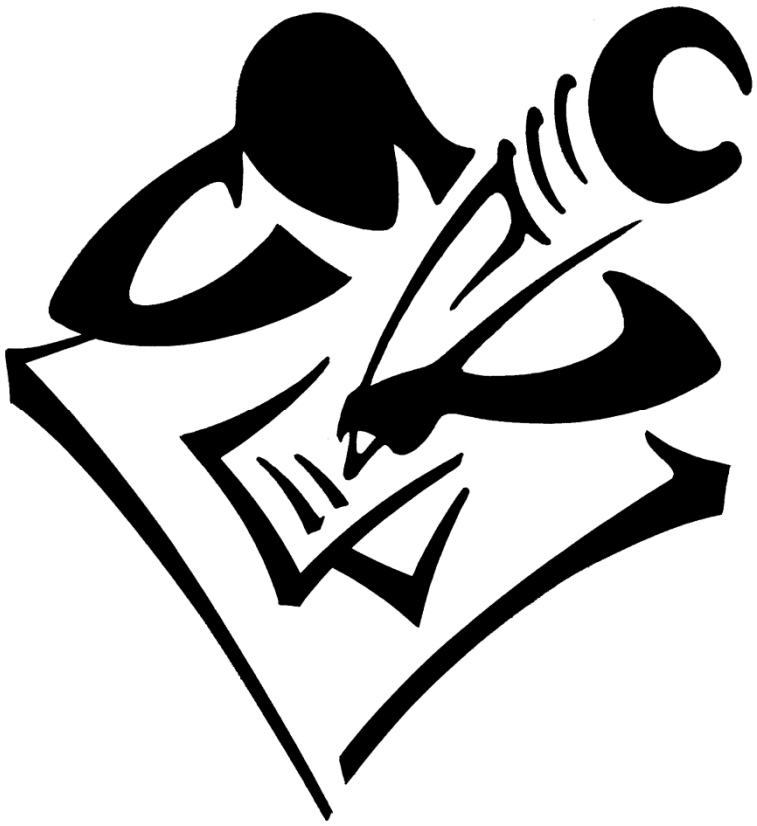
Tennessee Comprehensive Assessment Program

TCAP/CRA 2013



7

Anchor Set

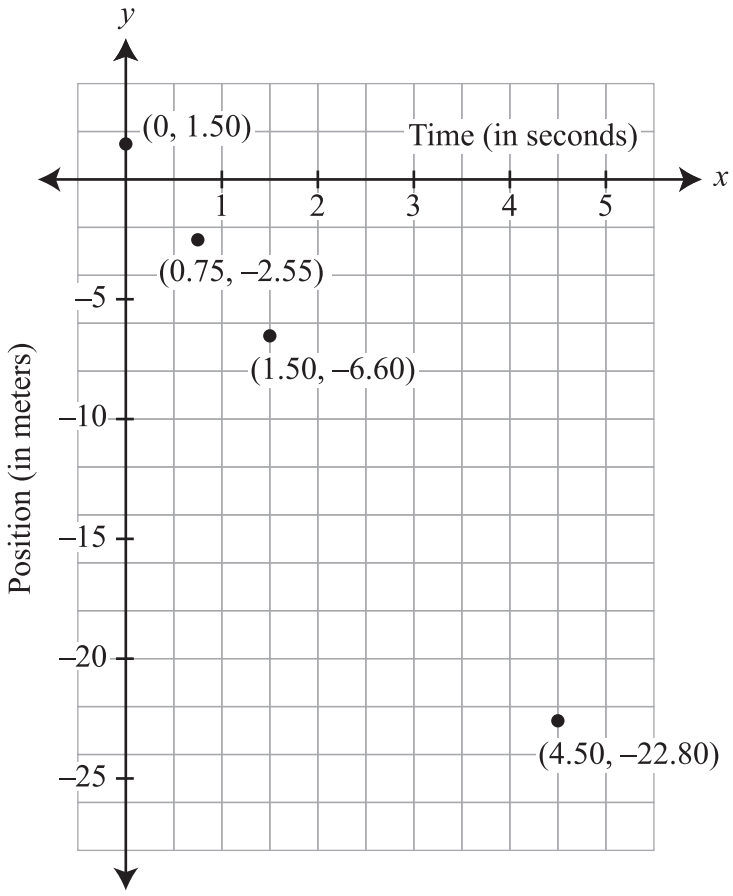
Grade 7 – Scuba Dive Task

SECURE MATERIAL - Reader Name: _____

Tennessee Comprehensive Assessment Program

Scuba Dive Task

Martin is learning to scuba dive. He jumps off a diving platform that is 1.5 meters above the surface of the ocean. The graph shows his position over time.



GO ON TO THE NEXT PAGE

a. The instructor says that when Martin is at a position of –5 meters, it means Martin has dropped a vertical distance of 6.5 meters. Use words and an equation or the graph to explain how the instructor determined the vertical distance.

b. There is a reef located 41.7 meters below the surface of the water. The diving instructor uses the equation $y = 1.5 – 5.4x$ to describe Martin's position with respect to time. Use the equation to determine how long it will take Martin to reach the reef. Show your work.

Scoring Guide

The CCSS for Mathematical Content (2 points)

7.NS.A.1b Interprets the vertical distance 6.5 meters to be the sum of 1.5 and |-5|, where 1.5 meters is the height of the diving platform above the water and 5 meters is the depth of Martin's dive in any of the following ways: _____

- Writing a number sentence (e.g., 1.5 + 5 = 6.5 or 1.5 – (–5) = 6.5) to illustrate this relationship;
- Drawing and labeling vertical segments on the graph to represent the height of the diving platform and the depth of 5 meters, and/or the sum of those two distances;
- Explaining that the instructor is considering the distance from the platform to the water in addition to the distance Martin descends under water. **(1 Point)**

7.EE.B.4a Uses the equation $y = 1.5 – 5.4x$ to find out how long it will take Martin to reach the reef in one of the following ways: _____

- Setting up and solving the equation $–41.7 = 1.5 – 5.4x$ algebraically;
- Using guess and check by evaluating the expression $1.5 – 5.4x$ for several values of x to find the solution;
- Creating a table containing time and depth and extending time by increments until a depth of 41.7 meters is reached. **(1 Point)**

The CCSS for Mathematical Practice (2 points)

MP1 Completes all parts of the problem making connections between the graph, context, and equation. **(1 Point)** _____
(MP1: Make sense of problems and persevere in solving them.)

MP6 Performs all mathematical calculations accurately and uses correct mathematical language and notation, including correct use of the equal sign. **(1 Point)** _____
(MP6: Attend to precision.)

TOTAL POINTS: 4

The CCSS for Mathematical Content Addressed In This Task

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	
7.NS.A.1b	Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
7.EE.B.4a	Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.

