



**Educational Improvement and
Assessment Program**

**EXAMPLES OF
STUDENT RESPONSES
FOR MATHEMATICS SCORE POINTS
END-OF-GRADE-TEN ASSESSMENT
2003**

**NEW HAMPSHIRE EDUCATIONAL IMPROVEMENT
AND ASSESSMENT PROGRAM
2003 OPEN-RESPONSE SCORING GUIDE
END-OF-GRADE-TEN MATHEMATICS**

Common #31

Score	Description
4	Student earns a total of 4 points.
3	Student earns a total of 3 points.
2	Student earns a total of 2 points.
1	Student earns a total of 1 point. OR Student demonstrates a minimal understanding of drawing a scatter plot or using data to make predictions.
0	Response is incorrect or irrelevant.
Blank	No response.

Training notes:

- Part a:
- 2 points Student provides a clear, accurate scatter plot that includes
 - adequately labeled axes and
 - points plotted with reasonable accuracy so that a decreasing pattern is evident.

 - 1 point Student provides evidence of some understanding of scatter plot construction, with one or two of the following error(s):
 - data point(s) plotted incorrectly (e.g., clearly outside range of 8:00 through 6:30, or show increase from one point to next)
 - nonequal units on scale (**Note: Assign 0 points if student puts time values from chart on axis with equal space between the time values.**)
 - axes and/or scales not sufficiently labeled
 - reversed axes
 - reversed order of values on one axis
 - interprets time as decimal (i.e., 7:44 = 7.44 minutes or 744 seconds)
 - draws line graph or bar graph

Note: Students who make minor arithmetic errors that do not affect the answer, who label units incorrectly, or who describe the rate of change incorrectly should not receive a 4 score. Otherwise, do not penalize these students.

- Part b:
- 2 points Student provides the correct answer (**Week 10, 11, or 12**) with justification or strategy shown. The student's answer may be based on averaging individual change amounts or finding total change and dividing by number of weeks of change (**average rate of change is $84 \div 7 = 12$ seconds per week**) or it may be based on reasonable line of best fit extended to show week for 6:00 and falling within acceptable range for answer.

 - 1 point Student provides correct answer with incomplete explanation or strategy shown.
OR
Student provides a generally correct strategy with error(s) in one or two of the following categories:
 - arithmetic
 - time calculation
 - number or weeks
 - drawing a line of best fit

 - 0 points Student provides correct answer with obviously incorrect strategy or no strategy or explanation.

Use the chart below to answer question 31.

