

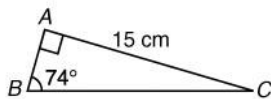
## More about Trigonometry (I)

### 續三角（一）

#### Exercises(練習)

1. In the figure,  $\angle B = 74^\circ$ ,  $\angle A = 90^\circ$  and  $AC = 15$  cm. Find the lengths of  $AB$  and  $BC$  correct to 3 significant figures.

在  $\triangle ABC$  中， $\angle B = 74^\circ$ ， $\angle A = 90^\circ$  及  $AC = 15$  cm。求  $AB$  和  $BC$  的長度，準確至三位有效數字。



2. In a right-angled triangle with  $\theta$  as one of its interior angles, it is given that  $\cos \theta = \frac{1}{\sqrt{5}}$ . Find the values of  $\sin \theta$  and  $\tan \theta$ .

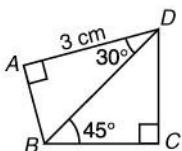
已知  $\theta$  是直角三角形的其中一個內角，而  $\cos \theta = \frac{1}{\sqrt{5}}$ ，求  $\sin \theta$  和  $\tan \theta$ 。

3. In the figure, find the lengths of the following line segments without using a calculator.

在圖中，試不使用計算機，求下列各線段的長度。

(a)  $BD$

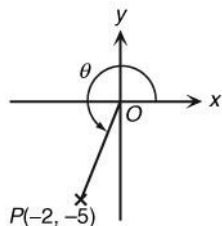
(b)  $CD$



Question Bank

4. If  $P(-2, -5)$  lies on the terminal side of  $\theta$ , find the values of  $\sin \theta$ ,  $\cos \theta$  and  $\tan \theta$ .

若  $P(-2, -5)$  是  $\theta$  的終邊上的一點，求  $\sin \theta$ 、 $\cos \theta$  和  $\tan \theta$  的值。



5. Given that  $\tan \theta = \frac{12}{5}$ , find  $\sin \theta$ .

已知  $\tan \theta = \frac{12}{5}$ ，求  $\sin \theta$ 。

6. Given that  $\cos \theta = -\frac{12}{13}$ , where  $90^\circ < \theta < 180^\circ$ , find  $\sin \theta$  and  $\tan \theta$ .

已知  $\cos \theta = -\frac{12}{13}$ ，其中  $90^\circ < \theta < 180^\circ$ ，求  $\sin \theta$  和  $\tan \theta$ 。

7. Determine whether the following trigonometric ratios are positive or negative.

判斷下列各三角比的值是正還是負。

(a)  $\cos 280^\circ$

(b)  $\tan 110^\circ$

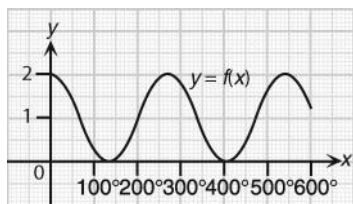
(c)  $\sin (-200^\circ)$

8. Given that  $\sin \theta = -\frac{7}{25}$  and  $\tan \theta < 0$ , find  $\cos \theta$  and  $\tan \theta$ .

已知  $\sin \theta = -\frac{7}{25}$  及  $\tan \theta < 0$ ，求  $\cos \theta$  和  $\tan \theta$ 。

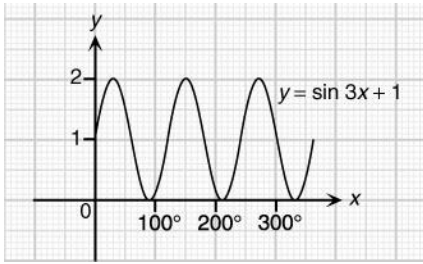
9. The following figure shows the graph of a periodic function  $y = f(x)$ . Find the period of the function  $y = f(x)$  from its graph.

