



# The Pennsylvania System of School Assessment

## Mathematics Item and Scoring Sampler

# SUPPLEMENT

2009–2010  
Grade 11

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# MATHEMATICS

## ***INTRODUCTION***

The 2009–2010 Mathematics Item and Scoring Sampler Supplement displays released items from the 2009 PSSA operational test. The sampler supplement is to be used in conjunction with the previous year’s item sampler. The 2008–2009 Mathematics Item and Scoring Sampler can be found on the Pennsylvania Department of Education website at <http://www.pde.state.pa.us/>. Select the “Pre K–12 Schools” tab at the top of the page. Then select “Assessment” in the “Learn About” column to the left. Select “Resource Materials” in the “Learn About” column of the next page, and then scroll down to find the appropriate sampler. Alternately, you may type in or click this link to reach the location of the item samplers:

[http://www.pde.state.pa.us/a\\_and\\_t/cwp/view.asp?a=108&Q=73314&a\\_and\\_tNav=680&a\\_and\\_tNav=](http://www.pde.state.pa.us/a_and_t/cwp/view.asp?a=108&Q=73314&a_and_tNav=680&a_and_tNav=)

This item and scoring sampler supplement contains 16 mathematics multiple-choice items and 1 open-ended item. Each item is preceded by the Assessment Anchor and Eligible Content coding. The majority of multiple-choice answer options are followed by a brief analysis or rationale. The correct answer is indicated by an asterisk. The table following each multiple-choice item displays the percentages of students who chose each answer option. The correct answer is also shaded in these tables. The table following the open-ended item indicates the students’ performance for each scorepoint. Sample student responses for each of the scoring levels are also included for the open-ended item.

# MATHEMATICS

## MULTIPLE-CHOICE ITEMS

Note: All percentages listed in the tables below the items have been rounded.

### A.1.1.2

1. What is  $4.31 \times 10^{-5}$  expressed in standard form?

A 0.00431

*counted five digits after decimal*

B 0.000431

*missed one decimal place*

C 0.0000431 \*

D 0.00000431

*put five zeros after decimal*

A	B	C	D
6%	7%	81%	7%

During an assessment, students would not be permitted to use a calculator on item 2.

### A.2.2.1

2. Simplify:

$$(\sqrt{5})^{-4}$$

A -100

*opposite of 5 squared, multiplied by 4*

B -25

*opposite of square root of 5 raised to the 4th power*

C  $\frac{1}{100}$

*reciprocal of 5 squared, multiplied by 4*

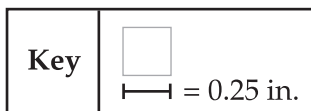
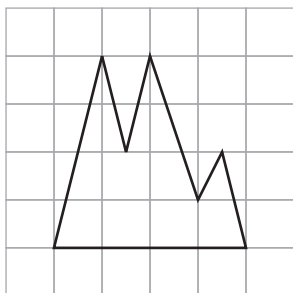
D  $\frac{1}{25}$  \*

A	B	C	D
11%	23%	16%	50%

# MATHEMATICS

## B.2.2.3

Use the figure below to answer question 3.



3. Which is the closest estimate of the perimeter of the figure?

A 1 in. *estimated area, not perimeter*

B 4 in. \*

C 10 in. *estimated area by counting grid squares*

D 18 in. *counted number of segments within squares, around the figure*

A	B	C	D
13%	64%	15%	8%

## B.2.3.1

4. The length of the base of a triangle is tripled. The height remains unchanged. By what factor is the area of the triangle increased?

A 2 *confused tripling with doubling*

B 3 \*

C 6 *doubled the multiplication factor using 2 from  $A = 1/2bh$*

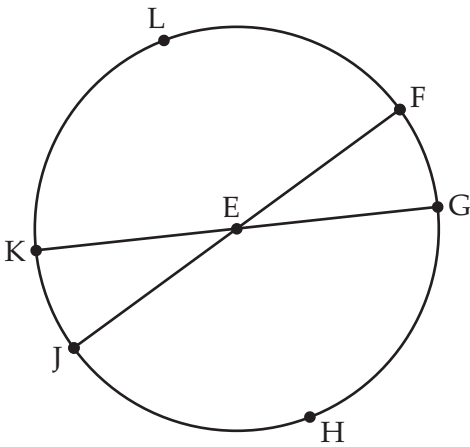
D 9 *squared the multiplication factor*

A	B	C	D
10%	69%	13%	8%

# MATHEMATICS

## C.1.1.2

5. Circle E is shown below.



The measure of  $\widehat{GH}$  is  $(5x - 50)^\circ$ .

