks for five subjects at school.

Textbooks

Subject	Number of Textbooks
Math	214
Reading	187
Science	226
Language	208
History	193

How many more science textbooks than reading textbooks are at this school?

STAAR PROBLEMS: LESSON 5



A. Campers at a lake rented canoes and paddleboats each week during 5 weeks.

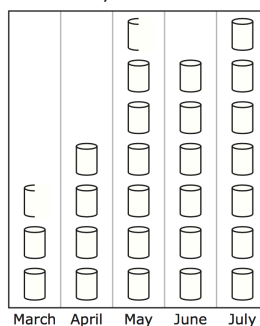
Canoes and Paddleboats


Number of Canoes	Number of Paddleboats
72	90
37	55
61	79
85	103
68	86

Based on the table, how many more paddleboats than canoes did the campers rent during the five weeks?

B. The graph below shows the number of pounds of plastic the Keller family recycled for five months.

Recycled Plastic



Each  means 20 pounds.

Based on the graph, how many more pounds of plastic did the family recycle in July than in April?

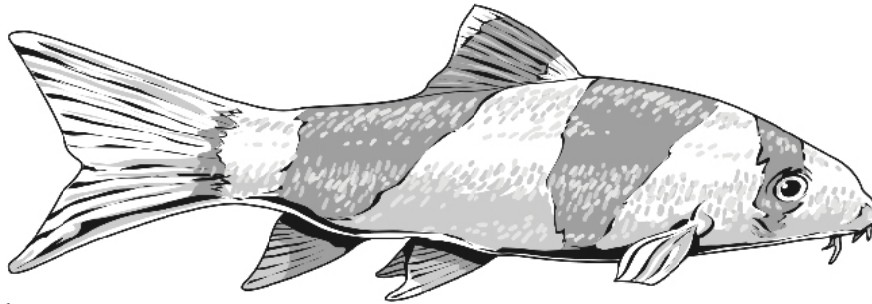
C. Latoya has the two fish shown below in a fish tank.

Tiger Barb



12 inches

Clown Loach

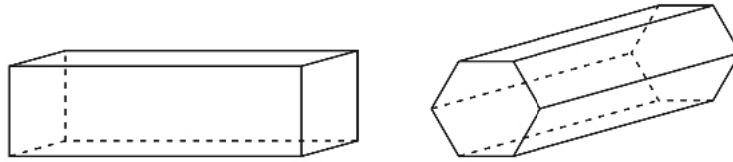


39 inches

What is the difference in inches between the lengths of these two fish?



A. A pair of three-dimensional figures is shown below.



What is the difference between the number of edges on these two figures?

B. Rob had 345 concert tickets to sell. He sold 127 of these tickets on Monday. How many tickets does Rob have left to sell?

C. Mr. Garcia grew a vegetable garden last year. The list below shows the number of three vegetables he grew.

-718 onions

-344 potatoes

-187 cucumbers

What is the difference between the number of potatoes and the number of cucumbers Mr. Garcia grew in his garden?

STAAR PROBLEMS: LESSON 7



A. Gilbert had 85 pieces of candy. He gave 27 pieces of candy to his sister. How many pieces of candy does Gilbert have now?

B. There were 19 birds sitting on the fence. Then, 29 more birds landed on the fence. How many birds are on the fence now?

C. There were 67 apples on the apple trees. If 29 apples fell to the ground, how many apples are still on the trees?




STAAR PROBLEMS: LESSON 8




A. Pam won 18 gold medals in a swimming competition. She earned 6 more medals during her gymnastics meet. How many medals does Pam have now?

B. There were 25 people in the library. Some people left the library and went home. There are 13 people remaining in the library. How many people left the library?

C.

Toy Prices	
Video	
Blocks	
Doll House	

Each  stands for \$5.

Pablo had \$30 in his piggy bank. Then, he bought blocks. How much money does Pablo have now?

