Name: SOLUTIONS Date: _____

Baldivis Secondary College

Year 12 Essentials Mathematics

Test 4, 2017

Topic –Pythagoras' Theorem and Trigonometry

50
=____ %

Total Time: ***60*** *minutes*

Total Reading: *5 minutes*

Total Working: *55 minutes*

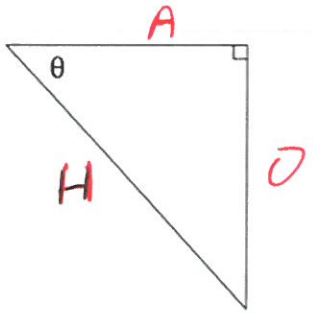
Weighting: _____*% of the year.*

Equipment: *½ page notes (A4 one side), Scientific Calculator*

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

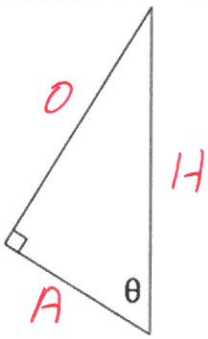
Label the sides Hypotenuse, Opposite and Adjacent on the following right angled triangles:

a)



✓

b)

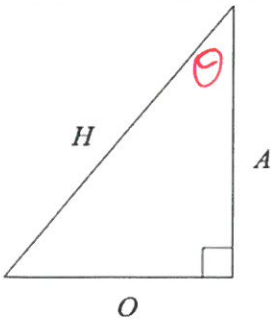


✓

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

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

a)



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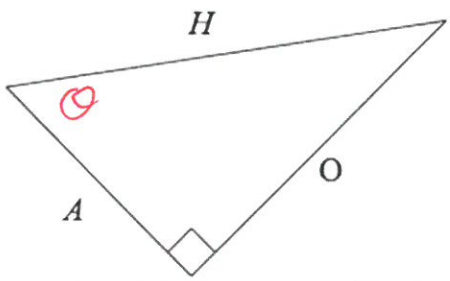
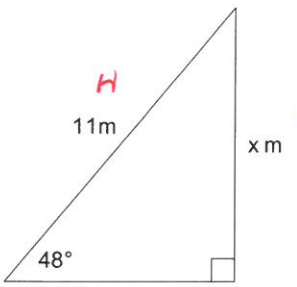


✓

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

Determine the value of the pronumeral in each of the following

a)



O

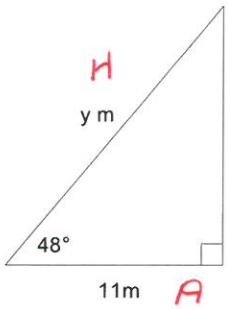
$\sin\theta = \frac{O}{H}$ ✓

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

$11 \times \sin 48 = x$ ✓

$x = 8.2\ m$ ✓

b)



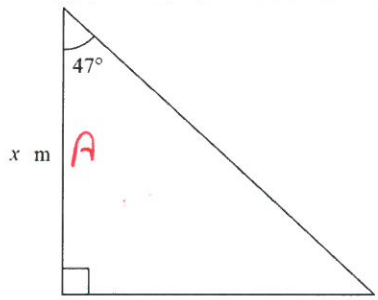
$\cos\theta = \frac{A}{H}$

$\cos 48 = \frac{11}{y}$ ✓

$y = \frac{11}{\cos 48}$ ✓

$y = 16.4\ m$ ✓

c)



O

$\tan\theta = \frac{O}{A}$

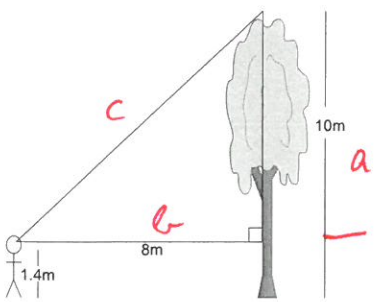
$\tan 47° = \frac{11}{x}$ ✓

$x = \frac{11}{\tan 47}$ ✓

$x = 10.3\ m$ ✓

4. **[4 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?



$a = 10 - 1.4$ ✓

$= 8.6\ m$

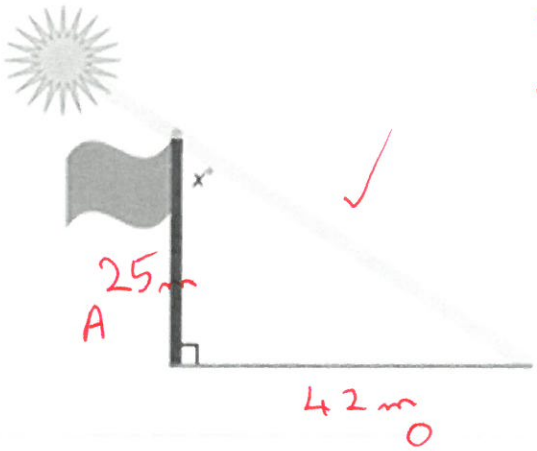
$c = \sqrt{(a^2 + b^2)}$ ✓

$= \sqrt{(8^2 + 8.6^2)}$ ✓

$= 11.7\ m$ ✓

5. **[4 marks]**

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



$\tan\theta = \frac{O}{A}$ ✓

$\tan\theta = \frac{42}{25}$

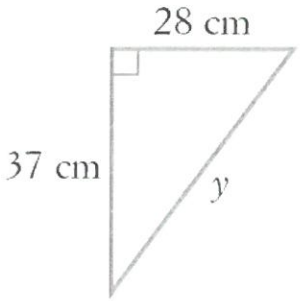
$\theta = \tan^{-1}(42/25)$ ✓

$\theta = 59.2^{\circ}$ ✓

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

Determine the value of the pronumeral in each of the following

a)

