6th Grade Math

Chapter 2: *i*LEAP Math, Grade 6

This section describes the overall design of the *i*LEAP Math test to be administered to students in grade 6. Test specifications, sample test questions, and scoring rubrics are provided so that teachers may align classroom practices with the state assessment.

Test Structure

The Math test consists of three parts, or subtests, which are administered in a single day:

- Part 1: a 30-item multiple-choice session that **does not** allow the use of calculators
- Part 2: a 30-item multiple-choice session that **allows** the use of calculators
- Part 3: a 2-item constructed-response session that **allows** the use of calculators

The suggested testing times for the Grade 6 *i*LEAP Math test listed in Table 2.1 are estimates only. The Math test is **untimed.**

Table 2.1: Suggested Testing Times

Part	Description	Number of Items	Testing Time
1	Multiple Choice, no calculator	30	60 minutes
2	Multiple Choice, calculator	30	60 minutes
3	Constructed Response, calculator	2	30 minutes
	TOTAL	62	150 minutes

Information about additional time needed to read test directions to students and accomplish other activities related to test administration is included in the *iLEAP Test Administration Manual.*

The Math test is composed of criterion-referenced test (CRT) items only. These items measure Louisiana GLEs that more closely match the Common Core State Standards (CCSS) focus areas.

Item Types and Scoring Information

The test has sixty (60) multiple-choice items and two constructed-response items.

The multiple-choice items consist of an interrogatory stem and four answer options. These items assess a student's knowledge and conceptual understanding, and responses are scored 1 if correct and 0 if incorrect.

The constructed-response items, which involve a number of separate steps and application of multiple skills, are designed to assess one or more of the GLEs. The response format is open-ended and may include numerical answers, short written answers, and other types of constructed response (e.g., construct and draw rectangles [including squares] with given dimensions). Students may be required to explain in writing how they arrived at their

answers. These items are scored, according to an item-specific rubric, on a scale of 0 to 4 points.

General Scoring Rubric for Grade 6 *i*LEAP Math Constructed-Response Items

4	The student's response demonstrates in-depth understanding of the relevant content and/or procedures.
	The student completes all important components of the task and communicates ideas effectively.
	Where appropriate, the student offers insightful interpretations and/or extensions.
	Where appropriate, the student uses more sophisticated reasoning and/or efficient procedures.
3	The student completes most important aspects of the task accurately and communicates clearly.
	The response demonstrates an understanding of major concepts and/or processes, although less important ideas or details may be overlooked or misunderstood.
	The student's logic and reasoning may contain minor flaws.
2	The student completes some parts of the task successfully.
	The response demonstrates gaps in the conceptual understanding.
1	The student completes only a small portion of the tasks and/or shows minimal understanding of the concepts and/or processes.
0	The student's response is incorrect, irrelevant, too brief to evaluate, or blank.

Description of the Math Test and GLEs Assessed

The Math test was developed specifically for Louisiana. Committees of Louisiana educators reviewed all items for content and alignment with Louisiana's GLEs. Separate committees reviewed the items for potential bias and sensitive material.

The Math test is **untimed.** Suggested times are estimates for scheduling sessions and assisting students in managing their time.

Students are given a Mathematics Reference Sheet to consult as a reference. Calculators may be used on two parts of the test.

As Louisiana students and teachers transition to the CCSS (http://www.doe.state.la.us/topics/common_core.html) and PARCC assessments (http://www.doe.state.la.us/topics/common_core_assessments.html), the Math test will include only items measuring GLEs aligned to the CCSS. Table 2.2 provides a list of GLEs eligible for assessment during the transition. The table identifies the GLEs and the corresponding CCSS alignment. Some grade 6 GLEs align to CCSS at other grade levels but will continue to be taught and tested in grade 6 to decrease the possibility that the transition will create curricular gaps.