STAAR PROBLEMS: LESSON 9



A. An art teacher had 736 crayons.

- She threw away 197 broken crayons.
- Then she bought 150 more crayons.

How many crayons does the art teacher have now?

B. Rita had two boxes of ribbons.

- She had 37 large ribbons in the first box.
- She had 56 small ribbons in the second box.
- She gave 28 of the ribbons to her sister.

How many ribbons does Rita have left in the two boxes?

C. Wanda traveled on an airplane three times last year.

-In January she traveled 278 miles.

-In April she traveled 652 miles.

-In September she traveled 767 miles.

How many more miles did Wanda travel in January and April combined than she traveled in September?

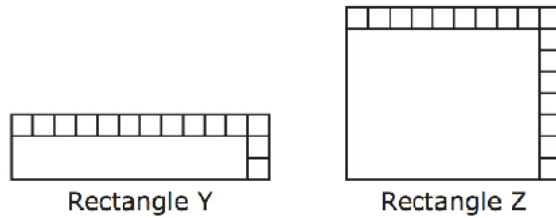
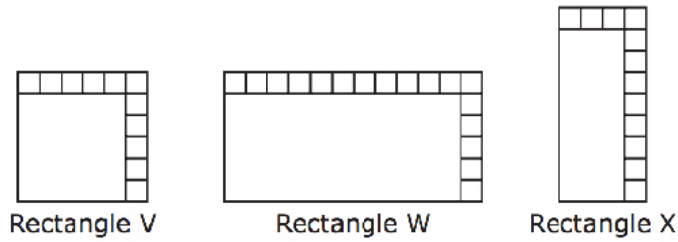
STAAR PROBLEMS: LESSON 10



A. A baseball league bought 9 boxes of baseballs. Each box contained 4 baseballs. How many baseballs did the league buy?

B. A classroom has 6 rows of chairs with 5 chairs per row. How many chairs are in the classroom?

C. Each rectangle shown will be covered with equal-sized squares. Some of the squares have been placed as shown.



□ = 1 square centimeter

What is the area of Rectangle V?

STAAR PROBLEMS: LESSON 11



A. Aaron will place 99 towels on a shelf. He will make 9 equal stacks. How many towels will be in each stack?

B. Gina has 42 mushrooms to put into 6 salads. She wants to put the same number of mushrooms in each salad. How many mushrooms should Gina put in each salad?

C. Deon and his two brothers ate a bowl of grapes. There were 27 grapes in the bowl. Each boy ate the same number of grapes.

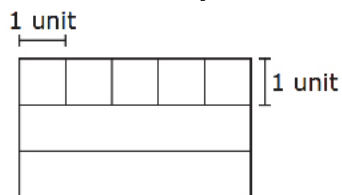
What is the number of grapes each boy ate?

STAAR PROBLEMS: LESSON 12



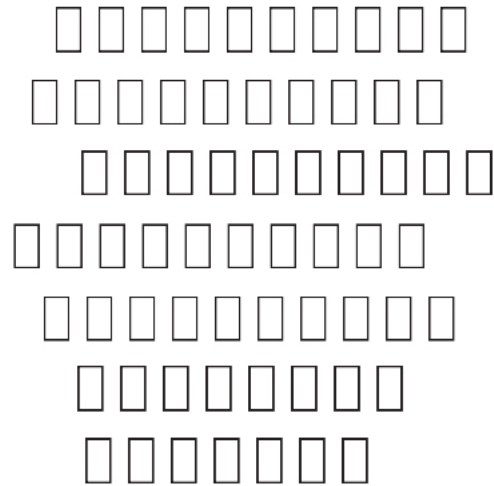
A. Scott has 28 toy cars to put on 4 shelves. He wants to put the same number of cars on each shelf. How many toy cars should Scott put on each shelf?

B. A model of a rectangular bulletin board is shown. The top row has been divided into squares of equal size.



The rest of the model will also be divided into squares of the same size. What is the area in square units represented by this model?