下圖所示為周期函數  $y = f(x)$  的圖像，求它的周期。



10. The following figure shows the graph of  $y = \sin 3x + 1$  for  $0^\circ \leq x \leq 360^\circ$ .

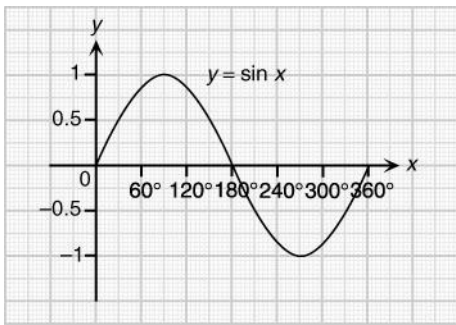
下圖所示為  $y = \sin 3x + 1$  的圖像，其中  $0^\circ \leq x \leq 360^\circ$ 。



- (a) What are the maximum and minimum values of  $y$ ?  
 (b) Is  $y = \sin 3x + 1$  a periodic function? If so, find its period.  
 (a) 求  $y$  的極大值和極小值。  
 (b)  $y = \sin 3x + 1$  是一個周期函數嗎？若是的話，求它的周期。

11. The figure shows the graph of  $y = \sin x$ .

下圖所示為  $y = \sin x$  的圖像。



Solve the following equations by drawing a suitable straight line on the graph for  $0^\circ \leq x \leq 360^\circ$ .

試在圖中加上適當的直線，從而解下列各方程，其中  $0^\circ \leq x \leq 360^\circ$ 。

- (a)  $\sin x = -1$   
 (b)  $\sin x = -0.5$

12. Find the maximum and minimum values of the following functions.

求下列各函數的極大值和極小值。

- (a)  $y = \sin x - 2$   
 (b)  $y = \frac{1}{3 + \sin x}$

13. Find the maximum and minimum values of the following functions.

求下列各函數的極大值和極小值。

- (a)  $y = -2\cos x$   
 (b)  $y = \cos^2 x + 2$

Question Bank

14. Solve  $\sin x = \cos 2x$  for  $0^\circ \leq x \leq 360^\circ$  graphically.

利用圖解法解  $\sin x = \cos 2x$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。

15. Solve  $\tan 3x = -1$  for  $0^\circ \leq x \leq 360^\circ$  graphically.

利用圖解法解  $\tan 3x = -1$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。

16. Express each of the following trigonometric ratios in terms of the same trigonometric ratio of an acute angle.

試以同類的三角比來表示下列各題，其中各角均須為銳角。

(a)  $\sin 162^\circ$

(b)  $\cos 238^\circ$

(c)  $\sin (-130^\circ)$

17. Find, in surd form, the values of the following trigonometric ratios.

求下列各三角比的值。（答案以根式表示。）

(a)  $\sin 240^\circ$

(b)  $\cos 135^\circ$

18. Solve the following equations for  $0^\circ \leq \theta \leq 360^\circ$ .

解下列各方程，其中  $0^\circ \leq \theta \leq 360^\circ$ 。

(a)  $\sin \theta = \sin 70^\circ$

(b)  $\cos \theta = -\cos 42^\circ$

19. Simplify the following expressions.

化簡下列各式。

(a)  $\frac{\sin(360^\circ - \theta)}{\cos(180^\circ + \theta)}$

(b)  $\frac{\cos(360^\circ + \theta) \tan(180^\circ - \theta)}{\sin(180^\circ - \theta)}$

20. Solve  $\sqrt{3} \sin x + 3 \cos x = 0$  for  $0^\circ \leq x \leq 360^\circ$ .

解  $\sqrt{3} \sin x + 3 \cos x = 0$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。

21. Solve the following equations for  $0^\circ \leq \theta \leq 360^\circ$ .

解下列各方程，其中  $0^\circ \leq \theta \leq 360^\circ$ 。

(a)  $\tan \theta = 1.5$

(b)  $\cos \theta = -0.253$

(Give your answers correct to 1 decimal place.)

(答案須準確至一位小數。)

22. Solve  $2\sin^2 x + \cos x - 1 = 0$  for  $0^\circ \leq x \leq 360^\circ$ .

解  $2\sin^2 x + \cos x - 1 = 0$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。

23. Solve  $2\sin^2 x + 5\sin x - 3 = 0$  for  $0^\circ \leq x \leq 360^\circ$ .

解  $2\sin^2 x + 5\sin x - 3 = 0$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。

24. Given that  $\tan \theta = 3$ , find the value of  $\frac{4\sin \theta}{5\sin \theta - 3\cos \theta}$ .

已知  $\tan \theta = 3$ ，求  $\frac{4\sin \theta}{5\sin \theta - 3\cos \theta}$  的值。

25. Find the maximum and minimum values of the following functions.

求下列各函數的極大值和極小值。

(a)  $y = 3 - 2\sin^2 \theta$

(b)  $(3 - 2\sin \theta)^2$

26. Given that  $\cos \alpha = -\frac{5}{13}$  and  $\tan \beta = \frac{4}{3}$  where  $\alpha$  and  $\beta$  are in the same quadrant, find the value of

$\tan \alpha - \sin \beta$ .