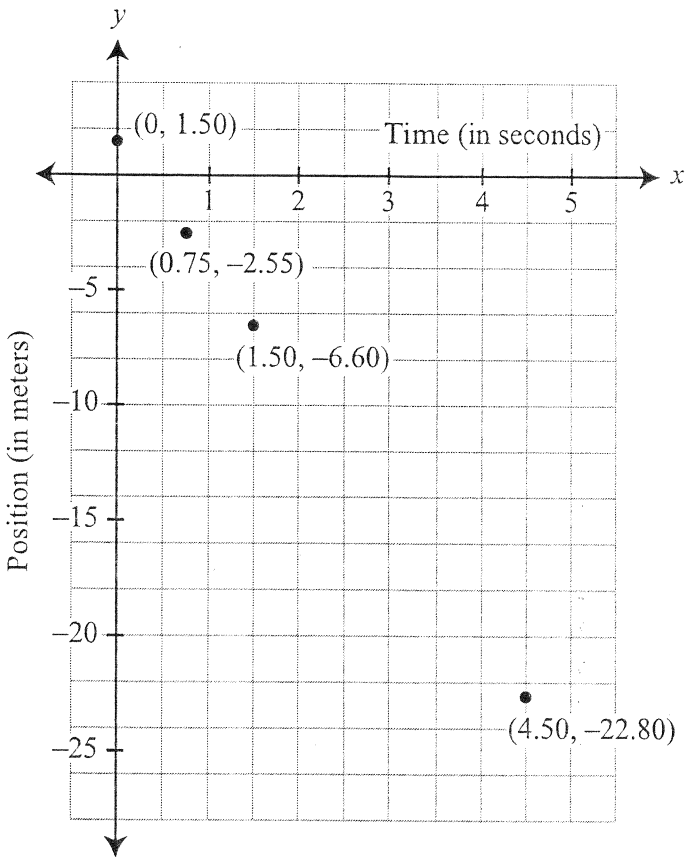
The CCSS for Mathematical Practice*

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

* Gray type indicates Mathematical Practices not addressed in this assessment.

Scuba Dive Task

Martin is learning to scuba dive. He jumps off a diving platform that is 1.5 meters above the surface of the ocean. The graph shows his position over time.



a. The instructor says that when Martin is at a position of –5 meters, it means Martin has dropped a vertical distance of 6.5 meters. Use words and an equation or the graph to explain how the instructor determined the vertical distance.

$1.5 + |-5| = 1.5 + 5 = 6.5$ meters

b. There is a reef located 41.7 meters below the surface of the water. The diving instructor uses the equation $y = 1.5 - 5.4x$ to describe Martin's position with respect to time. Use the equation to determine how long it will take Martin to reach the reef. Show your work.

$y = 1.5 - 5.4x$

$-41.7 = 1.5 - 5.4x$

$-43.2 = -5.4x$

$x = 8$ seconds

Anchor 1 Litho 1001

Total Content Points: 2 (7.NS.A.1b, 7.EE.B.4a)

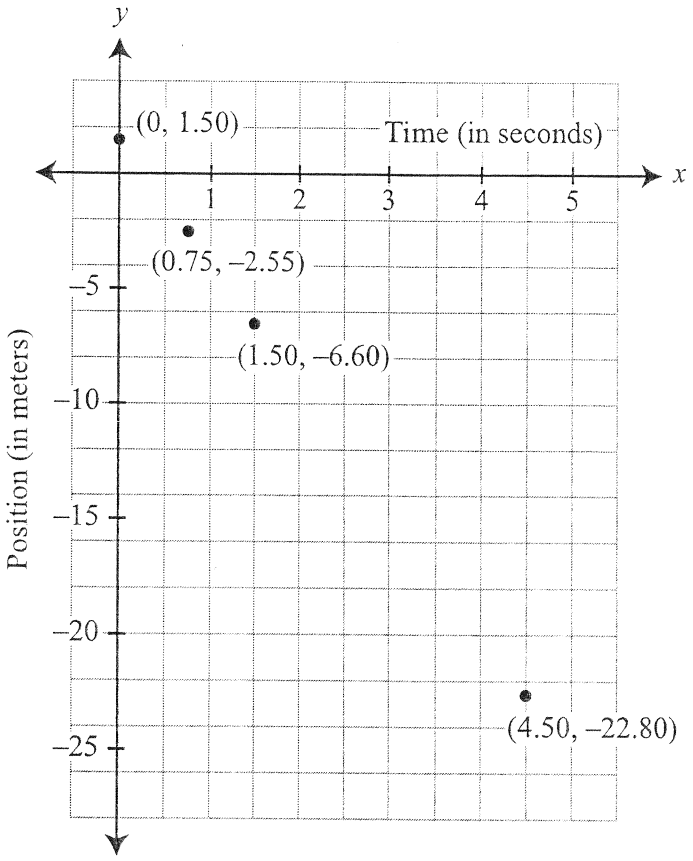
Total Practice Points: 2 (MP1, MP6)

The student writes a number sentence ($1.5 + |–5| = 1.5 + 5 = 6.5$ meters) to explain the instructor's reasoning in Part A (7.NS.A.1b). The student correctly sets up and solves the equation algebraically in Part B (7.EE.B.4a). The student completes all parts of the problem and makes connections between the graph, context, and equation as shown by the correct work in Part B (MP1). All calculations are correct and the mathematical language and notation used is precise (MP6).

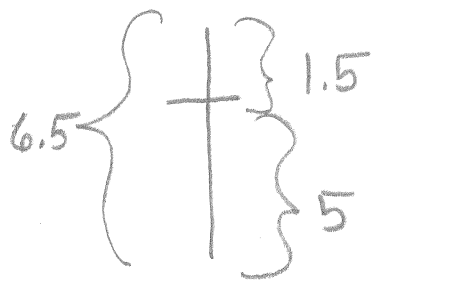
Total Awarded Points: 4 out of 4

Scuba Dive Task

Martin is learning to scuba dive. He jumps off a diving platform that is 1.5 meters above the surface of the ocean. The graph shows his position over time.



a. The instructor says that when Martin is at a position of –5 meters, it means Martin has dropped a vertical distance of 6.5 meters. Use words and an equation or the graph to explain how the instructor determined the vertical distance.