C. In math class 5 students split up 65 flash cards to practice their math facts. The picture shows the total number of flash cards. Each student took the same number of flash cards.



What is the number of flash cards each student took?

STAAR PROBLEMS: LESSON 13



A. Ms. Losoya has 72 index cards. She will arrange the cards in 6 equal stacks. How many index cards will be in each stack?

B. Mrs. Lanier saved \$617 in January. In February she spent \$249 of the money she had saved. She saved \$291 more in March. How much money did Mrs. Lanier have at the end of March?

C. A company received 492 phone calls from customers in June and 267 phone calls from customers in July. What is the difference between the number of phone calls received in these two months?

STAAR PROBLEMS: LESSON 14



A. Adyssen started with \$87 in her bank account. She put \$213 into her account last week and another \$137 this week. What is the total amount Adyssen now has in her bank account?

B. A triangle has a perimeter of 18 units. Each side of this triangle is the same length.

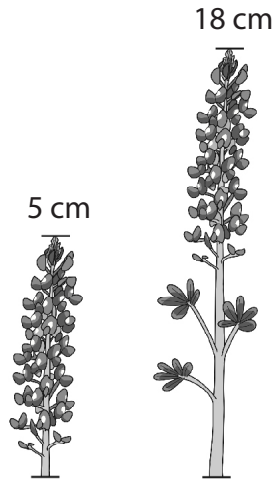
What is the length of one side of the triangle in units?

C. The members of a gym use 8 towels every day. How many towels are used in 5 days?

STAAR PROBLEMS: LESSON 15



A. Haley saw two bluebonnets like the ones shown below.



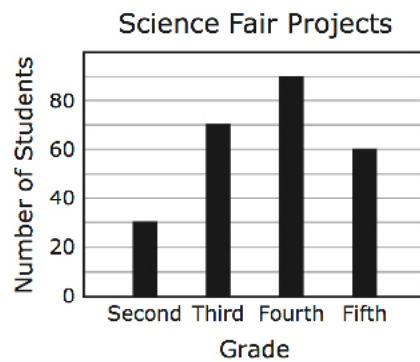
What is the difference in the heights of these two bluebonnets?

B. Vandra had 573 lightbulbs then she sold the following number of lightbulbs during two months at a store.

- She sold 345 lightbulbs in January.
- She sold 210 lightbulbs in February.

How many lightbulbs does Vandra have now?

C. The graph shows the number of students at different grade levels who brought projects for a science fair.

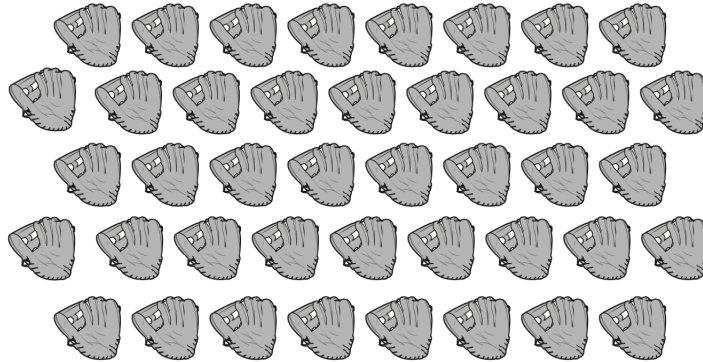


How many students in second grade and fourth grade brought a project?

STAAR PROBLEMS: LESSON 16



A. Daria has 42 baseball gloves in her store.



She will put these gloves on 7 shelves. She will put the same number of gloves on each shelf. How many gloves will Daria put on each shelf?

B. James had 18 pieces of gum. He gave 16 pieces of gum to his friend Wells. Then, he bought 36 more pieces of gum at the store. How many pieces of gum does James have now?