The measure of  $\widehat{KLF}$  is  $(3x + 30)^\circ$ .

What is the measure of  $\angle KEF$ ?

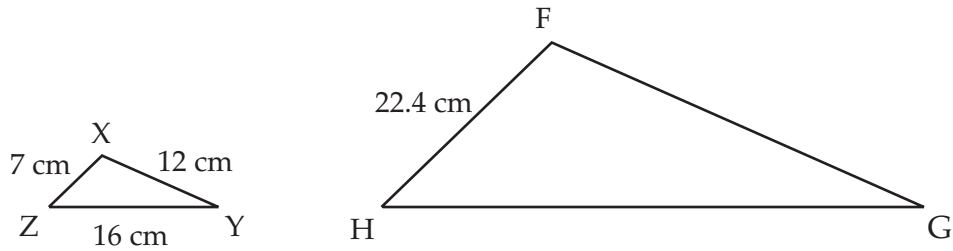
- A  $40^\circ$  *found value of x only*
- B  $75^\circ$  *thought  $\angle KEF$  was inscribed and took half of arc measure*
- C  $105^\circ$  *added arc measures and set equal to 180; used  $3x + 30$  to find angle measure*
- D  $150^\circ$  \*

A	B	C	D
20%	9%	13%	58%

# MATHEMATICS

## C.1.3.1

6. In the diagram below, triangle XYZ is similar to triangle FGH.



What is the length of  $\overline{FG}$ ?

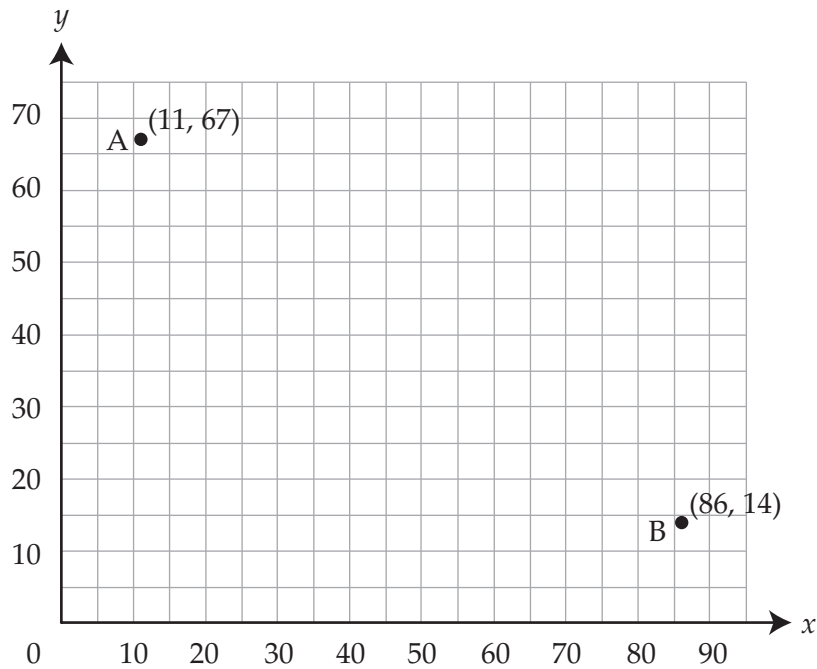
- A 27.4 cm  $7 + 5 = 12$ , so added 5 to 22.4
- B 31.4 cm  $7 + 9 = 16$ , so added 9 to 22.4
- C 38.4 cm \*
- D 51.2 cm *length of segment HG*

A	B	C	D
21%	7%	67%	4%

# MATHEMATICS

## C.3.1.1

7. Mike's computer screen contains the 2 points shown below.



Mike graphs a point on the screen that is exactly halfway between point A and point B. What point does Mike graph?

A (37.5, 26.5)  $\left(\frac{86 - 11}{2}, \frac{67 - 14}{2}\right)$

B (39, 50)  $\left(\frac{11 + 67}{2}, \frac{86 + 14}{2}\right)$

C (43, 33.5)  $\left(\frac{86}{2}, \frac{67}{2}\right)$

D (48.5, 40.5) \*

A	B	C	D
10%	10%	10%	69%

# MATHEMATICS

## D.1.1.1

8. Amy is performing a biology experiment. The table below shows a relationship between the temperature ( $t$ ) and number of bacteria in an experiment ( $n$ ).

$t$	$n$
4	10
8	12
12	14
16	16
20	18

Which equation describes the relationship?

