Name: SOLUTIONS Date: _____

Baldivis Secondary College

Year 12 Essentials Mathematics

Test 1, 2018

Topic –Pythagoras' Theorem and Trigonometry

	45
	=_____ %

Total Time: ***50*** *minutes*

Total Reading: *5 minutes*

Total Working: *55 minutes*

Weighting: *5% of the year.*

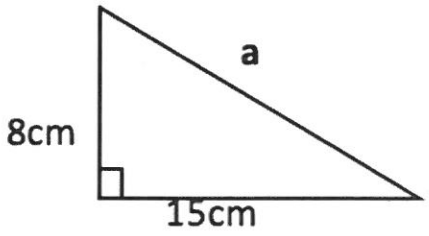
Equipment: *1x A4 page notes (front and back), Scientific Calculator*

Full working out must be shown to get full marks.
All units must be noted or marks will be deducted.
Attempt all questions

1. **[6 marks: 3,3]**

Determine the value of the pronumeral in each of the following HINT Use Pythagoras Theorem

a)



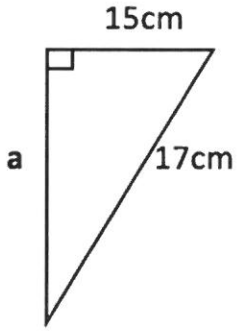
$a^2 + b^2 = c^2$ ✓

$8^2 + 15^2 = c^2$

$c^2 = \sqrt{289}$ ✓

$c = 17\text{cm}$ ✓

b)



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

$a^2 = c^2 - b^2$ ✓

$a^2 = 17^2 - 15^2$

$a = \sqrt{64}$ ✓

$= 8\text{cm}$ ✓

2. **[3 marks:]**

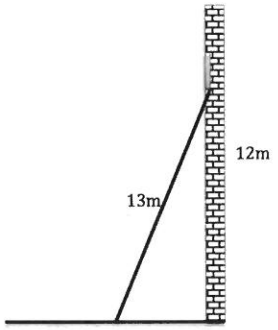
A fireman has a ladder that is 13 metres long. If he wants to reach a window that is 12 metres above the ground, how far from the wall should he put the bottom of his ladder?

$a^2+b^2=c^2$ ✓

$a^2 = c^2-b^2$ ✓

$a = \sqrt{13^2-12^2}$

$= 5m.$ ✓



3. **[3 marks:]**

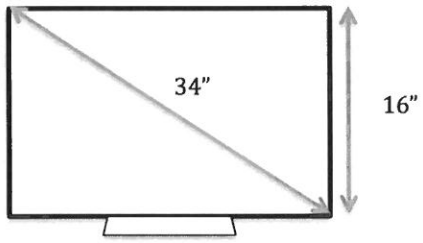
Laura is buying a television. It has a 34 inch screen. If it is 16 inches tall, how wide is the screen? Her television cabinet is 19 inches wide. Will the television fit in it?

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

$= \sqrt{34^2-16^2}$ ✓

$= 30$ inches ✓

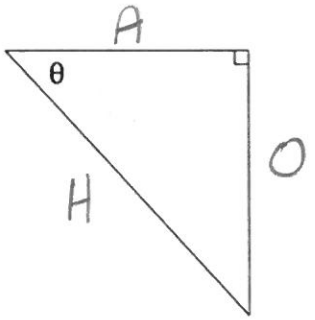
No it will not fit ✓



4. **[2 marks: 1, 1]**

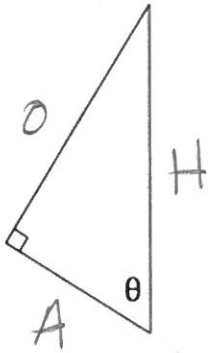
Label the sides Hypotenuse, Opposite and Adjacent sides on the following right angled triangles:

a)



✓

b)