Best Mile Run Times

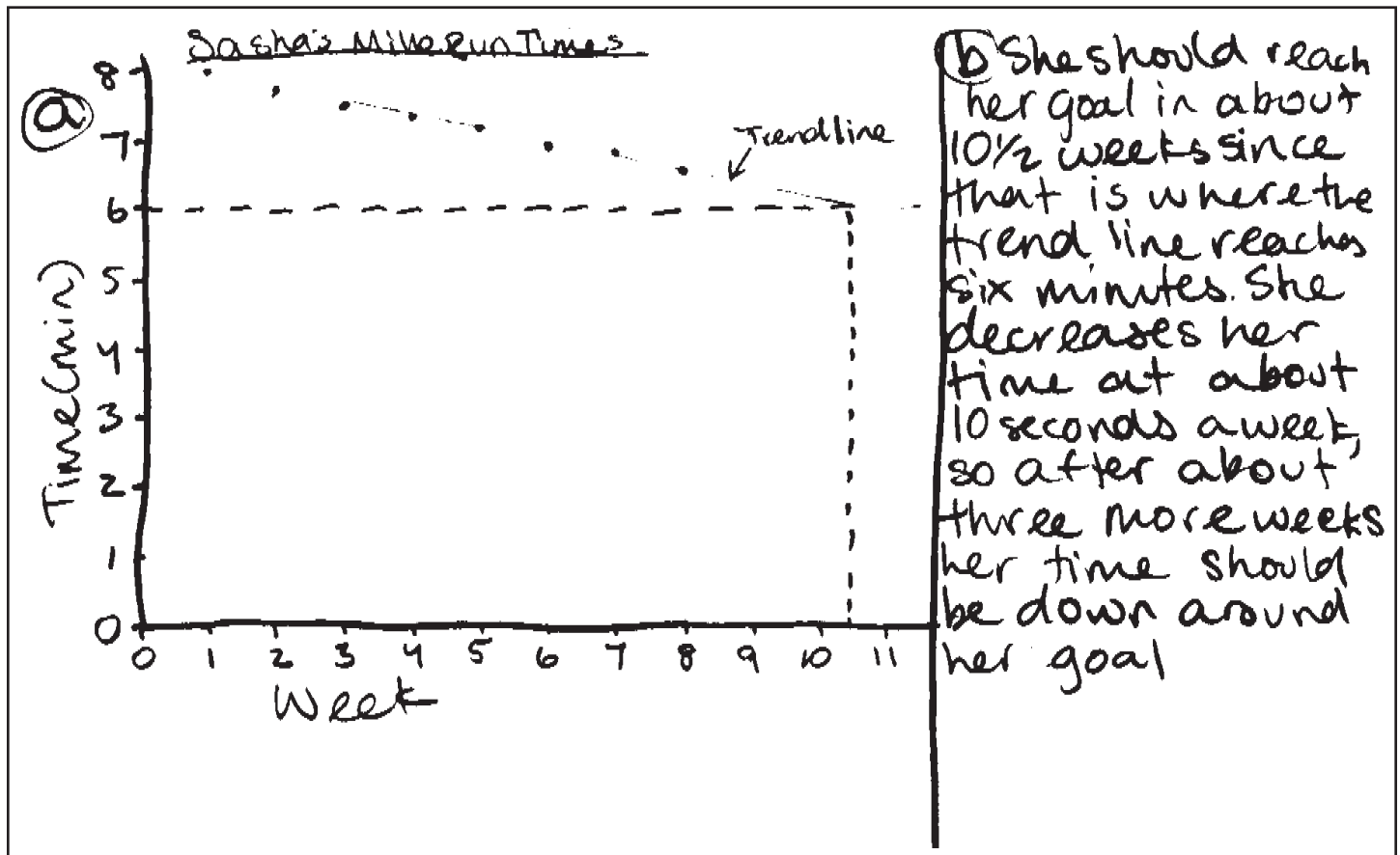
Week	Time
1	8:00
2	7:44
3	7:30
4	7:22
5	7:10
6	6:54
7	6:50
8	6:36

31. This chart shows Sasha's best time for running one mile during each week of the track season.
- Draw a scatter plot showing Sasha's times in your Student Response Booklet. Put the week on the horizontal (x) axis and the time on the vertical (y) axis.
 - Sasha's goal is to run one mile in 6 minutes or less. If she continues to improve at the same average rate per week, during which week will she reach her goal? Justify your answer mathematically.

