

INSPIRE STEAM

Mathematics

Plan a drone flight path using Pythagoras.

This lesson forms part of an inter-disciplinary learning experience to plan and execute a drone mission, using Pythagoras, to provide relief for flood victims in KwaZulu Natal.

Incorporates:
3D Printing
Drones



(i)Think
Subject Specific Lesson



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CREATED

for teachers,
by teachers



Pythagoras

Exit Learning Outcome	Use Pythagoras to determine a drone flight path.	Suggested timeframe	1 hour	Resources & Equipment
Learning Outcomes	LO1: Recall the Pythagoras theorem LO2: Recall Geometric proofs LO3: Apply knowledge and understanding LO4: Determine the hypotenuse of a flight path			<ul style="list-style-type: none"> Devices Protractor
STEAM Skills & Other	<ul style="list-style-type: none"> Collaboration Critical thinking Communication Problem-solving 			
Content & Concepts	<ul style="list-style-type: none"> Geometry <ul style="list-style-type: none"> Pythagoras 			

Teacher's Notes for Lesson

Introduction to Lesson

Pythagoras is regularly applied in real life. Some of the most common uses is in construction and architecture. Pythagoras is also used in two-dimensional navigation to find the shortest distance. Furthermore, it is used to survey the steepness of the slopes of mountains or hills. In this lesson, learners will use Pythagoras to determine the flight path of a drone, to provide relief supplies to flood victims in KwaZulu Natal.

This lesson can be used to lead up to the (i)RL drone mission challenge called, Relief Theorem.

Introduction to content

- Discuss real life application of Pythagoras.
 - Watch the video on the use of Pythagoras in real life.
- Hand out the worksheet.

Navigate to the Inspire Campus

Procedure

- Review the Pythagoras theorem.
 - Complete Activity 1 on the worksheet.
 - Determining the values as indicated.

- Recall other properties of angles.

Refer to the prescribed textbook.

- Complete Activity 2 on the worksheet.
 - The image in Activity 2 shows an aerial map of the key delivery points.
 - Allow learners to use a protractor to determine the interior angles of the diagram.
 - Encourage learners to use their knowledge of Pythagoras to determine the hypotenuse of the right-angle triangles.

Closing

- Consolidate all main concepts and their meaning.
- Navigate to the Inspire Campus and allow the learners to complete their activities.



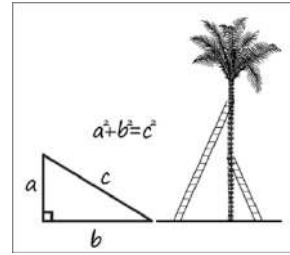


Pythagoras

What is Pythagoras?

The Pythagoras theorem explains the relationship between the three sides of a right-angled triangle. According to the theorem, the square of the hypotenuse is equal to the sum of the squares of the other two sides of a triangle.

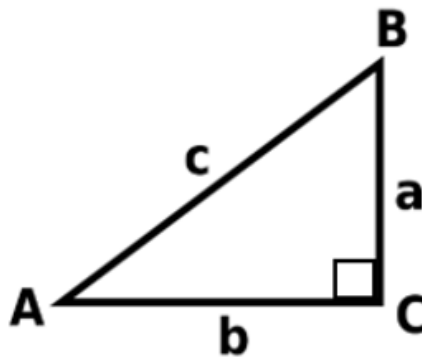
Pythagoras has many real-life applications in construction, navigation and land surveying.



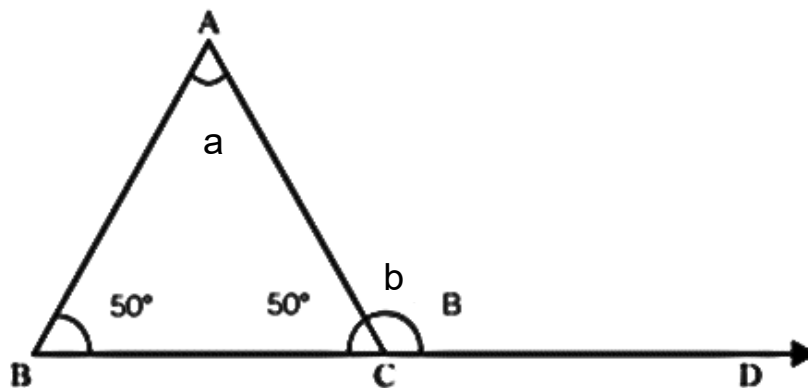
Complete the following activities below:

Activity 1: Determine the value

1.1 Determine the value of c.



1.2 Determine the value of a and b.

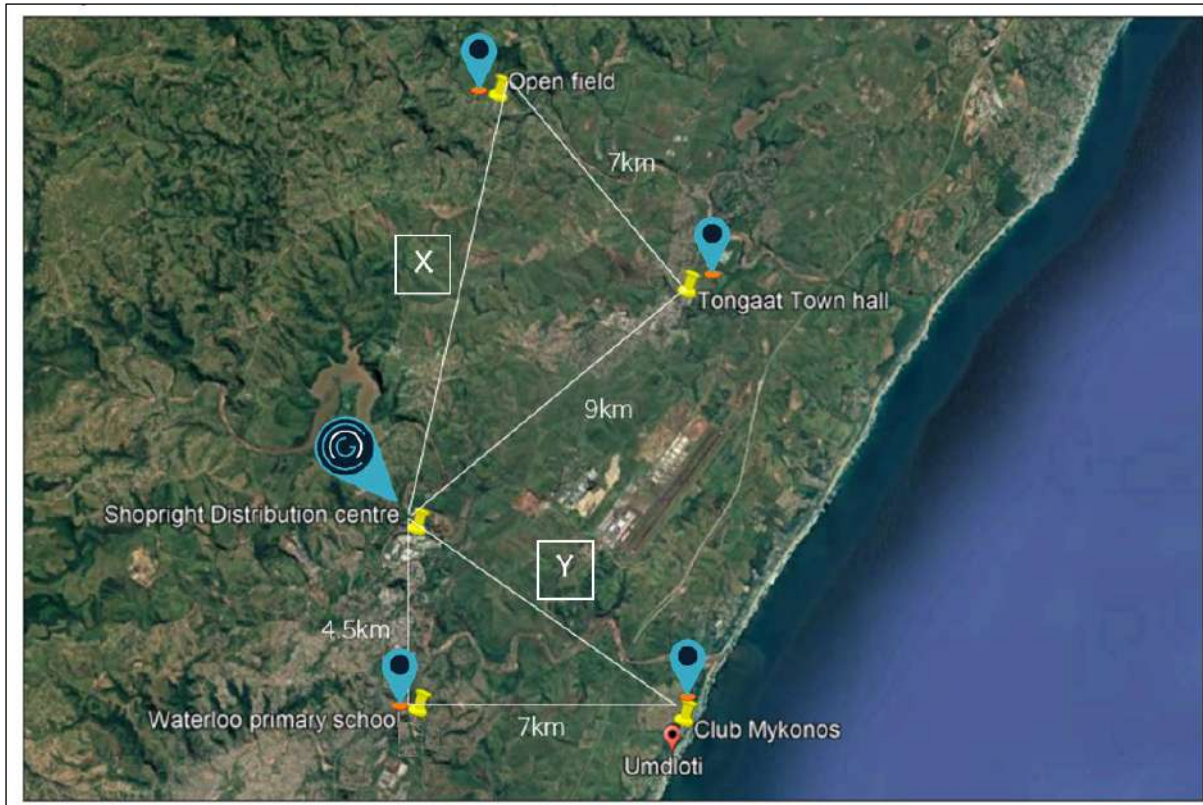




Activity 2: Determine the flight path

A drone pilot has been tasked to deliver relief items to victims of a flood disaster. You are tasked with determining the most direct route for the drone to return to the home zone which is at the Shoprite Distribution centre.

The image below shows an aerial map of the key delivery points.



The table below demonstrates how to calculate the hypotenuse of both right-angled triangles.