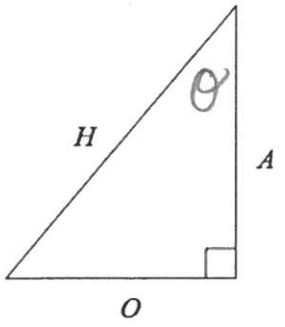


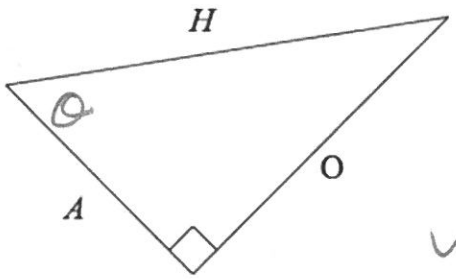
✓

5. **[2 marks: 1, 1]**

Label the angle θ in the correct place on the following right angled triangles:

a)

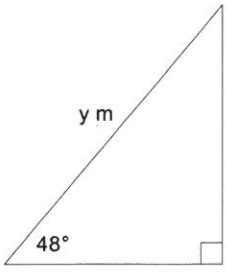




6. **[9 marks, 3, 3, 3,]**

Determine the value of the pronumeral in each of the following HINT Use Trigonometry

a)



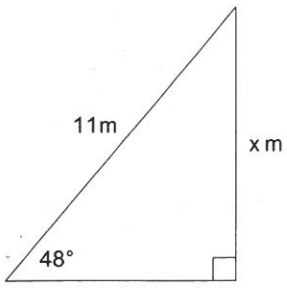
$\cos\theta = \frac{A}{H}$ ✓

$\cos 48 = \frac{11}{y}$

$y = \frac{11}{\cos 48}$ ✓

$= 16.4\text{m}$. ✓

b)



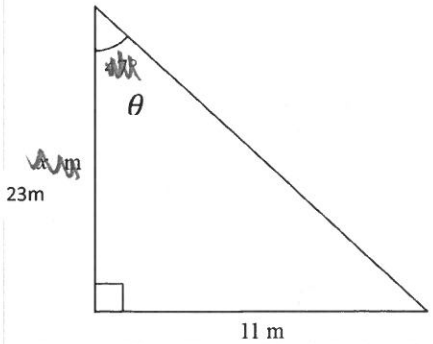
$\sin\theta = \frac{O}{H}$ ✓

$\sin 48 = \frac{x}{11}$

$x = \sin 48 \times 11$ ✓

$= 8.2\text{m}$ ✓

c)



Hint: find the missing angle.

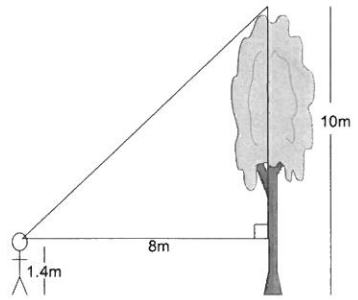
$\tan\theta = \frac{O}{A}$ ✓

$\tan^{-1}\theta = \frac{11}{23}$ ✓

$\theta = 25.56°$. ✓

7. **[3 marks]**

A boy notices a bird sitting at the very top of a 10m tall tree. If he is standing 8m from the base of the tree, what is the distance between his eye and the top of the tree?



$a = 10 - 1.4$

$= 8.6\text{m}$ ✓

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

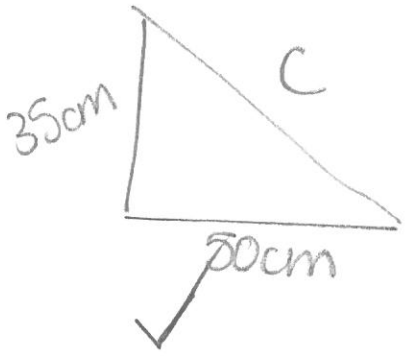
$= 8^2 + 8.6^2$ ✓

$c = \sqrt{137.96}$

11.74m ✓

8. **[4 marks]**

The school council needs to have a ramp build over the steps of each of the building exits, to accommodate a student in a wheelchair. If the junior school building is 35cm off the ground and has steps that reach out 50cm, calculate the length of the ramp
(Sketch a diagram of the scenario).