- A  $n = \frac{1}{4}t + 9$  *only used first data point*
- B  $n = \frac{1}{2}t + 8$  \*
- C  $n = 2t + 2$  *used  $n$  increase of 2 with first data point*
- D  $n = 4t - 6$  *used  $t$  increase of 4 with first data point*

A	B	C	D
5%	76%	13%	5%

## D.2.1.3

9. An office supply store will enlarge photographs for \$1.25 per photograph plus a service fee of \$3. Which equation describes the total cost ( $c$ ) to enlarge  $p$  photographs?

- A  $c = 1.25p$  *ignored service fee*
- B  $c = 4.25p$  *added service fee and per-photograph charge*
- C  $c = 3p + 1.25$  *reversed variables in equation*
- D  $c = 1.25p + 3$  \*

A	B	C	D
3%	7%	7%	83%

# MATHEMATICS

## D.2.2.3

10. Simplify:

$$\frac{4x^4 - 8x^2}{2x^3}; x \neq 0$$

A  $2x - 4$  *for second term, simplified  $8x^2 / 2x^2$*

B  $2x^2 - 4$  *used  $(4x^4 - 8x^2) / 2x^2$*

C  $2 - \frac{4}{x}$  *dropped  $x$  after correctly simplifying  $x^2 / x^3$*

D  $2x - \frac{4}{x}$  \*

A	B	C	D
19%	28%	13%	40%

## D.3.1.1

11. A backpack cost \$17. Four years later the same type of backpack cost \$23. What was the backpack's average yearly increase in cost?

A \$ 1.50 \*

B \$ 4.25  $17 / 4$

C \$ 6.00  $23 - 17$

D \$20.00  $(17 + 23) / 2$

A	B	C	D
83%	3%	13%	1%

## D.3.2.2

12. Which equation describes the line passing through the points (2, 6.5) and (7, 22.75)?

A  $y = -3.25x$  *negative slope rather than positive*

B  $y = -0.31x$  *line that passes through (6.5, -2) and (22.75, -7)*

C  $y = 0.31x$  *slope of a line that passes through (6.5, 2) and (22.75, 7)*

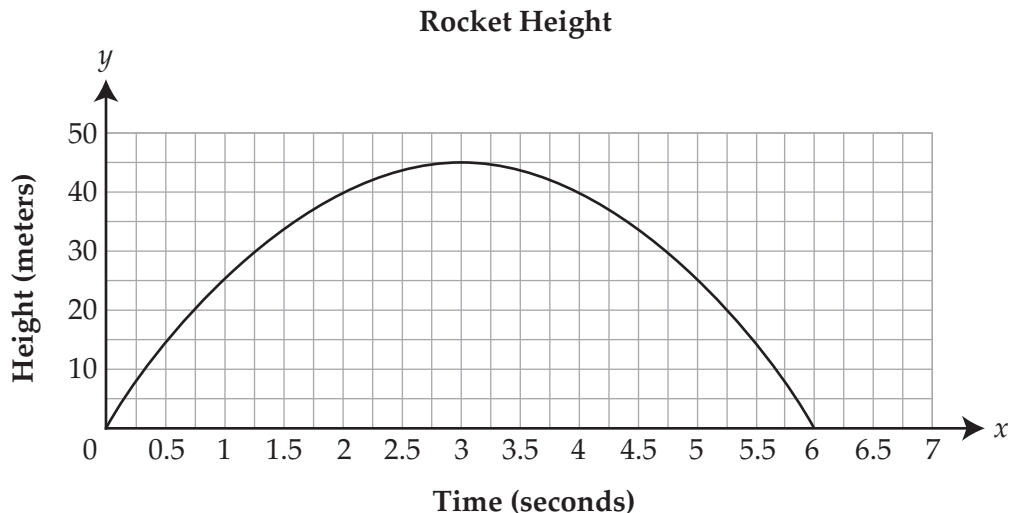
D  $y = 3.25x$  \*

A	B	C	D
9%	9%	15%	67%

# MATHEMATICS

## D.4.1.1

13. A water-powered rocket is launched. The graph below shows the relationship between the height of the rocket ( $y$ ) and the number of seconds since it was launched ( $x$ ).



Which table shows the relationship?