$1.5 + 5 = 6.5$

b. There is a reef located 41.7 meters below the surface of the water. The diving instructor uses the equation $y = 1.5 - 5.4x$ to describe Martin's position with respect to time. Use the equation to determine how long it will take Martin to reach the reef. Show your work.

$$1.5 - 5.4x = -41.7$$
$$-5.4x = -43.2$$
$$x = 8$$

Anchor 2 Litho 1011

Total Content Points: 2 (7.NS.A.1b, 7.EE.B.4a)

Total Practice Points: 1 (MP1)

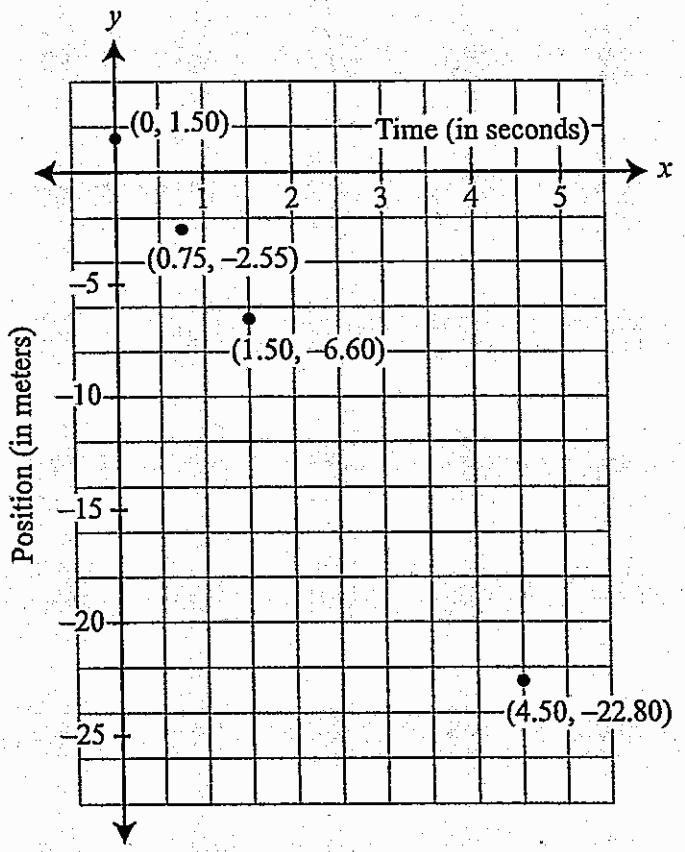
The student draws and labels vertical segments of the graph and uses a number sentence to explain the instructor's reasoning in Part A (7.NS.A.1b). The student correctly sets up and solves the equation algebraically in Part B (7.EE.B.4a). The student completes all parts of the problem and makes connections between the graph, context, and equation (MP1). The lack of labels throughout the response indicates a failure to use correct mathematical language and notation, and therefore indicates a lack of sufficient attention to precision (no credit for MP6).

Total Awarded Points: 3 out of 4

A-3a

2. Scuba Dive Task

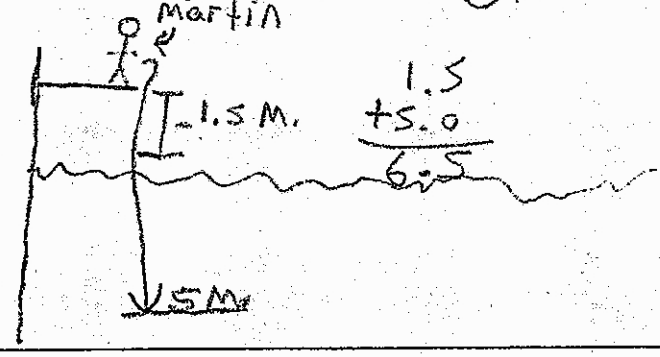
Martin is learning to scuba dive. He jumps off a diving platform that is 1.5 meters above the surface of the ocean. The graph shows his position over time.



A-3b

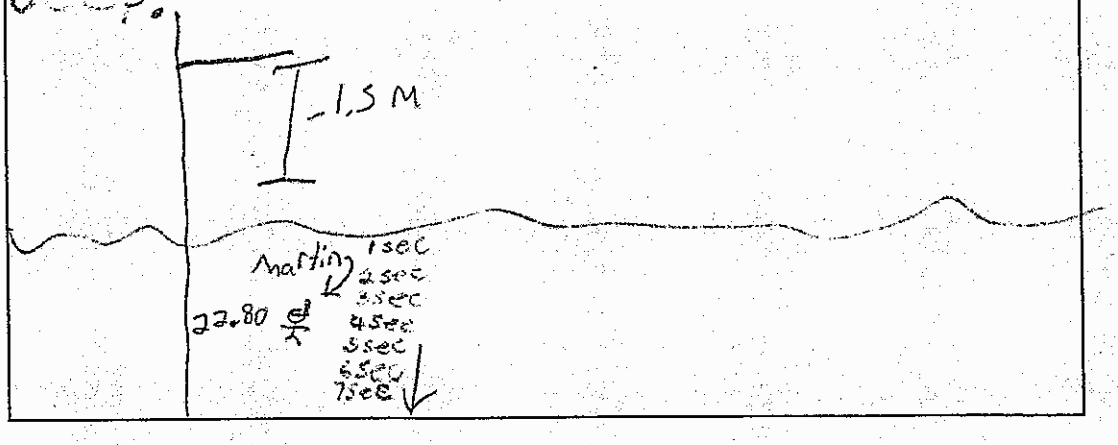
a. The instructor says that when Martin is at a position of –5 meters, it means Martin has dropped a vertical distance of 6.5 meters. Use words and an equation or the graph to explain how the instructor determined the vertical distance.

If he falls 1.5 meters off of the diving board and swims 5 meters below surface, you add 1.5 to the 5 meters he swam, you get 6.5 meters.



b. There is a reef located 41.7 meters below the surface of the water. The diving instructor uses the equation $y = 1.5 - 5.4x$ to describe Martin's position with respect to time. Use the equation to determine how long it will take Martin to reach the reef. Show your work.

It will take Martin about 10 seconds to reach it, Because it takes him 7 1/2 seconds to reach about 23 meters deep.



Anchor 3 Litho 00397200012

Total Content Points: 1 (7.NS.A.1b)

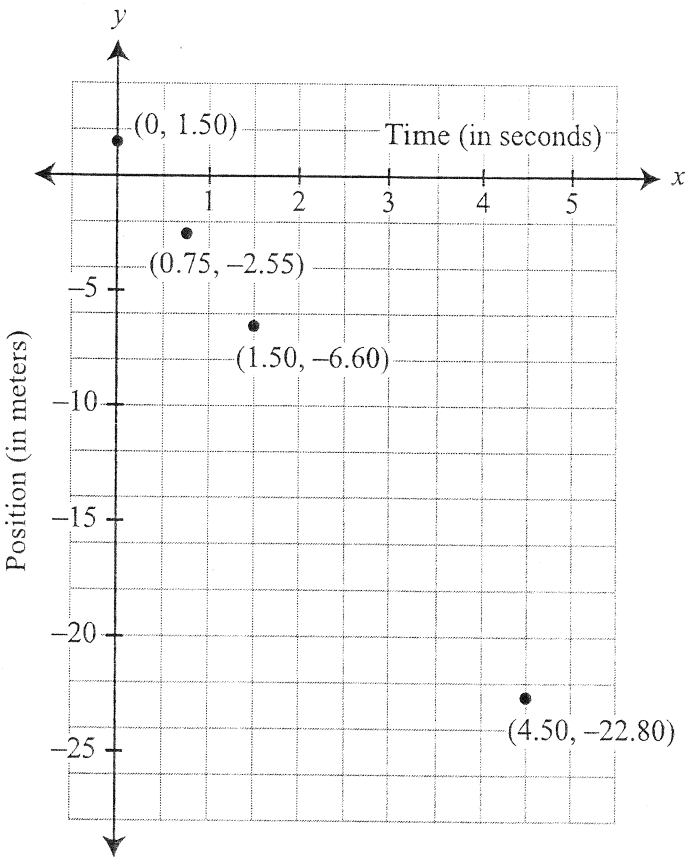
Total Practice Points: 1 (MP1)

