education equals

Topic: Area of a triangle

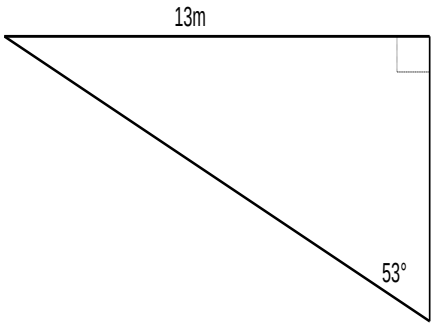
Time: 45 mins Marks: /45 marks

Calculator Assumed

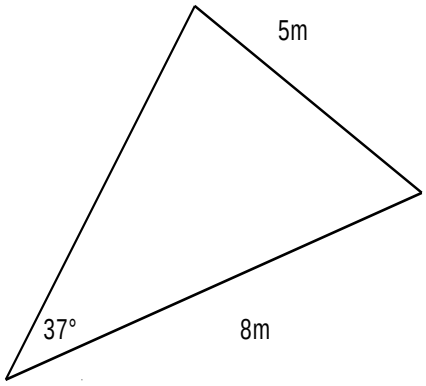
Question One: [4, 5, 3: 12 marks]

Calculate the area of the following triangles:

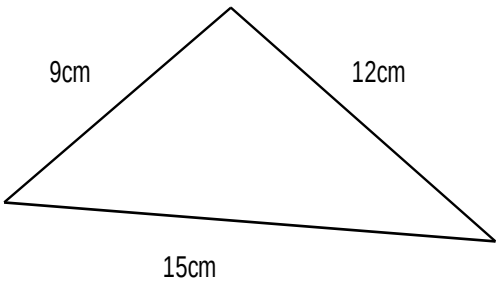
a)



b)



c)



Question Two: [4, 2: 6 marks]

a) A farmer has three sheets of fencing and he needs to put a fence around his vegetable patch to keep the animals out. He has two 6m pieces and an 8m piece of fencing. What is the area of the vegetable patch that he can enclose?

b) Andrea is making a paper craft boat out of cardboard. She is cutting out the sail and she cuts a 10cm horizontal line, then from the end of this line she cuts a vertical line of 7cm. Then from the end of this line she cuts a straight line directly back to the start. Calculate the area of the sail she has cut out.

Question Three: [1, 3: 1 marks]

Harrison leaves his home and drives his Ford due north for 93km. He then turns due east and drives for a while before finding a 115km road which will take him straight back home and completes the triangle which has been his journey.

