SUVA SANGAM COLLEGE
YEAR 10
MATHEMATICS
WEEK 1: MONDAY 05/07 TO FRIDAY 09/07

STRAND	**GEOMETRY**
SUB-STRAND	**Pythagoras Theorem**
CONTENT LEARNING OUTCOME	Study and discuss Pythagoras Theorem and how it is applied to any given right – angled triangle.
REFERENCE FROM TEXTBOOK	

Achievement Indicators

1. Calculate squares and square roots.

Lesson Notes

Square	Square roots
It is a number multiplies to itself.	Symbol $\sqrt{x}$
It is written as x^2	A square root of a number is a value that can be multiplied by itself to give the original number.
Squaring a negative number always gives a positive number. **Example 1**: $-3 \times -3 = 9$ Thus: $(-3)^2 = 9$ However: $-(3)^2 = -9$	**Example 2:** $\sqrt{49} = 7$ Because : 7×7
Example 3: simplify $6^2 \times (-3)^2 = 36 \times 9$ $= 324$	

Student Activity

Find the squares and the square roots correct to two decimal places.

1. $(2)^2$
2. $(-4)^2$
3. -5^2
4. 3.14^2
5. $\sqrt{16}$
6. $\sqrt{50}$
7. $\sqrt{196}$
8. $\sqrt{56.25}$

WEEK 2: MONDAY 12/07 TO FRIDAY 16/07

STRAND	**GEOMETRY**
SUB-STRAND	**Pythagoras Theorem**
CONTENT LEARNING OUTCOME	Study and discuss Pythagoras Theorem and how it is applied to any given right – angled triangle.
REFERENCE FROM TEXTBOOK	

Achievement Indicators

1. State the Pythagorean Theorem.
2. Define hypotenuse.
3. Identify the hypotenuse of a right triangle.

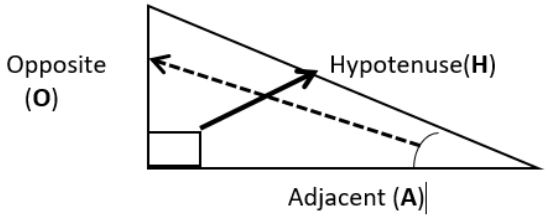
Lesson notes:

- Pythagoras Theorem Is a theorem that gives the relationship between the sides of a right - angled triangle.
- Pythagoras theorem:

$$a^2 + b^2 = c^2 \text{ or } \sqrt{a^2 + b^2} = c$$

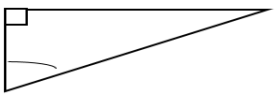
- Trigonometry is the study of the ratios of the sides of triangles. In Trigonometry, 'Trig' refers to triangles and 'metry' means to measure (right triangles).

Sides of a right triangle



Hypotenuse - is the longest side and it is the side that is opposite to the right triangle symbol.
Opposite side – it is the side opposite to the other angle of the right triangle.
Adjacent side - is those that are next to each other.
Student Activity: Identify the sides of the triangle.

1.



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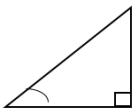
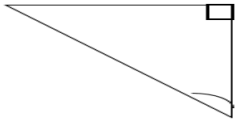


3.



WEEK 3: MONDAY 19/07 TO FRIDAY 23/07

STRAND	**GEOMETRY**
SUB-STRAND	**Pythagoras Theorem**
CONTENT LEARNING OUTCOME	Study and discuss Pythagoras Theorem and how it is applied to any given right – angled triangle.
REFERENCE FROM TEXTBOOK	

Achievement Indicators:

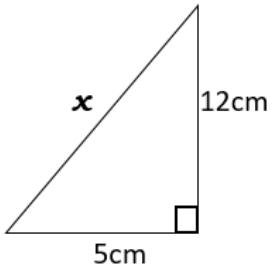
1. Calculate the unknown length of a triangle.

Lesson Notes:

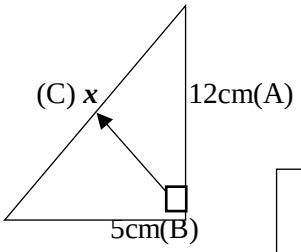
- The hypotenuse is the side opposite the right angle, ***c*** is the longest side of the triangle, ***a*** and ***b*** are the other two sides of the triangle.
- Given any two sides of the right angled triangle the Pythagoras theorem $a^2 + b^2 = c^2$ *or* $\sqrt{a^2 + b^2} = c$ can be used to find the length of the unknown side.