已知  $\cos \alpha = -\frac{5}{13}$  及  $\tan \beta = \frac{4}{3}$ ，其中  $\alpha$  和  $\beta$  屬於同一個象限，求  $\tan \alpha - \sin \beta$  的值。

27. Simplify the following expressions.

化簡下列各式。

(a)  $\sin (270^\circ - \theta)$

(b)  $\tan (270^\circ - \theta)$

Question Bank

28. Solve  $\tan x = \frac{1 + \cos x}{2 \sin x}$  for  $0^\circ \leq x \leq 360^\circ$ .

(Give your answers correct to 3 significant figures if necessary.)

解  $\tan x = \frac{1 + \cos x}{2 \sin x}$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。

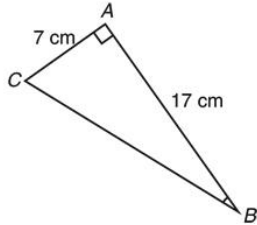
(如有需要，取答案準確至三位有效數字。)

## Pre-requisite Questions

## 預備測驗

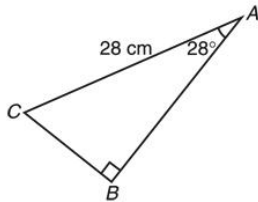
- 1 Find  $\angle ABC$  correct to 3 significant figures.

求  $\angle ABC$ ，準確至三位有效數字。



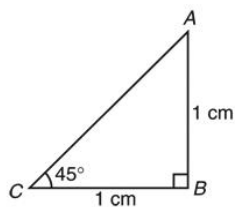
2. Find  $AB$  correct to 3 significant figures.

求  $AB$ ，準確至三位有效數字。



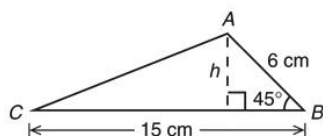
3. Find  $\sin 45^\circ$ ,  $\cos 45^\circ$  and  $\tan 45^\circ$  in surd form.

求  $\sin 45^\circ$ 、 $\cos 45^\circ$  和  $\tan 45^\circ$ ，答案以根式表示。



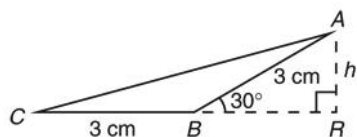
4. Find  $h$  in surd form. Hence, find the area of  $\triangle ABC$  correct to 3 significant figures.

求  $h$ ，答案以根式表示。由此，求  $\triangle ABC$  的面積，準確至三位有效數字。



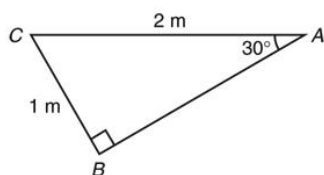
5. Find  $h$ . Hence, find the area of  $\triangle ABC$ .

求  $h$ 。由此，求  $\triangle ABC$  的面積。



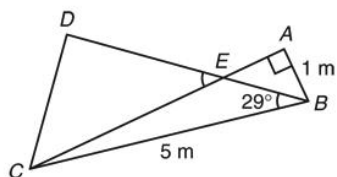
6. Find  $\sin 30^\circ$ ,  $\sin 60^\circ$ ,  $\cos 30^\circ$ ,  $\cos 60^\circ$ ,  $\tan 30^\circ$  and  $\tan 60^\circ$  in surd form.

求  $\sin 30^\circ$ 、 $\sin 60^\circ$ 、 $\cos 30^\circ$ 、 $\cos 60^\circ$ 、 $\tan 30^\circ$  和  $\tan 60^\circ$ ，答案以根式表示。



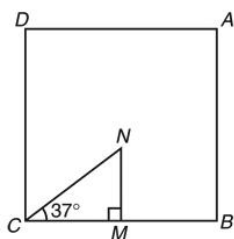
7. Find  $\angle CED$  correct to 3 significant figures.

求  $\angle CED$ ，準確至三位有效數字。



8. The area of the square  $ABCD$  is  $64 \text{ cm}^2$ . If  $M$  is the mid-point of  $BC$ , find  $CN$  correct to 3 significant figures.