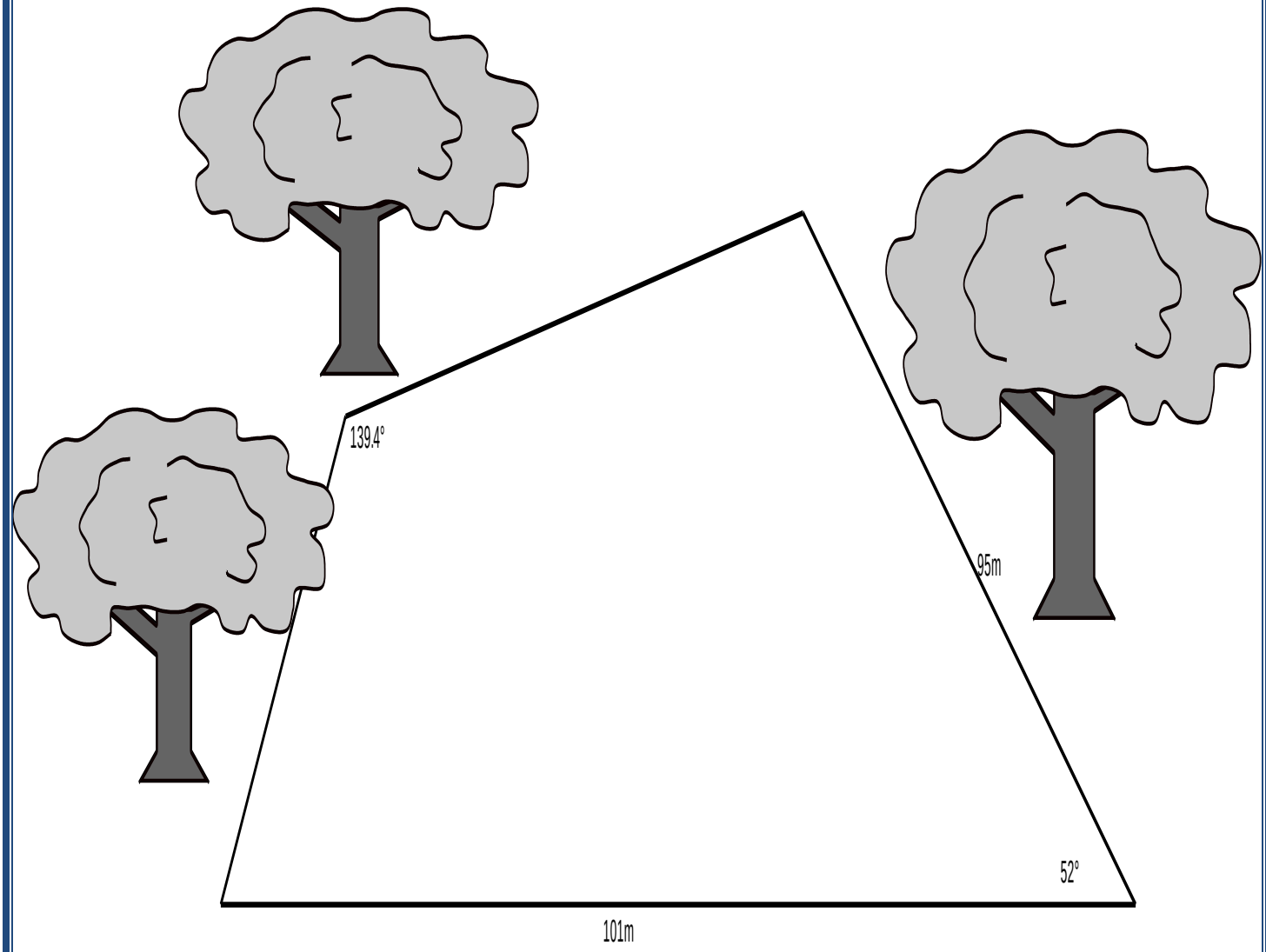
a) Draw a diagram of this situation.

b) Calculate the area of the triangle enclosed in Harrison's journey.

Question Four: [8 marks]

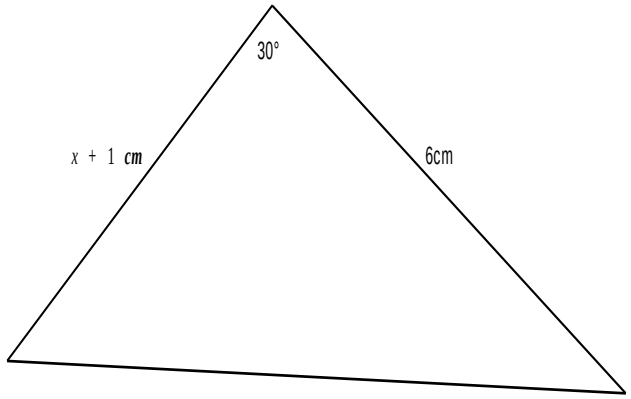
A farmer is creating a new paddock but some large trees are in the way and have caused it to be an unusual shape as shown below.

Calculate the area of the farmer's paddock.



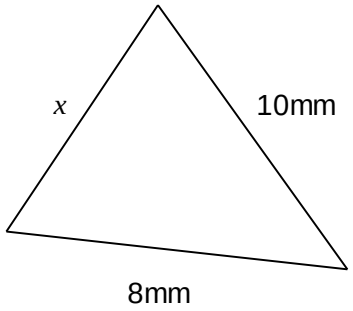
Question Five: [3, 2, 2: 7 marks]

a) Consider the following triangle below.



Calculate the value of x if the area is 12cm². Show working to justify your answer.

b) Consider the triangle below:



i) Show that $s = \frac{x}{2} + 9$

ii) Calculate the area of the triangle above if x = 6mm

Question Six: [2, 6: 8 marks]

Samuel is setting up an Easter egg hunt. He walks on a bearing of 130 degrees for 30m where he hides the first Easter egg. He then walks 50m on a bearing of 190 degrees and hides the second egg.

a) Draw a diagram of this situation.