Examples: Find the unknown sides of the triangle.

1.



Solution:



Identify the sides and its values

a = 12 ***b =5*** ***c = x***

$\sqrt{a^2 + b^2} = c$

$\sqrt{12^2 + 5^2} = c$

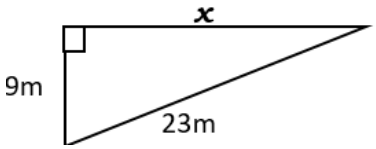
$\sqrt{144 + 25} = c$

$\sqrt{169} = c$

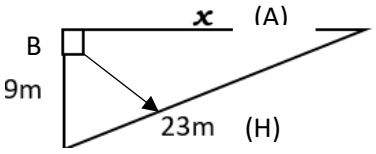
13 cm = *c*

Substitute the values and calculate for the unknown.

2.



Solution:



a = x ***b = 9*** ***c = 23***

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

$x^2 + 9^2 = 23^2$

$x^2 + 81 = 529$

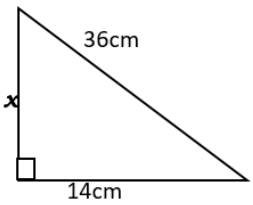
$x^2 + 81 - 81 = 529 - 81$

$x^2 = 448$

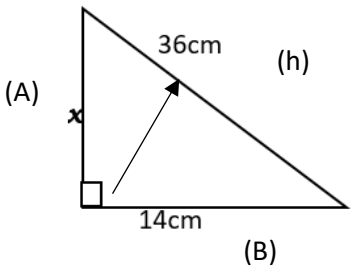
$\sqrt{x^2} = \sqrt{448}$

x = 21.16 cm

3.



Solution:



a = x ***b = 14*** ***c = 36***

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

$x^2 + 14^2 = 36^2$

$x^2 + 196 = 1296$

$x^2 + 196 - 196 = 1296 - 196$

$x^2 = 1100$

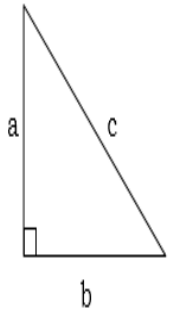
$\sqrt{x^2} = \sqrt{1100}$

x = 33.16 cm

Student Activity

1.

Which of the following expressions is true for the right angle triangle given below?



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

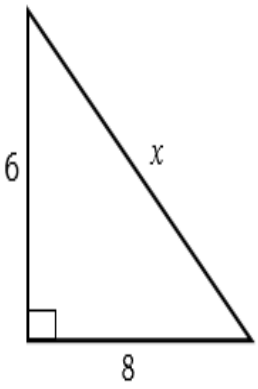
C. $c^2=a^2+b^2$

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

D. $c^2=a^2-b^2$

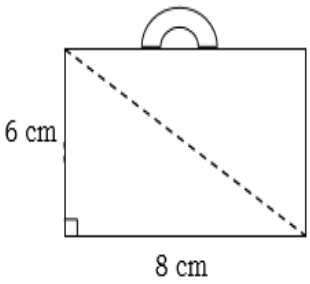
2.

For the right angled triangle shown below, find the value of length x.



3.

A toy suitcase measures 8 cm long and 6 cm high. What is the diagonal length of the suitcase?



WEEK 4: MONDAY 26/07 TO FRIDAY 30/07

STRAND	**GEOMETRY**
SUB-STRAND	**Pythagoras Theorem**
CONTENT LEARNING OUTCOME	Study and discuss Pythagoras Theorem and how it is applied to any given right – angled triangle.
REFERENCE FROM TEXTBOOK	

Achievement Indicators:

1. Determine pythagorean triads.

Pythagorean triad:

- The theorem can also be used to determine whether a triangle is a right angled triangle or not.
- A Pythagorean triad is a set of numbers(or measurements) that satisfies $a^2 + b^2 = c^2$ or $\sqrt{a^2 + b^2} = c$.

Examples:

1. A triangle has lengths 8, 15 and 16. Is it a right angled triangle

Solution: note :{ 8, 15, and 16} the biggest number will represent the hypotenuse. Why?

$a^2 + b^2 = c^2$ **a = 8 b = 15 c = 16**

$(8)^2 + (15)^2 = (16)^2$

$64 + 225 = 256$

$289 \neq 256$

Since LHS ≠ RHS this triangle is **not** a right triangle.