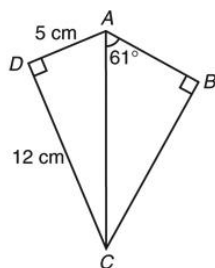
正方形  $ABCD$  的面積是  $64 \text{ cm}^2$ 。若  $M$  是  $BC$  的中點，求  $CN$ ，準確至三位有效數字。



9. Find  $BC$  correct to 3 significant figures.

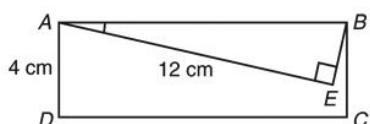
求  $BC$ ，準確至三位有效數字。





10. The area of the rectangle  $ABCD$  is  $52 \text{ cm}^2$ . Find  $\angle BAE$  correct to 3 significant figures.

長方形  $ABCD$  的面積是  $52 \text{ cm}^2$ 。求  $\angle BAE$ ，準確至三位有效數字。



11. If  $\sin \theta = a$  and  $\cos \theta = b$ , simplify  $(\sin \theta - \cos \theta)^2$ .

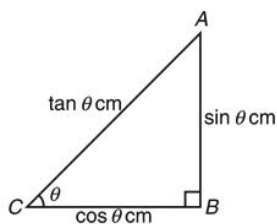
若  $\sin \theta = a$  及  $\cos \theta = b$ ，化簡  $(\sin \theta - \cos \theta)^2$ 。

12. If  $\sin \theta = \frac{3}{5}$  and  $\cos \theta = \frac{4}{5}$ , find  $\tan \theta$ .

若  $\sin \theta = \frac{3}{5}$  及  $\cos \theta = \frac{4}{5}$ ，求  $\tan \theta$ 。

13. Consider  $\triangle ABC$  in the figure.

考慮下圖中的  $\triangle ABC$ 。



Find  $\theta$ .

Hence, show that  $\triangle ABC$  is an isosceles triangle.

求  $\theta$ 。

由此，證明  $\triangle ABC$  是一個等腰三角形。

14. Show that  $\tan \theta + \frac{\cos \theta}{\sin \theta} = \frac{1}{\sin \theta \cos \theta}$ .

證明  $\tan \theta + \frac{\cos \theta}{\sin \theta} = \frac{1}{\sin \theta \cos \theta}$ 。

Question Bank

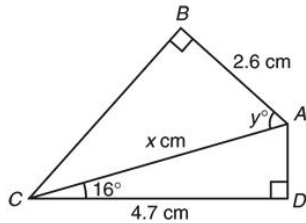
**15.** Show that  $1 - \cos \theta \bullet \frac{\sin \theta}{\tan \theta} = \sin^2 \theta$ .

證明  $1 - \cos \theta \bullet \frac{\sin \theta}{\tan \theta} = \sin^2 \theta$  。

## Level 1 Questions

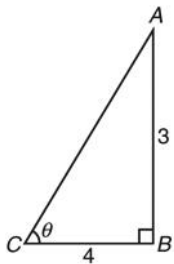
### 程度 1 題目

1. Find the values of the unknowns in the following figure correct to 3 significant figures.  
求圖中的未知量，準確至三位有效數字。



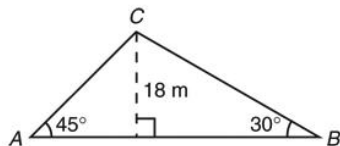
2. It is given that  $\tan \theta = \frac{3}{4}$  and  $\theta$  is an acute angle. Find the values of  $\sin \theta$  and  $\cos \theta$ .

已知  $\tan \theta = \frac{3}{4}$  及  $\theta$  是一個銳角。求  $\sin \theta$  和  $\cos \theta$  的值。



3. In  $\triangle ABC$ ,  $\angle A = 45^\circ$ ,  $\angle B = 30^\circ$  and the perpendicular from  $C$  to  $AB$  is 18 m. Find  $AB$ . (Leave your answer in surd form.)