Keynotes

- Each triangle that is formed during the flight is right-angled.
- The hypotenuse of a right-angled triangle is $a^2+b^2=c^2$
- Use a protractor to determine the angles of each of the triangles
- The sum of the interior angles of a triangle = 180°



2.1 Use Pythagoras to determine the distances between:

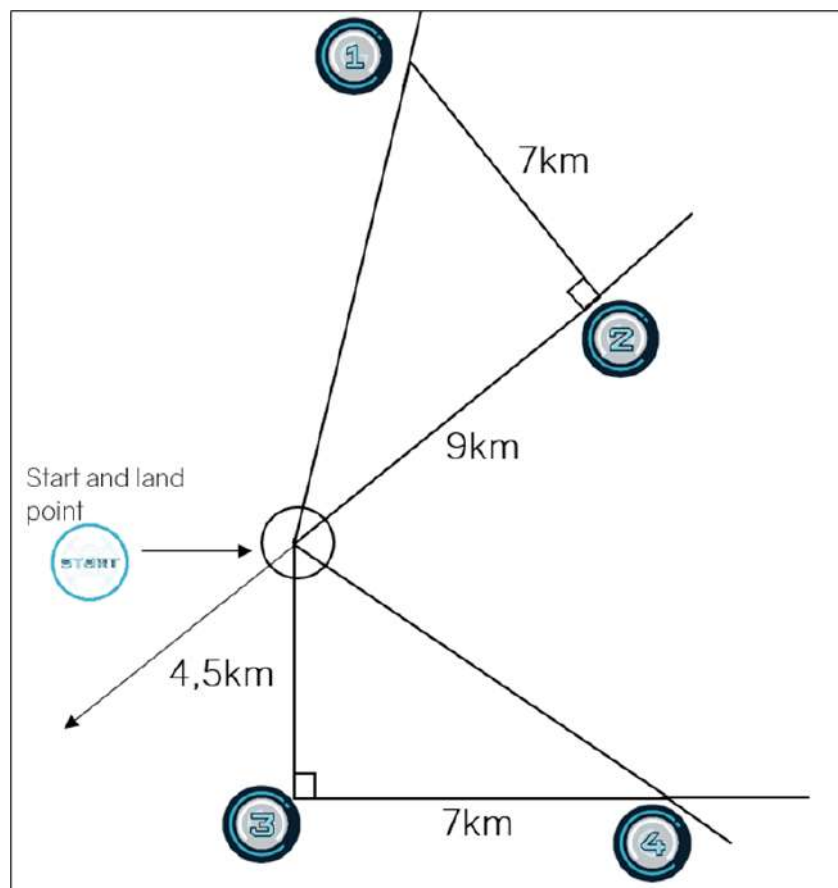
- START and Open field (X)
- Club Mykonos and START (Y)

The table below provides a space for you to write down your calculations.

Distance X =	Distance of Y =
$a^2+b^2=c^2$	$a^2+b^2=c^2$

2.2 Determine angles

Use the following flight illustration to determine all angles. Use your protractor and knowledge of angles to determine the angles. Knowing all the angles will assist in establishing the degree to which the drone must yaw to change direction.

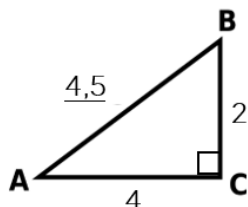
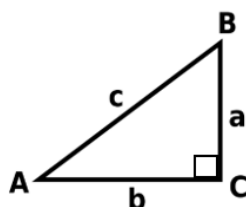




Pythagoras

Activity 1:

1.1



Answer:

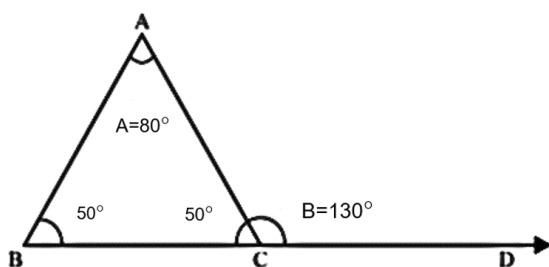
$$a^2 + b^2 = c^2$$

$$2^2 + 4^2 = c^2$$

$$4 + 16 = 20$$

$$\sqrt{20} = 4,47 \text{ (4,5)}$$

1.2



Answer:

$$A = 180^\circ - 100^\circ = 80^\circ$$

$$B = 180^\circ - 50^\circ = 130^\circ$$

Activity 2:

2.1

Distance X =	Distance of Y =
$a^2 + b^2 = c^2$	$a^2 + b^2 = c^2$
$7^2 + 9^2 = X^2$	$4.5^2 + 7^2 = Y^2$
$49 + 81 = X^2$	$20.25 + 49 = Y^2$
$130 = X^2$	$69.25 = Y^2$
$\sqrt{130} = X$	$\sqrt{69.25} = Y$
$X = 11,4$	$Y = 8.3$



2.2