A

$x$	0	0.5	1.25	3	4.25	5.5	6
$y$	0	15	30	45	30	15	0

4.25 is not on graph

B

$x$	0	1	2	3	4	5	6
$y$	0	25	40	45	50	55	60

first 4 points are correct, then  $y$ -values increase by 5

C

$x$	0	0.5	1.25	3	4.25	5.5	6
$y$	0	15	30	45	60	75	90

first 4 points are correct, then  $y$ -values increase in a linear fashion (+15)

D

$x$	0	1	2	3	4	5	6
$y$	0	25	40	45	40	25	0

\*

A	B	C	D
26%	4%	5%	65%

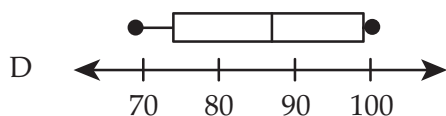
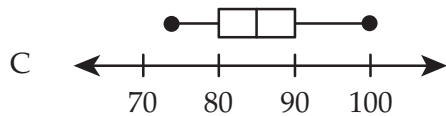
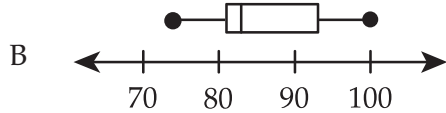
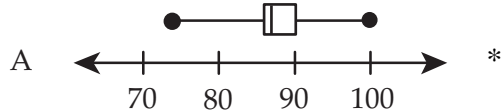
# MATHEMATICS

## E.1.1.1

14. Jamal's scores from 12 rounds of golf are shown below.

74, 81, 85, 87, 87, 87, 87, 88, 89, 91, 93, 99

Which box-and-whisker plot **best** represents Jamal's scores?



A	B	C	D
45%	13%	18%	25%

## E.4.1.1

15. The table below shows how each student on an academic team has performed in competitions this year.

Academic Team Performance

Student	Number of Questions Attempted	Number of Correct Responses
Ben	420	212
Carol	440	176
Jude	210	168
Kate	310	217

The student with the greatest probability of answering a question correctly based on the table will be selected to answer a tie-breaking question. Which student will be selected?

- A Ben *large number attempted and with slightly more than half correct*
- B Carol *largest number attempted, but only 40% accurate*
- C Jude \*
- D Kate *largest number of correct responses, but only 70% accurate*

A	B	C	D
6%	10%	69%	16%

# MATHEMATICS

## E.4.2.2

16. A researcher gathered data to predict the number of new types of plants ( $y$ ) that will be in a state park after  $x$  years. After making a scatter plot of the data, she determined the equation of a line of best fit. The equation is shown below.

$$y = 0.25x + 8$$

Based on the equation, what is the number of new types of plants that will be in the park after 24 years?

- A 8
- B 14 \*
- C 32
- D 64

A	B	C	D
7%	78%	9%	6%

# MATHEMATICS

## OPEN-ENDED ITEM

### D.2

17. Patrika wants to join 1 of 2 gyms near her home. Each gym charges an enrollment fee for joining the gym and a monthly membership fee, as shown below.

Sport Gym	
Enrollment Fee:	\$55
Monthly Fee:	\$30

City Gym	
Enrollment Fee:	\$95
Monthly Fee:	\$25

- A. Calculate the cost of a **1-year** membership at **each** gym. Show all your work.

- B. Write an equation for each gym's membership plan that describes the relationship between the number of months of membership ( $x$ ) and the total cost ( $y$ ).

**GO TO THE NEXT PAGE TO FINISH THE QUESTION.**

# MATHEMATICS

17. *Continued.* Please refer to the previous page for task explanation.

- C. Determine the number of months at which the total cost of membership at each gym will be the same amount of money. Show all your work. Explain why you did each step.

Score Point 4	Score Point 3	Score Point 2	Score Point 1	Score Point 0
33%	15%	24%	18%	10%

# MATHEMATICS

## ITEM-SPECIFIC SCORING GUIDELINE

### Item #17

This item is reported under Category D, Algebraic Concepts.

#### Assessment Anchor:

D.2– Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

#### Specific Eligible Content addressed by this item:

D.2.1.3– Write, solve, and/or apply a linear equation (including problem situations).

#### Scoring Guide:

Score	In response to this item, the student—
4	demonstrates a <i>thorough</i> understanding of how to write and/or solve a linear equation from given problem situations by correctly solving problems and clearly explaining procedures.
3	demonstrates a <i>general</i> understanding of how to write and/or solve a linear equation from given problem situations by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	demonstrates a <i>partial</i> understanding of how to write and/or solve a linear equation from given problem situations by correctly performing a significant portion of the required task.
1	demonstrates <i>minimal</i> understanding of how to write and/or solve a linear equation from given problem situations.
0	The response has given no correct answer and <i>insufficient</i> evidence to demonstrate any understanding of the mathematical concepts and procedures as required by the task. Response may show only information copied from the question.
Non-scorable	BLK (blank)... Blank, entirely erased, or written refusal to respond OT.....Off task IL..... Illegible LOE..... Response in a language other than English