在  $\triangle ABC$  中， $\angle A = 45^\circ$  及  $\angle B = 30^\circ$ ，而從  $C$  至  $AB$  的垂直線長 18 m。求  $AB$ 。（答案以根式表示。）



4. Simplify the following expressions.

化簡下列各式。

(a)  $\tan^2 \theta \cos^2 \theta + \sin^2 (90^\circ - \theta)$

(b)  $\sin^2 \theta \bullet \left( \frac{1}{1 - \cos \theta} + \frac{1}{1 + \cos \theta} \right)$

5. It is given that  $\sin \theta = \frac{8}{15}$  and  $\theta$  is an acute angle. Find the values of  $\cos \theta$  and  $\tan \theta$  in surd form.

已知  $\sin \theta = \frac{8}{15}$  及  $\theta$  是一個銳角。求  $\cos \theta$  和  $\tan \theta$  的值，答案以根式表示。

6. (a) If  $\sin(\theta - 10^\circ) = \cos 38^\circ$ , find the acute angle  $\theta$  without using a calculator.

(b) If  $\tan(\theta + 30^\circ) = \frac{1}{\tan 20^\circ}$ , find the acute angle  $\theta$  without using a calculator.

(a) 若  $\sin(\theta - 10^\circ) = \cos 38^\circ$ ，試不使用計算機，求銳角  $\theta$  的值。

(b) 若  $\tan(\theta + 30^\circ) = \frac{1}{\tan 20^\circ}$ ，試不使用計算機，求銳角  $\theta$  的值。

7. Find the values of the following expressions. Leave your answers in surd form if necessary.

求下列各式的值。如有需要，答案以根式表示。

(a)  $3\sin 45^\circ + 2\cos 45^\circ + \tan 0^\circ$

(b)  $\sin^2 30^\circ - \cos^2 360^\circ + \sin^2 270^\circ$

8. Find the values of the following expressions without using a calculator.

試不使用計算機，求下列各式的值。

(a)  $\frac{\sin 270^\circ + \cos 270^\circ}{\sin 90^\circ + \cos 90^\circ}$

(b)  $\frac{\sin 180^\circ + \cos 180^\circ}{\sin 0^\circ + \cos 0^\circ}$

9. (a) If  $\sin \theta = \frac{2}{3}$  and  $90^\circ < \theta < 180^\circ$ , find  $\cos \theta$  and  $\tan \theta$  in surd form.

(b) If  $\cos \theta = -\frac{3}{5}$  and  $180^\circ < \theta < 270^\circ$ , find  $\sin \theta$  and  $\tan \theta$ .

(a) 若  $\sin \theta = \frac{2}{3}$ ，其中  $90^\circ < \theta < 180^\circ$ ，求  $\cos \theta$  和  $\tan \theta$ ，答案以根式表示。

(b) 若  $\cos \theta = -\frac{3}{5}$ ，其中  $180^\circ < \theta < 270^\circ$ ，求  $\sin \theta$  和  $\tan \theta$ 。

10. If  $\sin \theta \cos \theta > 0$ , suggest a quadrant that  $\theta$  lies in.

若  $\sin \theta \cos \theta > 0$ ，試舉出  $\theta$  所屬的可能象限。

11. (a) If  $\tan \theta = -\frac{5}{7}$  and  $90^\circ < \theta < 180^\circ$ , find  $\sin \theta$  and  $\cos \theta$  in surd form.

(b) If  $\sin \theta = -\frac{5}{8}$  and  $270^\circ < \theta < 360^\circ$ , find  $\cos \theta$  and  $\tan \theta$  in surd form.

• (a) 若  $\tan \theta = -\frac{5}{7}$ ，其中  $90^\circ < \theta < 180^\circ$ ，求  $\sin \theta$  和  $\cos \theta$ ，答案以根式表示。

(b) 若  $\sin \theta = -\frac{5}{8}$ ，其中  $270^\circ < \theta < 360^\circ$ ，求  $\cos \theta$  和  $\tan \theta$ ，答案以根式表示。

12. (a) If  $\tan \theta = \frac{5}{7}$  and  $\theta$  lies in quadrant III, find  $\sin \theta$  and  $\cos \theta$  in surd form.