2. Show that {10, 24, and 26} is a right triangle.

Solution: note :{ 10, 24, and 26}

a = 10 b = 24 c = 26

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

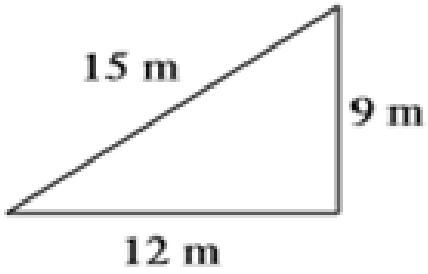
$(10)^2 + (24)^2 = (26)^2$

$100 + 576 = 676$

$676 = 676$

Since LHS = RHS this triangle is a right triangle.

3. Show that the triangle given below is a right triangle.



Solution: **note :{ 9, 12, and 15}**

a = 9 b = 12 c = 15

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

$(9)^2 + (12)^2 = (15)^2$

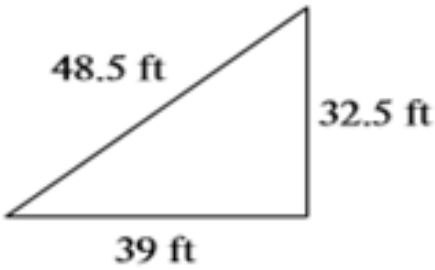
81 + 144 = 225

225 = 225

Since LHS = RHS this triangle is a right triangle.

Student Activity

1. Show that the triangle given below is a right triangle.



2. The side lenghts of various triangles are given. Determine which ones are right angled triangles.

(a) {6, 8, 10}

(b) {3,5,6}

(c) { $\sqrt{3}, \sqrt{11}, \sqrt{8}$}

WEEK 5: MONDAY 02/08 TO FRIDAY 06/08

STRAND	**GEOMETRY**
SUB-STRAND	**Pythagoras Theorem**
CONTENT LEARNING OUTCOME	Study and discuss Pythagoras Theorem and how it is applied to any given right – angled triangle.
REFERENCE FROM TEXTBOOK	

Achievement Indicators:

1. Use the Pythagoras theorem to solve word problems.

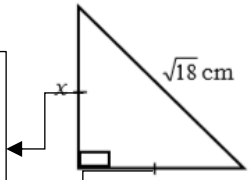
Lesson Notes:

- A Pythagorean triad is a set of numbers(or measurements) that satisfies $a^2 + b^2 = c^2$ *or* $\sqrt{a^2 + b^2} = c$.

Examples:

1. Find the length of side marked *x*.

This mark indicates that both these sides are of the same size.



Solution:

a* = *x ***b* = *x*** ***c* = $\sqrt{18}$**

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

$x^2 + x^2 = (\sqrt{18})^2$

$2x^2 = 18$

$2x^2 \div 2 = 18 \div 2$

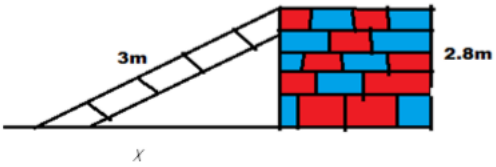
$x^2 = 9$

$\sqrt{x^2} = \sqrt{9}$

***x* = 3 cm**

1. Substitute the values.
2. Manipulate the formula to make *x* the subject of the formula

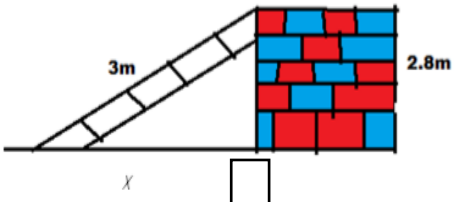
2. A 3m ladder stands on a horizontal ground and reaches 2.8m up a vertical wall. How far is the foot of the ladder from the base of the wall?