# MATHEMATICS

Item #17

**Top Scoring Response:**

Part A Answer	Support
Sport Gym: \$415 City Gym: \$395	Sport Gym: $55 + 30 \cdot 12$ $55 + 360$ 415  <b>OR</b> equivalent work  City Gym: $95 + 25 \cdot 12$ $95 + 300$ 395

**(1 score point)**

0.5 point for **each** correct answer and work

Part B Answer
Sport Gym: $y = 55 + 30x$ City Gym: $y = 95 + 25x$  <b>OR</b> equivalent equations

**(1.5 score points)**

1.5 points for 2 correct equations

Part C Answer	Support
8 (months)	$55 + 30x = 95 + 25x$ $5x = 40$ $x = 8$  <b>OR</b> equivalent work  <b>Sample Explanation (1):</b> To determine the number of months it takes for the total membership costs to be the same amount, I set the equations I wrote in part B equal to each other and then solved for $x$ . Since $x = 8$ , it will be 8 months of membership when the costs are the same.  <b>Sample Explanation (2):</b> (a) To determine the number of months (for total membership costs to be equal) I set the equations in B equal to each other. (b) To combine like terms I subtracted $25x$ from both sides and I subtracted 55 from both sides. (c) To find the value of $x$ , I divided both sides by 5.

**(1.5 score points)**

0.5 point for correct answer  
 0.5 point for correct work  
 0.5 point for complete explanation

# MATHEMATICS

## OPEN-ENDED ITEM RESPONSES

### D.2 Response Score: 4

17. Patrika wants to join 1 of 2 gyms near her home. Each gym charges an enrollment fee for joining the gym and a monthly membership fee, as shown below.

Sport Gym
Enrollment Fee: \$55
Monthly Fee: \$30

City Gym
Enrollment Fee: \$95
Monthly Fee: \$25

- A. Calculate the cost of a 1-year membership at **each** gym. Show all your work.

$$\begin{array}{l} \text{Sport Gym} \\ 55 + 12 \cdot 30 = \boxed{\$415} \\ \hline \text{City Gym} \\ 95 + 12 \cdot 25 = \boxed{\$395} \end{array}$$

The student has given two correct answers.  
The student has shown correct work.

- B. Write an equation for each gym's membership plan that describes the relationship between the number of months of membership ( $x$ ) and the total cost ( $y$ ).

$$\begin{array}{l} \text{Sport Gym : } y = 30x + 55 \\ \text{City Gym : } y = 25x + 95 \end{array}$$

The student has given two correct equations.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

17. *Continued.* Please refer to the previous page for task explanation.

- C. Determine the number of months at which the total cost of membership at each gym will be the same amount of money. Show all your work. Explain why you did each step.

$$25x + 95 = 30x + 55$$

$$5x = 40$$

$$x = 8$$

8 months

By setting the equations derived in part B equal, the total costs are made equal. Then, solving for  $x$  will determine how many months will be needed to make that statement true.

The student has given a correct answer.  
The student has shown correct work.  
The student has given a complete explanation.

# MATHEMATICS

## D.2 Response Score: 3

17. Patrika wants to join 1 of 2 gyms near her home. Each gym charges an enrollment fee for joining the gym and a monthly membership fee, as shown below.

Sport Gym
Enrollment Fee: \$55
Monthly Fee: \$30

City Gym
Enrollment Fee: \$95
Monthly Fee: \$25

- A. Calculate the cost of a 1-year membership at **each** gym. Show all your work.

$$55 + 12(30) = \\ \$415 = \text{Sport Gym}$$

$$95 + 12(25) = \\ \$395 = \text{City Gym}$$

The student has given two correct answers.  
The student has shown correct work.

- B. Write an equation for each gym's membership plan that describes the relationship between the number of months of membership ( $x$ ) and the total cost ( $y$ ).

Sport Gym:

$$55 + 30(x) = y$$

City Gym:

$$95 + 25(x) = y$$

The student has given two correct equations.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

17. *Continued.* Please refer to the previous page for task explanation.

- C. Determine the number of months at which the total cost of membership at each gym will be the same amount of money. Show all your work. Explain why you did each step.

$$\text{Sport Gym: } 55 + 30(x) = ?$$

$$\text{City Gym: } 95 + 25(x) = ?$$

$$55 + 30(x) = 95 + 25(x)$$

$$30x - 25x = 95 - 55$$

$$\frac{5x}{5} = \frac{40}{5}$$

$$x = 8 \text{ months}$$

$$x = 8 \text{ months}$$

★ 8 months at both gym will equal \$295

The student has given a correct answer.  
The student has shown correct work.  
The student has given no explanation.  
Based on PSSA scoring rules, 3½ points count as 3 points.