31. This chart shows Sasha's best time for running one mile during each week of the track season.

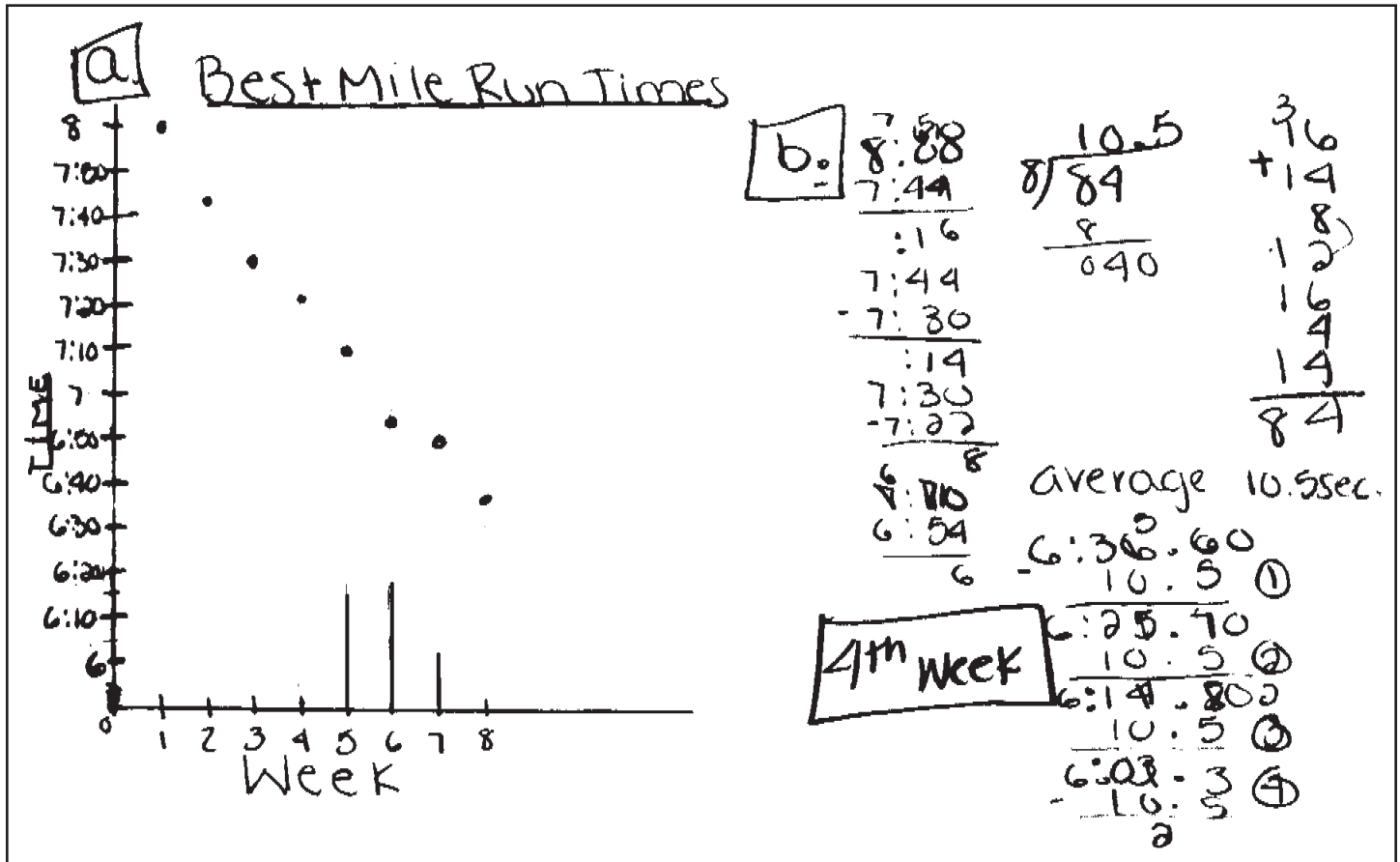
- Draw a scatter plot showing Sasha's times in your Student Response Booklet. Put the week on the horizontal (x) axis and the time on the vertical (y) axis.
- Sasha's goal is to run one mile in 6 minutes or less. If she continues to improve at the same average rate per week, during which week will she reach her goal? Justify your answer mathematically.

SCORE POINT 4



31. This chart shows Sasha's best time for running one mile during each week of the track season.
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 - Sasha's goal is to run one mile in 6 minutes or less. If she continues to improve at the same average rate per week, during which week will she reach her goal? Justify your answer mathematically.