Table 2.2: GLE Content to be Taught and Tested in 2012–13 and 2013–14

GLE #	Grade-Level Expectation Text	Aligned CCSS #
3	Find the greatest common factor (GCF) and least common multiple (LCM) for whole numbers in the context of problem-solving	6.NS.4
4	Recognize and compute equivalent representations of fractions and decimals (i.e., halves, thirds, fourths, fifths, eighths, tenths, hundredths)	Retained[1]
6	Compare positive fractions, decimals, and positive and negative integers using symbols (i.e., <, =, >) and number lines	6.NS.6 6.NS.7
8	Demonstrate the meaning of positive and negative numbers and their opposites in real-life situations	6.NS.5
9	Add and subtract fractions and decimals in real-life situations	6.NS.3
12	Divide 4-digit numbers by 2-digit numbers with the quotient written as a mixed number or a decimal	6.NS.2
13	Use models and pictures to explain concepts or solve problems involving ratio, proportion, and percent with whole numbers	6.RP.1 6.RP.3
14	Model and identify perfect squares up to 144	Retained[1]
15	Match algebraic equations and expressions with verbal statements and vice versa	6.EE.2 6.EE.6
16	Evaluate simple algebraic expressions using substitution	6.EE.2
17	Find solutions to 2-step equations with positive integer solutions (e.g., $3x - 5 = 13$, $2x + 3x = 20$)	6.EE.5
19	Calculate perimeter and area of triangles, parallelograms, and trapezoids	6.G.1
20	Calculate, interpret, and compare rates such as $/lb., mpg, and mph	6.RP.2 6.RP.3
22	Estimate perimeter and area of any 2-dimensional figure (regular and irregular) using standard units	Retained[1]
25	Relate polyhedra to their 2-dimensional shapes by drawing or sketching their faces	6.G.4
28	Use a rectangular grid and ordered pairs to plot simple shapes and find horizontal and vertical lengths and area	6.NS.8 6.G.3 6.RP.3
29	Collect, organize, label, display, and interpret data in frequency tables, stem-and-leaf plots, and scatter plots and discuss patterns in the data verbally and in writing	Retained[1]
30	Describe and analyze trends and patterns observed in graphic displays	Retained[1]
32	Calculate and discuss mean, median, mode, and range of a set of discrete data to solve real-life problems	6.SP.3 6.SP.5
37	Describe, complete, and apply a pattern of differences found in an input-output table	6.RP.3

[1] This GLE was moved to another grade but will be taught and tested in this grade to decrease the possibility that the transition will create curricular gaps.

Reporting Categories

To be more reflective of the focus areas of the CCSS at each grade, the GLEs available for assessment have been grouped into the Reporting Categories shown in Table 2.3. During the transition, the Reporting Categories replace the mathematics strands (e.g., Number and Number Relations, Algebra, etc.) for assessment purposes.

Table 2.3: Grade 6 Math Reporting Categories

Reporting Category	GLEs Covered
Ratio, Proportion, and Algebra	13, 15, 16, 17, 20, 37
Number System	3, 4, 6, 8, 9, 12, 14
Measurement, Data, and Geometry	19, 22, 25, 28, 29, 30, 32

Math Test Specifications

Table 2.4 provides test specifications for the multiple-choice parts of the grade 6 *i*LEAP Math assessment. The values in the table are approximations due to slight variations in the content across test forms at grade 6.

Table 2.4: Grade 6 Math Test Specifications

Reporting Category	% of Multiple-Choice Points
Ratio, Proportion, and Algebra	40
Number System	40
Measurement, Data, and Geometry	20
Total	**100**

Sixty 1-point MC items plus two 4-point constructed-response items equals a 68-point test.

Calculator Recommendations and Restrictions

It is recommended that a calculator be made available to **each** student for instructional and assessment purposes. As with all instructional materials, each individual district and school should determine which calculator best supports its mathematics curriculum and instructional program.

