

Education Quality and
Accountability Office



Grade 9 Assessment of Mathematics

Spring 2008, Applied

**Released Item-Specific Rubrics and
Sample Student Responses with
Annotations**

Clarence's Quandry (Spring 2008)

Code	Descriptor
B	Blank: nothing written or drawn in response to the question
I	- Illegible: cannot be read; completely crossed out/erased; not written in English; - Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, "?", "!", "I don't know"); - Off topic: no relationship of written work to the question.
10	Application of knowledge and skills shows limited effectiveness due to <ul style="list-style-type: none">• misunderstanding of concepts of proportional reasoning• incorrect selection or misuse of procedures to determine the dosage
20	Application of knowledge and skills shows some effectiveness due to <ul style="list-style-type: none">• partial understanding of the concepts of proportional reasoning• errors and/or omissions in the application of the procedures to determine the dosage
30	Application of knowledge and skills shows considerable effectiveness due to <ul style="list-style-type: none">• an understanding of most of the concepts of proportional reasoning• minor errors and/or omissions in the application of the procedures to determine the dosage
40	Application of knowledge and skills shows a high degree of effectiveness due to <ul style="list-style-type: none">• a thorough understanding of the concepts of proportional reasoning• an accurate application of the procedures to determine the dose to be 60 ml (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding)

Clarence works at a veterinarian's office. He needs to give a dose of medicine to a 24 kg dog. The recommended dosage for a dog that weighs 10 kg is 25 mL. Determine the dose Clarence should give to the 24 kg dog if the rate remains the same. Show your work.

$$10 \text{ kg is } 25 \text{ mL}$$

$$10 \text{ kg} + 14 \text{ kg} = 25 \text{ kg}$$

$$25 \text{ mL} + 14 \text{ mL} = 39 \text{ mL}$$

\therefore He should give the ^{24 kg} dog 39 mL of dose.

Annotation:

Student demonstrates an incorrect selection of procedures; uses additive reasoning.

Clarence works at a veterinarian's office. He needs to give a dose of medicine to a 24 kg dog. The recommended dosage for a dog that weighs 10 kg is 25 mL. Determine the dose Clarence should give to the 24 kg dog if the rate remains the same. Show your work.

$$10 \text{ kg} = 25 \text{ mL}$$

$$\text{So } 20 \text{ kg} = 50 \text{ mL}$$

∴ Clarence should give
50 mL to the dog.

Annotation:

Student demonstrates an omission in the procedures; uses proportional reasoning to find 20 kg: 50 mL but failed to account for the additional 4 kg.

Clarence works at a veterinarian's office. He needs to give a dose of medicine to a 24 kg dog. The recommended dosage for a dog that weighs 10 kg is 25 mL. Determine the dose Clarence should give to the 24 kg dog if the rate remains the same. Show your work.

$$10 \text{ kg} = 25 \text{ ml}$$

$$20 \text{ kg} = 25 \text{ ml} + 25 \text{ ml} \\ = 50 \text{ ml}$$

$$5 \text{ kg} = 25 \text{ ml} \div 2 \\ = 12.5$$

$$24 \text{ kg} = 50 \text{ ml} + 12.5 \text{ ml} \\ = 62.5 \text{ ml}$$

Clarence should give the dog
62 ml of medicine.

Annotation:

Student demonstrates minor errors in the application of the procedures; correctly determines the dosage for a 25 kg dog but does not adjust the dosage for a 24 kg dog, as the question states.

Clarence works at a veterinarian's office. He needs to give a dose of medicine to a 24 kg dog. The recommended dosage for a dog that weighs 10 kg is 25 mL. Determine the dose Clarence should give to the 24 kg dog if the rate remains the same. Show your work.

$$10 \text{ kg} = 25 \text{ mL}$$

$$10 \text{ kg} \times 2 = 20 \text{ kg}$$

$$25 \text{ mL} \times 2 = 50 \text{ mL}$$

$$25 \div 10 = 2.5 \text{ mL per } 1 \text{ kg}$$

$$2.5 \text{ mL} \times 4 \text{ kg}$$

$$= 10 \text{ mL}$$

$$50 \text{ mL} + 10 \text{ mL}$$

$$= 60 \text{ mL}$$

The dose Clarence should use is 60 mL for a 24 kg dog.

Annotation:

Student demonstrates an accurate application of procedures to determine the dose to be 60 mL.