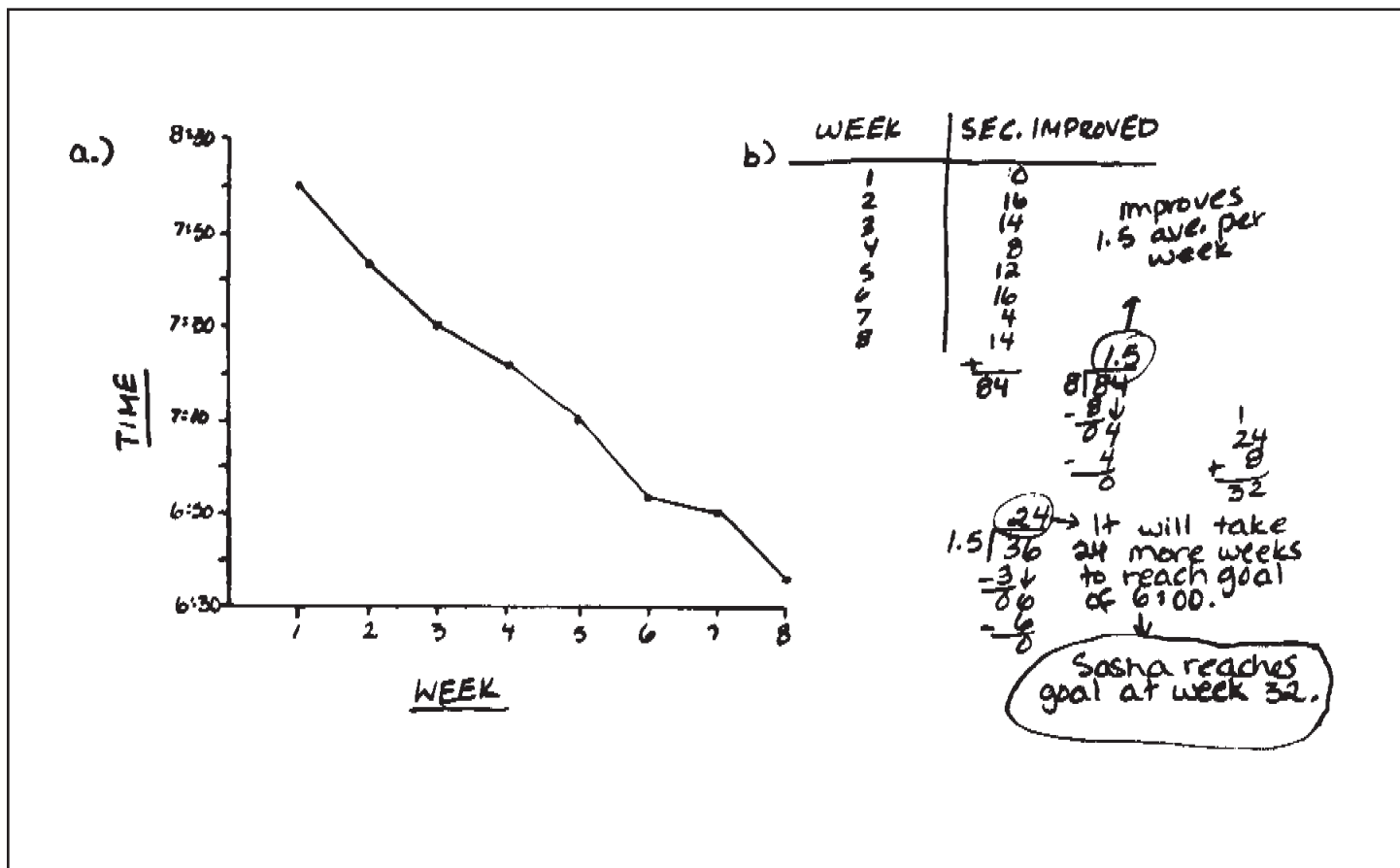
SCORE POINT 3



31. This chart shows Sasha's best time for running one mile during each week of the track season.

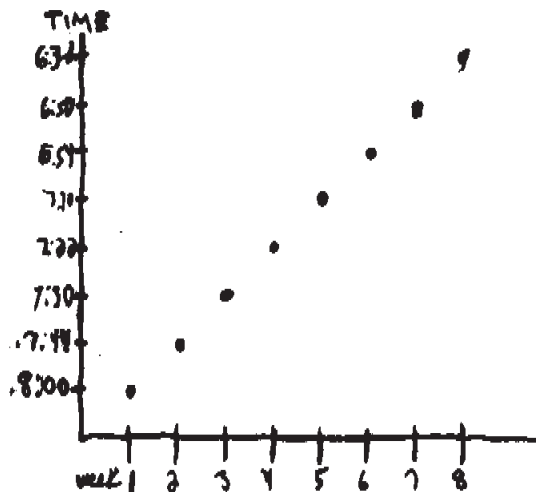
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- Sasha's goal is to run one mile in 6 minutes or less. If she continues to improve at the same average rate per week, during which week will she reach her goal? Justify your answer mathematically.

SCORE POINT 2



31. This chart shows Sasha's best time for running one mile during each week of the track season.
- Draw a scatter plot showing Sasha's times in your Student Response Booklet. Put the week on the horizontal (x) axis and the time on the vertical (y) axis.
 - Sasha's goal is to run one mile in 6 minutes or less. If she continues to improve at the same average rate per week, during which week will she reach her goal? Justify your answer mathematically.

SCORE POINT 1



B. She would reach her goal around the tenth week she averages between 10 and 15 second better every week, so at this rate she will be under six minutes by week 10.

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Common #32

Score	Description
4	Student earns a total of 3 points.
3	Student earns a total of 2½ points.
2	Student earns a total of 1 to 2 points.
1	Student earns ½ point. OR Student shows a minimal understanding of the task by displaying some understanding of discount or ability to find percent.
0	Response is incorrect or irrelevant.
Blank	No response.

Training notes:

Part a: 1 point Student provides correct answer (**\$140, or “she needs \$5.00 more”**).

AND

1 point Student provides complete solution strategy.

$$\begin{aligned} \$175 \times 0.20 &= \$35 && \text{discount} \\ \$175 - \$35 &= \$140 && \text{cost of parka} \\ \text{OR} \\ \$175 \times 0.80 &= \$140 && \text{cost of parka} \end{aligned}$$

½ point Student provides some correct work.