Calculators recommended for instruction and assessment:
- K–4 students: four-function calculator
- 5–8 students: scientific calculator
- 9–12 students: scientific calculator with graphing capabilities

Calculators <u>not</u> permitted on statewide assessment:
- handheld or laptop computers
- pocket organizers
- calculators with Computer Algebra Systems (CAS) or other symbolic manipulation capabilities
- calculators with paper tape
- calculators that talk or make noise
- calculators with QWERTY (typewriter-style) keypads
- electronic writing pads or pen input devices

Sample Test Items: Grade 6 Math

Sample Mathematics Constructed-Response Items and Scoring Rubrics

Questions 1 and 2 show sample constructed-response items. Each item involves a number of separate steps and the application of multiple skills. The constructed-response items are designed to assess one or more of the GLEs. The items are scored using an item-specific rubric on a scale of 0 to 4 points.

1 Marcus is looking at the Harry's Hungry Hut menu, which has two sections: entrées and side dishes.

Harry's Hungry Hut	
Entrées	
Hot Dog	$2.50
Tuna	$3.75
Hamburger	$3.25
Chicken	$3.50
Pork Chop	$4.25
Side Dishes	
Fries	$1.55
Salad	$3.35
Onion Rings	$2.00
Drink	$1.65

A If Marcus orders one item from each section of the menu, what is the <u>least</u> amount he can spend? Show or explain how you found your answer.

B On Thursdays, Harry's Hungry Hut offers a special: one pork chop with a side salad for $5.99. How much would Marcus save if he were to order the special instead of ordering one pork chop and one salad on another day of the week? Show or explain how you found your answer.

C How many combinations of one item from the entrée section and one item from the side section can Marcus choose? Show or explain how you found your answer.

Match to GLE: This item measures GLE 9: Add and subtract fractions and decimals in real-life situations. This item also measures GLE 34: Use lists, tree diagrams, and tables to determine the possible combinations from two disjoint sets when choosing one item from each set.

Scoring Rubric	
4	The student earns 6 points.
3	The student earns 4 or 5 points.
2	The student earns 2 or 3 points.
1	The student earns 1 point. **OR** The student demonstrates minimal understanding of adding and subtracting decimals, or of determining possible combinations from two disjoint sets when choosing one item from each set.
0	The student's response is incorrect or irrelevant to the skill or concept being measured or is blank.

Sample Answer:

Part A. $4.05 **AND** Marcus orders the least expensive item from the entrée section and the least expensive item from the side dish section (2.50 + 1.55)

Part B. $1.61
AND
4.25 + 3.35 = 7.60; 7.60 - 5.99 = 1.61

Part C. 20 combinations
AND

Hot Dog/Fries	Tuna/Fries	Hamburger/Fries	Chicken/Fries	Pork Chop/Fries
Hot Dog/Salad	Tuna/Salad	Hamburger/Salad	Chicken/Salad	Pork Chop/Salad
Hot Dog/On. Rings	Tuna/On. Rings	Hamburger/On. Rings	Chicken/On. Rings	Pork Chop/On. Rings
Hot Dog/Drink	Tuna/Drink	Hamburger/Drink	Chicken/Drink	Pork Chop/Drink

Points Assigned:

Part A. 2 points
2 points for the correct answer and the correct explanation
OR
1 point for the correct answer with an incorrect or no procedure **OR** 1 point for an incorrect answer based on minor arithmetic errors with the correct procedure

Part B. 2 points
2 points for the correct answer and the correct procedure
OR
1 point for the correct answer with an incorrect or no procedure **OR** 1 point for an incorrect answer based on minor arithmetic errors with the correct procedure

Part C. 2 points
2 points for the correct answer and the correct procedure
OR
1 point for the correct answer with no procedure **OR** 1 point for an incorrect answer based on minor arithmetic errors with the correct procedure

2   The graph shows the number of sandwiches sold at Tom's Deli.

Month	Number of Sandwiches Sold
March	50
April	62
May	56
June	83
July	88
August	80

A   What is the range of the number of sandwiches sold at the deli?

B   Find the mean number of sandwiches sold over the 6 months at Tom's Deli. Round your answer to the nearest whole number. Show your work.

C   When buying supplies for the month of May, Tom spent $5.60 for lettuce, $5.60 for pickles, $10.50 for tomatoes, $10.50 for bread, $30.80 for sandwich meat, and $7.00 for onions. How much did each sandwich cost Tom? Show your work.

