

Mathematics Department

Course: A2MAA

Topic Title: Test 2



Student Name: Solutions

Date: _____

Special Instructions: Formula Sheet, 1 page of double sided A4 notes and calculators allowed.

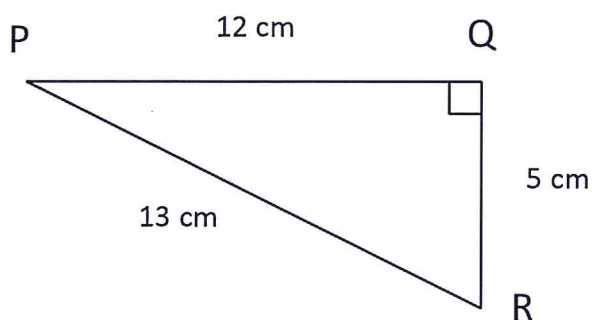
Time Allowed: 50 minutes

Marks: / 40

Question 1.

(4 marks)

Use the triangle below to obtain the fractions for the trigonometric ratios given.



a) $\sin P = \frac{5}{13}$ ✓

b) $\sin R = \frac{12}{13}$ ✓

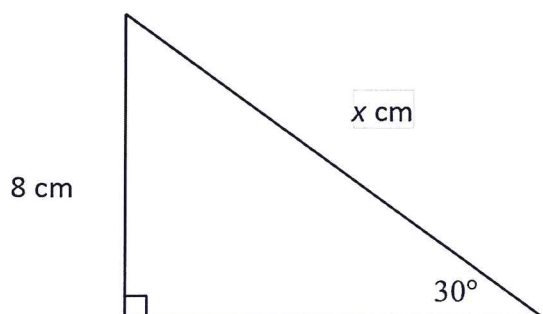
c) $\cos R = \frac{5}{13}$ ✓

d) $\tan P = \frac{5}{12}$ ✓

Question 2.

(2 marks)

Calculate the length of the missing side.



$$\sin 30^\circ = \frac{8}{x}$$

$$x = \frac{8}{0.5}$$

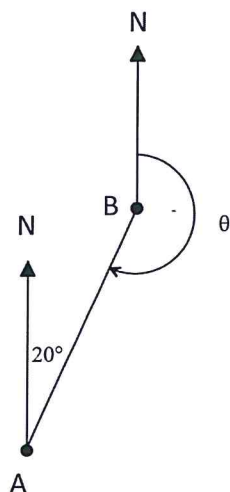
$$x = 16 \text{ cm}$$
 ✓✓

Question 3.

(2 marks)

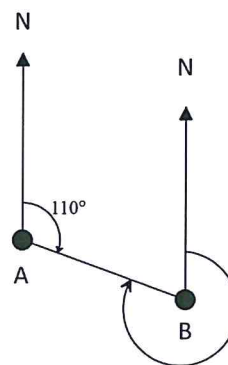
Calculate the bearing of A from B in the following two scenarios.

a)



200° ✓

b)

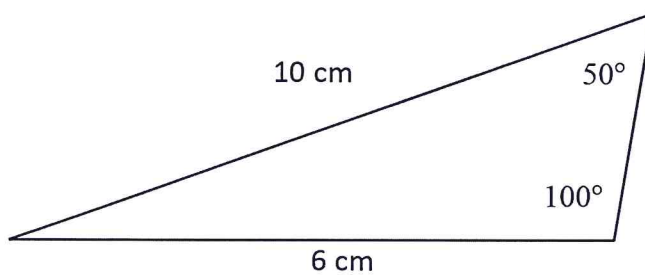


290° ✓

Question 4.

(2 marks)

Calculate the area of the triangle below.



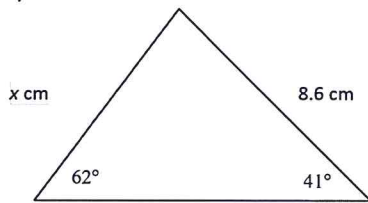
$$\begin{aligned} \text{Area} &= \frac{1}{2} ab \sin C \quad \checkmark \\ &= 15 \text{ cm}^2 \quad \checkmark \end{aligned}$$

Question 5.

(4 marks)

Find the value of x in each of the following. (diagrams are not to scale)

a)

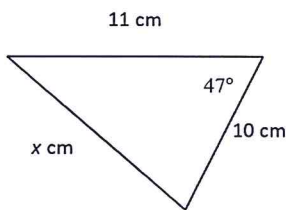


(2 marks)

$$\frac{x}{\sin 62^\circ} = \frac{8.6}{\sin 41^\circ} \quad \checkmark$$

$$x = 11.57 \text{ cm} \quad \checkmark$$

b)



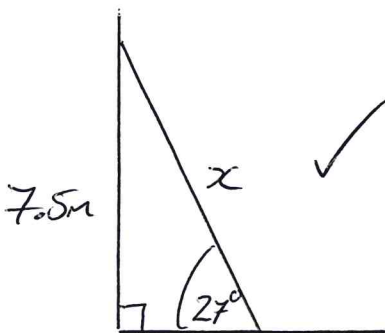
$$x^2 = 11^2 + 10^2 - 2 \times 11 \times 10 \times \cos 47^\circ \quad (2 \text{ marks}) \quad \checkmark$$

$$x = 8.42 \text{ cm} \quad \checkmark$$

Question 6.

(3 marks)

A ladder leans against a wall inclined at an angle 27° to the horizontal. If the ladder reaches 7.5m up the wall, what is the length of the ladder?



