GRAYS TUITION CENTRE – Online Tutoring

WEEK: 11
Week Beginning: (01/03/2021)
Subject: MATHS
Year: 10

Lesson Objective:

- Be able to understand patterns in Sin, Cos and Tan graphs
- Be able to find exact values of trig values and be able to memorise some important values for non calc papers

Class Worksheets

- Page 328 – 330, 546 - 550 GCSE Maths 4-9 Elmwood (Blue book)
- GCSE Trig and Exponential graph questions (Maths Genie)

Homework

- Completing classwork for homework and Maths Genie questions*

Additional Notes

- All homework from last week will be marked at the beginning of the lesson. Make sure that you have your homework with you in the lesson and are ready to mark it
- Also prepare any questions if you struggled with the homework so I can help you.All lesson worksheets and homework for next week (**due Week 16**) worksheets can be found below
- *https://www.mathsgenie.co.uk/resources/trigandexponential.pdf

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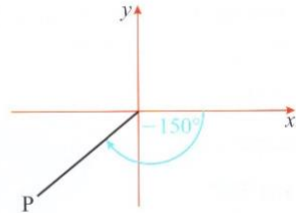
A negative angle is obtained by travelling in a clockwise direction from the x-axis.

(a) Draw the graph of $y = \cos \theta$ for values of θ from $-360°$ to $360°$.

(b) Does the relationship $\cos(360° + \theta) = \cos \theta$ seem to be true?

(c) Draw the graph of $y = \tan \theta$ for values of θ from $-360°$ to $360°$.

(d) Find three different values of θ from your graph which illustrate that $\tan(180° + \theta) = \tan \theta$.
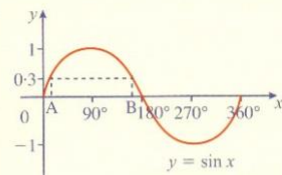
E   Solving equations involving sin, cos or tan

(a) If $\cos 25° = 0·906$, find another angle whose cosine is $0·906$.
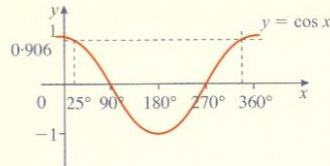
By using the symmetry of the graph of $y = \cos x$, another angle whose cosine $= 0·906$ is $360° - 25° = 335°$

(b) Solve $\sin x = 0·3$ for x-values between $0°$ and $360°$.

SHIFT   sin   0·3 on a calculator to find an angle whose sine is $0·3$.

INV

We find that $\sin 17·5° = 0·3$.

correct to 1 decimal place

On the graph, A $= 17·5°$. By using symmetry, another angle whose sine $= 0·3$ is B which is $180° - 17·5° = 162·5°$
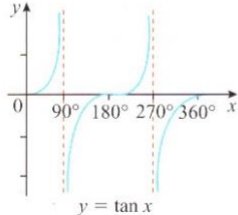
The solutions of $\sin x = 0·3$ in the range $0 \leqslant x \leqslant 360°$ are $x = 17·5°$ and $162·5°$

E17.2

Use the symmetry of the graphs of $y = \sin x$ and $y = \cos x$ to answer the following questions, giving your answers to the nearest degree.

1. If $\cos 32° = 0·848$, find another angle whose cosine is $0·848$

2. If $\cos 68° = 0·375$, find another angle whose cosine is $0·375$

3. If $\sin 18° = 0·309$, find another angle whose sine is $0·309$

4. If $\sin 230° = -0·766$, find another angle whose sine is $-0·766$

549

5 Write down another angle which has the same sine as
   (a) 75° (b) 133° (c) 158° (d) 320°

6 Solve $\cos x = 0.5$ for x-values between 0° and 360°.

7 Solve $\sin x = 0.82$ for x-values between 0° and 360°.

8 Solve $\cos x = -0.34$ for x-values between 0° and 360°.

9 Solve $\cos x = -0.8$ for $0° \leqslant x \leqslant 360°$.

10 Express the following in terms of the sine or cosine of an acute angle (the first one is done for you):
   (a) $\sin 265° = -\sin 85°$ (b) $\cos 290°$ (c) $\cos 115°$
   (d) $\sin 170°$ (e) $\sin 205°$ (f) $\cos 125°$
   (g) $\cos 335°$ (h) $\sin 295°$ (i) $\cos 248°$

