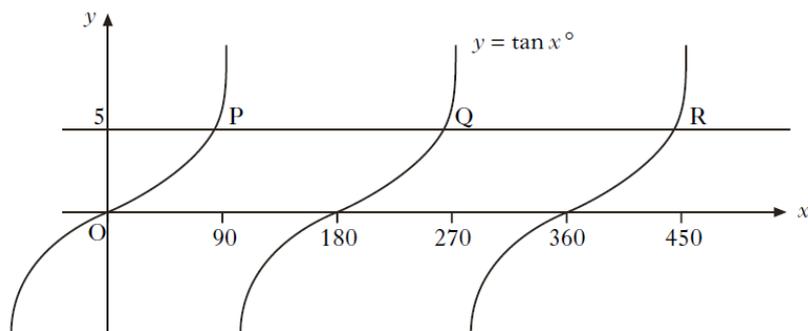


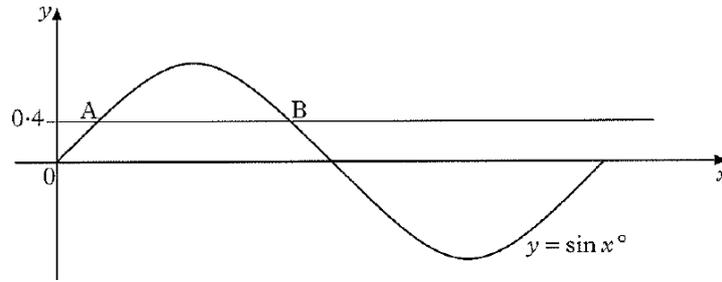
## Trigonometric Equations - Past Paper Questions

- 1) Solve the following equation  $7 \sin x^\circ - 3 = 0$  for  $0 \leq x \leq 360$ . 3
- 2) Solve the following equation  $7 \cos x^\circ - 5 = 0$ ,  $0 \leq x \leq 360$ . 3
- 3) Solve the following equation  $2 \tan x^\circ + 7 = 0$ ,  $0 \leq x \leq 360$ . 3
- 4) Solve the following equation  $5 \tan x^\circ - 6 = 2$ ,  $0 \leq x \leq 360$ . 3
- 5) Solve the following equation  $4 \cos x^\circ + 3 = 0$ ,  $0 \leq x \leq 360$ . 3
- 6) Solve the following equation  $7 \sin x^\circ + 1 = -5$ ,  $0 \leq x \leq 360$ . 3
- 7) Solve the following equation  $2 \tan x^\circ - 3 = 5$ ,  $0 \leq x \leq 360$ . 3
- 8) Solve the following equation  $5 \cos x^\circ - 3 = 1$ ,  $0 \leq x \leq 360$ . 3
- 9) Solve the following equation  $3 \tan x^\circ - 2 = 4$ ,  $0 \leq x \leq 360$ . 3
- 10) Solve algebraically the equation  $\tan 40^\circ = 2 \sin x^\circ + 1$ ,  $0 \leq x \leq 360$ . 3
- 11) Solve algebraically the equation  $4 \sin x^\circ + 1 = -2$ ,  $0 \leq x \leq 360$ . 3
- 12) Solve algebraically the equation  $5 \cos x^\circ + 4 = 0$ ,  $0 \leq x \leq 360$ . 3
- 13) Solve the equation  $11 \cos x^\circ - 2 = 3$ , for  $0 \leq x \leq 360$ . 3
- 14) a) Solve algebraically the equation  $\sqrt{3} \sin x^\circ - 1 = 0$ ,  $0 \leq x \leq 360$ . 3  
 b) Hence write down the solution of the equation  $\sqrt{3} \sin 2x^\circ - 1 = 0$ ,  $0 \leq x \leq 90$ . 1
- 15)  $f(x) = 3 \sin x^\circ$ ,  $0 \leq x \leq 360$   
 a) Find  $f(270)$ . 1  
 b)  $f(t) = 0 \cdot 6$ . Find 2 possible values of  $t$ . 4
- 16) The diagram shows part of the graph of  $y = \tan x^\circ$ .  
 The line  $y = 5$  is drawn and intersect the graph of  $y = \tan x^\circ$  at P and Q. 3



- a) Find the  $x$ -coordinate of P and Q. 3
- b) Write down the  $x$ -coordinate of the point R, where the line  $y = 5$  next intersects the graph of  $y = \tan x^\circ$ . 1

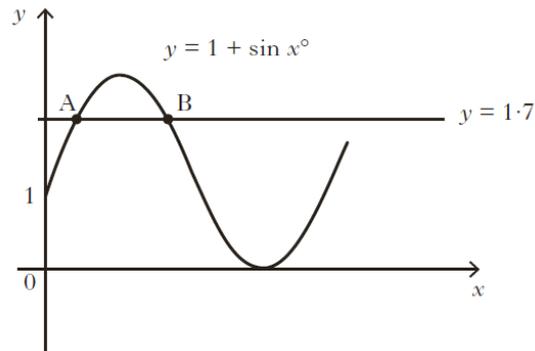
- 17) The diagram shows part of the graph of  $y = \sin x^\circ$ .



The line  $y = 0.4$  is drawn and cuts the graph of  $y = \sin x^\circ$  at A and B.  
Find the  $x$ -coordinates of A and B.

3

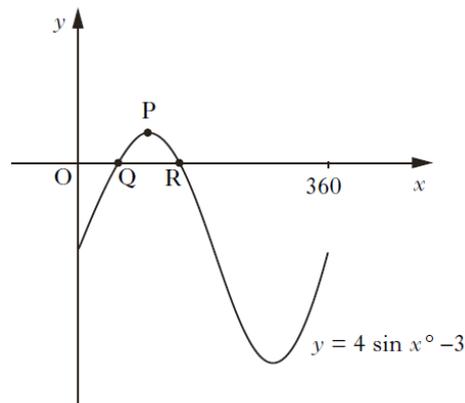
- 18) Part of the graph of  $y = 1 + \sin x^\circ$  is shown in the diagram below.



