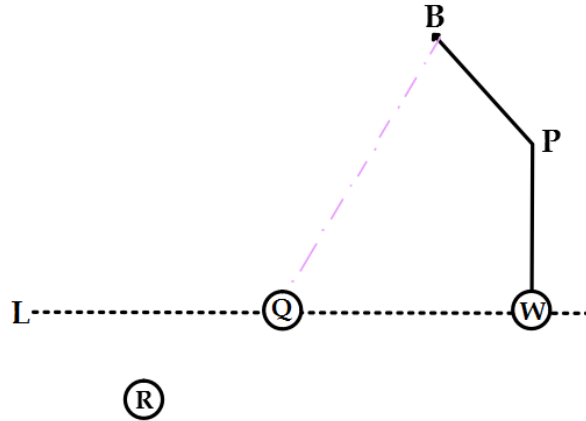


Trigonometry: Football Project (Laws of Sines and Cosines)

The quarterback for the Moanalua High School varsity football team is trying to figure out the timing of his pass to a wide receiver based on the pattern (the path that the wide receiver runs).

- The quarterback starts at point Q . The wide receiver starts at point W . Both points are on the horizontal line L .
- Point W is $\alpha =$ _____ yards to the right of point Q .
- The wide receiver runs vertically for $\beta =$ _____ yards, reaching point P .
- The wide receiver pivots to the left at an angle of $\theta =$ _____ $^\circ$, then runs for another $\phi =$ _____ yards, reaching point B .



- (a) In order for the wide receiver to catch the ball at point B , how far will the quarterback have to throw the ball?
Assume the quarterback throws the ball from point Q .

Answer: _____ yards

- (b) The wide receiver runs at an avg speed of $\Psi =$ _____ yds/sec. The quarterback throws the ball at a speed of $\lambda =$ _____ yds/sec.
How many seconds does the quarterback have to wait before he throws the ball to point B ?
(Assume the time it takes the wide receiver to change direction is negligible.)

Answer: _____ seconds

- (c) How many yards north of line L is the wide receiver when he makes the catch at point B ?

Answer: _____ yards

- (d) In a slightly different trick play, the quarterback tosses the ball backwards to his running back at point R . The angle between line L and the line segment \overline{QR} is $\Omega =$ _____ $^\circ$. The running back at point R is $\mu =$ _____ yards away from the quarterback at point Q .

The running back will throw the ball to point B . It takes three seconds for the running back to catch the ball, spot the wide receiver, and begin his throw. Assume the running back can throw at the same speed as the quarterback.

In order for this play to be successful, the football and the wide receiver must arrive within 0.5 second of each other.

Will the play be successful? State YES or NO: _____

Does the ball or the wide receiver reach point B first? State BALL or WR: _____

What is the difference in time between when the ball and the wide receiver reach point B ?

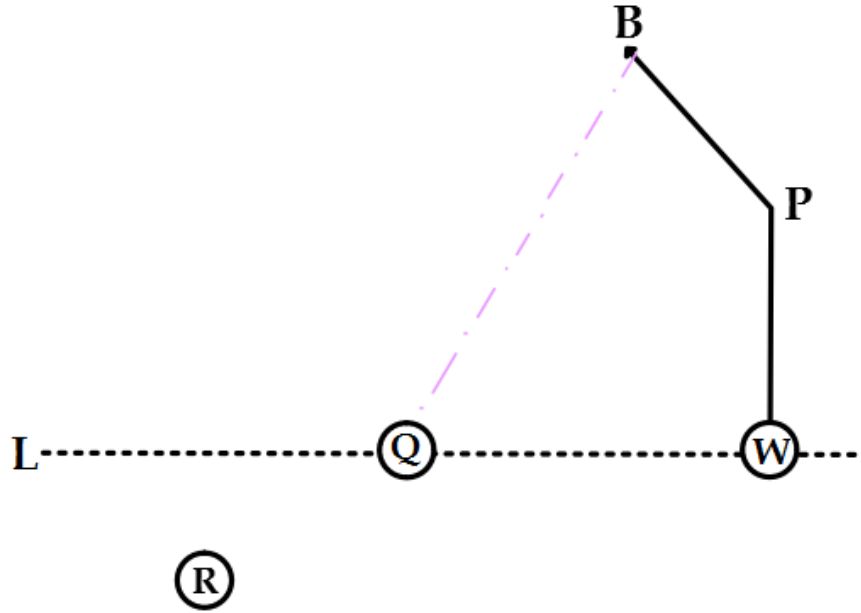
Answer: _____ seconds

Work for Part _____

Name _____

Use this diagram to show what triangle(s) you are using for this part. Clearly label all parts that are being used.

