The Lionfish Invasion!

What is as graceful and beautiful as a butterfly, as ferocious as the most dangerous predator, and delivers a painful sting with its poisonous spines?

It is the lionfish, a fish from the coral reefs in the tropical waters of the South Pacific and Indian Oceans. But you don’t have to travel halfway around the world to see a lionfish.

Perhaps you have seen one in a friend’s home aquarium?

Lionfish are popular saltwater aquarium fish all over the world, but especially in the United States. Nowadays, they also live in Atlantic waters off the East Coast of the United States. These lionfish are what scientists call an invasive species or an “alien invader.”

Lionfish invade U.S. waters

Local divers off the coast of North Carolina were not expecting to see what they found one day in August 2002—they spotted the exotic and beautiful lionfish, common to the warm waters of the western Pacific, but unknown at that time as residents of the Carolina coast. They provided the first solid evidence that lionfish were in the Atlantic—an actual specimen that they collected there. A year later, scientists had documented 19 lionfish sightings at eight locations along the North Carolina continental shelf. By then, lionfish were also being observed off the coasts of Florida, Georgia, and South Carolina. Juvenile lionfish were also showing up off of Bermuda, about 650 miles away from the North Carolina coast, and even as far north as Long Island, New York! Since then, many more United States divers have reported sightings of the distinctive fish. Between 2000 and 2003, lionfish sightings were reported at 16 different shipwrecks and natural hard bottom locations. During a summer 2004 research expedition, NOAA scientists collected 155 lionfish at 19 different locations off the North Carolina coast alone. The jump in numbers and distributions over such a short time, plus sightings of juveniles smaller than those sold for aquaria, strongly indicates that the lionfish is reproducing in the Atlantic Ocean. If this is true, it’s the first time that a western Pacific fish has populated the U.S. Atlantic coast.
How did the lionfish get into the Atlantic Ocean?

Lionfish are a popular ornamental aquarium fish that were likely released on purpose when people no longer want them as aquarium pets! The swift and warm Gulf Stream, which likely transported buoyant lionfish eggs and larvae from Florida northward, helped the lionfish’s Atlantic journey.

It’s pretty unusual for non-native, tropical marine fishes, like the lionfish, to establish themselves at this latitude. In Florida waters and along the continental shelf near the Gulf Stream the temperatures are very similar to the lionfish’s native waters.

However, from north Florida upward, the waters along the coastline are too cold in the winter for lionfish to survive. Scientists expect them to survive the winter only at water depths greater than 120 ft because this is where the Gulf Stream has influence all year long. Very importantly, the types of predators and competitors present in the marine community in the Atlantic are very different from the native range of the lionfish. Generally, species like the lionfish have not been perceived to pose a significant threat to marine ecosystems because they were not likely to survive long.

Text and Photos NOAA. http://oceanservice.noaa.gov

Words that could be defined for students are in bold.
Which statement best reflects the central idea of the article?

A  In 2002, divers looking for other species of fish discovered the lionfish off the coast of North Carolina.
B  The beautiful and exotic lionfish, a native of tropical waters, has been populating the waters of the Atlantic Ocean.
C  While dangerous to other forms of marine life, the lionfish has become a popular aquarium pet because of its unique appearance.
D  The warm waters of the Gulf Stream extend from the Gulf of Mexico toward Europe and provide a habitat for the lionfish.

Key: B

Aligned CCLS: RI.6.2

Commentary: This question aligns to CCLS RI.6.2 in that it asks the student to identify the central idea of the article.

Rationale: Option B is correct. The fact that divers found lionfish off the coast of North Carolina in 2002 is not the main point of the article, and the portions of the text concerning the lionfish as a pet and the nature of the Gulf Stream are minor details, not central ideas.
Scientists call the lionfish an *alien invader* (line 6) because lionfish

A attack other species with their poisonous spines  
B have overtaken the habitats of other marine species  
C came from one place and spread to another place  
D are able to live in hostile environments

**Key: C**

**Aligned CCLS:** RI.6.4

**Commentary:** This question aligns to RI.6.4 in that it asks the student to interpret the figurative phrase “alien invader” in light of information in the article as a whole.

