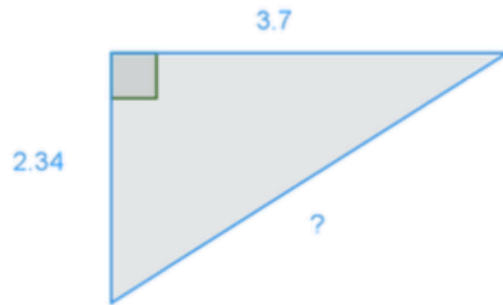


1. For each of the situations below, determine whether to use the Pythagorean theorem, right triangle trigonometry, law of sines, law of cosines, or some other method.

a.

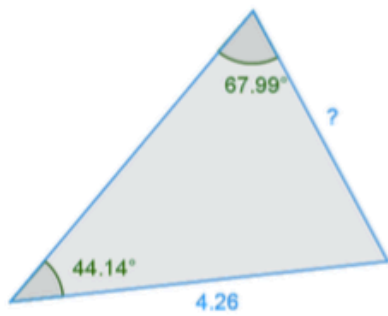


Pythagorean theorem

b. Know one side and an angle of a right triangle and want to find any other side.

Right triangle trigonometry

c.

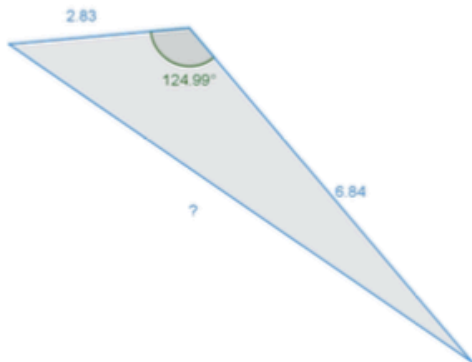


Law of sines

d. Know two angles of a triangle and want to find the third.

Find the sum of the measures of the two known angles, and subtract the result from 180°.

e.

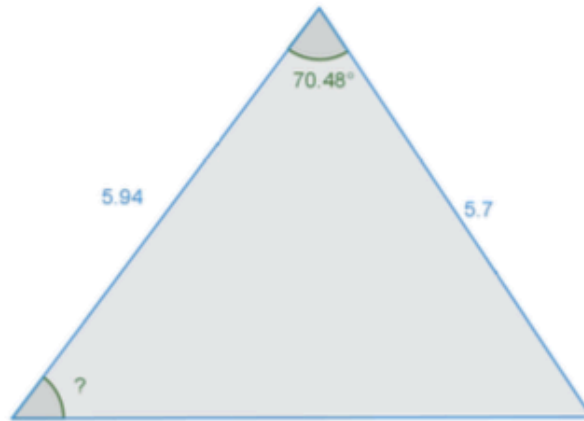


Law of cosines

- f. Know three sides of a triangle and want to find an angle.

Law of cosines

- g.

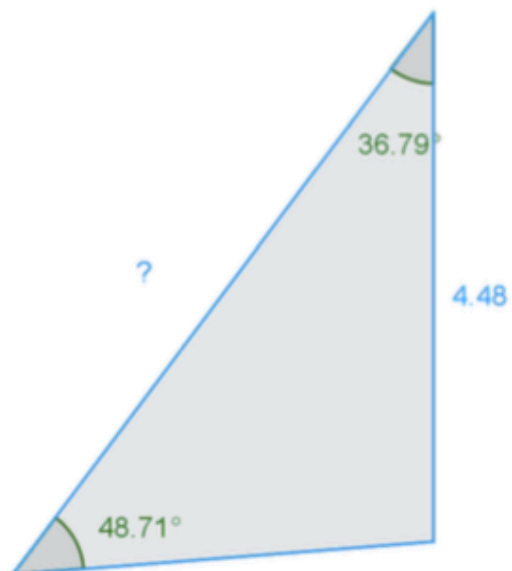


Either law of cosines twice or a combination of law of cosines and law of sines

- h. Know a side and two angles and want to find the third angle.

Find the sum of the measures of the two known angles, and subtract the result from 180° .

- i.



Law of sines

A paintball is fired from a gun with a force of 59 N at an angle of elevation of 1° . If the force due to gravity on the paintball is 0.0294 N, then answer the following:

- a. Is this angle of elevation enough to overcome the initial force due to gravity and still have an angle of elevation greater than 0.5° ?

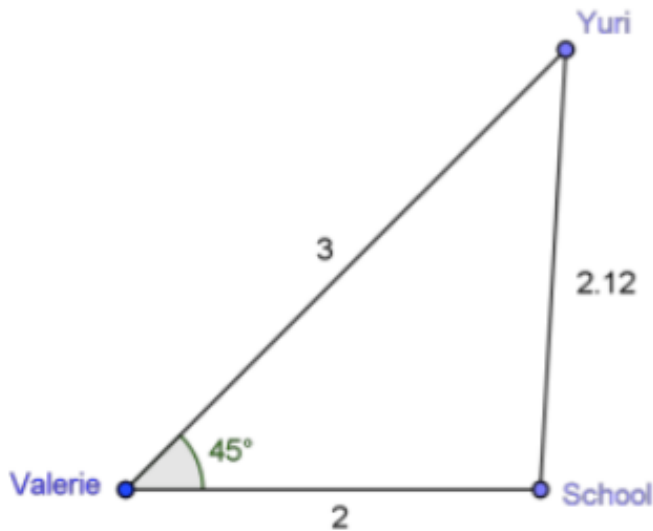
Yes. The force due to gravity is so small that there is effectively no difference initially. The third side has a magnitude of 58.999. The angle of elevation is reduced by less than 0.029° .

- b. What is the resultant magnitude of the vector in the direction of the paintball?

58.999 N

Valerie lives 2 miles west of her school and her friend Yuri lives 3 miles directly northeast of her.

- a. Draw a diagram representing this situation.



- b. How far does Yuri live from school?

$$c = \sqrt{2^2 + 3^2 - 2 \cdot 2 \cdot 3 \cdot \cos(45)}$$

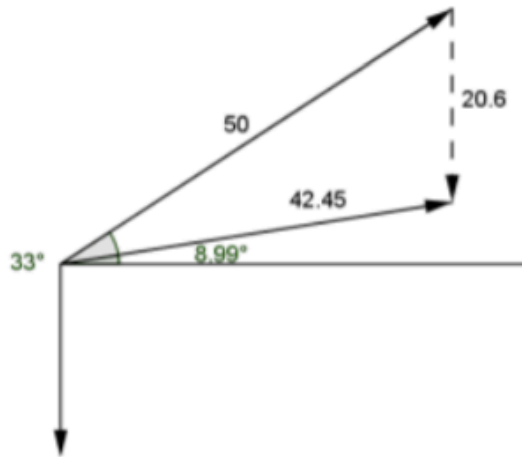
$$= \sqrt{13 - 6\sqrt{2}}$$

$$\approx 2.125$$

Yuri lives approximately 2.125 mi. from school.

A 2.1 kg rocket is launched at an angle of 33° with an initial force of 50 N. Assume the acceleration due to gravity is $9.81 \frac{\text{m}}{\text{s}^2}$.

- a. Draw a picture representing the force vectors and their resultant vector.



- b. What is the magnitude of the resultant vector?

The force due to gravity: $F = 2.1 \cdot 9.81 = 20.601$

$$c = \sqrt{50^2 + 20.601^2 - 2 \cdot 50 \cdot 20.601 \cdot \cos(57^\circ)} \\ \approx 42.455$$

The resultant vector is about 42.455 N.