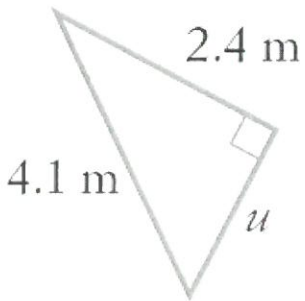


$c = \sqrt{a^2 + b^2}$ ✓

$y = \sqrt{(37^2 + 28^2)}$ ✓

$= 46.4$ cm ✓

b)

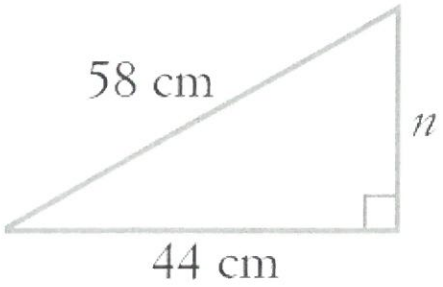


$b = \sqrt{c^2 - a^2}$ ✓

$u = \sqrt{(4.1^2 - 2.4^2)}$ ✓

$= 3.3$ m ✓

c)



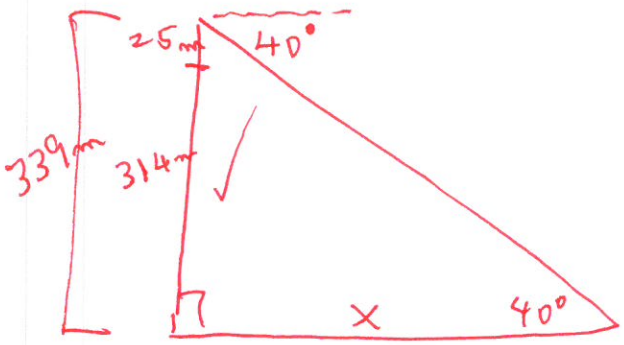
$b = \sqrt{c^2 - a^2}$ ✓

$= \sqrt{(58^2 - 44^2)}$ ✓

$= 37.8$ cm ✓

7. [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).



$\tan\theta = \frac{O}{A}$

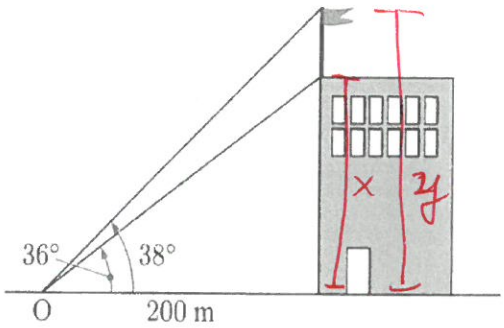
$\tan 40 = \frac{314}{x}$ ✓

$x = \frac{314}{\tan 40}$ ✓

$x = 374.2\ m$ ✓

8. [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.



$Ht = y - x$

$\tan\theta = \frac{O}{A}$

$\tan 38 = \frac{y}{200}$

$200 \tan 38 = y$ ✓

$y = 156.26\ m$ ✓

$\tan 36 = \frac{x}{200}$

$200 \times \tan 36 = x$ ✓ ✓

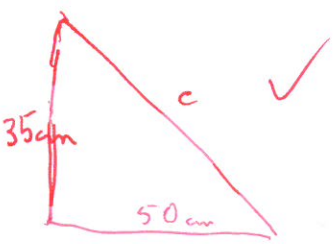
$x = 145.31\ m$

$Ht = 156.26 - 145.31$ ✓

$= 10.95\ m$ OR $11\ m$ ✓

9. [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).



✓

$c = \sqrt{a^2 + b^2}$ ✓

$= \sqrt{(35^2 + 50^2)}$ ✓

$= 61.0\ cm$ ✓

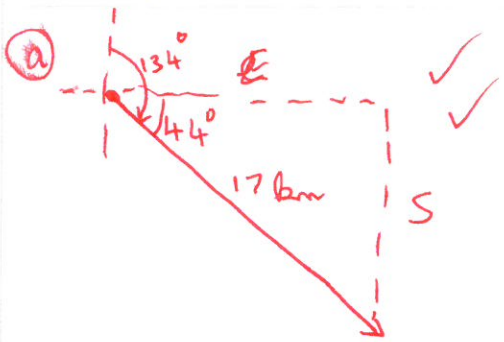
10. [6 marks]

Ashley hikes 17km on a bearing of 134°.

a. Draw a diagram of the situation

b. How far east is Ashley from his starting point?

c. How far south is Ashley from his starting point?



b) $\cos\theta = \frac{A}{H}$

$\cos 44 = \frac{E}{17}$

$17 \times \cos 44 = E$

$\therefore$ 12.2 km EAST

c) $\sin\theta = \frac{O}{H}$

$\sin 44 = \frac{S}{17}$

$17 \times \sin 44 = S$

$\therefore$ 11.8 km SOUTH

~ END OF TEST ~