Starting Costs (Spring 2008)

Code	Descriptor
B	Blank: nothing written or drawn in response to the question
I	<ul style="list-style-type: none"> - Illegible: cannot be read; completely crossed out/erased; not written in English; - Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”, “!”, “I don’t know”); - Off topic: no relationship of written work to the question.
10	<p>Application of knowledge and skills to determine the initial value and rate of change and describe how they relate to the total cost of renting a car shows limited effectiveness due to</p> <ul style="list-style-type: none"> • misunderstanding of concepts; • incorrect selection or misuse of procedures.
20	<p>Application of knowledge and skills to determine the initial value and rate of change and describe how they relate to the total cost of renting a car shows some effectiveness due to</p> <ul style="list-style-type: none"> • partial understanding of the concepts; • errors and/or omissions in the application of the procedures.
30	<p>Application of knowledge and skills to determine the initial value and rate of change and describe how they relate to the total cost of renting a car shows considerable effectiveness due to</p> <ul style="list-style-type: none"> • an understanding of most of the concepts; • minor errors and/or omissions in the application of the procedures.
40	<p>Application of knowledge and skills to determine the initial value and rate of change and describe how they relate to the total cost of renting a car shows a high degree of effectiveness due to</p> <ul style="list-style-type: none"> • a thorough understanding of the concepts; • an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding) <p>(e.g., initial value is 20 and rate of change is 0.15)</p>

A car rental company uses the equation $C = 20 + 0.15d$ to determine the cost of renting a car, where C is the total cost in dollars and d is the distance travelled in kilometres.

Determine the initial value and the rate of change.

Initial value \$20

Rate of change 0.15

Describe how the initial value and the rate of change relate to the total cost of renting a car. The initial value relates to the total cost because without it you would not be able to know what to add 0.15 to.

Commentaires:

Student demonstrates a misunderstanding of the concepts of rate of change and initial value; identifies initial value correctly, but rate of change not identified and description is unclear for both.

A car rental company uses the equation $C = 20 + 0.15d$ to determine the cost of renting a car, where C is the total cost in dollars and d is the distance travelled in kilometres.

Determine the initial value and the rate of change.

Initial value 20

Rate of change 0.15

Describe how the initial value and the rate of change relate to the total cost of renting a car.

The initial value & the rate of change relate to each other because while the rate of change is increasing or decreasing the initial value would change.

Commentaires:

Student demonstrates a partial understanding of the concepts; initial value and rate of change correctly determined but descriptions are unclear for both.

A car rental company uses the equation $C = 20 + 0.15d$ to determine the cost of renting a car, where C is the total cost in dollars and d is the distance travelled in kilometres.

Determine the initial value and the rate of change.

Initial value 20 dollars

Rate of change 15 cents per km

Describe how the initial value and the rate of change relate to the total cost of renting a car.

the initial value is 20 dollars,
the further you drive the more
it costs.

Commentaires:

Student demonstrates an understanding of most of the concepts; both initial value and rate of change identified correctly and rate of change described (15 cents per km). No description of the initial value provided.

A car rental company uses the equation $C = 20 + 0.15d$ to determine the cost of renting a car, where C is the total cost in dollars and d is the distance travelled in kilometres.

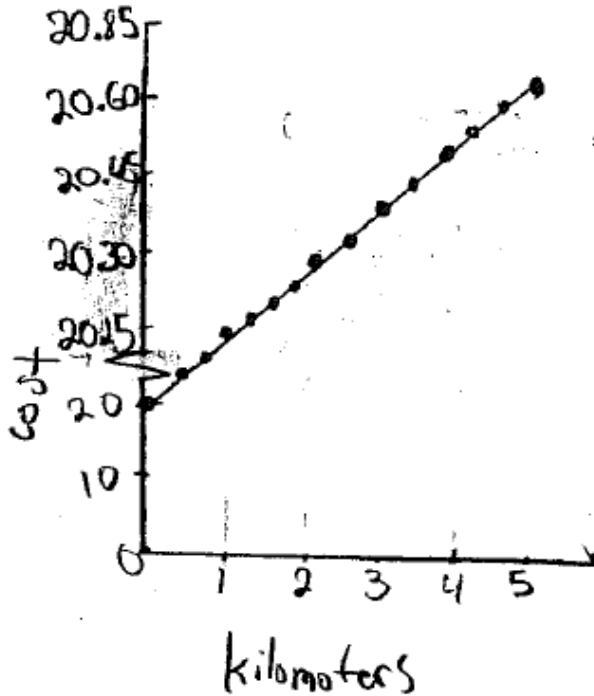
Determine the initial value and the rate of change.

