

# Pearson Edexcel AS Mathematics 8MA0

## Unit Test 4 Trigonometry

Time allowed: 50 minutes

School:

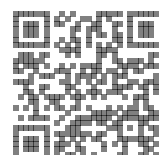
Name:

Teacher:

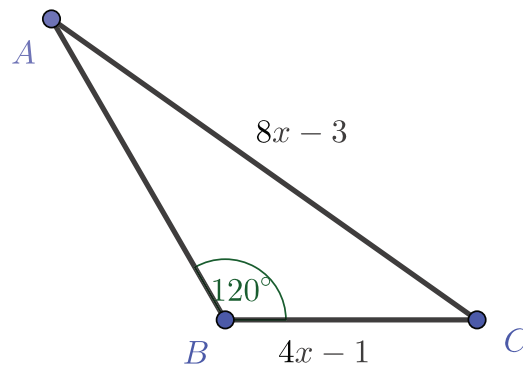
How I can achieve better:

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Question	Points	Score
1	10	
2	10	
3	6	
4	10	
5	6	
6	3	
7	5	
Total:	50	

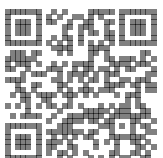


1. The diagram shows  $\triangle ABC$  with  $AC = 8x - 3$ ,  $BC = 4x - 1$ ,  $\angle ABC = 120^\circ$  and  $\angle ACB = 15^\circ$ .

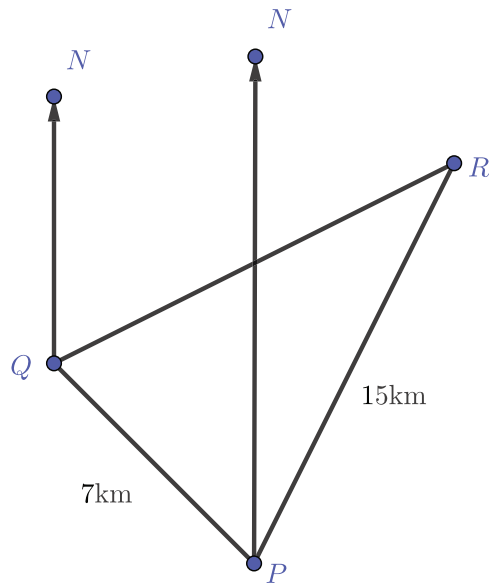


- (a) Show that the exact value of  $x$  is  $\frac{9 + \sqrt{6}}{20}$ . [7]
- (b) Find the area of  $\triangle ABC$  giving your answer to 2 decimal places. [3]

Total: 10

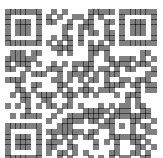


2. The diagram shows the position of three boats,  $P$ ,  $Q$  and  $R$ . Boat  $Q$  is 7 km from boat  $P$  on a bearing of  $327^\circ$ . Boat  $R$  is 15 km from boat  $P$  on a bearing of  $041^\circ$ .



- (a) Find the distance between boats  $Q$  and  $R$  to 1 decimal place. [5]
- (b) Find the 3 figure bearing of boat  $R$  from boat  $Q$ . [5]

Total: 10

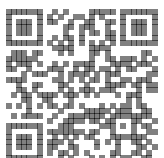


3. Find all the solutions, in the interval  $0 \leq x \leq 360^\circ$ , to the equation

[6]

$$8 - 7 \cos(x) = 6 \sin^2(x),$$

giving solutions to 1 decimal place where appropriate.



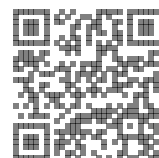
4. (a) Calculate the value of  $-2 \tan(-120^\circ)$ . [1]
- (b) On the same set of axes sketch the graphs of  $y = 2 \sin(x - 60^\circ)$  and  $y = -2 \tan(x)$ , in the interval  $-180^\circ \leq x \leq 180^\circ$ , showing the coordinates of points of intersection with the coordinate axes in exact form. [7]
- (c) Explain how you can use the graph to identify solutions to the equation [1]

$$y = 2 \sin(x - 60^\circ) + 2 \tan(x) = 0$$

in the interval  $-180^\circ \leq x \leq 180^\circ$ .

- (d) Write down the number of solutions of the above equation. [1]

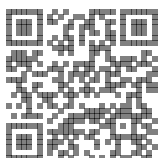
Total: 10



5. Find, to 1 decimal place, the values of  $\theta$  in the interval  $0 \leq \theta \leq 180^\circ$  for which

[6]

$$4\sqrt{3} \sin(3\theta + 20^\circ) = 4 \cos(3\theta + 20^\circ)$$



6. A teacher asks one of her students to solve the equation  $2 \cos(2x) + \sqrt{3} = 0$  for  $0 \leq x \leq 180^\circ$ .

The attempt is shown below.

$$2\cos 2x = -\sqrt{3}$$

$$\cos 2x = -\frac{\sqrt{3}}{2}$$

$$2x = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$$

$$2x = 150^\circ$$

$$x = 75^\circ$$

$$w \text{ or } x = 360^\circ - 75^\circ = 295^\circ \text{ so reject as out of range.}$$

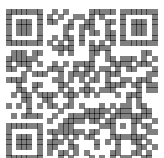
(a) Identify the mistake made by the student.

[1]

(b) Write down the correct solutions to the equation.

[2]

Total: 3

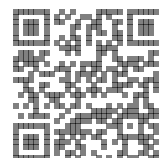


7. A buoy is a device which floats on the surface of the sea and moves up and down as waves pass.

For a certain buoy, its height, above its position in still water,  $y$  in metres, is modelled by a sine function of the form  $y = \frac{1}{2} \sin(180t^\circ)$ , where  $t$  is the time in seconds.

- (a) Sketch a graph showing the height of the buoy above its still water level for  $0 \leq t \leq 10$  [3]  
showing the coordinates of points of intersection with the  $t$ -axis.
- (b) Write down the number of times the buoy is 0.4 m above its still water position during the [1]  
first 10 seconds.
- (c) Give one reason why this model might not be realistic. [1]

Total: 5





(Q7 continued)