✓ ✓

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

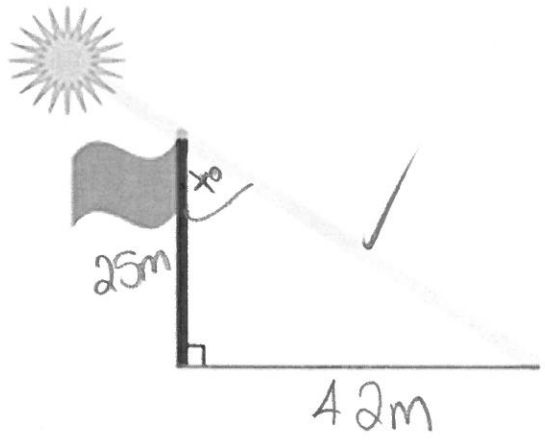
$= 35^2 + 50^2$ ✓

$= \sqrt{3725}$ ✓

61.03m ✓

9. **[3 marks]**

A 25 m flagpole casts a 42 m shadow. What is the angle the sun makes with the flagpole



✓

$\tan\theta = \frac{\text{opp}}{\text{adj}}$ ✓

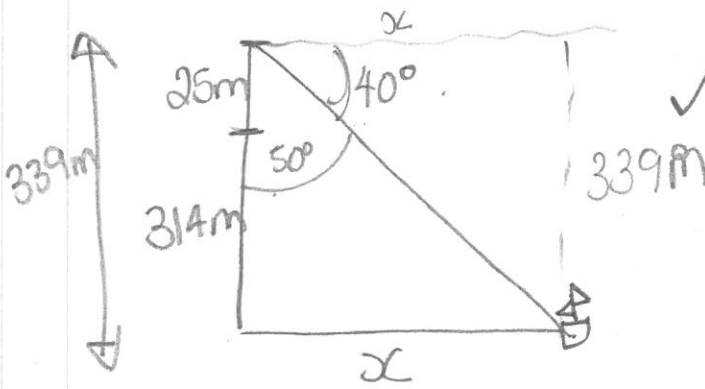
$= \frac{42}{25}$

$\theta = \tan^{-1}\left(\frac{42}{25}\right)$ ✓

$\theta = 59.24^\circ$ ✓

10. **[4 marks]**

From the top of a 25 m lighthouse, on a 314 m tall cliff, the angle of depression to a sailing boat out in the ocean is 40°. How far is the sailing boat from the base of the cliff?
(Sketch a diagram of the scenario).



339m ✓

$\tan\theta = \frac{opp}{adj}$ ✓

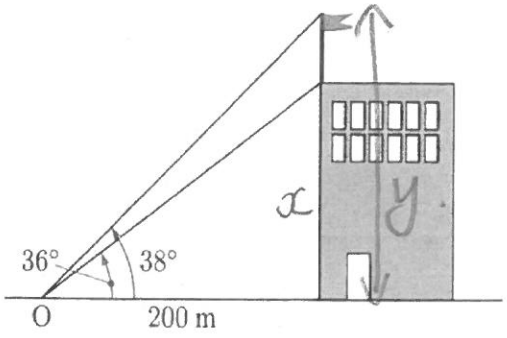
$\tan 40 = \frac{339}{x}$ ✓

$x = \frac{339}{\tan 40}$

$= 404.00m$ ✓

11. **[6 marks]**

From an observer at O who is 200m from a building, the angles of elevation to the bottom and top of a flagpole are 36° and 38 ° respectively. Find the height of the flagpole.



$\tan = \frac{opp}{adj}$

$\tan 36° = \frac{x}{200}$ ✓

$x = \tan 36 \times 200$

$x = 145.31m$ ✓

$\tan 38 = \frac{y}{200}$ ✓

$y = \tan 38 \times 200$

$y = 156.26$ ✓

Flag pole $= y - x$

$= 156.26 - 145.31$ ✓

$= 10.95m$ ✓

~ **END OF TEST** ~