The first and second eggs were hidden on the vertices of the boundary of a triangle in which all the other eggs were hidden. A third egg is hidden on the third vertex of this triangle. It isn't at the starting point but is in line with the starting point and the first egg. It is also on a bearing of 300 degrees from the second egg.

b) Calculate the area within which all the eggs are hidden.

education equals

Topic: Area of a triangle SOLUTIONS

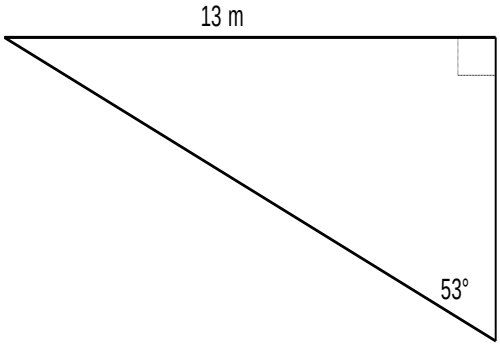
Time: 45 mins Marks: /45 marks

Calculator Assumed

Question One: [4, 5, 3: 12 marks]

Calculate the area of the following triangles:

a)



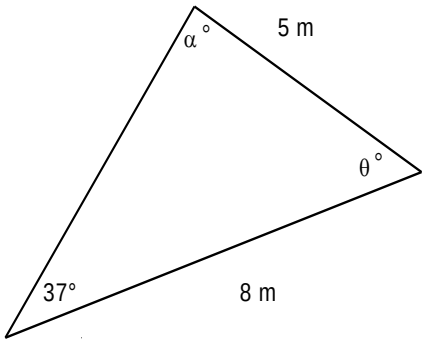
$tan53° = \frac{13}{x}$ ✓

$x = 9.8\ m$ ✓

$A = 0.5 \times 9.8 \times 13$ ✓

$= 63.7m^2$ ✓

b)



$\frac{sin\alpha}{8} = \frac{sin39°}{5}$ ✓

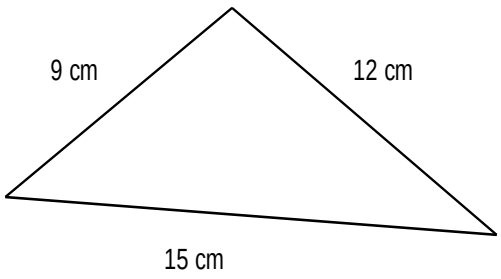
$\alpha = 74.345°$ ✓

$\theta = 68.655°$ ✓

$A = 0.5 \times 5 \times 8 \times sin\theta$ ✓

$= 18.63m^2$ ✓

c)



By Heron's formula:

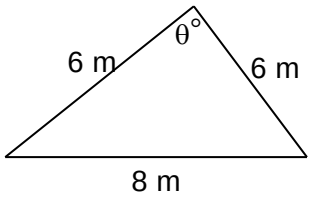
$s = \frac{9 + 12 + 15}{2} = 18$ ✓

$A = \sqrt{18 \times 9 \times 6 \times 3}$ ✓

$= 54cm^2$ ✓

Question Two: [4, 2: 6 marks]

a) A farmer has three sheets of fencing and he needs to put a fence around his vegetable patch to keep the animals out. He has two 6m pieces and an 8m piece of fencing. What is the area of the vegetable patch that he can enclose?

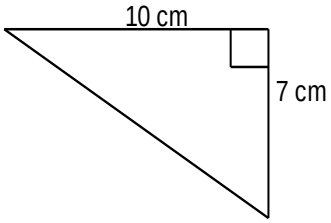


$$\theta = \frac{6^2 + 6^2 - 8^2}{2 \times 6 \times 6} = 83.62°$$

$$A = 0.5 \times 6 \times 6 \times sin\theta°$$

$$= 17.89m^2$$

b) Andrea is making a paper craft boat out of cardboard. She is cutting out the sail and she cuts a 10cm horizontal line, then from the end of this line she cuts a vertical line of 7cm. Then from the end of this line she cuts a straight line directly back to the start. Calculate the area of the sail she has cut out.