# MATHEMATICS

## D.2 Response Score: 3

17. Patrika wants to join 1 of 2 gyms near her home. Each gym charges an enrollment fee for joining the gym and a monthly membership fee, as shown below.

Sport Gym
Enrollment Fee: \$55
Monthly Fee: \$30

City Gym
Enrollment Fee: \$95
Monthly Fee: \$25

- A. Calculate the cost of a 1-year membership at **each** gym. Show all your work.

$$\begin{array}{l} \text{Sport:} \\ \hline 55 + 30(12) \quad (\$415) \\ \\ \text{City} \\ \hline 95 + 25(12) \quad (\$395) \end{array}$$

The student has given two correct answers.  
The student has shown correct work.

- B. Write an equation for each gym's membership plan that describes the relationship between the number of months of membership ( $x$ ) and the total cost ( $y$ ).

$$\begin{array}{l} \text{Sport} \\ \hline y = 30x + 55 \\ \\ \text{City} \\ \hline y = 25x + 95 \end{array}$$

The student has given two correct equations.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

# MATHEMATICS

17. *Continued.* Please refer to the previous page for task explanation.

- C. Determine the number of months at which the total cost of membership at each gym will be the same amount of money. Show all your work. Explain why you did each step.

Month	Sport	City
1	85	120
2	115	145
3	145	170
4	175	195
5	205	220
6	245	245
7	265	270
★ (8) ★	295	295
9	325	320
10	355	345
11	385	370
12	405	395

On the 8<sup>th</sup> month the fee or total cost will be the same at \$295.

The student has given a correct answer.  
 The student has shown correct work.  
 The student has given no explanation.  
 Based on PSSA scoring rules, 3½ points count as 3 points.

# MATHEMATICS

## D.2 Response Score: 2

17. Patrika wants to join 1 of 2 gyms near her home. Each gym charges an enrollment fee for joining the gym and a monthly membership fee, as shown below.

Sport Gym
Enrollment Fee: \$55
Monthly Fee: \$30

City Gym
Enrollment Fee: \$95
Monthly Fee: \$25

- A. Calculate the cost of a 1-year membership at **each** gym. Show all your work.

$$\text{Sports Gym} = 55 + (12)30 = \$415$$

$$\text{City Gym} = 95 + (12)25 = \$395$$

The student has given two correct answers.  
The student has shown correct work.

- B. Write an equation for each gym's membership plan that describes the relationship between the number of months of membership ( $x$ ) and the total cost ( $y$ ).

$$y = \text{Enrollment Fee} + \text{Monthly Fee}(x)$$

$\uparrow$   
total cost

$\uparrow$   
number of months

The student has given two incorrect equations.

**GO TO THE NEXT PAGE TO FINISH THE QUESTION.**

## MATHEMATICS

17. *Continued.* Please refer to the previous page for task explanation.

- C. Determine the number of months at which the total cost of membership at each gym will be the same amount of money. Show all your work. Explain why you did each step.

I'll start by using the equation to solve for 5 months, 10 months, 15 months and see if there is correlation or patterns.

$$\begin{array}{c} \text{Sports} \\ 5 \quad y = 55 + 30(5) = \$205 \end{array}$$

$$\begin{array}{c} \text{City} \\ y = 95 + 25(5) = \$220 \end{array}$$

$$10 \quad y = 55 + 30(10) = \$355$$

$$y = 95 + 25(10) = \$345$$

$$15 \quad y = 55 + 30(15) = \$505$$

$$y = 95 + 25(15) = \$470$$

From this information I will try 11 months because 10 months was closest to being equal costs.

$$\begin{array}{c} y = 55 + 30(11) \\ \$385 \end{array}$$

$$\begin{array}{c} y = 95 + 25(11) \\ \$370 \end{array}$$

Now I will try 9 because that is also close to ten months:

$$\begin{array}{c} y = 55 + 30(9) \\ \$325 \end{array}$$

$$\begin{array}{c} y = 95 + 25(9) \\ \$320 \end{array}$$

Now I will try eight because 9 was closer than:

$$\begin{array}{c} y = 55 + 30(8) \\ \$295 \end{array}$$

$$\begin{array}{c} y = 95 + 25(8) \\ \$295 \end{array}$$

As you can see, 8 month plans at either gyms would cost the same amount of money (\$295)

The student has given a correct answer.  
 The student has shown correct work.  
 The student has given a complete explanation.  
 Based on PSSA scoring rules, 2½ points count as 2 points.