Part b: 1 point Student provides complete description or formula with variable defined.
Student should use one of the descriptions below.

- Multiply the percent times the original price and then subtract the answer from the original price. The answer is the sale price. (Note: Explicit percent-to-decimal conversion is not necessary.)
- OR
- Subtract the percent of discount from 100 percent and multiply the new percent (written as a decimal) times the original price. The answer is the sale price.

½ point Student provides incomplete or vague description or formula with no definitions for variables.

32. a. Susan is saving money for a ski parka that had an original price of \$175.00. Susan has saved \$135.00. The parka is now on sale for 20% off the original price. Does she have enough money to buy the parka? Show your work.
- b. Write a **detailed explanation** of a method that works in any situation to find a sale price when the original price and the percent of discount are known.

SCORE POINT 4

Ⓐ $175 \times 20\% = 35$
 $175 - 35 = 140$
NO, she needs \$5.

Ⓑ Multiply the original price by the percent of discount, then subtract that value from the original price and you have the sale price.

$$\text{O.P.} \times \% = N$$

$$\text{O.P.} - N = \text{Sale price}$$

32. a. Susan is saving money for a ski parka that had an original price of \$175.00. Susan has saved \$135.00. The parka is now on sale for 20% off the original price. Does she have enough money to buy the parka? Show your work.
- b. Write a **detailed explanation** of a method that works in any situation to find a sale price when the original price and the percent of discount are known.

SCORE POINT 3

(A) $\$175.00 \times .80 = \140.00

$$\begin{array}{r} \cancel{\$140.00} \\ - 135.00 \\ \hline \text{\$}500 \end{array} \quad \text{No}$$

(B) You multiply the price by whatever percent subtracted from hundred percent.

SCORE POINT 2

$$\begin{array}{r} 175.00 \\ - 26\% \\ \hline 140.00 \\ - 135.00 \\ \hline 5 \end{array}$$

she needs
five more dollars
in order to get the
parka.

32. a. Susan is saving money for a ski parka that had an original price of \$175.00. Susan has saved \$135.00. The parka is now on sale for 20% off the original price. Does she have enough money to buy the parka? Show your work.
- b. Write a **detailed explanation** of a method that works in any situation to find a sale price when the original price and the percent of discount are known.

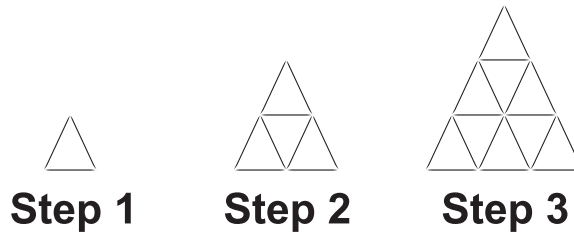
SCORE POINT 1

a. $135 \times 20\% = 27$ 175
So she would have $\frac{27}{175}$
enough to go

b. The original price multiplied by a percent changed to a fraction

Explanations for parts b and c may be based on relevant arithmetic patterns/sequences, drawing and counting, or use of formula. Award full credit if the student refers to adding more triangles to Step 4 and provides 45 as the answer. Base credit for parts b, c, and d on the student's answers to preceding parts.

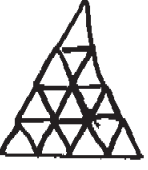
Use the pattern below to answer question 33.

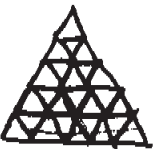


33. This pattern is made from toothpicks.

- Draw the next step in the pattern.
- How many toothpicks in all will be needed for **Step 5** of the pattern? Show or explain how you found your answer.
- How many toothpicks in all will be needed for **Step 12** of the pattern? Show or explain how you found your answer.
- Write a formula using n that will show how many toothpicks are needed to build **Step n** in the pattern.

SCORE POINT 4

a 

b  45 toothpicks, draw & count

row 1 has 3 picks
row 2 has 6 picks
row 3 has 9 picks
and so on

3 on 1st level
6 + 1 w/ next level
+ 9 w/ next level

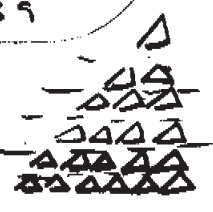
234 toothpicks

39 39 39 39 39 39

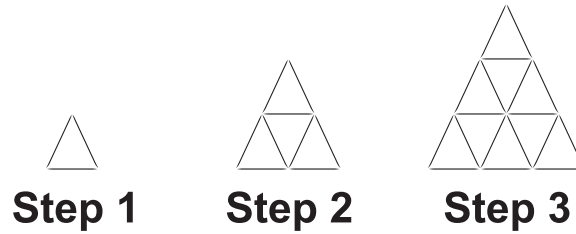
5
39
x6
234

d $\frac{n(3+3n)}{2}$ # of rows (picks in row 1 + plus pick in row n) all ÷ 2

row 1
row 2
row 3
row 4
row 5
row 6



Use the pattern below to answer question 33.