The student uses words, a labeled drawing, and a number sentence to explain the instructor's reasoning in Part A (7.NS.A.1b). The student fails to determine the correct answer in Part B (no credit for 7.EE.B.4a). The student completes all parts of the problem, and the reasoning in Part B shows the student recognizes the connections between the graph, context, and equation (MP1). The exact answer is not correctly calculated in Part B, and while the work shown indicates some conceptual understanding, the explanation (about 23meters) and the drawing, which shows iterations to 7 seconds and uses an arrow to indicate completion of the problem, do not indicate sufficient attention to precision (no credit for MP6).

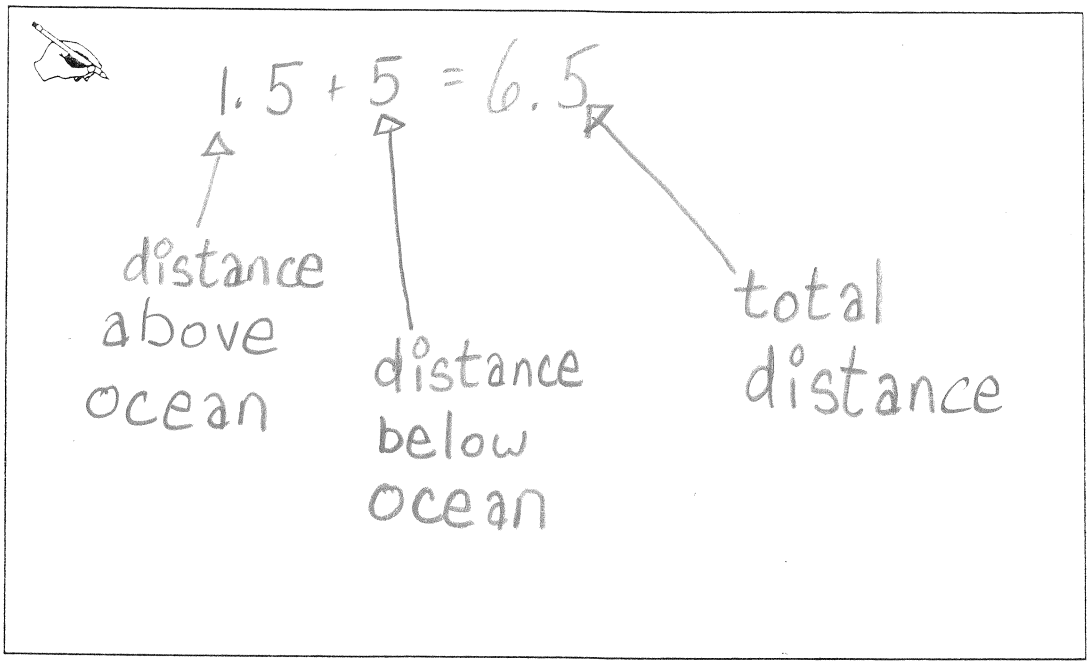
Total Awarded Points: 2 out of 4

Scuba Dive Task

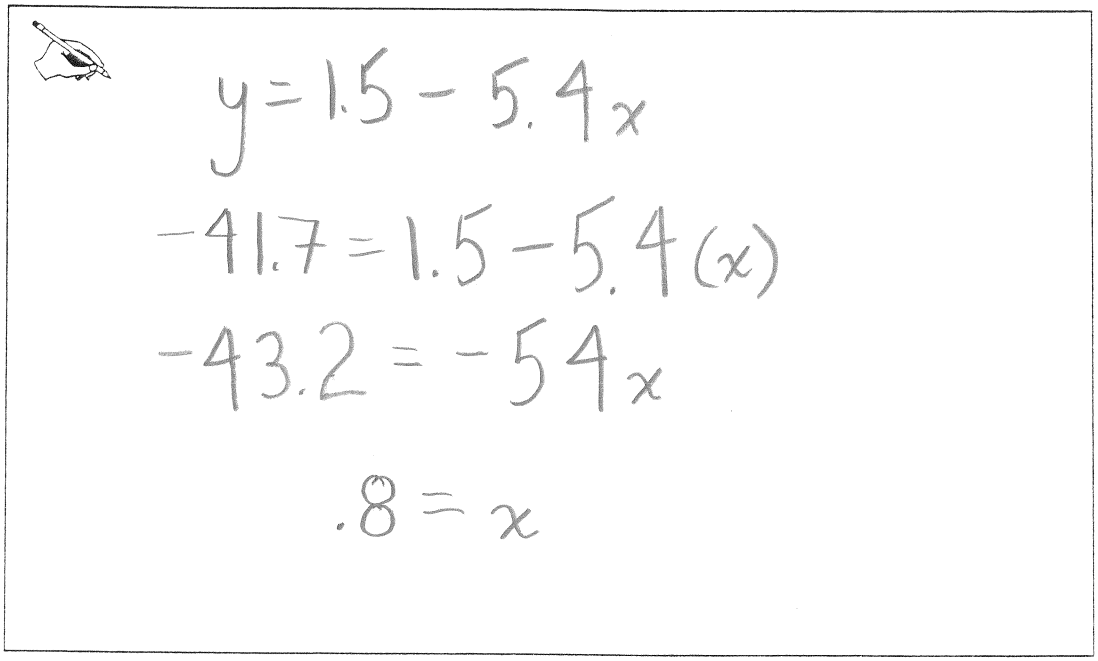
Martin is learning to scuba dive. He jumps off a diving platform that is 1.5 meters above the surface of the ocean. The graph shows his position over time.



a. The instructor says that when Martin is at a position of –5 meters, it means Martin has dropped a vertical distance of 6.5 meters. Use words and an equation or the graph to explain how the instructor determined the vertical distance.



b. There is a reef located 41.7 meters below the surface of the water. The diving instructor uses the equation $y = 1.5 - 5.4x$ to describe Martin's position with respect to time. Use the equation to determine how long it will take Martin to reach the reef. Show your work.