C. The table below shows the number of coats and sweaters donated during a clothing drive.

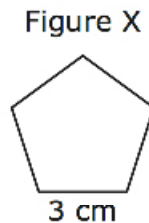
Clothing Drive

Day	Coats	Sweaters
Wednesday	83	31
Thursday	58	14
Friday	71	50

What is the difference between the number of coats and the number of sweaters donated during the clothing drive?



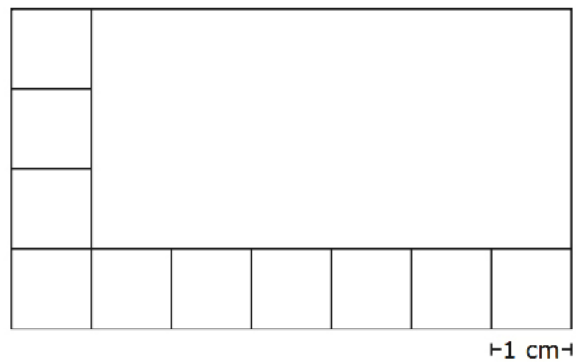
A. All of the sides of Figure X are congruent. The length of one side of the figure is shown below.



What is the perimeter of Figure X?

B. There are a total of 36 bicycles in 6 rows at a bicycle shop. There are the same number of bicycles in each row. How many bicycles are in each row?

C. Felicia started placing square tiles inside a rectangle, as shown in the diagram. Each square tile has a side length of 1 cm.

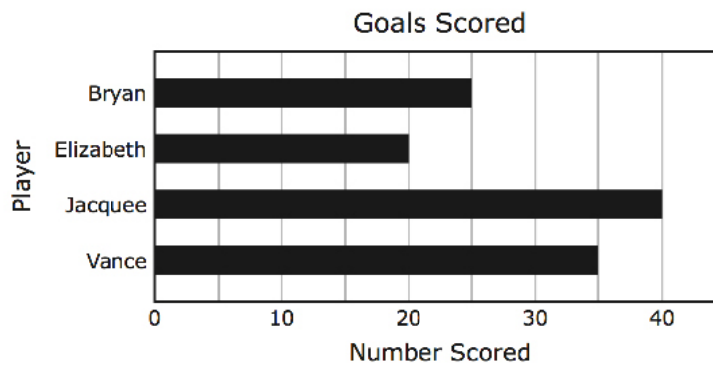


She continued placing square tiles without any overlaps to cover the rectangle. What is the area of the rectangle in square centimeters?

STAAR PROBLEMS: LESSON 18

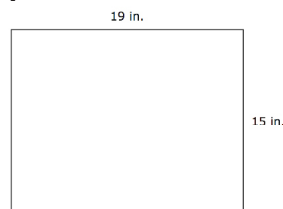


A. The graph below shows the number of goals four players scored during a soccer season.



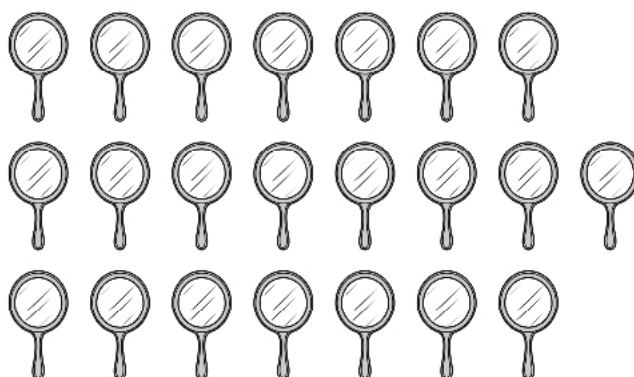
Based on the graph, what is the difference between the number of goals Vance scored and the number of goals Elizabeth scored?

B. Adam wants to use ribbon to make a border around the perimeter of a rectangular picture.



How much ribbon does Adam need to make a border around this picture?

C. Valentina will arrange 22 mirrors on 2 shelves in a store. There will be an equal number of mirrors on each of the shelves.



How many mirrors will be on each of the shelves?