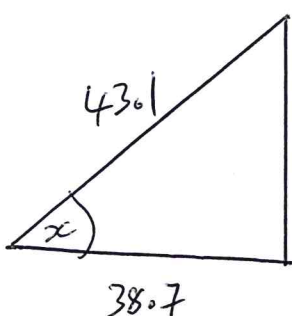
$$\sin 27^\circ = \frac{7.5}{x} \quad \checkmark$$

$$x = 16.52 \text{ m} \quad \checkmark$$

Question 7.

(3 marks)

A triangle has an area of 767.69 cm^2 . The lengths of two of the sides of the triangle are 43.1cm and 38.7cm. Find the size of the angle between these two sides.



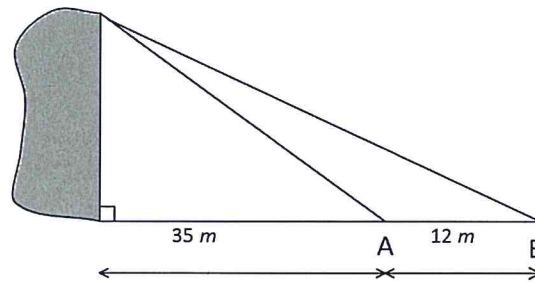
$$\text{Area} = 767.69 \text{ cm}^2 \quad \checkmark$$

$$\begin{aligned} \text{Area} &= \frac{1}{2} ab \sin C \\ 767.69 &= 0.5(43.1)(38.7) \sin C \\ C &= 67^\circ \quad \checkmark \end{aligned}$$

Question 8.

(6 marks)

From the top of the cliff, ship A is observed at an angle of depression of 15° , 35m from the base of the cliff. At the same time ship B is observed 12m from ship A as shown in the diagram below.



Determine:

- a) The height of the cliff

(4 marks)

$$\tan 75^\circ = \frac{35}{x} \quad \checkmark$$

$$x = 9.37822 \text{ m} \quad \checkmark \checkmark$$

- b) The angle of elevation from ship B to the top of the cliff

(2 marks)

$$\tan x = \frac{9.38}{47} \quad \checkmark$$

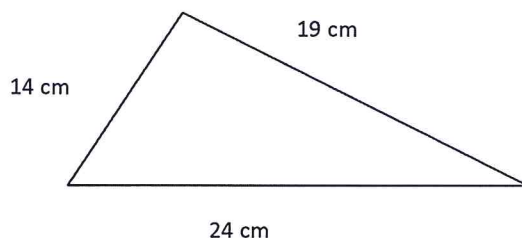
$$x = 11 \quad \checkmark$$

angle of elevation is 11° ✓

Question 9.

(4 marks)

Consider the triangle below.



$$S = \frac{19 + 24 + 14}{2}$$

$$S = 28.5 \quad \checkmark$$

Use Heron's formula to calculate the area of this triangle.

$$A = \sqrt{28.5(28.5 - 14)(28.5 - 24)(28.5 - 19)} \quad \checkmark$$

$$\text{Area} = 132.92 \text{ cm}^2 \quad \checkmark \checkmark$$

Question 10.

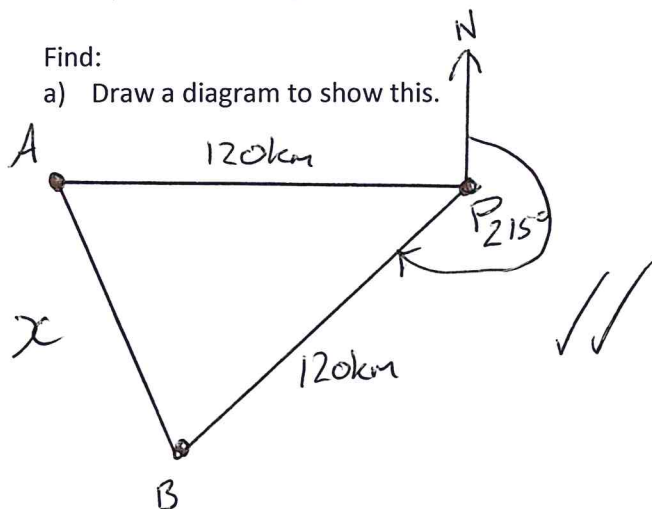
(10 marks)

Ship A leaves port P travelling 120km west. Ship B leaves port on a bearing of 215° travelling 120km.

Find:

- a) Draw a diagram to show this.

(2 marks)



- b) the distance between the two ships

(2 marks)

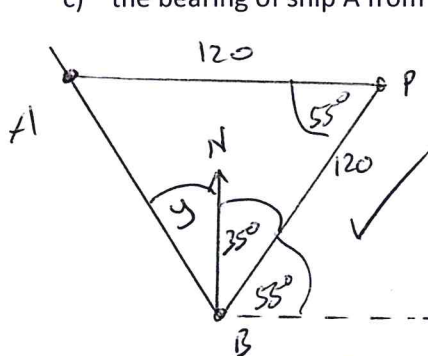
angle between is 55° ✓

$$AB^2 = 120^2 + 120^2 - 2 \times 120 \times 120 \times \cos 55$$

$$AB = 110.82 \text{ km} \quad \checkmark$$

- c) the bearing of ship A from ship B

(4 marks)



angle ABP

$$\frac{120}{\sin \theta} = \frac{110.82}{\sin 55} \quad \checkmark$$

$$\theta = 62.5^\circ$$

angle y $62.5^\circ - 35^\circ$
 $= 27.5^\circ \quad \checkmark$

Bearing =

$$360^\circ - 27.5^\circ$$

$$= 332.5^\circ \quad \checkmark$$

- d) the bearing of ship B from ship A

(2 marks)

angle BAP

$$180^\circ - 55^\circ - 62.5^\circ$$

$$= 62.5^\circ \quad \checkmark$$

$$\text{Bearing} = 90^\circ + 62.5^\circ$$

$$= 152.5^\circ \quad \checkmark$$