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Express the following in terms of the tangent of an acute angle:
   (a) $\tan 220°$
   (b) $\tan 254°$
   (c) $\tan 105°$
   (d) $\tan 300°$

12 Solve $\tan x = 2$ for $0° \leqslant x \leqslant 360°$.

13 Solve $\tan x = \dfrac{1}{\sqrt{3}}$ for $0° \leqslant x \leqslant 360°$.

14 Find two solutions between 0° and 360° for each of the following:
   (a) $\sin x = \dfrac{1}{\sqrt{2}}$ (b) $\tan x = \sqrt{3}$ (c) $\sin x = \dfrac{\sqrt{3}}{2}$
   (d) $\cos x = -\dfrac{1}{\sqrt{2}}$ (e) $\tan x = 1$ (f) $\cos x = -\dfrac{\sqrt{3}}{2}$

15 Write down 4 values of x for which $\cos x = 0.5$.

16 Write down 4 values of x for which:
   (a) $\sin x = 0.71$ (b) $\tan x = 5.7$ (c) $\cos x = -0.6$

17 Solve $3 \sin x = 1$ for x-values between 0° and 360°.

18 The depth d (metres) of water in a river after t minutes is given by the formula
   $$d = 16 + 12 \cos t$$
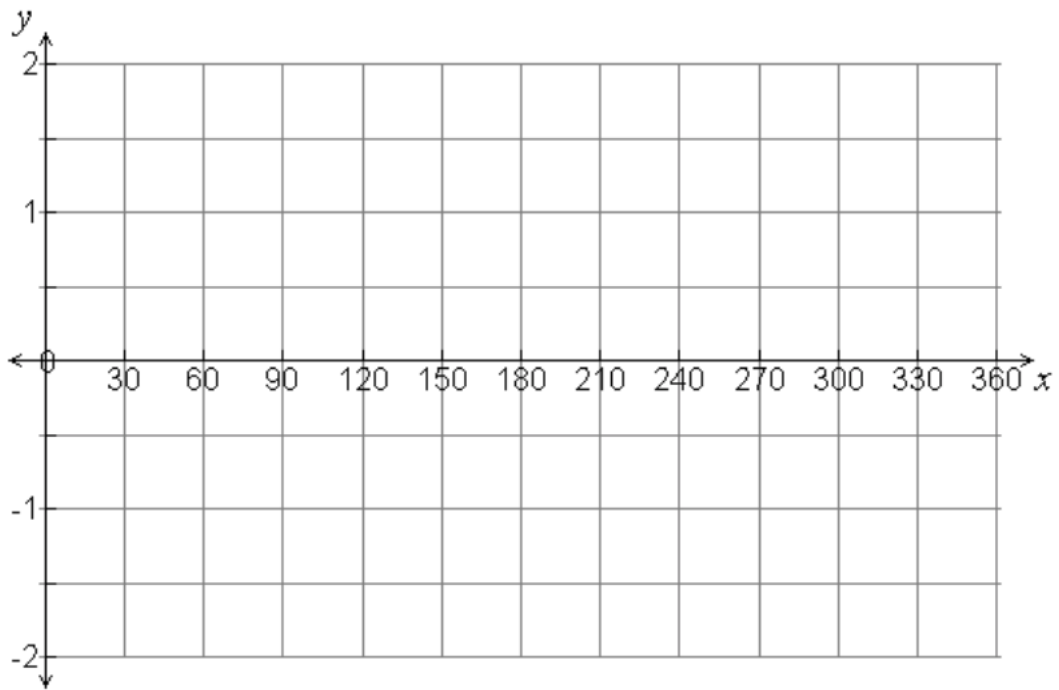   Find two values of t at which the depth will be 4 metres.