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- Write a formula using n that will show how many toothpicks are needed to build **Step n** in the pattern.

SCORE POINT 3

a

Step 4. 30

b

Step 5

45 toothpicks will be needed to build Step 5. I found this out by drawing it and counting it out.

c

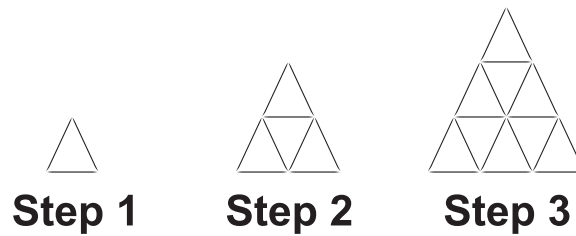
Step 1 = 3	>	6
Step 2 = 9	>	9
Step 3 = 18	>	12
Step 4 = 30	>	15
Step 5 = 45	>	18
Step 6 = 63	>	21
Step 7 = 84	>	24
Step 8 = 108	>	27
Step 9 = 135	>	30
Step 10 = 165	>	33

Step 11 = 198 > 36
Step 12 = 234 toothpicks

d

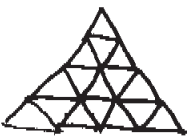
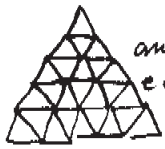
?

Use the pattern below to answer question 33.



33. This pattern is made from toothpicks.
- Draw the next step in the pattern.
 - How many toothpicks in all will be needed for **Step 5** of the pattern? Show or explain how you found your answer.
 - How many toothpicks in all will be needed for **Step 12** of the pattern? Show or explain how you found your answer.
 - Write a formula using n that will show how many toothpicks are needed to build **Step n** in the pattern.

SCORE POINT 2

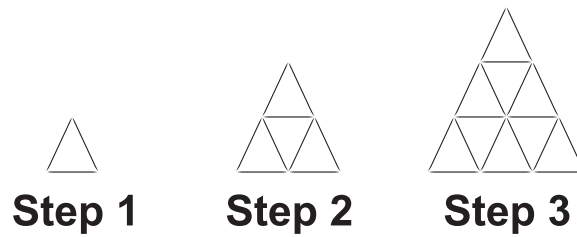
A)  b) 45 will be needed in all -  and I counted each one

c) $3 + 6 = (9) + 9 = (18) + 12 = (30) + 15 = (45) + 18 = (63) + 21 = (84) + 24 = (108) + 27 = (135) + 30 = (165)$
 $+ 33 = (198) + 36 = (234) + 39 = (273)$

273 will be needed for step 12 of the pattern

d)

Use the pattern below to answer question 33.



33. This pattern is made from toothpicks.

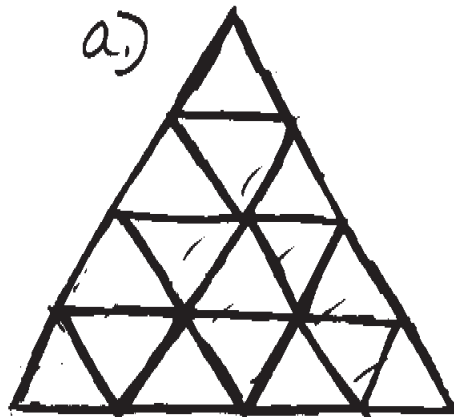
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SCORE POINT 1

b.) 45 toothpicks (add on a extra 9
on the triangle)

c.) 60 (add on to triangle)

d.) $40n$



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Common #34

Score	Description
4	Student earns a total of 5 points.
3	Student earns a total 4 points.
2	Student earns a total of 2 or 3 points.
1	Student earns a total of 1 point. OR Student shows a minimal understanding of translations.
0	Response is incorrect or irrelevant.
Blank	No response.

Training notes:

Part a: 1 point Student provides correct coordinates **(-4,6)**.