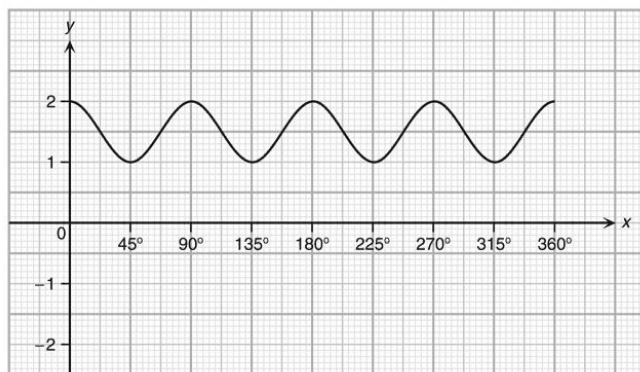
(b) If  $\sin \theta = \frac{3}{8}$  and  $\theta$  lies in quadrant II, find  $\cos \theta$  and  $\tan \theta$  in surd form.

• (a) 若  $\tan \theta = \frac{5}{7}$  且  $\theta$  屬於象限 III，求  $\sin \theta$  和  $\cos \theta$ ，答案以根式表示。

(b) 若  $\sin \theta = \frac{3}{8}$  且  $\theta$  屬於象限 II，求  $\cos \theta$  和  $\tan \theta$ ，答案以根式表示。

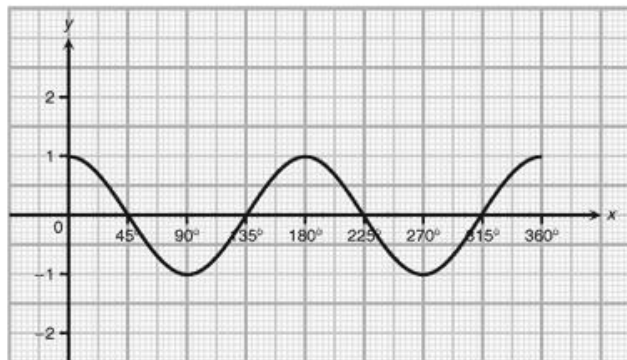
13. The following figure shows the graph of a periodic function. Find the period of the function from its graph.

下圖所示為一個周期函數的圖像。求它的周期。



14. The following figure shows the graph of a periodic function. Find the period of the function from its graph.

下圖所示為一個周期函數的圖像。求它的周期。



15. Find the maximum and minimum values of the following functions algebraically.

求下列各函數的極大值和極小值。

(a)  $y = -3 \sin x$

(b)  $y = 2 \cos 2x - 3$

16. Find the maximum and minimum values of the following functions algebraically.

求下列各函數的極大值和極小值。

(a)  $y = \sin^2 3x$

(b)  $y = \cos^2 x$

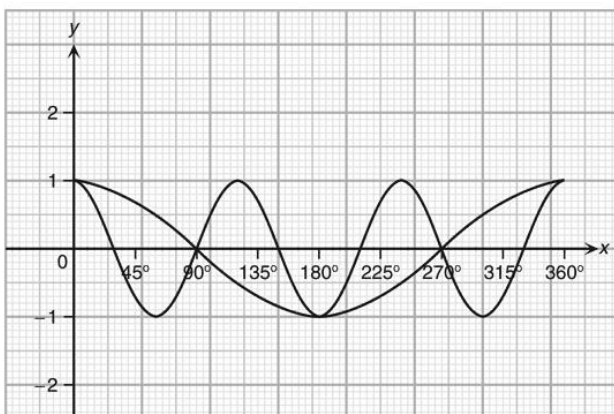
17. Find the maximum and minimum values of the function  $y = 3 \sin 4x - 2$  algebraically.

求函數  $y = 3 \sin 4x - 2$  的極大值和極小值。

18. The figure below shows the graph of  $y = \cos 3x$  and  $y = \cos x$ . Solve  $\cos 3x = \cos x$  for

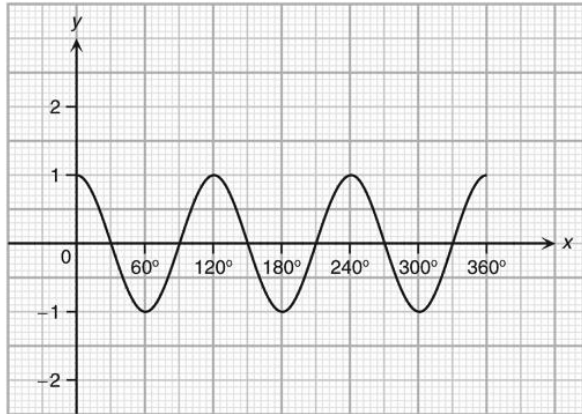
$0^\circ \leq x \leq 360^\circ$ .