**Rationale:** Option C is correct. There is no indication in the article that lionfish have uprooted other species; and while lionfish are predators and are able to adapt to certain environments, these characteristics do not explain the idea that they are “alien invaders.”
Why does the author include lines 12–16 (“A year later...as far north as Long Island, New York!”) in the article?

A to list all of the places lionfish can be found  
B to track the movements of lionfish and their habitats  
C to warn people living in certain locations about poisonous fish  
D to describe how widespread lionfish sightings have become

Key: D

Aligned CCLS: RI.6.5

Commentary: This question aligns to CCLS RI.6.5 in that it requires students to determine the purpose of a particular paragraph in an article. Understanding of the overall structure of the article and its general content is required to answer this question.

Rationale: Option D is correct. Lines 12–16 illustrate the extent of the lionfish invasion (as far as Bermuda and New York). The paragraph is not presented as a complete list, and nothing in the article indicates that people should be warned about the fish or that scientists are tracking movements of the fish.
Which of these words is closest in meaning to *expedition* (line 19)?

A  a display  
B  a contest  
C  a trip  
D  a report  

Key: C  

**Aligned CCLS: L.6.4a**  

**Commentary:** This question aligns to CCLS L.6.4a in that it asks the student to determine the meaning of an unknown word ("expedition") from context.  

**Rationale:** It is clear from context that the “NOAA scientists” went on a trip to collect lionfish at various locations off of the Carolina coast. There is no indication that the scientists collected the fish during a display or during a contest, and it does not make sense to say they collected them during a report.
In the city of Athens about twenty-five years after the Peloponnesian War there lived a delicate boy named Demosthenes. His father was a manufacturer of swords and made a great deal of money. But when Demosthenes was only seven years old his father died. Guardians had charge of his property for ten years. They robbed the boy of part of his fortune and managed the rest so badly that Demosthenes could not go to school to the best teachers in Athens because he had not money enough to pay them.

One day, when he was sixteen years old, a great trial was going on at Athens and he strolled into the court. There were fifteen hundred and one dicasts or, as we call them, jurymen in their seats, and the court was crowded with citizens who, like Demosthenes, had gone in from curiosity. A lawyer named Callistratus was speaking. He did not finish his speech for nearly four hours. But no one left the court until he ceased to speak. Then hundreds of people went out and hurried home. Demosthenes waited to see the end. When each of the jurymen had thrown a voting pebble into a basket the clerk of the court counted the pebbles and told the result. Callistratus had won the case.

Demosthenes went home determined to become a lawyer and public speaker. In one year from that time he brought suit against his guardians, delivered four orations against them and won his case. He recovered a large part of the property which his father had left to his mother and himself.

After this he entered public life, but the first time he made a speech in the public assembly it was a complete failure. He stammered and could not speak loud enough, and in trying to do so he made odd faces.

People laughed at him, and even his friends told him that he never could be a speaker, so he went home greatly cast down.

Then an actor who was a great friend of his family went to see him and encouraged him. He asked Demosthenes to read to him some passages of poetry. Then the actor recited the same passages. The verses now seemed to have new meaning and beauty. The actor pronounced the words as if he felt them. The tones of his voice were clear and pleasant and his gestures were graceful. Demosthenes was charmed.

“You can learn to speak just as well as I do,” said the actor, “if you are willing to work patiently. Do not be discouraged, but conquer your difficulties.”

“I will,” said Demosthenes. And he did.
It is said that to improve his voice he spoke with stones in his mouth, and to become accustomed to the noise amid confusion of the public assembly he went to the seashore and recited there amid the roar of the waves. To overcome his habit of lifting one shoulder above the other he suspended a sword so that the point would prick his shoulder as he raised it.