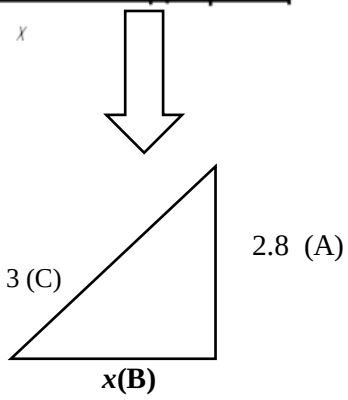


Solution:

Steps:

1. Illustrate the problem mathematically.





2. Solve using pythagoras theorem.

a = 2.8 ***b = x*** ***c = 3***

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

$2.8^2 + x^2 = 3^2$

$7.84 + x^2 = 9$

$7.84 - 7.84 + x^2 = 9 - 7.84$

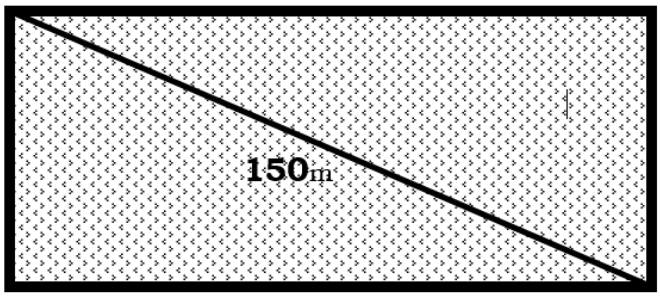
$x^2 = 1.16$

$\sqrt{x^2} = \sqrt{1.16}$

x = 1.077 cm

1. Substitute the values.
2. Manipulate the formula to make *x* the subject of the formula

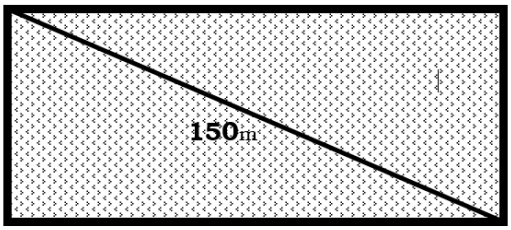
3. A rectangular field is 125m long and the length of one diagonal of the field is 150m. What is the width of the field?



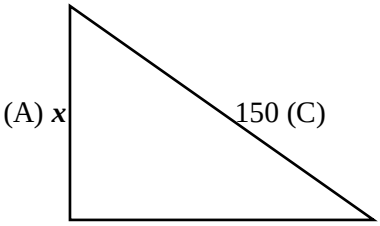
125m

Solution:

1. Illustrate the problem mathematically.



125m



1. Solve using pythagoras theorem.

a = 125 ***b = x*** ***c = 150***

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

$125^2 + x^2 = 150^2$

$15{,}625 + x^2 = 22{,}500$

$15{,}625 - 15{,}625 + x^2 = 22{,}500 - 15{,}625$

$x^2 = 6{,}875$

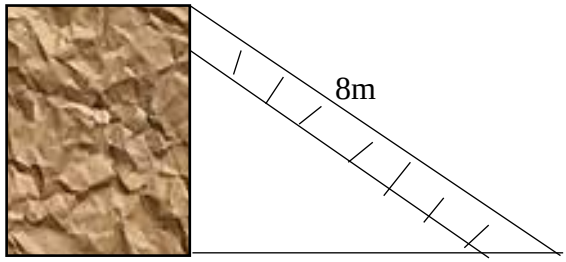
$\sqrt{x^2} = \sqrt{6{,}875}$

x = 82.915 cm

1. Substitute the values.
2. Manipulate the formula to make *x* the subject of the formula

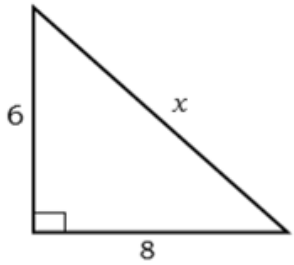
EXERCISE:

1. A 8m ladder is leaned against the side of a wall. How high is does the ladder reach it its base is 3m away from the building?

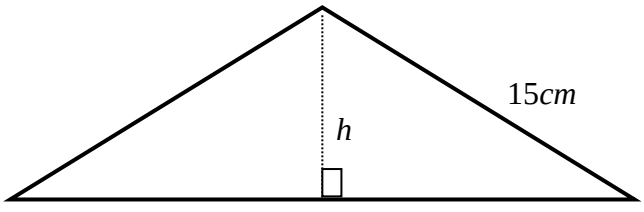


2. Linda is mountain climbing with Allie and has just climbed a 16-metre vertical roc rock face. Allie is standing 12 metres away from the bottom of the cliff, looking up a up at Linda. How far away are Linda and Allie?

3. For the right angled triangle shown below, find the value of length *x*.



4. The diagram shown below gives the dimension**s of a coat** hanger.



Find the height, ***h***.