Anchor 4 Litho 1021

Total Content Points: 1 (7.NS.A.1b)

Total Practice Points: 1 (MP1)

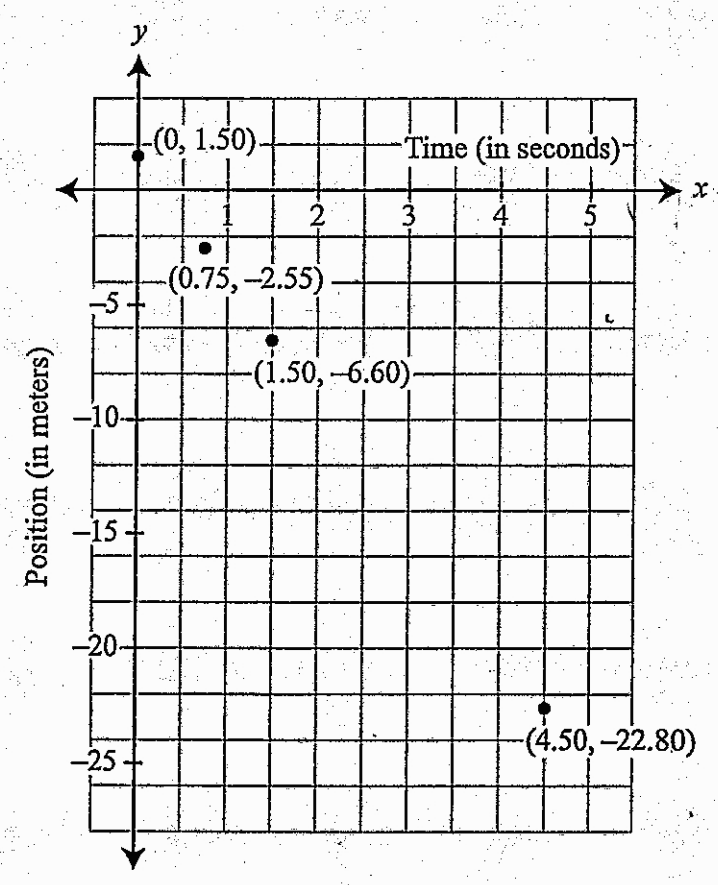
The student writes and labels a number sentence (1.5 + 5 = 6.5) to explain the instructor's reasoning in Part A (7.NS.A.1b). The student sets up the correct equation in Part B, but does not determine the correct answer (no credit for 7.EE.B.4a). The student completes all parts of the problem and makes connections between the graph, context, and equation (MP1). The student misplaces a decimal point while solving the equation in Part B, indicating a lack of precision, and does not label units (no credit for MP6).

Total Awarded Points: 2 out of 4

A-5a

2. Scuba Dive Task

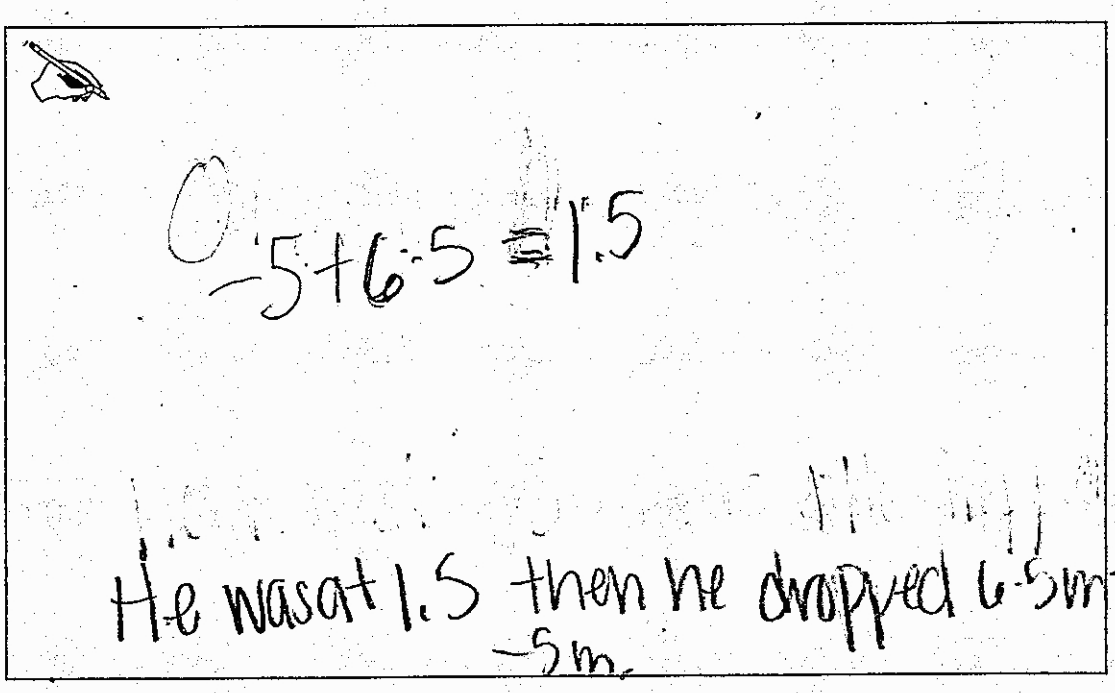
Martin is learning to scuba dive. He jumps off a diving platform that is 1.5 meters above the surface of the ocean. The graph shows his position over time.



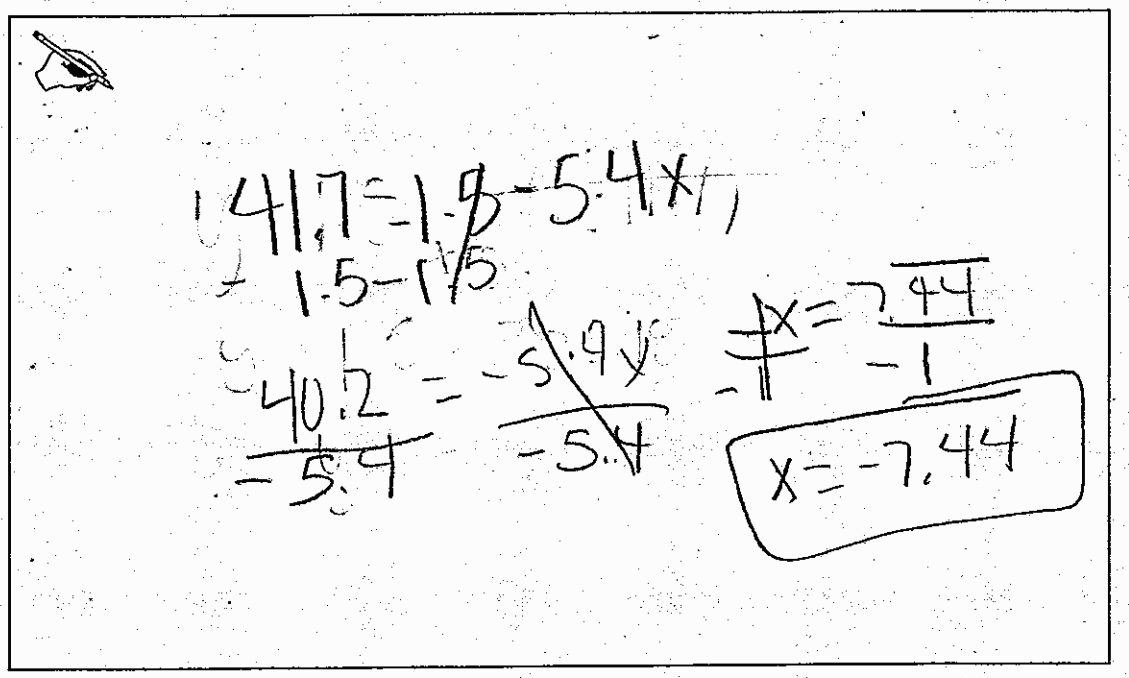
Litho#: 0038

A-5b

a. The instructor says that when Martin is at a position of –5 meters, it means Martin has dropped a vertical distance of 6.5 meters. Use words and an equation or the graph to explain how the instructor determined the vertical distance.



b. There is a reef located 41.7 meters below the surface of the water. The diving instructor uses the equation $y = 1.5 - 5.4x$ to describe Martin's position with respect to time. Use the equation to determine how long it will take Martin to reach the reef. Show your work.