Initial value \$20

Rate of change \$.15 Per kilometer

Describe how the initial value and the rate of change relate to the total cost of renting a car.

It's \$20 flat fee all \$.15 every kilometer



Commentaires:

Student demonstrates a thorough understanding of the concepts; identifies both the initial value and rate of change correctly and describes both accurately (flat fee and rate per kilometre).

Let's Go to a Water Park! (Spring 2008)

Code	Descriptor
B	Blank: nothing written or drawn in response to the question
I	<ul style="list-style-type: none"> - Illegible: cannot be read; completely crossed out/erased; not written in English; - Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”, “!”, “I don’t know”); - Off topic: no relationship of written work to the question.
10	<p>Problem-solving process to determine and interpret the point of intersection shows limited effectiveness due to</p> <ul style="list-style-type: none"> • minimal evidence of a solution process; • limited identification of important elements of the problem; • too much emphasis on unimportant elements of the problem; • no conclusions presented or conclusion presented without supporting evidence.
20	<p>Problem-solving process to determine and interpret the point of intersection shows some effectiveness due to</p> <ul style="list-style-type: none"> • an incomplete solution process; • identification of some of the important elements of the problem; • some understanding of the relationships between important elements of the problem; • simple conclusions with little supporting evidence.
30	<p>Problem-solving process to determine and interpret the point of intersection shows considerable effectiveness due to</p> <ul style="list-style-type: none"> • a solution process that is nearly complete; • identification of most of the important elements of the problem; • a considerable understanding of the relationships between important elements of the problem; • appropriate conclusions with supporting evidence.
40	<p>Problem-solving process to determine and interpret the point of intersection shows a high degree of effectiveness due to</p> <ul style="list-style-type: none"> • a complete solution process; • identification of all important elements of the problem; • a thorough understanding of the relationships between all of the important elements of the problem; • appropriate conclusions with thorough and insightful supporting evidence.

Two water parks have different methods of determining the cost of a season pass. The equations for both parks are given below, where C is the cost of the pass and n is the number of visits.

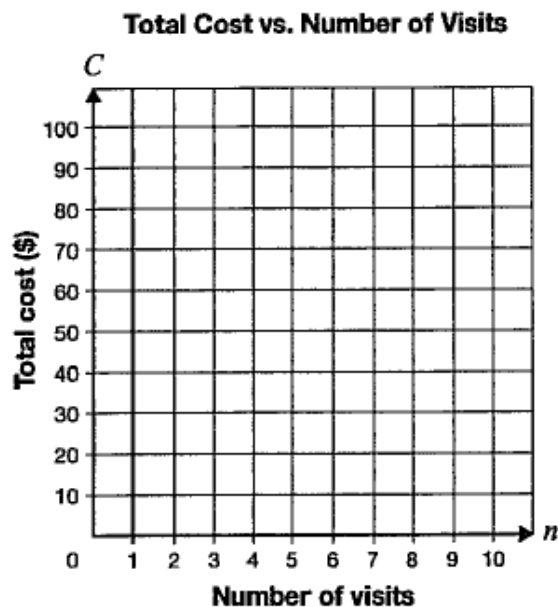
Wet Water World

$C = 20 + 10n$	
Number of visits, n	Total cost, C (\$)
0	20
2	40
4	60
6	80
8	100

Bubbling Blue

$C = 50 + 5n$	
Number of visits, n	Total cost, C (\$)
0	50
2	100
4	200
6	300
8	400

Graph the costs for both water parks on the grid below.



Determine which water park has the lower cost for a season pass.

Justify your answer.

Annotation:

Problem solving process demonstrates minimal evidence of a solution process; tables completed for both parks with or without errors, but missing graphs and conclusion.

Two water parks have different methods of determining the cost of a season pass. The equations for both parks are given below, where C is the cost of the pass and n is the number of visits.