下圖所示為  $y = \cos 3x$  及  $y = \cos x$  的圖像。解方程  $\cos 3x = \cos x$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。



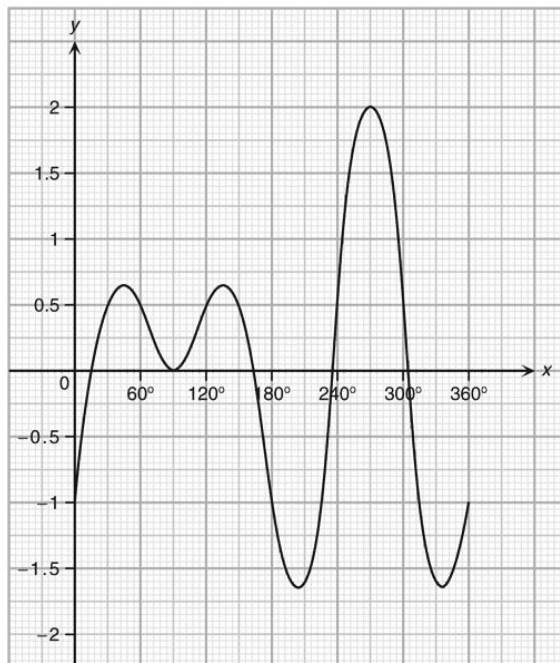
19. The figure below shows the graph of  $y = \cos 3x$ . Solve  $\cos 3x - 1 = 0$  by drawing a suitable straight line on the graph for  $0^\circ \leq x \leq 360^\circ$ .

下圖所示為  $y = \cos 3x$  的圖像。試在圖中加上適當的直線，從而解方程  $\cos 3x - 1 = 0$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。



20. The figure below shows the graph of  $y = \sin 3x - \cos 2x$ . Solve  $2 \sin 3x = 1 + 2 \cos 2x$  by drawing a suitable straight line on the graph for  $0^\circ \leq x \leq 360^\circ$ .

下圖所示為  $y = \sin 3x - \cos 2x$  的圖像。試在圖中加上適當的直線，從而解方程  $2 \sin 3x = 1 + 2 \cos 2x$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。



- 21.** Suppose the graph of  $y = \sqrt{3} \sin x + \cos x + 4$  is given. Find the equations of the straight lines needed to be drawn on the given graph so as to solve the following equations.

假設已知  $y = \sqrt{3} \sin x + \cos x + 4$  的圖像。求在解下列各方程時，應在圖像中加上的直線的方程。

- (a)  $\sqrt{3} \sin x + \cos x = -2$
- (b)  $\cos x = -\sqrt{3} \sin x$
- (c)  $3 \sin x + \sqrt{3} \cos x = -5\sqrt{3}$

- 22.** Suppose the graph of  $y = 2 \sin x + 3 \cos x - 2$  is given. Find the equations of the straight lines needed to be drawn on the given graph so as to solve the following equations.

假設已知  $y = 2 \sin x + 3 \cos x - 2$  的圖像。求在解下列各方程時，應在圖像中加上的直線的方程。

- (a)  $2 \sin x + 3 \cos x + 2 = 0$
- (b)  $2 \sin x = -3 \cos x$
- (c)  $4 \sin x + 6 \cos x = -1$

- 23.** Express each of the following trigonometric ratios in terms of the same trigonometric ratio of an acute angle.

試以同類的三角比來表示下列各題，其中各角均須為銳角。

- (a)  $\cos 127^\circ$
- (b)  $\sin 318^\circ$
- (c)  $\tan 205^\circ$

- 24.** Evaluate the following expressions without using a calculator. (Leave your answers in surd form if necessary.)

試不使用計算機，求下列各式的值。（如有需要，答案以根式表示。）

- (a)  $\sin 150^\circ + \cos 240^\circ$
- (b)  $\sin 240^\circ + \cos 330^\circ$

- 25.** Express each of the following trigonometric ratios in terms of the same trigonometric ratio of an acute angle.

試以同類的三角比來表示下列各題，其中各角均須為銳角。

- (a)  $\cos 290^\circ$
- (b)  $\sin 156^\circ$
- (c)  $\tan 348^\circ$



- 26.** Evaluate the following expressions without using a calculator. (Leave your answers in surd form if necessary.)