Anchor 5 Litho 0038

Total Content Points: 1 (7.NS.A.1b)

Total Practice Points: 1 (MP6)

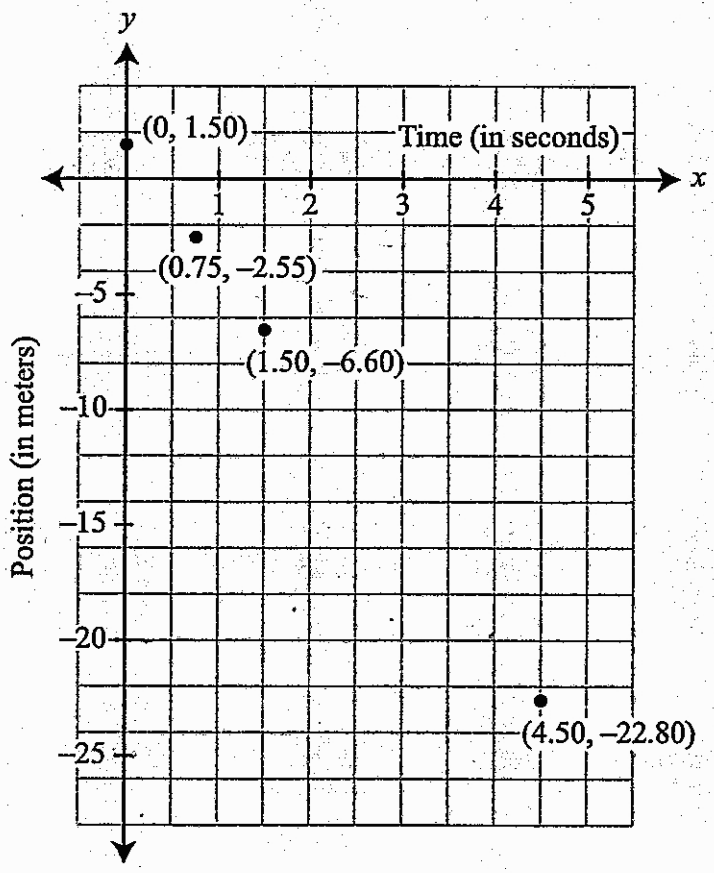
In Part A, the student uses words to adequately explain an otherwise insufficiently clear number sentence that does not have 6.5 as its answer (7.NS.A.1b). The student has incorrectly substituted 41.7 instead of –41.7 for *y* in the equation and therefore does not determine the correct answer in Part B (no credit for 7.EE.B.4a). The student completes all parts of the problem, but the incorrect equation in Part B (positive 41.7 instead of negative) indicates a lack of connections being made between the graph, context, and equation (no credit for MP1). All calculations are correct, and mathematical language and notation is precise, including the correct use of units in Part A (MP6).

Total Awarded Points: 2 out of 4

A-6a

2. Scuba Dive Task

Martin is learning to scuba dive. He jumps off a diving platform that is 1.5 meters above the surface of the ocean. The graph shows his position over time.



A-6b

a. The instructor says that when Martin is at a position of –5 meters, it means Martin has dropped a vertical distance of 6.5 meters. Use words and an equation or the graph to explain how the instructor determined the vertical distance.

the graph shows martin standing 1.5 meters above the ocean surface and then he jumped, that 1.5 meters already, plus with a drop of 5 meters, or you can say a difference ↓ in integers of 1.5 to -5 ✓ = 6.5 meters 6.5

b. There is a reef located 41.7 meters below the surface of the water. The diving instructor uses the equation $y = 1.5 - 5.4x$ to describe Martin's position with respect to time. Use the equation to determine how long it will take Martin to reach the reef. Show your work.

$y = 1.5 - 5.4x$

$y = 1.5 - 5.4(41.7)$ ✓

$y = 1.5 - 225.18$

Anchor 6 Litho 00577200016

Total Content Points: 1 (7.NS.A.1b)

Total Practice Points: 0

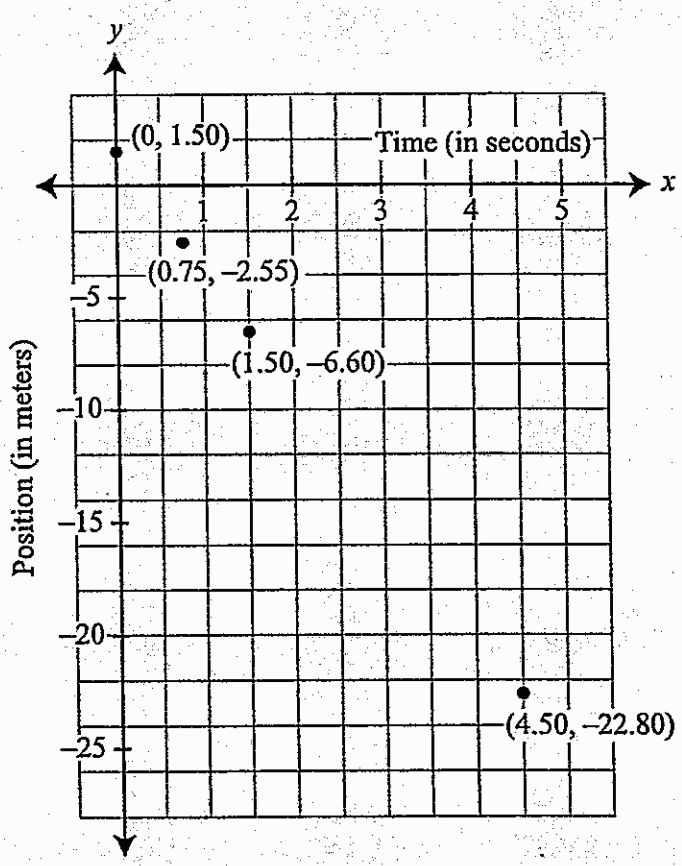
The student uses words to correctly explain the instructor's reasoning in Part A (7.NS.A.1b). The student sets up the equation incorrectly in Part B and does not find the correct answer (no credit for 7.EE.B.4a). The student plugs in the location of the reef in the incorrect part of the equation, demonstrating a lack of understanding of the connection between the graph, context, and equation (no credit for MP1). The student uses imprecise mathematical language in Part A (integers) and leaves the calculations incomplete in Part B (no credit for MP6).