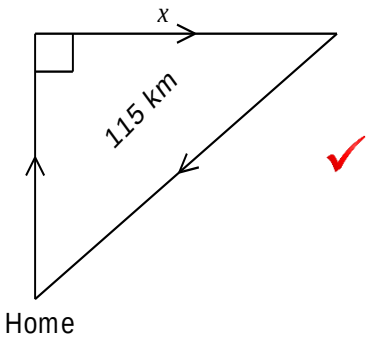
$$A = 10 \times 7 \div 2$$

$$= 35cm^2$$

Question Three: [1, 3: 4 marks]

Harrison leaves his home and drives his Ford due north for 93km. He then turns due east and drives for awhile before finding a 115km road which will take him straight back home and completes the triangle which has been his journey.

a) Draw a diagram of this situation.



b) Calculate the area of the triangle enclosed in Harrison's journey.

$$x = \sqrt{115^2 - 93^2}$$

$$= 67.646\ km$$

$$A = 0.5 \times 93 \times x$$

$$= 3145.55 km^2$$

Question Four: [8 marks]

A farmer is creating a new paddock but some large trees are in the way and have caused it to be an unusual shape as shown below.

Calculate the area of the farmer's paddock.

$Area\ A = 0.5 \times 101 \times 95 \times sin52°$ ✓

$= 3780.482m^2$ ✓

$x = \sqrt{95^2 + 101^2 - (2 \times 95 \times 101 \times cos52°)}$ ✓

$= 86.0898m$ ✓

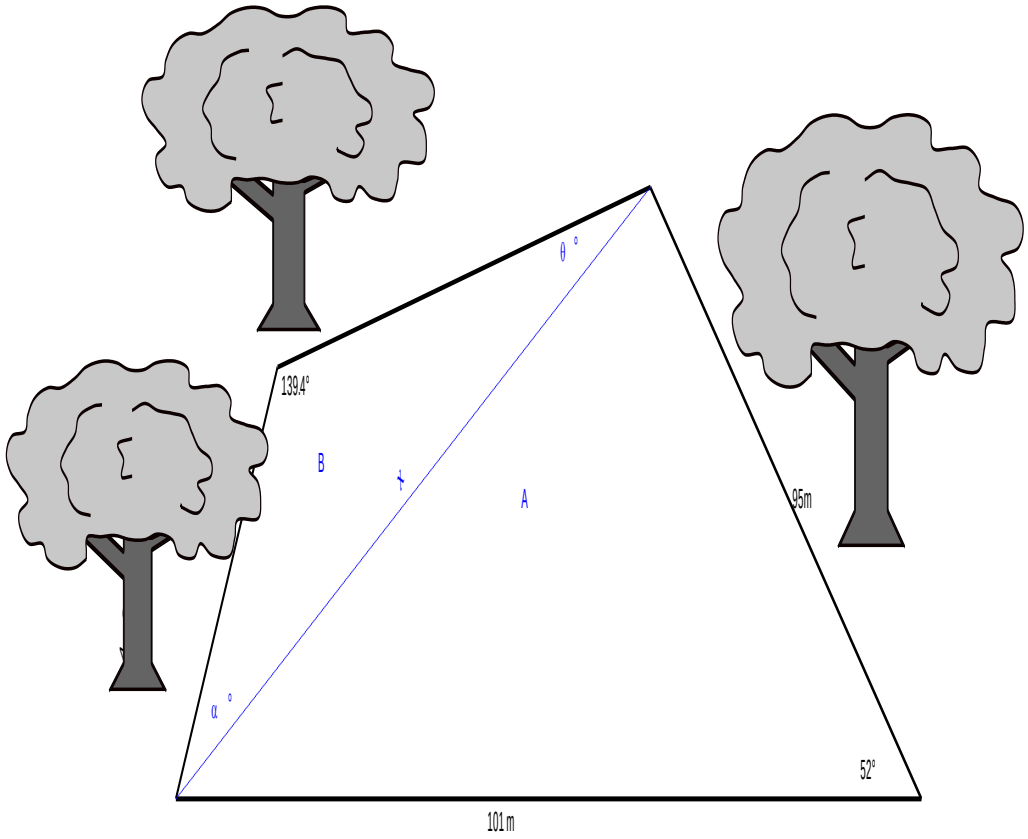
$\frac{sin\theta}{40.5} = \frac{sin139.4°}{x}$ ✓

$\theta = 19.045° \ \therefore \alpha = 24.872°$ ✓

$Area\ B = 0.5 \times 40.5 \times x \times sin \propto$

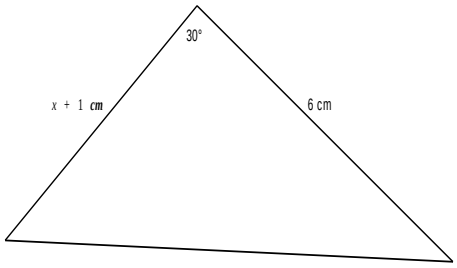
$= 733.236m^2$ ✓

$Total\ area = 4513.718\ m^2$ ✓



Question Five: [3, 2, 2: 7 marks]

a) Consider the following triangle below.