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2.(a) Complete the table of values for $y=\sin(x)$ (2)

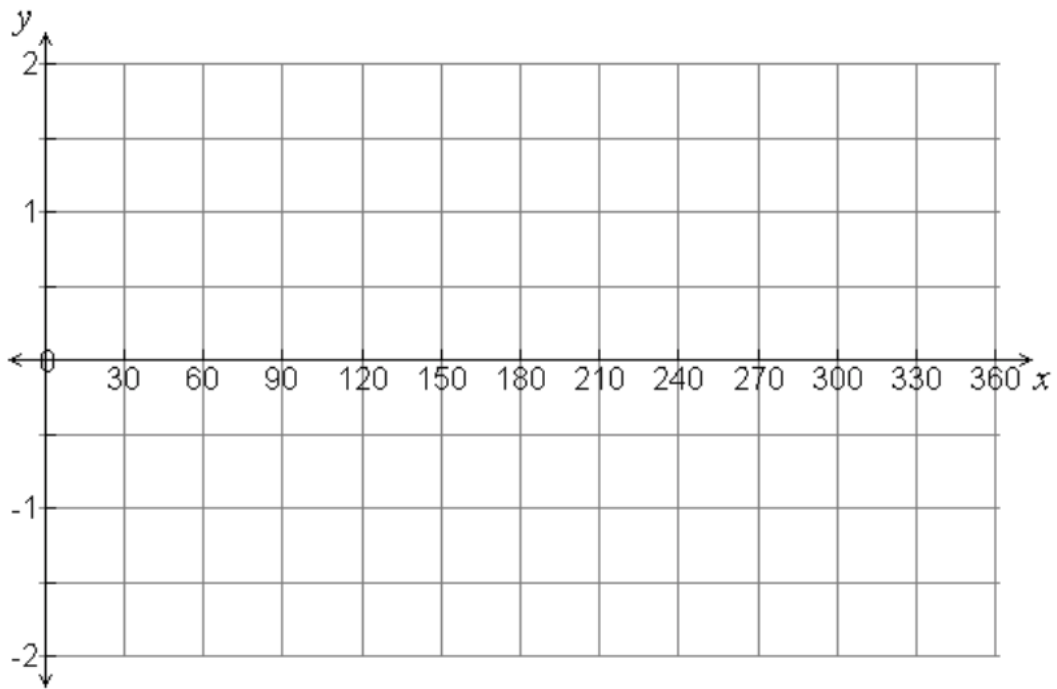| x	0	30	60	90	120	150	180	210	240	270	300	330	360
y													

b) On the grid, draw the graph of $y=\sin(x)$ (2)

3.(a) Complete the table of values for $y=\cos(x)$ (2)

x	0	30	60	90	120	150	180	210	240	270	300	330	360
y													

b) On the grid, draw the graph of $y=\cos(x)$ (2)