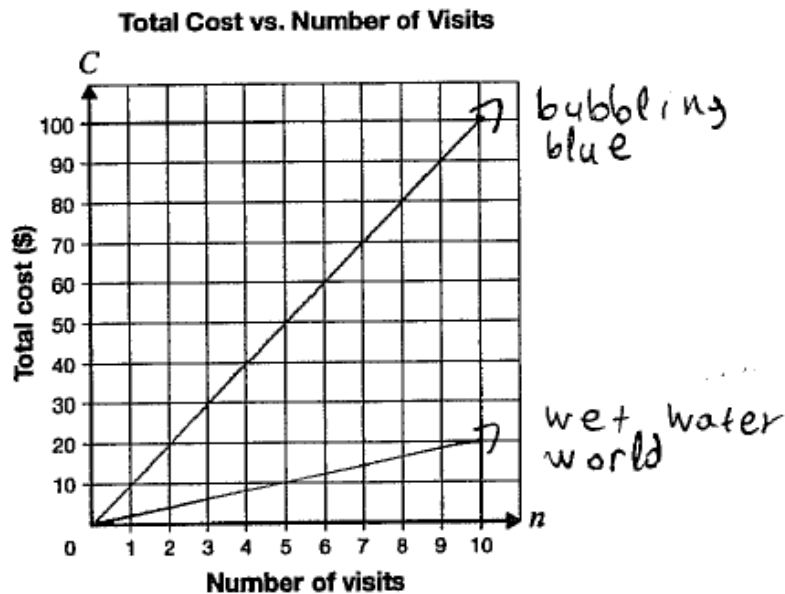
Wet Water World

$C = 20 + 10n$	
Number of visits, n	Total cost, C (\$)
0	0
2	4
4	8
6	12
8	16

Bubbling Blue

$C = 50 + 5n$	
Number of visits, n	Total cost, C (\$)
0	0
2	20
4	40
6	60
8	80

Graph the costs for both water parks on the grid below.



Determine which water park has the lower cost for a season pass.

Justify your answer.

Annotation:

Problem solving process demonstrates an incomplete solution process; table of values completed with errors in both but points correctly graphed and conclusion is missing.

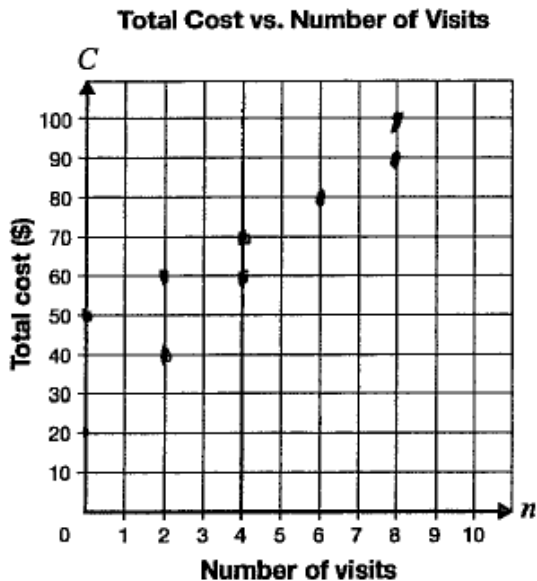
Wet Water World

$C = 20 + 10n$	
Number of visits, n	Total cost, C (\$)
0	20
2	40
4	60
6	80
8	100

Bubbling Blue

$C = 50 + 5n$	
Number of visits, n	Total cost, C (\$)
0	50
2	60
4	70
6	80
8	90

Graph the costs for both water parks on the grid below.



Determine which water park has the lower cost for a season pass.

Justify your answer. It depends on how many rides you go on. Wet water world would be the cheapest to go to if you went onto 2 or 3 rides any more the bubbling blue would be cheaper.

Annotation:

Problem solving process demonstrates a considerable understanding of the relationships between the important elements of the problem; both tables of values and graphs are correct but conclusion is only partially correct as should state Bubbling Blue is best for more than 6 rides, according to their graph, not 3 rides as mentioned.

Two water parks have different methods of determining the cost of a season pass. The equations for both parks are given below, where C is the cost of the pass and n is the number of visits.

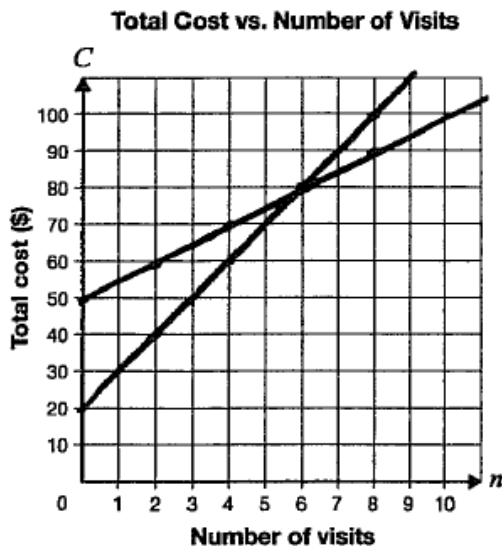
Wet Water World

$C = 20 + 10n$	
Number of visits, n	Total cost, C (\$)
0	20
2	40
4	60
6	80
8	100

Bubbling Blue

$C = 50 + 5n$	
Number of visits, n	Total cost, C (\$)
0	50
2	60
4	70
6	80
8	90

Graph the costs for both water parks on the grid below.