D   For September, Tom plans on buying enough supplies to make the mean number of sandwiches sold from March to August. If the cost of supplies for each sandwich is the same as in the month of May, how much will Tom spend on supplies for September? Show or explain how you found your answer.

Match to GLE: This item measures GLE 32: Calculate and discuss mean, median, mode, and range of a set of discrete data to solve real-life problems. This item also measures GLE 9: Add and subtract fractions and decimals in real-life situations.

Scoring Rubric	
4	The student earns 7 points.
3	The student earns 5 or 6 points.
2	The student earns 2, 3, or 4 points.
1	The student earns 1 point. **OR** The student shows minimal understanding of calculating the mean of a set of data.
0	The student's response is incorrect or irrelevant to the skill or concept being measured or is blank.

Sample Answer:

Part A. The range is 38 OR 88 - 50 = 38.

Part B. The mean is 70 (rounded to the nearest whole number).
AND
$50 + 62 + 56 + 83 + 88 + 80 = 419$
$419/6 = 69.83, \approx 70$ (rounded to the nearest whole number)

Part C. $ 1.25
AND
$5.6 + 5.6 + 10.5 + 10.5 + 30.80 + 7 = \$70$
$70/56 = \$1.25$

Part D. $87.50
AND
$70 \times 1.25 = \$87.50$

Points Assigned:

Part A. 1 point
1 point for the correct answer

Part B. 2 points
2 points for the correct answer and the correct procedure
OR
1 point for an incorrect answer based on minor arithmetic errors with the correct procedure **OR** 1 point for the correct answer with an incorrect procedure or no procedure

Part C. 2 points
2 points for the correct answer and the correct procedure
OR
1 point for an incorrect answer based on minor arithmetic errors with the correct procedure **OR** 1 point for the correct answer with an incorrect procedure or no procedure

Part D. 2 points
2 points for the correct answer (or an answer based on an incorrect answer from part B and/or part C) with the correct procedure
OR
1 point for an incorrect answer based on minor arithmetic errors with the correct procedure **OR** 1 point for the correct answer (or an answer based on an incorrect answer from part B and/or part C) with an incorrect procedure or no procedure

Sample Multiple-Choice Items

Questions 3 through 24 are sample multiple-choice items, arranged by GLE. The items test students' ability to solve math problems. Most items are provided in context and require students to use information from stories, graphs, or tables to solve a problem. Items may assess some of the skills of a GLE, while other items may measure all of the skills of the GLE.

3   Alice and Jorge have the same number of stamps. Alice puts her stamps in rows of 8. Jorge puts his stamps in rows of 10. Neither of them have any partial rows. **What is the least number of stamps that Alice and Jorge could each have?**

    A 18

    B 24

    C 40

    D 80

Correct response: C

Match to GLE: This item measures GLE 3: Find the greatest common factor (GCF) and least common multiple (LCM) for whole numbers in the context of problem-solving.

4   **What is another way to represent** $\frac{1}{2}$ **?**

    A 0.12

    B 0.21

    C 0.50

    D 0.55

Correct response: C

Match to GLE: This item measures GLE 4: Recognize and compute equivalent representations of fractions and decimals (halves, thirds, fourths, fifths, eighths, tenths, hundredths).

5   **Which set of numbers is arranged from largest to smallest?**

    A $0.75 > 0.50 > 0.38$

    B $0.67 > 0.25 > 0.42$

    C $0.50 > 0.67 > 0.83$

    D $0.30 > 0.80 > 0.50$

Correct response: A

Match to GLE: This item measures GLE 6: Compare positive fractions, decimals, and positive and negative integers using symbols (i.e., <, =, >) and number lines.

6   The low temperature one day was 5°F. The low temperature the next day was -5°F. **Which statement about the temperatures is true?**

    A   The difference between the temperatures is 0°F.

    B   The difference between the temperatures is 5°F.

    C   The temperatures are the same distance from 0°F.

    D   The temperatures are the same distance from 5°F.

Correct Response: C

Match to GLE: This item measures GLE 8: Demonstrate the meaning of positive and negative numbers and their opposites in real-life situations.