Total Awarded Points: 1 out of 4

A-7a

2. Scuba Dive Task

Martin is learning to scuba dive. He jumps off a diving platform that is 1.5 meters above the surface of the ocean. The graph shows his position over time.



A-7b

a. The instructor says that when Martin is at a position of –5 meters, it means Martin has dropped a vertical distance of 6.5 meters. Use words and an equation or the graph to explain how the instructor determined the vertical distance.

1.5 + 5 = 6.5 meters

b. There is a reef located 41.7 meters below the surface of the water. The diving instructor uses the equation $y = 1.5 - 5.4x$ to describe Martin's position with respect to time. Use the equation to determine how long it will take Martin to reach the reef. Show your work.

He is only 36 meters down He has 41.6 meters to go

Anchor 7 Litho 00277200012

Total Content Points: 1 (7.NS.A.1b)

Total Practice Points: 0

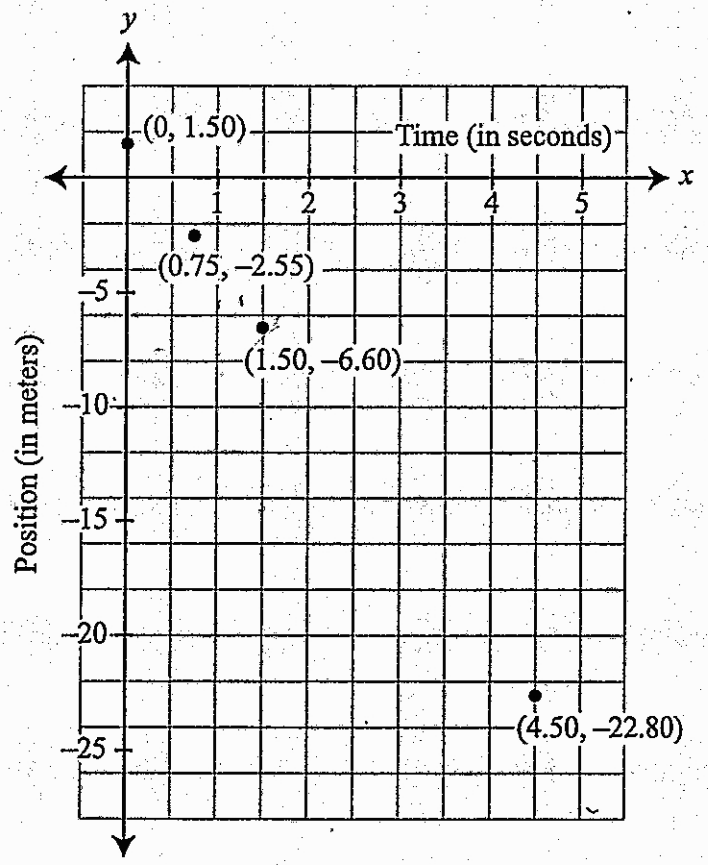
The student correctly uses a number sentence to explain the instructor's reasoning in Part A (7.NS.A.1b). The student does not determine the correct answer in Part B (no credit for 7.EE.B.4a). The student attempts all parts of the problem, but makes no connections between the graph, context, and equation (no credit for MP1). The student does not provide enough work to demonstrate precise mathematical language or notation (no credit for MP6).

Total Awarded Points: 1 out of 4

A-8a

2. Scuba Dive Task

Martin is learning to scuba dive. He jumps off a diving platform that is 1.5 meters above the surface of the ocean. The graph shows his position over time.



Litho#: 0076

A-8b

a. The instructor says that when Martin is at a position of –5 meters, it means Martin has dropped a vertical distance of 6.5 meters. Use words and an equation or the graph to explain how the instructor determined the vertical distance.

He probably took the negative number 5 seconds and multiplied times 1.30m.

1.5+5=6.5

b. There is a reef located 41.7 meters below the surface of the water. The diving instructor uses the equation $y = 1.5 – 5.4x$ to describe Martin's position with respect to time. Use the equation to determine how long it will take Martin to reach the reef. Show your work.

It will take him 8.3 secs.

25:4.5
-41.7:8.3

y=1.5–5.4x

Anchor 8 Litho 0076

Total Content Points: 0

Total Practice Points: 0

In Part A, the student writes a correct number sentence, but the incorrect explanation ("He probably took the he the number 5 seconds and multiplied times 1.50 m") casts doubt on the degree of understanding (no credit for 7.NS.A.1b). The student does not determine the correct answer in Part B (no credit for 7.EE.B.4a). The student attempts all parts of the problem, but makes no connections between the graph, context, and equation (no credit for MP1). The student uses imprecise language in Part A and shows insufficient work in Part B to demonstrate precision (no credit for MP6).

Total Awarded Points: 0 out of 4

A-9a

2. Scuba Dive Task

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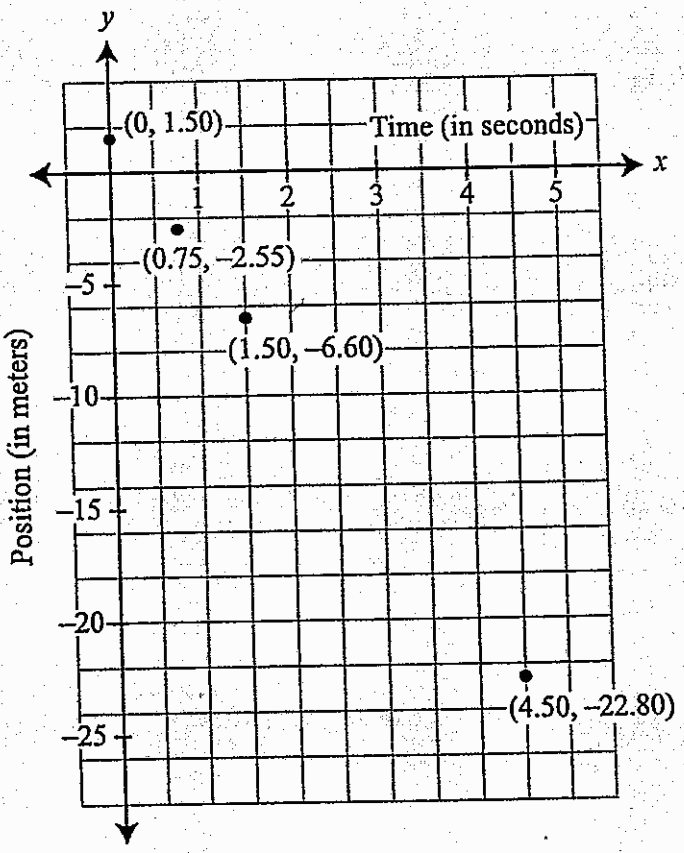


A-9b

a. The instructor says that when Martin is at a position of –5 meters, it means Martin has dropped a vertical distance of 6.5 meters. Use words and an equation or the graph to explain how the instructor determined the vertical distance.