He built an underground room in which he could study without interruption and practice speaking without disturbing anyone. He had one side of his head shaved so that he would be ashamed to leave this retreat. Then he remained there for months at a time engaged in study. One thing that he did while there was to copy eight times the speeches in the famous history of Thucydides. This was to teach him to use the most fitting language. Besides all this he took lessons of an excellent speaker named Iosm’us who taught declamation. In this way the awkward boy who had been laughed out of the assembly became in time the greatest orator of Athens. Not only was Demosthenes a graceful orator, but he was wise and patriotic. He soon acquired great influence in Athens and became one of the ten official orators.
Icarus and Daedalus

by Josephine Preston Peabody

Among all those mortals who grew so wise that they learned the secrets of the gods, none was more cunning than Daedalus.

He once built, for King Minos of Crete, a wonderful Labyrinth of winding ways so cunningly tangled up and twisted around that, once inside, you could never find your way out again without a magic clue. But the king’s favor veered with the wind, and one day he had his master architect imprisoned in a tower. Daedalus managed to escape from his cell; but it seemed impossible to leave the island, since every ship that came or went was well guarded by order of the king.

At length, watching the sea-gulls in the air—the only creatures that were sure of liberty—he thought of a plan for himself and his young son Icarus, who was captive with him.

Little by little, he gathered a store of feathers great and small. He fastened these together with thread, molded them in with wax, and so fashioned two great wings like those of a bird. When they were done, Daedalus fitted them to his own shoulders, and after one or two efforts, he found that by waving his arms he could **winnow** the air and **cleave** it, as a swimmer does the sea. He held himself aloft, wavered this way and that, with the wind, and at last, like a great fledgling, he learned to fly.

Without delay, he fell to work on a pair of wings for the boy Icarus, and taught him carefully how to use them, bidding him beware of rash adventures among the stars. “Remember,” said the father, “never to fly very low or very high, for the fogs about the earth would weigh you down, but the blaze of the sun will surely melt your feathers apart if you go too near.”

For Icarus, these cautions went in at one ear and out by the other. Who could remember to be careful when he was to fly for the first time? Are birds careful? Not they! And not an idea remained in the boy’s head but the one joy of escape.

The day came, and the fair wind that was to set them free. The father bird put on his wings, and, while the light urged them to be gone, he waited to see that all was well with Icarus, for the two could not fly hand in hand. Up they rose, the boy after his father. The hateful ground of Crete sank beneath them; and the country folk, who caught a glimpse of them when they were high above the tree-tops, took it for a vision of the gods—Apollo, perhaps, with Cupid after him.

At first there was a terror in the joy. The wide vacancy of the air dazed them—a glance downward made their brains reel. But when a great wind filled their wings, and Icarus felt himself sustained, like a halcyon-bird in the hollow of a wave, like a child uplifted by his mother, he forgot everything in the world but joy. He forgot Crete and the other islands that he had passed over: he saw but vaguely that
winged thing in the distance before him that was his father Daedalus. He longed for one draught of flight to quench the thirst of his captivity: he stretched out his arms to the sky and made towards the highest heavens.

Alas for him! Warmer and warmer grew the air. Those arms, that had seemed to uphold him, relaxed. His wings wavered, drooped. He fluttered his young hands vainly—he was falling—and in that terror he remembered. The heat of the sun had melted the wax from his wings; the feathers were falling, one by one, like snowflakes; and there was none to help.

He fell like a leaf tossed down the wind, down, down, with one cry that overtook Daedalus far away. When he returned, and sought high and low for the poor boy, he saw nothing but the bird-like feathers afloat on the water, and he knew that Icarus was drowned.

The nearest island he named Icaria, in memory of the child; but he, in heavy grief, went to the temple of Apollo in Sicily, and there hung up his wings as an offering. Never again did he attempt to fly.

Words that could be defined for students are in bold.
Short Answer Constructed Response for “Demosthenes”

How does Demosthenes’ experience observing a trial at age 16 affect his life choices, as described in the passage? Use **two** details from the passage to support your response.