# MATHEMATICS

## D.2 Response Score: 2

17. Patrika wants to join 1 of 2 gyms near her home. Each gym charges an enrollment fee for joining the gym and a monthly membership fee, as shown below.

Sport Gym
Enrollment Fee: \$55
Monthly Fee: \$30

City Gym
Enrollment Fee: \$95
Monthly Fee: \$25

- A. Calculate the cost of a 1-year membership at **each** gym. Show all your work.

12 months  
 $30 \times 12 = \$360$   
 Fee =  $55 + 360 = 415$

1 = 30      7 = 30  
 2 = 30      8 = 30  
 3 = 30      9 = 30  
 4 = 30      10 = 30  
 5 = 30      11 = 30  
 6 = 30      12 = 30

12 months  
 $12 \times 25 = 300$   
 Fee = 95

300  
 + 95  
 395

The student has given two correct answers.  
 The student has shown correct work.

- B. Write an equation for each gym's membership plan that describes the relationship between the number of months of membership ( $x$ ) and the total cost ( $y$ ).

months =  $x$   
 total =  $y$   
Sport Gym  
 $30x + 55 = y$

City Gym  
 $25x + 95 = y$

The student has given two correct equations.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

17. *Continued.* Please refer to the previous page for task explanation.

- C. Determine the number of months at which the total cost of membership at each gym will be the same amount of money. Show all your work. Explain why you did each step.

$$\begin{array}{l} \text{Gym \#1} \\ \hline 12 = 415 \\ 12 = 775 \\ 12 = 1135 \\ 12 = 1495 \end{array}$$

$$\begin{array}{l} \text{Gym \#2} \\ \hline 12 = 395 \\ 12 = 695 \\ 12 = 995 \\ 12 = 1295 \end{array}$$

The two months will never be the same cost because the sports gym fee is \$5 dollars more, but the enrollement fee is \$40 less, so therefore the City Gym will be alot cheaper to go to.

The student has given an incorrect answer.  
The student has shown incorrect work.  
The student has given an incorrect explanation.  
Based on PSSA scoring rules, 2½ points count as 2 points.

# MATHEMATICS

## D.2 Response Score: 1

17. Patrika wants to join 1 of 2 gyms near her home. Each gym charges an enrollment fee for joining the gym and a monthly membership fee, as shown below.

Sport Gym	
Enrollment Fee:	\$55
Monthly Fee:	\$30

City Gym	
Enrollment Fee:	\$95
Monthly Fee:	\$25

- A. Calculate the cost of a 1-year membership at **each** gym. Show all your work.

Sport gym.

$$\begin{array}{r} 55 \\ + 30(12) \\ \hline 55 \\ + 360 \\ \hline \end{array}$$

\$415 1 year membership

City Gym.

$$\begin{array}{r} 95 \\ + 25(12) \\ \hline 95 \\ + 300 \\ \hline \end{array}$$

\$395 1 year membership

$$\begin{array}{r} 25 \\ 12 \\ \hline 50 \\ 250 \\ \hline 300 \end{array}$$

The student has given two correct answers.  
The student has shown correct work.

- B. Write an equation for each gym's membership plan that describes the relationship between the number of months of membership ( $x$ ) and the total cost ( $y$ ).

$$y = 30x + 55$$

Sport Gym

$$y = 25x + 95$$

City Gym

The student has given two incorrect equations.

GO TO THE NEXT PAGE TO FINISH THE QUESTION.

## MATHEMATICS

17. *Continued.* Please refer to the previous page for task explanation.

- C. Determine the number of months at which the total cost of membership at each gym will be the same amount of money. Show all your work. Explain why you did each step.

5 months at Sport Gym is to  
6 months at City Gym

$$30(5) = 150$$

$$25(6) = 150$$

The student has given an incorrect answer.  
The student has shown incorrect work.  
The student has given an incorrect explanation.

# MATHEMATICS

## D.2 Response Score: 1

17. Patrika wants to join 1 of 2 gyms near her home. Each gym charges an enrollment fee for joining the gym and a monthly membership fee, as shown below.

Sport Gym
Enrollment Fee: \$55
Monthly Fee: \$30

City Gym
Enrollment Fee: \$95
Monthly Fee: \$25

- A. Calculate the cost of a 1-year membership at **each** gym. Show all your work.