Determine which water park has the lower cost for a season pass.

Justify your answer.

If you visit more than six times Bubbling Blue is the Best.

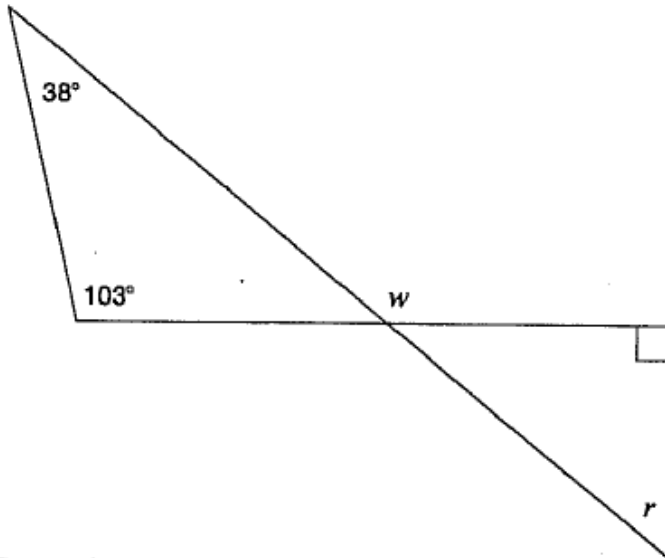
Annotation:

Problem solving process demonstrates a thorough understanding of the relationships between the important elements of the problem; both tables and graph correct and conclusion references the point of intersection and interprets the point of intersection (more than).

Determining Degrees (Spring 2008)

Code	Descriptor
B	Blank: nothing written or drawn in response to the question
I	<ul style="list-style-type: none"> - Illegible: cannot be read; completely crossed out/erased; not written in English; - Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, “?”, “!”, “I don’t know”); - Off topic: no relationship of written work to the question.
10	<p>Application of knowledge and skills of interior and exterior angles of triangles to determine the values of r and w shows limited effectiveness due to</p> <ul style="list-style-type: none"> • misunderstanding of concepts; • incorrect selection or misuse of procedures.
20	<p>Application of knowledge and skills of interior and exterior angles of triangles to determine the values of r and w shows some effectiveness due to</p> <ul style="list-style-type: none"> • partial understanding of the concepts; • errors and/or omissions in the application of the procedures.
30	<p>Application of knowledge and skills of interior and exterior angles of triangles to determine the values of r and w shows considerable effectiveness due to</p> <ul style="list-style-type: none"> • an understanding of most of the concepts; • minor errors and/or omissions in the application of the procedures.
40	<p>Application of knowledge and skills of interior and exterior angles of triangles to determine the values of r and w shows a high degree of effectiveness due to</p> <ul style="list-style-type: none"> • a thorough understanding of the concepts; • an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding) <p>(e.g., $r = 51^\circ$ and $w = 141^\circ$)</p>

Consider the following diagram.



Determine the values of r and w .

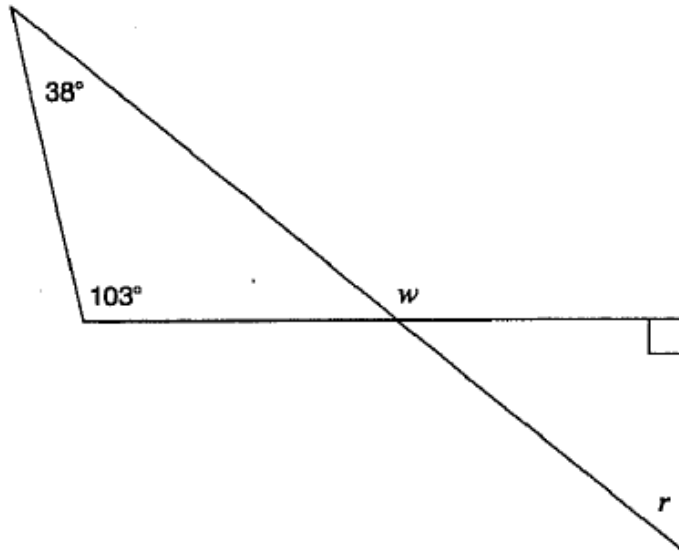
Justify your answer.