The line  $y = 1.7$  is drawn. It cuts the graph of  $y = 1 + \sin x^\circ$  at A and B as shown.  
Calculate the  $x$ -coordinates of A and B.

4

- 19) Part of the graph of  $y = 4 \sin x^\circ - 3$  is shown below.



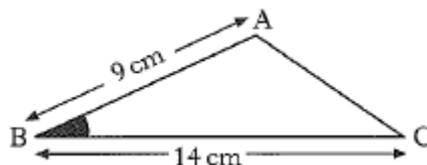
The graph cuts the  $x$ -axis at Q and R.  
P is the maximum turning point.

- a) Write down the coordinates of P.  
b) Calculate the  $x$ -coordinates of Q and R.

1

4

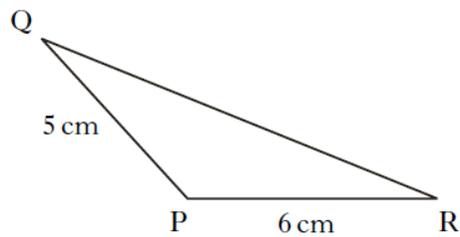
- 20) The area of triangle ABC is 38 square centimetres.  
AB is 9 centimetres and BC is 14 centimetres.



Calculate the size of the acute angle ABC.

3

- 21) In triangle PQR:
- $PQ = 5\text{cm}$
  - $PR = 6\text{cm}$
  - area of triangle =  $12\text{ cm}^2$
  - Angle QPR is obtuse
- Calculate the size of angle QPR.



4

- 22) The depth of water,  $D$  metres, in a harbour is given by the formula

$$D = 3 + 1.75 \sin 30 h^\circ$$

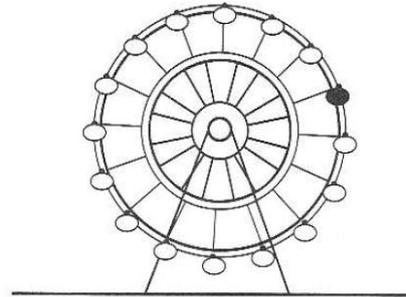
where  $h$  is the number of hours after midnight.

- a) Calculate the depth of water at 5 am. 2
- b) Calculate the maximum difference in depth of the water in the harbour.  
**Do not use a trial and improvement method.** 2

- 23) At the carnival, the height,  $H$  Metres, of a carriage on the big wheel above the ground is given by the formula

$$H = 10 + 5 \sin t^\circ$$

$t$  seconds after starting to turn.



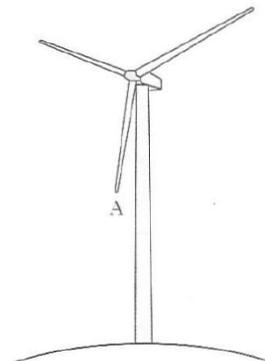
- a) Find the height of the carriage above the ground after 10 seconds. 2
- b) Find the two times during the first turn of the wheel when the carriage is  $12.5\text{m}$  above the ground. 4

- 24) The arms on a wind turbine rotate at a steady rate.

The height,  $h$  metres, of a point A above the ground at time  $t$  seconds is given by the

equation 
$$h = 8 + 4 \sin t^\circ$$

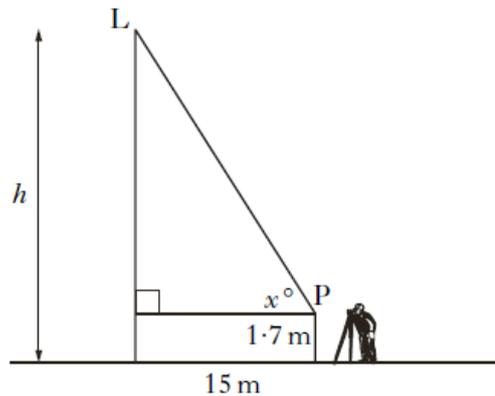
- a) Calculate the height of point A at time 30 seconds. 2
- b) Find the two times during the first turn of the arms when point A is at a height of  $10.5\text{m}$ . 4



- 25) A surveyor views a lift as it travels up the outside of a building.



In the diagram below, the point L represents the lift.

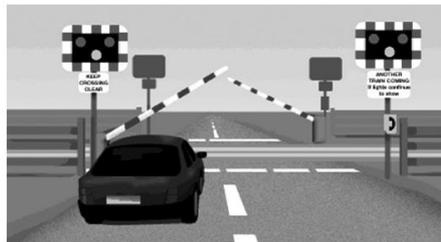


The height,  $h$  metres, of the lift above the ground is given by the formula

$$h = 15 \tan x^\circ + 1.7$$

where  $x^\circ$  is the angle of elevation of the lift from the surveyor at point P.

- a) What is the height of the lift above the ground when the angle of elevation from P is  $25^\circ$ ? 2
- b) What is the angle of elevation at point P when the height of the lift above the ground is 18.4 metres? 3
- 26) The barrier at a level crossing is raised after a train has passed.



The height,  $h$  centimetres, of the end of the barrier can be calculated using the formula below

$$h = 320 \sin x^\circ + 150, 0 \leq x \leq 90$$

where  $x^\circ$  is the size of the angle between the barrier and the horizontal.

Calculate the size of the angle between the barrier and the horizontal when the height of the end of the barrier is 458 centimetres.

3