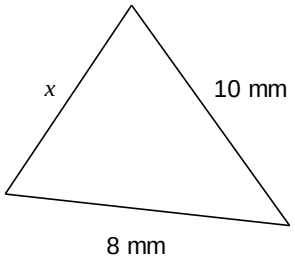
Calculate the value of x if the area is 12 cm². Show working to justify your answer.

$$12 = \frac{1}{2} \times 6 \times (x+1) \times \frac{1}{2}$$ ✓

$$8 = x + 1$$ ✓

$$x = 7cm$$ ✓

b) Consider the triangle below:



i) Use Heron's Formula to show that $s = \frac{x}{2} + 9$

$$s = \frac{a+b+c}{2}$$

$$= \frac{x+10+8}{2}$$ ✓

$$= \frac{x}{2} + \frac{18}{2}$$ ✓

$$= \frac{x}{2} + 9$$

ii) Calculate the area of the triangle above if x = 6 mm

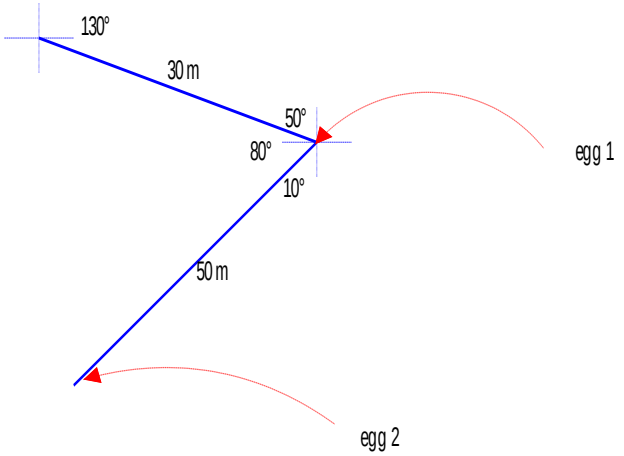
✓ $s = 15mm$

$$A = \sqrt{15 \times 9 \times 5 \times 7} = 68.74mm^2$$ ✓

Question Six: [2, 6: 8 marks]

Samuel is setting up an Easter egg hunt. He walks on a bearing of 130 degrees for 30m where he hides the first Easter egg. He then walks 50m on a bearing of 190 degrees and hides the second egg.

a) Draw a diagram of this situation.



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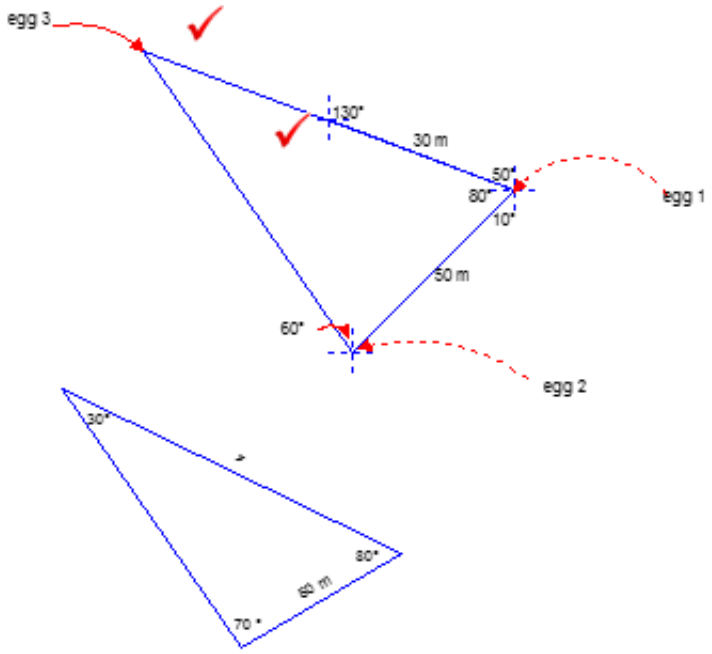

$$\frac{x}{sin70} = \frac{50}{sin\ 30}$$

$$x = 93.9693\ m$$

$$area = \frac{93.9693 \times 50 \times sin80}{2}$$

$$= 2313.54\ m^2$$