Use the spaces below to show your work. Each time you solve for a different part of the triangle, use a different box.



What part of the triangle are you solving for?	
What law are you using?	

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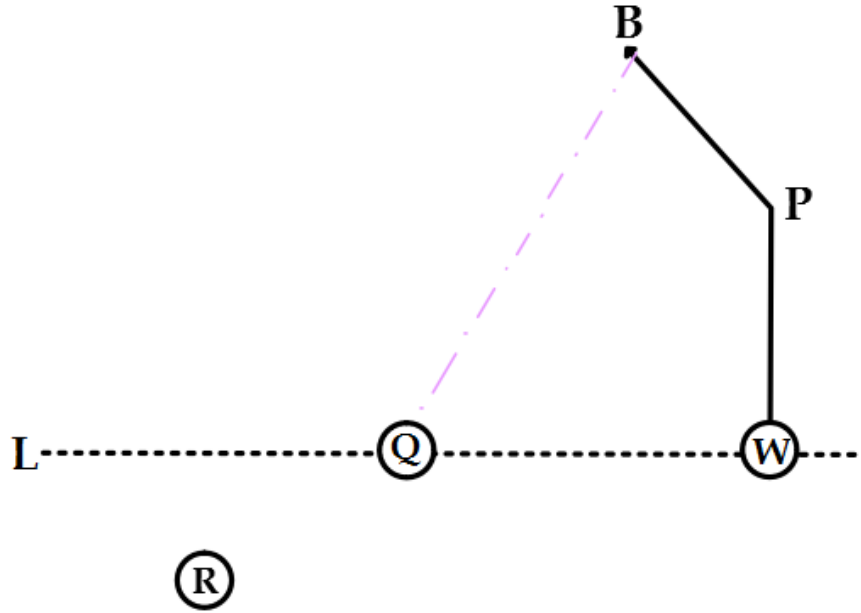
My final answer to this part is:

Work for Part _____

Name _____

Use this diagram to show what triangle(s) you are using for this part. Clearly label all parts that are being used.

Use the spaces below to show your work. Each time you solve for a different part of the triangle, use a different box.



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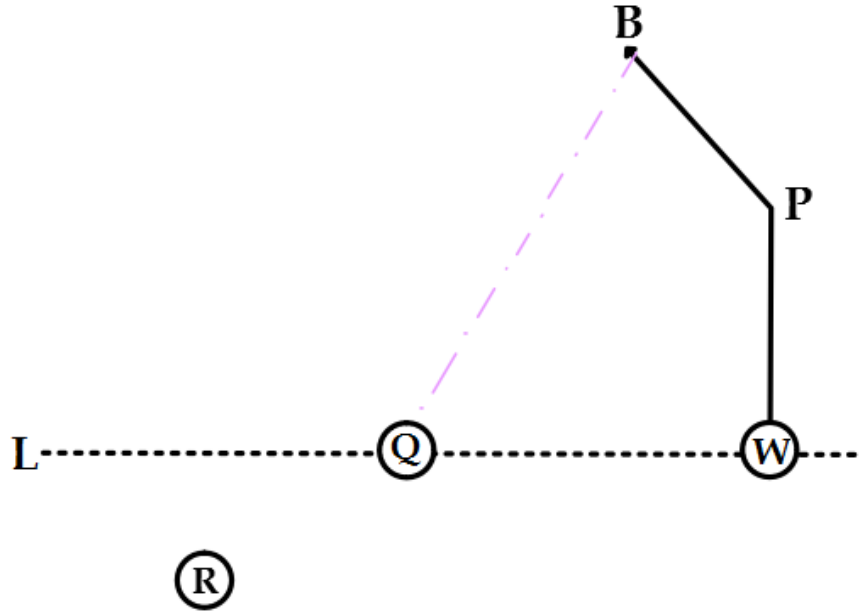
My final answer to this part is:

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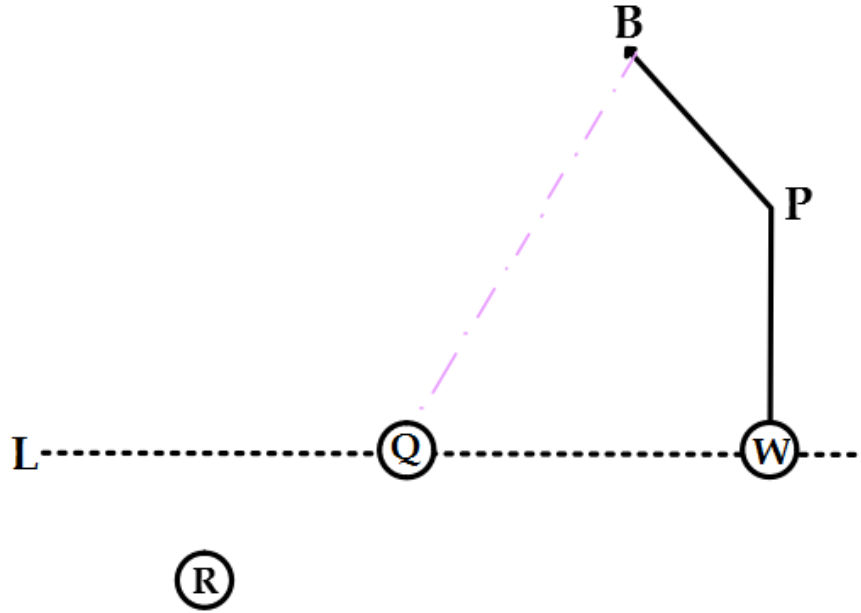
My final answer to this part is:

Work for Part _____

Name _____

Use this diagram to show what triangle(s) you are using for this part. Clearly label all parts that are being used.

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What law are you using?	

My final answer to this part is:

Reflection

Write a 1-3 page reflection in **paragraph essay form** that addresses the following prompts:

- Discuss what went well and what was difficult about this project.
- Explain how this project helped you to understand the concepts that we have covered so far this semester.

The reflection must be typed, double-spaced, using Times New Roman or Arial font in size 12, with 1" margins (not 1.25" margins) and no extra spacing. Your name and period number (and only this information, nothing else!) should be inserted at the top-right of the header, not in the body of the actual reflection. Staple the reflection to the back of this packet.

Submission and Grading

Each student must submit their project in-person. Projects submitted by a friend, left outside the classroom door, or left in the office mailbox will not be accepted.

This project must be submitted to your teacher by **December 4, 2018** (pds 1, 2, 4, 5) or **December 5, 2018** (pds 3, 6, 7), at the start of your class period. Any projects submitted after this will be marked late; late projects will only be accepted until **Wednesday, December 12, 2018** by 3:25 p.m. No late projects will be accepted after these dates.

	4 Exceeds	3 Meets	2 Approaching	1 Novice	0 No Understanding
General Learner Outcome (GLO) Self-Directed Learner Score: ____	Project is submitted prior to the due date.	Project is submitted on the due date.	Project is submitted 1-2 school days after the due date.	Project is submitted 3 or more school days after the due date.	Project was not submitted.
General Learner Outcome (GLO) Quality Producer Score: ____	All components of the student's project are neat, organized, and of high quality.	All components of the student's project are neat, organized, and of good quality.	Student's project is messy, disorganized, or incomplete.	Student project is messy, disorganized, and incomplete.	Student's project was not submitted.
General Learner Outcome (GLO) Effective Communicator Score: ____	Reflection is eloquent, with no grammar/spelling errors.	Reflection is effective, with only a few minor grammar/spelling errors.	Reflection is not always clear, due to grammar/spelling errors.	Reflection is riddled with significant grammar/spelling errors.	Reflection cannot be understood or is nonexistent.
General Learner Outcome (GLO) Effective and Ethical User of Technology Score: ____	Reflection is printed according to all instructions.	Reflection is printed according to most instructions.	Reflection is printed according to some instructions.	Reflection is hand-written.	No reflection is submitted.

All of the above GLO ratings must be a "meets" (3) or "exceeds" (4) in order to qualify for an "exceeds" (4) score on the graded standards below. Otherwise, the highest score that you will be eligible for on the graded standards will be a "meets" (3).

	4 Exceeds	3 Meets	2 Approaching	1 Novice	0 No Understanding
G.SRT.D.11 Overall Score: ____ Part a Score: ____ Part b Score: ____ Part c Score: ____ Part d Score: ____	Student applies the Law of Sines and the Law of Cosines correctly, accurate to four decimal places.	Student applies the Law of Sines and the Law of Cosines correctly, with minor rounding errors	Student applies the Law of Sines and the Law of Cosines correctly, but with a few major errors	Student applies the Law of Sines and the Law of Cosines incorrectly.	Student is unable to apply the Law of Sines and the Law of Cosines.