<p style="margin: 0;">Sport gym</p> <p style="margin: 0;">enrollment fee \$55.00</p> <p style="margin: 0;">monthly fee \$30.00</p> <p style="margin: 0;">a years monthly fee \$30.00 x 12</p> <p style="margin: 0; text-align: right;"><u>          </u></p> <p style="margin: 0; text-align: right;">\$360.00</p> <p style="margin: 0;">\$360.00</p> <p style="margin: 0;">+ \$55.00 enrollment fee</p> <p style="margin: 0;"><u>          </u></p> <p style="margin: 0;">\$415.00 for the first year</p>	<p style="margin: 0;">City Gym</p> <p style="margin: 0;">enrollment fee \$95.00</p> <p style="margin: 0;">monthly fee \$25.00</p> <p style="margin: 0;">a years monthly fee 25.00 x 12</p> <p style="margin: 0; text-align: right;"><u>          </u></p> <p style="margin: 0; text-align: right;">\$300.00</p> <p style="margin: 0;">\$300.00</p> <p style="margin: 0;">+ \$95.00</p> <p style="margin: 0;"><u>          </u></p> <p style="margin: 0;">\$395.00 for the first year</p>
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The student has given two correct answers.  
The student has shown correct work.

- B. Write an equation for each gym's membership plan that describes the relationship between the number of months of membership ( $x$ ) and the total cost ( $y$ ).

$55 + 30x(12) = 415y$        $95 + 25x(12) = 395y$

The student has given two incorrect equations.

**GO TO THE NEXT PAGE TO FINISH THE QUESTION.**

# MATHEMATICS

17. *Continued.* Please refer to the previous page for task explanation.

- C. Determine the number of months at which the total cost of membership at each gym will be the same amount of money. Show all your work. Explain why you did each step.

sport month	cost
14	475
15	505
16	535
17	565
18	595
19	625
20	655
21	685
22	715
23	745
24	775
25	805
26	835
27	865
28	895
29	925
30	955

From the looks of it I don't think they will ever be the same cost at the end of a month.

month	cost
14	445
15	476
16	495
17	520
18	545
19	570
20	595
21	620
22	645
23	670
24	695
25	720
26	745
27	770
28	795
29	820
30	845

The student has given an incorrect answer.  
 The student has shown incorrect work.  
 The student has given an incorrect explanation.

# MATHEMATICS

## D.2 Response Score: 0

17. Patrika wants to join 1 of 2 gyms near her home. Each gym charges an enrollment fee for joining the gym and a monthly membership fee, as shown below.

Sport Gym
Enrollment Fee: \$55
Monthly Fee: \$30

City Gym
Enrollment Fee: \$95
Monthly Fee: \$25

- A. Calculate the cost of a 1-year membership at **each** gym. Show all your work.

$$s) 30 \times 12 = \$400.15$$

$$c) 25 \times 12 = \$312.00$$

The student has given two incorrect answers.  
The student has shown incorrect work.

- B. Write an equation for each gym's membership plan that describes the relationship between the number of months of membership ( $x$ ) and the total cost ( $y$ ).

$$25x \times 12 = y$$

$$30x \times 12 = y$$

The student has given two incorrect equations.

**GO TO THE NEXT PAGE TO FINISH THE QUESTION.**

## MATHEMATICS

17. *Continued.* Please refer to the previous page for task explanation.

- C. Determine the number of months at which the total cost of membership at each gym will be the same amount of money. Show all your work. Explain why you did each step.

If you make them both <sup>the same</sup> ↑ a amount of money.

Sports gym  
enrollment fee \$55  
monthly fee \$30

city gym  
enrollment fee \$55  
monthly fee \$30

both (12) month = \$400.5

The student has given an incorrect answer.  
The student has shown incorrect work.  
The student has given an incorrect explanation.

# MATHEMATICS

## SUMMATIVE DATA TABLE

### Multiple-Choice Items

Sampler Sequence	A	B	C	D
1	6%	7%	81%	7%
2	11%	23%	16%	50%
3	13%	64%	15%	8%
4	10%	69%	13%	8%
5	20%	9%	13%	58%
6	21%	7%	67%	4%
7	10%	10%	10%	69%
8	5%	76%	13%	5%
9	3%	7%	7%	83%
10	19%	28%	13%	40%
11	83%	3%	13%	1%
12	9%	9%	15%	67%
13	26%	4%	5%	65%
14	45%	13%	18%	25%
15	6%	10%	69%	16%
16	7%	78%	9%	6%

### Open-Ended Item

Sampler Sequence	Score Point 4	Score Point 3	Score Point 2	Score Point 1	Score Point 0
17	33%	15%	24%	18%	10%

**Mathematics**  
**Grade 11**  
**Item and Scoring Sampler Supplement**

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