7   Mrs. Black had $2\frac{1}{8}$ yards of material. She used $1\frac{1}{4}$ yards to make a jacket for Sally. **How much material did she have left?**

A $1\frac{7}{8}$ yards

B $1\frac{1}{4}$ yards

C $\frac{7}{8}$ yard

D $\frac{1}{4}$ yard

Correct response: C

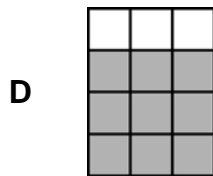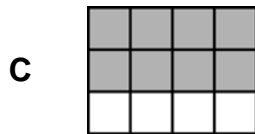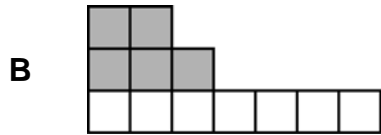*Match to GLE: This item measures GLE 9: Add and subtract fractions and decimals in real-life situations.*

8   A farmer sold 5,300 pounds of grain to 16 stores. He sold an equal amount of grain to each store. **How many pounds of grain did each store receive?**

A   331.164 lb.

B $331\frac{1}{4}$ lb.

C $331\frac{2}{5}$ lb.

D   331.416 lb.

Correct response: B

Match to GLE: This item measures GLE 12: Divide 4-digit numbers by 2-digit numbers with the quotient written as a mixed number or a decimal.

9   **Which model represents a ratio of 2:1?**

A

B

C

D
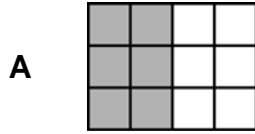
Correct response: C

Match to GLE: This item measures GLE 13: Use models and pictures to explain concepts or solve problems involving ratio, proportion, and percent with whole numbers.

10   Amber has been asked to make a square-shaped collage for a social studies project. **If the length of each side of the collage is a whole number, what could be the area of the collage?**

    A   24 square inches

    B   32 square inches

    C   56 square inches

    D   64 square inches

Correct response: D

Match to GLE: This item measures GLE 14: Model and identify perfect squares up to 144.

11   Tamera's class was divided in half to play a game of softball. There were 12 students on each team. **Which algebraic equation could be used to calculate the number of students, s, in Tamera's class?**

    A $\dfrac{12}{s} = 2$

    B $12 + s = 2$

    C $\dfrac{s}{2} = 12$

    D $s + 2 = 12$

Correct Response: C

Match to GLE: This item measures GLE 15: Match algebraic equations and expressions with verbal statements and vice versa.

12   Alana plans to order concert tickets that cost $45 each. She will also have to pay a $10 service charge for the order. To find the total amount she must pay, Alana used the expression $45n + 10$, where n is the number of tickets ordered. **What is the total amount of money Alana must pay if she orders 5 tickets?**

    A $19

    B $55

    C $225

    D $235

Correct Response: D

Match to GLE: This item measures GLE 16: Evaluate simple algebraic expressions using substitution.

13   Thirty-seven students in the sixth grade class voted for Jerry for class president. Of those 37 students, 3 fewer than twice the number of boys in the class voted for Jerry. This can be represented by the equation $2b - 3 = 37$, where b represents the number of boys. **How many boys are in the sixth grade class?**

    A   17

    B   20

    C   23

    D   32

Correct Answer: B

Match to GLE: This item measures GLE 17: Find solutions to two-step equations with positive integer solutions (e.g., $3x - 5 = 13$, $2x + 3x = 20$).

14 Ray wants to frame a rectangular poster for his room. The dimensions of the poster are 1.5 feet by 2 feet. **What is the perimeter of Ray's poster?**