	Value	Justification
r	38°	because it has the same degrees as the other triangles degrees and it runs on the same line
w	103°	because it has the same degrees as the other triangles degrees and it runs on the same line

Annotation:

Student demonstrates misunderstanding of concepts; incorrect answers with inappropriate justification.

Consider the following diagram.



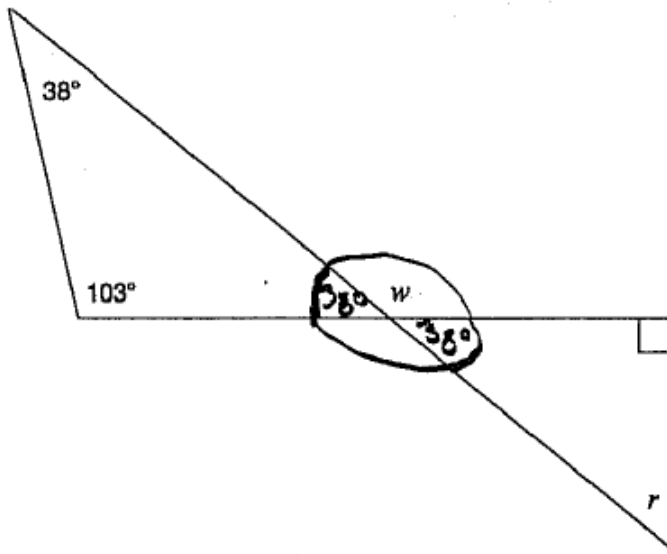
Determine the values of r and w .

Justify your answer.

	Value	Justification
r	51°	$38 + 103 = 141$ $180 - 141 = 39^\circ$ \sim $90 + 39 = 129$ $180 - 129 = 51^\circ$
w	130°	I just guessed.

Annotation:

Student demonstrates partial understanding of the concepts; determines correct value for r with appropriate justification, but incorrect value for w with inappropriate justification.



Determine the values of r and w .

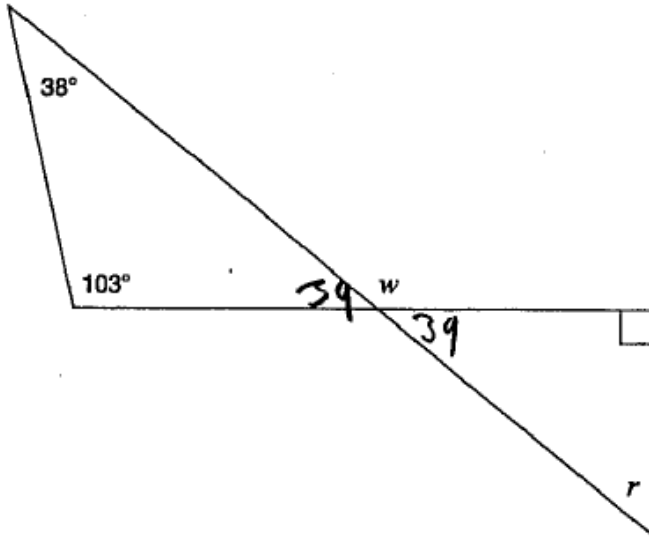
Justify your answer.

	Value	Justification
r	52°	$r = 90^\circ + 38^\circ = 128^\circ$ $\begin{array}{r} 180^\circ \\ - 128^\circ \\ \hline 52^\circ \end{array} \quad r = 52^\circ$
w	$= 142^\circ$	$w = 38^\circ - 180^\circ$ $w = \begin{array}{r} 180^\circ \\ - 38^\circ \\ \hline 142^\circ \end{array}$

Annotation:

Student demonstrates an understanding of most of the concepts; assumes third angle is 38° , but correctly determines answers for r and w with appropriate justification using this incorrect value.

Consider the following diagram.



Determine the values of r and w .

Justify your answer.

	Value	Justification
r	51°	$\begin{array}{r} 180 \\ - 90 \\ - 39 \\ \hline 51 \end{array}$
w	141°	$\begin{array}{r} 180 \\ - 103 \\ - 38 \\ \hline 39 \end{array}$ $39 + 141 = 180$ $w = 141$

Annotation:

Student demonstrates an accurate application of the procedures; correct answers for r and w with appropriate justification for both.