Note: Score part b based on student's answer to part a.

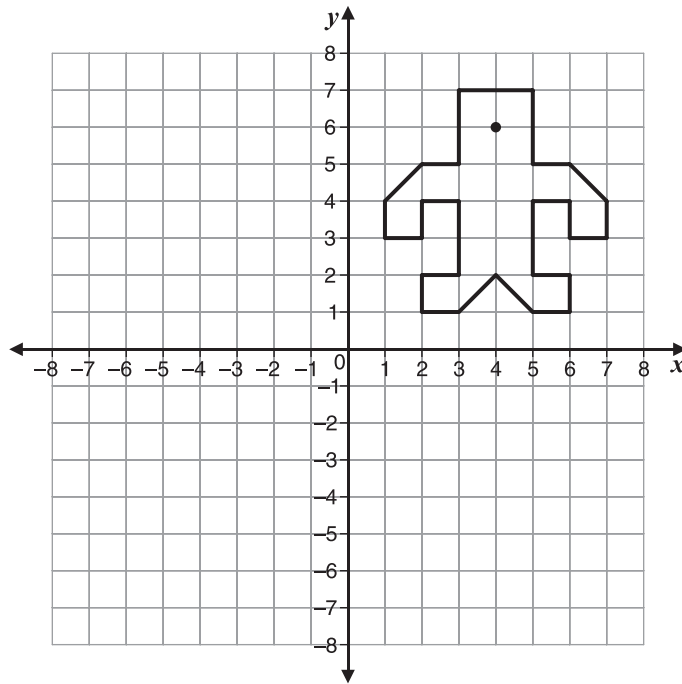
Part b: 2 points Student provides correct answer of **4 units right, 6 units down** [or equivalent expression, e.g., (4,-6) or <4,-6>].

1 point Student provides correct translation of one element.
OR
Student provides correct translation from original location **(4,6)**.
OR
Student provides any correct transformation (i.e., reflection or rotation, not a translation) that will map **(-4,6)** to **(0,0)**.

Part c: 2 points Student provides correct answer **(-p,q - 5)** or equivalent.

1 point Student provides answer with one transformation correctly applied to (p,q).
OR
Student provides any two elements of coordinates correctly. The elements include signs of both p and q, and application of -5.

Use the figure below to answer question 34.



34. The figure on this grid is a cyclops with a single eye located at $(4,6)$ in the middle of its head.
- If the cyclops is reflected through the y -axis, what will be the new coordinates of its eye?
 - After making the reflection in part a, describe the translation that will move the cyclops's eye to the origin $(0,0)$.
 - A randomly selected point on the cyclops is located at (p,q) . In terms of p and q , what are the final coordinates after the following two transformations?
 - reflecting the cyclops through the y -axis
 - translating the cyclops down 5 units

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- If the cyclops is reflected through the y -axis, what will be the new coordinates of its eye?
 - After making the reflection in part a, describe the translation that will move the cyclops's eye to the origin $(0,0)$.
 - A randomly selected point on the cyclops is located at (p,q) . In terms of p and q , what are the final coordinates after the following two transformations?
 - reflecting the cyclops through the y -axis
 - translating the cyclops down 5 units

SCORE POINT 4

- a.) $-4,6$
- b.) a glide translation of $\langle 4, -6 \rangle$
- (p, q)
- $(-p, q)$
- c.) $(-p, q-5)$

SCORE POINT 3

- a. $(-4, 6)$
- b. You would have move him 6 units down and 4 units across.
- c. $(-p, q-5)$

34. The figure on this grid is a cyclops with a single eye located at $(4,6)$ in the middle of its head.
- If the cyclops is reflected through the y -axis, what will be the new coordinates of its eye?
 - After making the reflection in part a, describe the translation that will move the cyclops's eye to the origin $(0,0)$.
 - A randomly selected point on the cyclops is located at (p,q) . In terms of p and q , what are the final coordinates after the following two transformations?
 - reflecting the cyclops through the y -axis
 - translating the cyclops down 5 units

SCORE POINT 2

a: $(-4, 6)$

b: the translation would be rotation 90° clockwise

c:

- through y axis, someplace in the lower right side of the graph

- It would move the point (p, q) down 5 units, so it would be $(p, q-5)$

SCORE POINT 1

a) $(-2, 6)$

b.) Down 6 units over 4 units

c.) $(p$ to left 6 units, q left 6 units)

$(p$ down 6 units over 4 units, q down 6 units over 4 units)

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Common #35

Score	Description
4	Student earns a total of 4 points.
3	Student earns a total of 3 points.
2	Student earns a total of 2 points.
1	Student earns a total of 1 point. OR Student shows a minimal understanding of writing expressions to model situations or solve equations.
0	Response is incorrect or irrelevant.
Blank	No response.