   A 3 feet

   B 3.5 feet
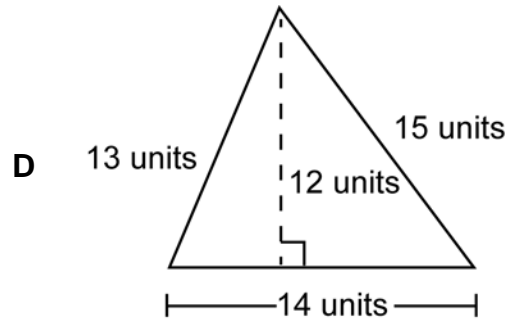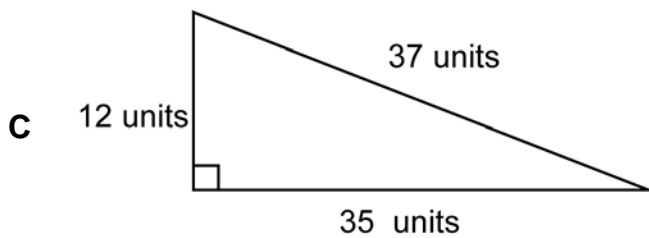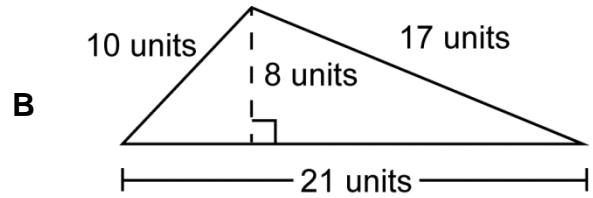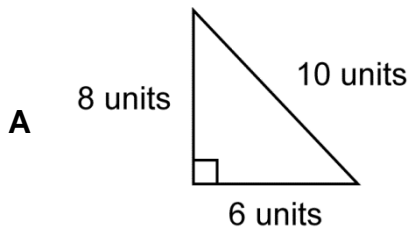
   C 5.5 feet

   D 7 feet

Correct Response: D

Match to GLE: This item measures GLE 19: Calculate perimeter and area of triangles, parallelograms, and trapezoids.

15   Marcela drew the triangle below.

25 units

7 units

24 units
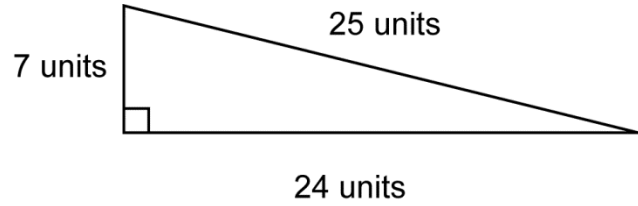
Which triangle has the same area as Marcela's triangle, but has the shortest perimeter? The triangles are <u>not</u> drawn to scale.

A   8 units   10 units   6 units

B   10 units   8 units   17 units   21 units

C   12 units   37 units   35 units

D   13 units   15 units   12 units   14 units

Correct Response: D

Match to GLE: This item measures GLE 19: Calculate perimeter and area of triangles, parallelograms, and trapezoids.

16   Mr. Jones drove 345 miles on 15 gallons of gas. **What was Mr. Jones' average number of miles per gallon?**

    A 11.5

    B 13.8

    C 23

    D 69

Correct Response: C

Match to GLE: This item measures GLE 20: Calculate, interpret, and compare rates such as dollar/pound, mpg, and mph.

17   Tyrone bought a new notebook for school. **Which of these is <u>most likely</u> the area of the front cover of the notebook?**

    A   5 square inches

    B   10 square inches

    C 100 square inches

    D 500 square inches

Correct Response: C

Match to GLE: This item measures GLE 22: Estimate perimeter and area of any two-dimensional figure (regular and irregular) using standard units.
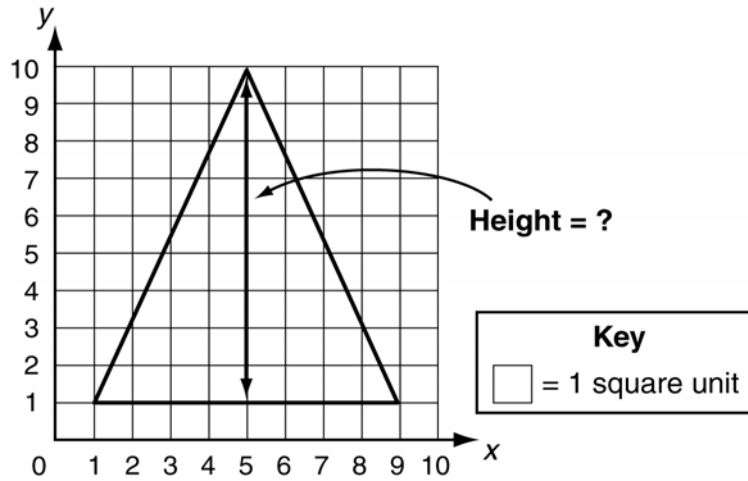
18   **Which set of two-dimensional shapes shows all the faces of a square pyramid?**