5. Here is a sketch of the curve $y = \cos x°$ for $0 \leqslant x \leqslant 360$
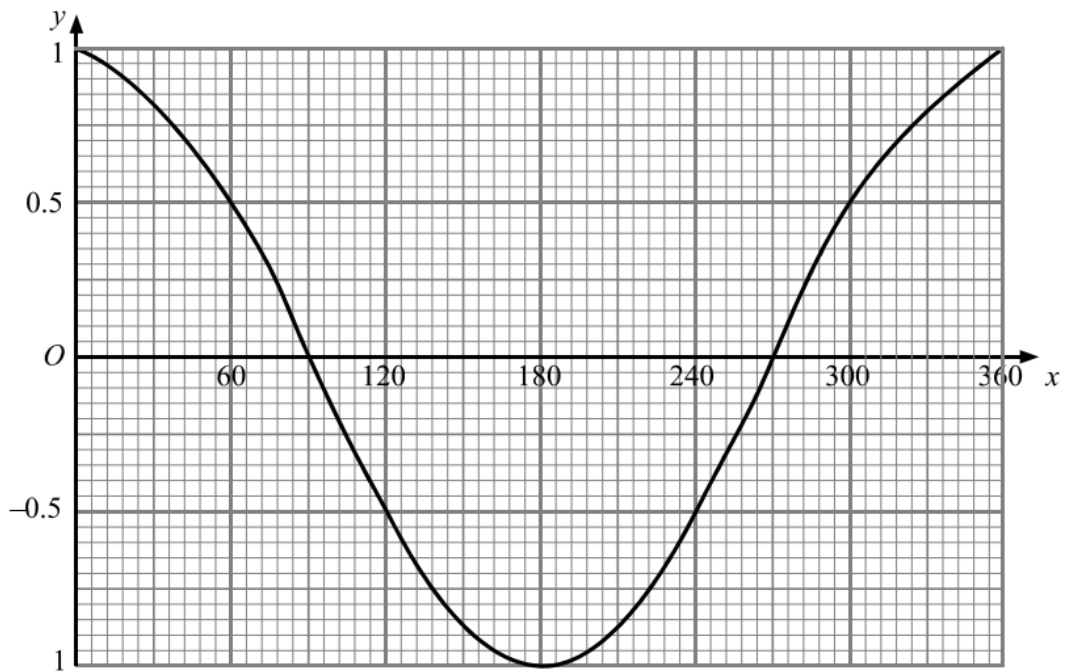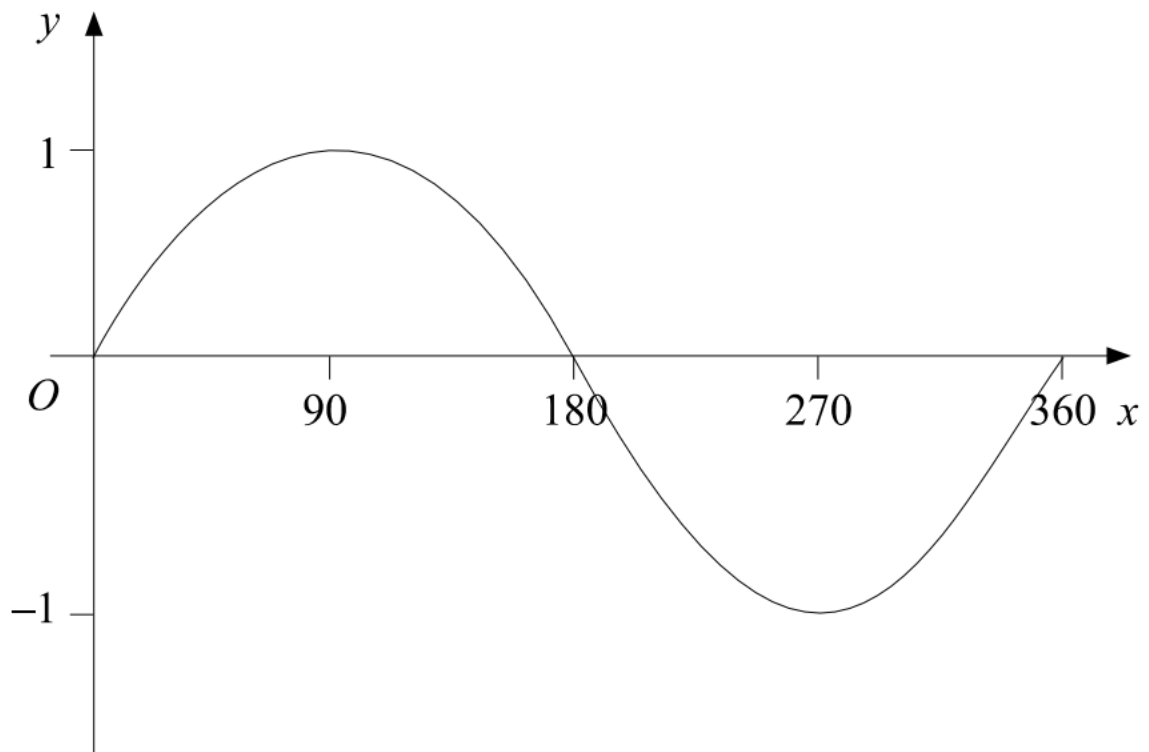

a) Use the graph to find estimates of the solutions, in the interval $0 \leqslant x \leqslant 360$, of the equation:

i) $\cos(x) = -0.4$

.... (2)

ii) $4\cos(x) = 3$

.... (2)