Training notes:

- Part a: 1 point **each** Student provides correct expressions
(car price: $4000 - 125n$; amount saved: $2500 + 150n$).
 Student may also write solution as equation(s)
 (e.g., $4000 - 125n = 2500 + 150n$ or $c = 4000 - 125n$).
 The definition of variables is not necessary if they are clear from context.
 Count as correct if student interprets savings as either.
- month 1 = \$150, month 2 = \$300, month 3 = \$450, etc.
- OR
- the total of \$125 and \$150 (sees the drop in price as savings), i.e., the amount saved is $2500 + 275n$.
- Part b: 2 points Student provides correct solution (**6 months**) with strategy clearly shown.
 See below for sample solution strategies.
 OR
 Student provides correct solution of incorrect expressions from part a.
 The solution must be clearly derived from those expressions to receive credit.
- 1 point Student provides correct solution but has incomplete or no explanation or strategy given.
 OR
 Student provides appropriate strategy but has an error in arithmetic or interpretation of result in context.

Sample Solution Strategy:

$$\begin{aligned}4000 - 125n &= 2500 + 150n \\1500 &= 275n \\5.45 &= n\end{aligned}$$

Therefore, it will be six months before Jody can purchase the car. Students may also create a chart or use post-hoc justification to show that after six months her savings will be enough to purchase the car.

Notes:

Do not penalize the student for an answer of 5.45 or $5\frac{1}{2}$ months, as the problem does not specify that the savings and discounts occur exclusively on a monthly basis as opposed to a weekly or bi-weekly basis.

Do not award a score of 4 if the expressions in part a are set equal to 0. Otherwise, do not penalize the student.

35. Jody is saving her money to buy a used car. The price of the car is now \$4000, but the price will be reduced by \$125 for each month that the car remains unsold. Jody currently has \$2500 saved, and she will be able to save an additional \$150 each month.
- a. Write an algebraic expression to represent each of the following:
- the price of the car in n months
 - the amount of money Jody will have saved after n months
- b. Determine the number of months until Jody will be able to purchase the car. Show your work.

SCORE POINT 4

a. • price of car $4000 - 125n$
• amount saved $2500 + 150n$

b. $4000 - 125n = 2500 + 150n$

$$\frac{1500}{275} = \frac{275n}{275}$$

$$5 R 125$$

After six more months, she can buy the car.

35. Jody is saving her money to buy a used car. The price of the car is now \$4000, but the price will be reduced by \$125 for each month that the car remains unsold. Jody currently has \$2500 saved, and she will be able to save an additional \$150 each month.
- a. Write an algebraic expression to represent each of the following:
- the price of the car in n months
 - the amount of money Jody will have saved after n months
- b. Determine the number of months until Jody will be able to purchase the car. Show your work.

SCORE POINT 3

$$a. 4000 - 125n = 2500 + 150n$$

b 6 months

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- a. Write an algebraic expression to represent each of the following:
- the price of the car in n months
 - the amount of money Jody will have saved after n months
- b. Determine the number of months until Jody will be able to purchase the car. Show your work.

SCORE POINT 2

$$\textcircled{A} 4000 - 125n$$

$$150n$$

$\textcircled{B} \begin{array}{r} 4,000 \\ - 125 \\ \hline 3,075 \\ - 125 \\ \hline 3,150 \\ - 125 \\ \hline 3,025 \\ - 125 \\ \hline 2,900 \end{array}$	$\begin{array}{r} 2,500 \\ + 150 \\ \hline 2,650 \\ + 150 \\ \hline 2,800 \\ + 150 \\ \hline 2,950 \end{array}$
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in 4 months, Jody can purchase the car

35. Jody is saving her money to buy a used car. The price of the car is now \$4000, but the price will be reduced by \$125 for each month that the car remains unsold. Jody currently has \$2500 saved, and she will be able to save an additional \$150 each month.
- a. Write an algebraic expression to represent each of the following:
- the price of the car in n months
 - the amount of money Jody will have saved after n months
- b. Determine the number of months until Jody will be able to purchase the car. Show your work.

SCORE POINT 1

$$4000 - 125(n) = 2500 + 150 - 17$$