A   △ △ △ △

B   △ △ △ ☐

C   △ △ △ △ ☐

D   △ △ ☐ ☐ ☐
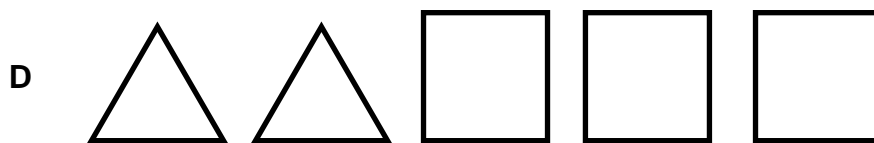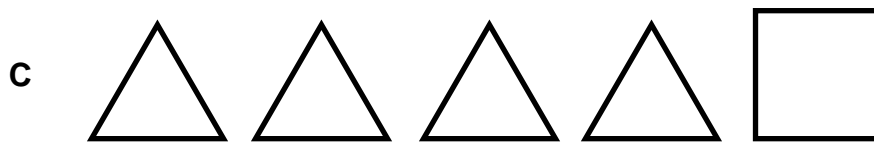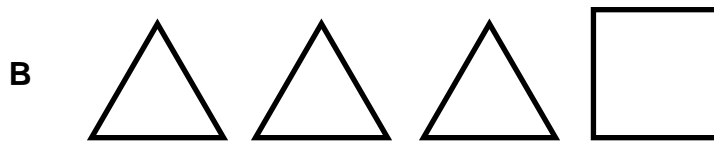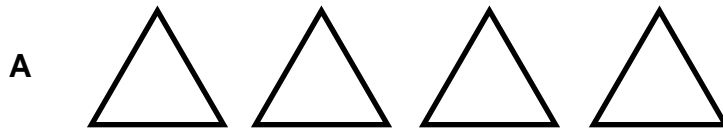
Correct Response: C

Match to GLE: This item measures GLE 25: Relate polyhedra to their 2-dimensional shapes by drawing or sketching their faces.

19   Toya found a triangular flag. She traced the flag on graph paper, as shown below.
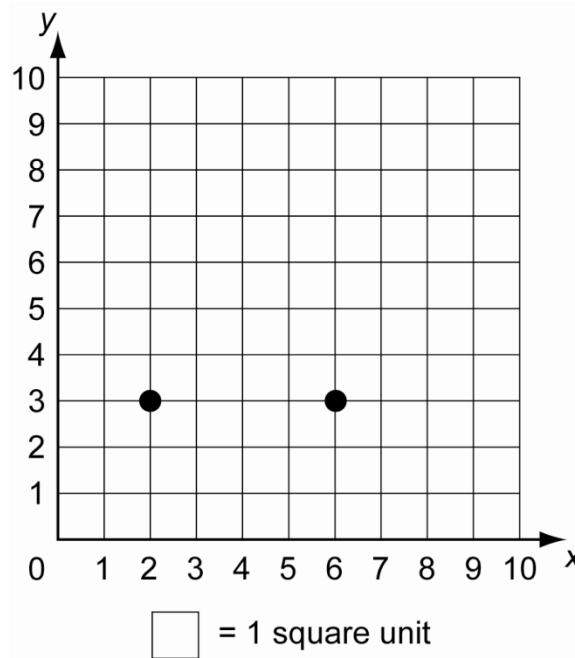

What was the height of the triangular flag?

A   4 units

B   8 units

C   9 units

D   10 units

Correct Response: C

Match to GLE: This item measures GLE 28: Use a rectangular grid and ordered pairs to plot simple shapes and find horizontal and vertical lengths and area.