Write your answer in complete sentences.

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________________________________________________________________________
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**CCLS Alignment:** RL.6.3

**Commentary:** This question aligns to CCLS RL.6.3. It asks students to look at a particular event in the beginning of the passage and explain how it affects the unfolding of the story and the development of the character throughout the rest of the passage.

**Rationale:** The response accurately describes Demosthenes’ reaction to the trial (“Demosthenes went home determined to become a lawyer and public speaker”) and then provides evidence that this reaction affected him throughout his life (“He brought suit against his guardians ... he recovered a large part of the property”) and (“He soon acquired great influence in Athens and became one of the ten official orators”).
How does Demosthenes overcome obstacles to reach his goal? Use two details from the passage to support your response.

Write your answer in complete sentences.

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CCLS Alignment: RL.6.1; additional standards may be added after further development.

Commentary: This question aligns to CCLS RL.6.1. It asks students to cite specific textual evidence to explain Demosthenes’ goal, the obstacles in his way, and how he overcame those obstacles.

Rationale: The response accurately describes the steps taken by Demosthenes in order to reach his goal of becoming a great orator (“It is said that to improve his voice he spoke with stones in his mouth,” “To overcome his habit of lifting one shoulder above the other he suspended a sword so that the point would prick his shoulder as he raised it,” “He built an underground room in which he could study,” etc.).
Closely reread the following sentence from lines 7–8 of the passage:

“...but it seemed impossible to leave the island, since every ship that came or went was well guarded by order of the king.”

How does this sentence contribute to the development of the plot of the passage? Use two details from the passage to support your answer.

Write your answer in complete sentences.

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Aligned CCLS: RL.6.5

Commentary: This item aligns to CCLS RL.6.5 because it asks students to analyze how a sentence fits into or impacts the overall development of the passage. Similarly, it challenges a student to look beyond the main idea of the passage, balancing the meaning of what came before the sentence and what followed.

Rationale: The response accurately explains that Daedalus’s motivation for flying was driven by his desire to be free from imprisonment, which eventually leads to his son flying too close to the sun. Appropriate textual evidence includes, but is not limited to, “like a great fledgling, [Daedalus] learned to fly,” “Up they rose, the boy and his father,” “The heat of the sun had melted the wax from his wings,” “He fell like a leaf tossed down the wind,” etc.
In both the *Demosthenes* biography and the *Icarus and Daedalus* myth the main characters exhibit determination in pursuit of their goals. Did determination help both main characters reach their goals, or did it lead them to tragedy? Write an argument for whether you believe determination helped or hurt the two main characters.

In your response, be sure to do the following:

- [ ] describe how determination affected the outcome in *Demosthenes*
- [ ] describe how determination affected the outcome in *Icarus and Daedalus*
- [ ] explain the similarities or differences that exist in the ways determination played into the outcome of both texts
- [ ] use details from both passages in your response

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**Aligned CCLS:** RL.6.9, W.6.1, W.6.4, W.6.8, W.6.9a, and W.6.9b

**Commentary:** This item aligns to CCLS RL.6.9, W.6.1, W.6.4, W.6.8, W.6.9a, and W.6.9b because it asks students to provide evidence from the texts to support written analysis of what the texts say explicitly.

**Rationale:** The response accurately describes how determination affects the outcome of *Demosthenes* and of *Icarus and Daedalus*, giving examples of similarities and differences that exist in the way this determination played into the outcome of both texts. In both texts the characters demonstrate determination. Demosthenes overcomes personal obstacles (his stuttering, soft voice, and odd posture) through determination and persistent hard work (building an underground room to practice speaking without disturbance, practicing speaking with stones in his mouth, reciting amid the roar of the waves, and pricking his shoulder to remind him to keep his posture perfect) to become one of Athens’ ten official orators. Daedalus overcomes the imprisonment of himself and his son, Icarus, on the Island of Crete, by his determination. He demonstrates this by his careful crafting of sea-gull inspired wings and learning to fly with them (like a fledgling bird). The wings were made of feathers and wax, so Daedalus warned young Icarus to be careful and not fly too high into the heavens. But Icarus did fly too high, the wings melted, and he fell to the
water and drowned. The determination of Daedalus did lead him to his successful escape, but he lost his son. In both texts determination leads to the characters’ goals; however, Demosthenes achieves complete success as an orator while Daedalus’s achievement of his goal also leads to tragedy.
Mathematics
Common Core Sample Questions

