**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**IB Mathematics SL Year 1**

**Take Home Problem Set**

**Trigonometry SSA**

**DUE DATE:**

What tools might you wish to put in your mathematical tool kit?

Write down a few important equations below.

**1.** The following diagram shows a triangle ABC, where BC = 5 cm, = 60°,  = 40°.



1. Calculate AB.

(b) Find the area of the triangle.

(Total 6 marks)

**2.** Two boats A and B start moving from the same point P. Boat A moves in a straight line at 20 km h–1 and boat B moves in a straight line at 32 km h–1. The angle between their paths is 70°.

Find the distance between the boats after 2.5 hours.

(Total 6 marks)

**3.** The diagram below shows a sector AOB of a circle of radius 15 cm and centre O. The angle ** at the centre of the circle is.

**diagram not to scale**

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1. Calculate the area of the sector AOB.

(b) Calculate the area of the shaded region.

(Total 4 marks)

**4.** A triangle has sides of length 4, 5, 7 units. Find, to the nearest tenth of a degree, the size of the largest angle.

(Total 4 marks)

**5.** The diagram shows a triangle ABC in which AC =, BC = 6, = 45°.



1. Use the fact that sin 45° =  to show that sin = .

(2)

The point D is on (AB), between A and B, such that sin = .

(b)

(i) Calculate the angle BCD.

(ii) Find the length of [BD].

(6)

(c) Show that  = .

(2)

(Total 10 marks)

6. A farmer owns a triangular field ABC. One side of the triangle, [AC], is 104 m, a second side, [AB], is 65 m and the angle between these two sides is 60°.

(a) Use the cosine rule to calculate the length of the third side of the field.

**(3)**

(b) Given that sin 60° = find the area of the field in the form where *p* is an integer.

**(3)**

6. continued from previous page

Let D be a point on [BC] such that [AD] bisects the 60° angle. The farmer divides the field into two parts *A*1 and *A*2 by constructing a straight fence [AD] of length *x* metres, as shown on the diagram below.



(c) (i) Show that the area of Al is given by .

(ii) Find a similar expression for the area of A2.

(iii) **Hence**, find the value of *x* in the form , where *q* is an integer.

**(7)**

6. continued from previous page

(d) (i) Explain why sin.

(ii) Use the result of part (i) and the sine rule to show that

.

**(5)**

**(Total 18 marks)**

**7.** In the following diagram, O is the centre of the circle and (AT) is the tangent to the circle at T.

 **diagram not to scale**

If OA = 12 cm, and the circle has a radius of 6 cm, ﬁnd the area of the shaded region.

(Total 4 marks)

**8.** The diagram shows a vertical pole PQ, which is supported by two wires fixed to the horizontal ground at A and B.



BQ = 40 m   
PQ = 36°  
BQ = 70°   
AQ = 30°

Find

(a) the height of the pole, PQ;

(b) the distance between A and B.

(Total 4 marks)

9. 