6.5 meters
- 5 meters
1.5 meters

b. There is a reef located 41.7 meters below the surface of the water. The diving instructor uses the equation $y = 1.5 - 5.4x$ to describe Martin's position with respect to time. Use the equation to determine how long it will take Martin to reach the reef. Show your work.

41.7 m

$1.5 - 5.4X = 41.7m$
$1.5 - 5.4 = 3.9$
$3.9 \cdot 41.7 = 162.63$

Anchor 9 Litho 00117200012

Total Content Points: 0

Total Practice Points: 0

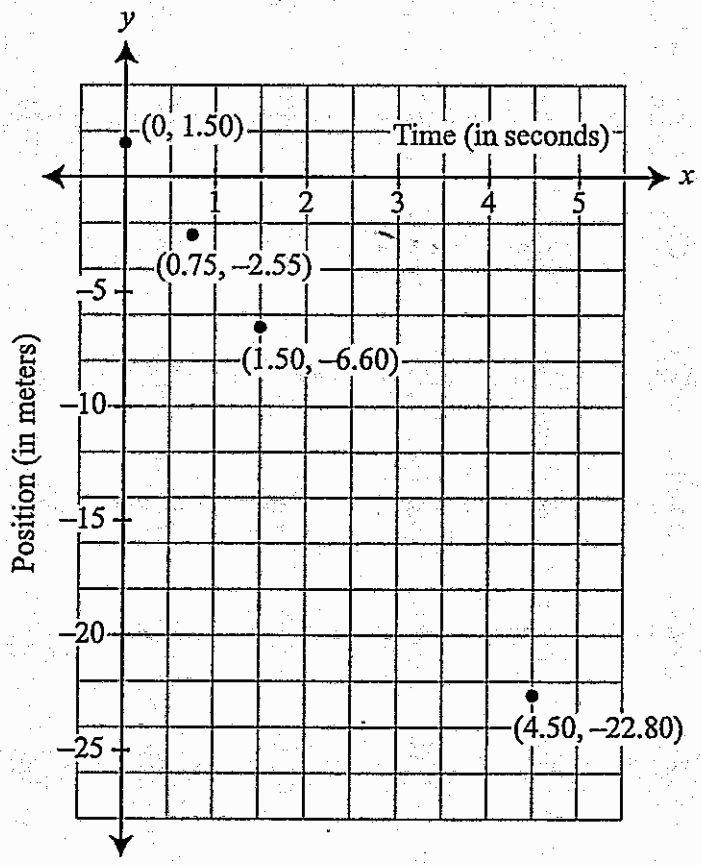
In Part A, the student writes an insufficiently clear number sentence, in which 6.5 is not the answer, and fails to provide any sort of explanation to clarify it (no credit for 7.NS.A.1b). The student sets up and solves the equation incorrectly in Part B (no credit for 7.EE.B.4a). The student attempts all parts of the problem, but makes no connections between the graph, context, and equation (no credit for MP1). The student incorrectly solves the equation in Part B, demonstrating a lack of precision (no credit for MP6).

Total Awarded Points: 0 out of 4

A-10a

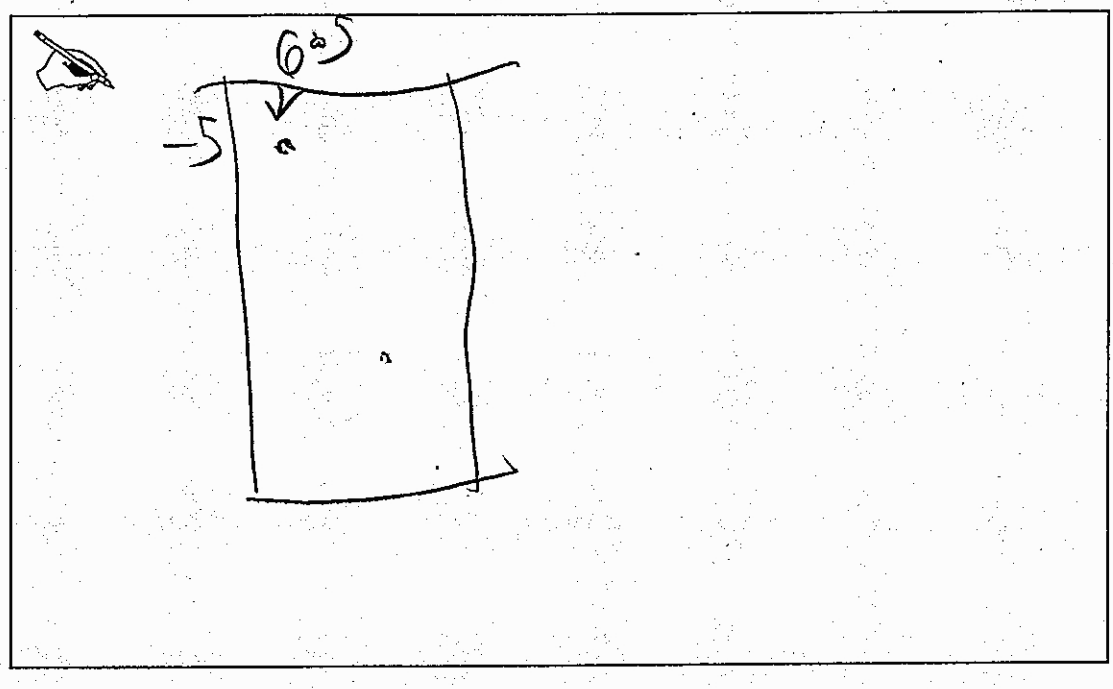
2. Scuba Dive Task

Martin is learning to scuba dive. He jumps off a diving platform that is 1.5 meters above the surface of the ocean. The graph shows his position over time.



A-10b

a. The instructor says that when Martin is at a position of –5 meters, it means Martin has dropped a vertical distance of 6.5 meters. Use words and an equation or the graph to explain how the instructor determined the vertical distance.



b. There is a reef located 41.7 meters below the surface of the water. The diving instructor uses the equation $y = 1.5 - 5.4x$ to describe Martin's position with respect to time. Use the equation to determine how long it will take Martin to reach the reef. Show your work.

it should take him about 8 seconds

Anchor 10 Litho 0060

Total Content Points: 0

Total Practice Points: 0

The student does not provide a valid explanation to justify the instructor's reasoning in Part A (no credit for 7.NS.A.1b). The student gives the correct answer in Part B, but no work is shown (no credit for 7.EE.B.4a). The student does not complete all parts of the problem or make connections between the graph, context, and equation (no credit for MP1). The student provides insufficient work to demonstrate mathematical precision (no credit for MP6).

Total Awarded Points: 0 out of 4