Grade 6
Domain: Ratios and Proportional Relationships
Item: MC

A grocery store sign indicates that bananas are 6 for $1.50, and a sign by the oranges indicates that they are 5 for $3.00. Find the total cost of buying 2 bananas and 2 oranges.

A $0.85  
B $1.70  
C $2.25  
D $4.50

Key: B

Aligned CCLS: 6.RP.3b, 6.RP.2

Commentary: This question aligns to CCLS 6.RP.3b and 6.RP.2 because students must find the unit price of each banana and each orange to determine the total cost of two of each item.

Rationale: Option B is correct; two bananas cost $0.50 and two oranges cost $1.20. Option A is the sum of the unit price of a banana and the unit price of an orange. Option C is half the sum of the given sale prices. Option D is the sum of the given sale prices.
Domain: Ratios and Proportional Relationships

Item: MC

Jeremy has two 7-foot-long boards. He needs to cut pieces that are 15 inches long from the boards. What is the greatest number of 15-inch pieces he can cut from the two boards?

A 5
B 10
C 11
D 12

Key: B

Aligned CCLS: 6.RP.3d

Commentary: This question aligns to CCLS 6.RP.3d because it assesses a student’s ability to use ratios for converting measurement units and to use reasoning skills and proportional thinking to make sense of the problem.

Rationale: Option B is correct. Converting from feet to inches, the length of one of the boards is $7 \times 12 = 84$ inches. Thus, the largest number of 15-inch-long pieces that Jeremy can cut from one board is 5, because dividing 84 by 15 yields a quotient of 5 and a remainder of 9. It follows that the greatest number of pieces that Jeremy can cut from the two boards is $5 + 5 = 10$. Option A is the number of sections from one board. Options C and D represent miscalculations and/or not understanding the context.
Domain: Ratios and Proportional Relationships
Item: CR

The new floor in the school cafeteria is going to be constructed of square tiles that are either gray or white and in the pattern that appears below:

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[Diagram of the floor pattern]
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**Part A:** What is the ratio of gray tiles to white tiles?

**Answer:** ________________

**Part B:** What is the ratio of white tiles to the total number of tiles in the pattern?

**Answer:** ________________

**Part C:** If the total cost of the white tiles is $12, what is the unit cost per white tile?

**Answer:** $_______________

**Key:**
- **Part A:** 10 to 8, 5:4, or other equivalent ratio
- **Part B:** 8 to 18, 4:9, or other equivalent ratio
- **Part C:** $1.50 per white tile

**Aligned CCLS:** Part A and Part B: 6.RP.1; Part C: 6.RP.2

**Commentary:** This question aligns to CCLS 6.RP.1 and 6.RP.2 as it assesses a student’s ability to apply the concept of ratio in a real-world situation. It requires that the student understand the concept and make sense of the situation.

**Rationale:**
- **Part A:** The correct answer is a ratio of 10 gray tiles to 8 white tiles, or simplified, the ratio will be 5 gray tiles to 4 white tiles.
- **Part B:** The correct answer is a ratio of 8 white tiles to 18 total tiles, or simplified, the ratio will be 4 white tiles to 9 tiles, in total.
- **Part C:** Counting the tiles by color in the pattern above, it is found that there are 8 white tiles. If 8 white tiles cost $12, then the cost per white tile is $1.50.
Domain: Ratios and Proportional Relationships
Item: CR

A clothing store offers a 30% discount on all items in the store.