20   Jahiem plotted two points on a grid.

= 1 square unit

Which point could Jahiem plot to create a triangle that has an area of 12 square units?

A   (2, 8)

B   (4, 9)

C   (6, 6)

D   (9, 6)

Correct Response: B

Match to GLE: This item measures GLE 28: Use a rectangular grid and ordered pairs to plot simple shapes and find horizontal and vertical lengths and area.

21   The stem-and-leaf plot below shows the height in inches of the students in Mr. Hill's science class.

| Stem	Leaf
4	8 8 9 9 9
5	0 1 3 3 3 3 4 5 5

Key
5 | 1 = 51
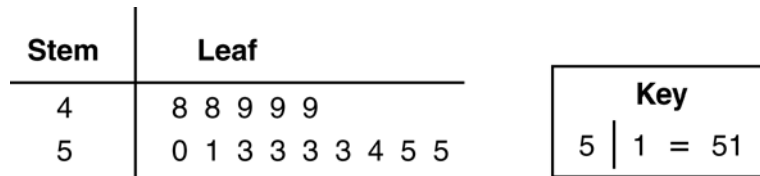
Mr. Hill will make a frequency table of all his students' heights. **How many tally marks should there be in the 45 through 50 range?**

A   5 tally marks

B   6 tally marks

C   9 tally marks

D   14 tally marks

Correct Response: B

Match to GLE: This item measures GLE 29: Collect, organize, label, display, and interpret data in frequency tables, stem-and-leaf plots, and scatter plots and discuss patterns in the data verbally and in writing.

22   The graph shows the weight of Ben's dog, Chow, over 5 weeks.
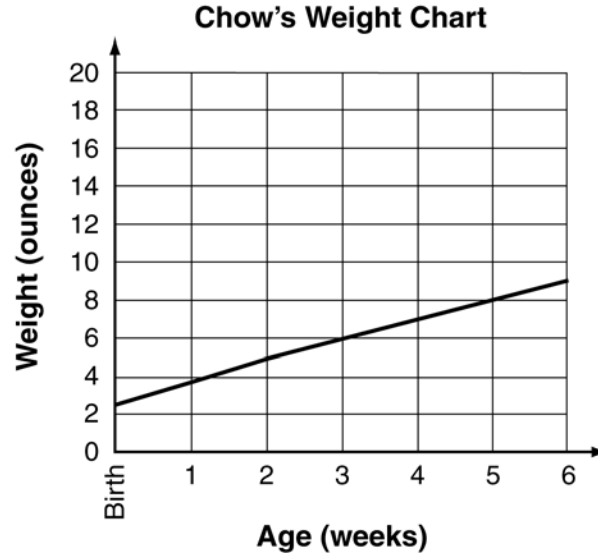
Chow's Weight Chart

Based on the graph, which of these is the **best** prediction for Chow's weight at 7 weeks?

A   4 oz.

B   9 oz.

C   10 oz.

D   20 oz.

Correct Response: C

Match to GLE: This item measures GLE 30: Describe and analyze trends and patterns observed in graphic displays.

23   Anjenette recorded the prices, in dollars, of 10 CDs at a store.

9, 9, 10, 10, 13, 15, 15, 15, 19, 25

Which measurements of the prices of the 10 CDs are the same?

A   Median and range

B   Mean and median

C   Mode and mean

D   Range and mode

Correct response: B

Match to GLE: This item measures GLE 32: Calculate and discuss mean, median, mode, and range of a set of discrete data to solve real-life problems.

24   Gretchen planned to make color photocopies of a poster for the school play. At the copy center she saw the table below.

Number of Color Photocopies	Total Cost of Photocopies
2	$0.30
4	$0.60
6	$0.90
8	$1.20

If Gretchen makes 14 color photocopies, what will be the total cost?

A $0.15

B $1.80

C $2.10

D $2.40

Correct Response: C

Match to GLE: This item measures GLE 37: Describe, complete, and apply a pattern of differences found in an input-output table.