4. Here is a sketch of the curve $y = \sin x°$ for $0 \leqslant x \leqslant 360$

a) Given that $\sin 30° = \dfrac{1}{2}$, write down the value of:
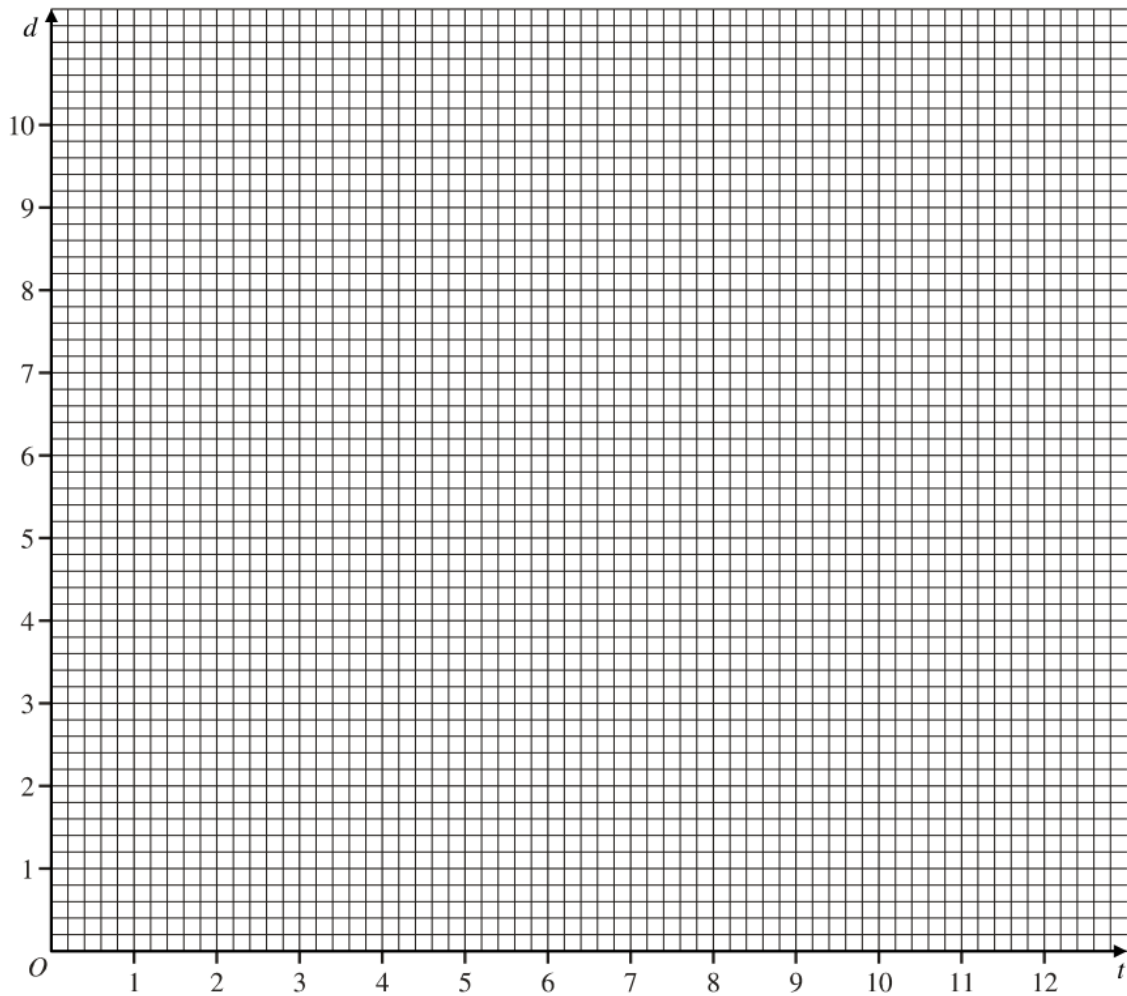
i) $\sin 150°$

.... (1)

ii) $\sin 330°$

.... (1)

7.

The depth of water, d metres, at the entrance to a harbour
is given by the formula: $d = 5 - 4\sin(30t)$
where t is the time in hours after midnight on one day.

a) On the axes below, draw the graph of d against t for $0 \leqslant t \leqslant 12$.   (4)

b) Find the two values of t, where $0 \leqslant t \leqslant 24$, when the depth is least.

.... and .... (1)