Part A: If the original price of a sweater is $40, how much will it cost after the discount?

Show your work.

Answer: ____________________

Part B: A shopper bought three of the same shirt and paid $63 after the 30% discount. What was the original price of one of the shirts?

Show your work.

Answer: ____________________

Part C: Every store employee gets an additional 10% off the already discounted price. If an employee buys an item with an original price of $40, how much will the employee pay?

Show your work.

Answer: ____________________

Key:
Part A: $28
Part B: $30
Part C: $25.20

Aligned CCLS: 6.RP.3c

Commentary: This question aligns to CCLS 6.RP.3c because it assesses a student’s ability to work with percents, namely, finding a percent of a quantity in a contextual situation.
Rationale:

**Part A:** The correct answer is $28. Since 30% of 40 is \( \frac{30}{100} \times 40 = 12 \), the cost of the sweater after the 30% discount is $40 – $12 = $28.

**Part B:** The 30% discount means the shopper pays 70% of the price, or 0.7, so \( \frac{63}{7} = \frac{63}{7} \times 100 = 63 \times 100 = 90 \). Since the original price of three shirts is $90, the original price of one shirt would be $30. The correct answer is $30.

**Part C:** The correct answer is $25.20. As shown in Part A’s rationale, applying a 30% discount on an item that originally cost $40 brings the price of the item down to $28. Applying the additional 10% employee discount on the already reduced price will further reduce the price by \( \frac{10}{100} \times 28 = 2.80 \), and so the final price of the item will be $28 – $2.80 = $25.20.
Domain: Expressions and Equations  

Item: MC

Represent the following expression algebraically:

A number, \( x \), decreased by the sum of \( 2x \) and 5

A \((2x + 5) - x\)
B \(x - (2x + 5)\)
C \(x - 2x + 5\)
D \((x + 2x) - 5\)

Key: B

Aligned CCLS: 6.EE.2a, 6.EE.2b

Commentary: This question aligns to CCLS 6.EE.2a and 6.EE.2b because it requires the translation from words to a multi-step algebraic expression. It also requires the conceptualization of part of the expression as a single entity using parentheses.

Rationale: Option B is correct and is consistent with the relationship between the minuend (\(x\)) and subtrahend (\(2x + 5\)). The expression in Option A confuses the minuend and subtrahend, identifying the minuend incorrectly as \((2x + 5)\). The expression in Option C is incorrect and does not take into account the expression the sum of \(2x\) and 5 as a single entity \((2x + 5)\), joined through subtraction. The expression ignores the subtraction of each term in the subtrahend, not just the term \(2x\). The expression in Option D incorrectly identifies the sum of \(x\) and \(2x\) as an expression.
Domain: Expressions and Equations  
Item: MC

The expression $6^3 \times 4^2$ is equivalent to which of the following numerical expressions?

A. $18 \times 8$
B. $(6 \times 4)^5$
C. $24^6$
D. $216 \times 16$

Key: D

Aligned CCLS: 6.EE.1

Commentary: This question aligns to CCLS 6.EE.1 because it assesses a student’s ability to translate mathematical statements that include exponents in equivalent form.

Rationale: Option D is correct. The mathematical expression in Option D correctly interprets the exponential form of each factor: $6^3 = 216$ and $4^2 = 16$. Option A uses exponents as the multiplier. Option B confuses the order of operations. Option C misuses both the base and exponent.
Domain: Expressions and Equations
Item: CR

What is the value of \(2x^3 + 4x^2 - 3x^2 - 6x\) when \(x = 3\)?

Show all work.

Answer: ____________________

Key: 45

Aligned CCLS: 6.EE.2c

Commentary: This question aligns to CCLS 6.EE.2c because it assesses a student’s ability to evaluate an algebraic expression when the variable is defined.

Rationale: Substituting \(x = 3\) into the expression yields \(2(3^3) + 4(3^2) - 3(3^2) - 6(3)\), which simplifies to 45.
Domain: Expressions and Equations
Item: CR

The figure below is a square with dimensions given.

2x – 1 in.

Part A: What is the perimeter of the square in terms of $x$?
Perimeter = __________

Part B: If the length of each side of the square is doubled, what would be the perimeter of this new square, in terms of $x$?
Perimeter = __________

Part C: If $x = 5$, what would be the ratio of the area of the original square to the area of the new square?
Answer: __________________

Key:
Part A: 8$x$ – 4 or 4(2$x$ – 1)
Part B: 16$x$ – 8 or 4(4$x$ – 2)
Part C: 81:324, 1:4, or any equivalent ratio

Aligned CCLS: 6.EE.2a, 6.EE.2c, 6.EE.3, 6.EE.7, 6.RP.1

Commentary: This question aligns to CCLS 6.EE.2a, 6.EE.2c, 6.EE.3, 6.EE.7, and 6.RP.1 because it asseses a student’s understanding of the simplification of algebraic expressions as well as the concept of a ratio and the use of ratio language to describe the relationship between two quantities. While the concept of perimeter and area is assessed at the third-grade level, using the concept within an algebraic form creates an on-grade-level question.
Rationale:

**Part A:** Since the length of each side of the square is $2x - 1$, the perimeter of the square is the sum of the lengths of the sides of the square, or 4 times the length of each side. So the perimeter of the square would be $4(2x - 1) = 8x - 4$.

**Part B:** If the length of each side of the square is doubled, the length of each side of the new square would be $2(2x - 1)$, or $4x - 2$ inches. The perimeter would be 4 times the length of each side, so the perimeter of the new square would be $4(4x - 2) = 16x - 8$.

**Part C:** If $x = 5$, the length of each side of the original square would be 9 inches. The area of the square is equal to $9 \times 9$, or 81 square inches. The length of each side of the new square is 18 inches, so the area of the new square is 324 square inches. The ratio of the area of the original square to the area of the new square is $81:324$ or $\frac{81}{324}$. This could also be represented in simplified form as 1:4, 1 to 4, or $\frac{1}{4}$. 
Domain: Geometry  
Item: MC  

Triangle $PQR$ and triangle $QRS$ have vertices $P(-9,7)$, $Q(4,7)$, $R(4,-3)$, and $S(10,-3)$. 

What is the area, in square units, of quadrilateral $PQRS$ which is formed by the two triangles?

A  30  
B  65  
C  95  
D  190  

Key: C  

Aligned CCLS: 6.G.1, 6.G.3  

Commentary: This question aligns to CCLS 6.G.1 and 6.G.3 because it requires students to determine the length of a side joining points with the same first coordinate or the same second coordinate, and to use these side lengths to find the areas of the two triangles.

Rationale: Option C is correct. Option A is the area of triangle $QRS$. Option B is the area of triangle $PQR$. Option D is the incorrect area of the trapezoid (created by both triangles) mistakenly found by $(6 + 13) \times 10$. 
Find the volume, in cubic feet, of the right rectangular prism pictured below.

A \( \frac{5}{16} \)
B 19
C \( \frac{3}{16} \)
D \( \frac{1}{2} \)

Key: D

Aligned CCLS: 6.G.2

Commentary: This question aligns to CCLS 6.G.2 because it asks students to find the volume of a right rectangular prism with fractional edge lengths.

Rationale: Option D correctly identifies the volume of the prism \( \left( 2 \frac{3}{8} \times 8 \times 3 \frac{1}{2} \right) \). Option A is the area of the front or rear face. Option B is the area of the top or bottom face. Option C is what students might find if they were to work with the whole numbers and fractions separately.
Domain: Geometry
Item: CR

Triangle $ADE$ is inside rectangle $ABCD$. Point $E$ is halfway between points $B$ and $C$ on the rectangle. Side $AB$ is 8 cm and side $AD$ is 7 cm.

Part A: What is the area of triangle $ADE$? Show your work.

Part B: What is the ratio of the area of triangle $ABE$ to the area of triangle $ADE$?

Part C: What is the ratio of the area of triangle $CDE$ to the area of rectangle $ABCD$?

Key:

Part A: 28 sq cm

Part B: 14 to 28, 1:2, or other equivalent answer

Part C: 14 to 56, 1:4, or other equivalent answer
Aligned CCLS: 6.G.1, 6.RP.1

Commentary: This question aligns to CCLS 6.G.1 and 6.RP.1 because it assesses a student’s ability to decompose polygons and use the information given to determine the area of a part of the polygon. The question also assesses a student’s ability to use ratio language to describe a ratio relationship between two quantities.

Rationale:

Part A: Using the formula to find the area of the triangle, the base of triangle $ADE$ is 8 cm and its height is 7 cm. The area is $\frac{1}{2} (7 \times 8) = 28$ sq cm.

Part B: The area of triangle $ABE$ is 14 sq cm and the area of triangle $ADE$ is 28 sq cm. The ratio of the area of triangle $ABE$ to the area of triangle $ADE$ is 14:28, 1:2, or other equivalent ratio.

Part C: The area of triangle $CDE$ is 14 sq cm and the area of rectangle $ABCD$ is 56 sq cm. The ratio of the area of triangle $CDE$ to the area of rectangle $ABCD$ can be represented by 14:56, 1:4, or other equivalent ratio.
A closed box in the shape of a rectangular prism has a length of 13 cm, a width of 5.3 cm, and a height of 7.1 cm.

**Part A:** Draw a net of the box and find its surface area in square centimeters.

**Answer:** ___________________

**Part B:** A smaller box has dimensions that are half the measurements of the original. Find the ratio of the surface area of the original box to the surface area of the smaller box.

**Answer:** ___________________

**Key:**

**Part A:** Answers may vary but should display figures similar to the diagram below:

![Net Diagram](image)

Surface area: \[2(13 \times 5.3) + 2(13 \times 7.1) + 2(5.3 \times 7.1) = 397.66 \text{ cm}^2\]

**Part B:** 4:1

**Aligned CCLS:** 6.G.4, 6.RP.1, 6.RP.2

**Commentary:** This question aligns to CCLS 6.G.4, 6.RP.1, and 6.RP.2 because it asks students to draw and use the net of a solid polyhedron to determine its surface area, and then to find the ratio of this surface area to the surface area of a box with dimensions that are half the size of the original.
Rationale:

Part A: The net can be represented in a variety of configurations, as long as there are four long rectangles all connected with two small rectangles each connected to one of the longer rectangles. The surface area is the sum of the areas of all the faces of the rectangular prism.

Part B: The surface area of the smaller box is 99.415 cm\(^2\). Students may use this measure in a ratio with the surface area of the original box and divide out the common factors. Other valid processes that result in 4:1 are also acceptable.
Fuel efficiency can be measured by how far, in miles, a car can travel using a gallon of gas. The histogram below shows the fuel efficiency levels, in miles per gallon, of 110 cars. What is the closest percentage of cars with an efficiency level greater than or equal to 20 miles per gallon?

![Efficiency Levels of 110 Cars](image)

A 25%

B 36%

C 40%

D 44%

Key: B

Aligned CCLS: 6.SP.4, 6.RP.3c

**Commentary:** This question aligns to CCLS 6.SP.4 and 6.RP.3c because it is about analyzing data from a histogram. In this process, the ability to find a percentage of a quantity is also tested.

**Rationale:** Based on the data shown in the histogram, of the 110 cars considered, there are $25 + 15 = 40$ cars that have efficiency levels greater than or equal to 20 miles per gallon. Thus, the percentage of these cars is

$$\frac{40}{110} = 0.363636... = \frac{36}{100} = 36.36\%.$$ Option B, 36%, is the closest one. Options A and C count the frequency instead of the percentage. Option D is a misread of the histogram.