試不使用計算機，求下列各式的值。（如有需要，答案以根式表示。）

(a)  $\frac{\sin 225^\circ}{1 - \cos 300^\circ}$

(b)  $\frac{\tan 225^\circ + \sin 210^\circ}{\tan^2 330^\circ}$

- 27.** Evaluate the following expressions without using a calculator. (Leave your answers in surd form if necessary.)

試不使用計算機，求下列各式的值。（如有需要，答案以根式表示。）

(a)  $\sin 300^\circ \cos 300^\circ$

(b)  $\cos 240^\circ \tan 330^\circ$

- 28.** Simplify the following expressions.

化簡下列各式。

(a)  $\sin^2 (180^\circ - \theta) + \cos^2 (-\theta)$

(b)  $\sin (90^\circ - \theta) + \cos (180^\circ + \theta)$

- 29.** Simplify the following expressions.

化簡下列各式。

(a)  $\sin (180^\circ + \theta) \tan (90^\circ - \theta)$

(b)  $\cos (360^\circ - \theta) \tan (180^\circ + \theta)$

- 30.** Simplify  $\frac{\tan (360^\circ - \theta) \tan (180^\circ - \theta)}{\sin (180^\circ + \theta) \cos (90^\circ - \theta)}$ .

化簡  $\frac{\tan (360^\circ - \theta) \tan (180^\circ - \theta)}{\sin (180^\circ + \theta) \cos (90^\circ - \theta)}$ 。

- 31.** If  $\sin 35^\circ = a$ , express  $\sin 215^\circ + 2 \cos 55^\circ$  in terms of  $a$ .

若  $\sin 35^\circ = a$ ，試以  $a$  表示  $\sin 215^\circ + 2 \cos 55^\circ$ 。

- 32.** If  $\cos 40^\circ = b$ , express  $\cos^2 140^\circ - 2 \cos 220^\circ + \cos 320^\circ$  in terms of  $b$ .

若  $\cos 40^\circ = b$ ，試以  $b$  表示  $\cos^2 140^\circ - 2 \cos 220^\circ + \cos 320^\circ$ 。

33. Solve the following equations for  $0^\circ \leq \theta \leq 360^\circ$ . (Give your answers correct to 1 decimal place.)

解下列各方程，其中  $0^\circ \leq \theta \leq 360^\circ$ 。（答案須準確至一位小數。）

(a)  $\sin \theta = 0.234$

(b)  $\cos \theta = -0.567$

34. Solve the following equations for  $0^\circ \leq \theta \leq 360^\circ$ .

解下列各方程，其中  $0^\circ \leq \theta \leq 360^\circ$ 。

(a)  $\sin \theta = \frac{1}{2}$

(b)  $\sin \theta = -\frac{\sqrt{3}}{2}$

35. Solve the following equations for  $0^\circ \leq \theta \leq 360^\circ$ .

解下列各方程，其中  $0^\circ \leq \theta \leq 360^\circ$ 。

(a)  $\cos \theta = -\frac{\sqrt{3}}{2}$

(b)  $\cos \theta = \frac{\sqrt{2}}{2}$

36. Solve the following equations for  $0^\circ \leq \theta \leq 360^\circ$ .

解下列各方程，其中  $0^\circ \leq \theta \leq 360^\circ$ 。

(a)  $\sin \theta = -\cos 40^\circ$

(b)  $\tan \theta = -\frac{1}{\tan 23^\circ}$

37. Solve the following equations for  $0^\circ \leq \theta \leq 360^\circ$ . (Give your answers correct to 1 decimal place.)

解下列各方程，其中  $0^\circ \leq \theta \leq 360^\circ$ 。

(a)  $\tan \theta = 1.23$

(b)  $\tan \theta = -7.89$

38. Solve the following equations for  $0^\circ \leq \theta \leq 360^\circ$ .

解下列各方程，其中  $0^\circ \leq \theta \leq 360^\circ$ 。

(a)  $\sin \theta = \sin 35^\circ$

(b)  $\cos \theta = -\cos 53^\circ$

(c)  $\tan \theta = -\tan 68^\circ$

- 39.** Solve the following equations for  $0^\circ \leq \theta \leq 360^\circ$ .

解下列各方程，其中  $0^\circ \leq \theta \leq 360^\circ$ 。

(a)  $\sin \theta \cos \theta = 0$

(b)  $\sin \theta \left( \sin \theta - \frac{1}{2} \right) = 0$

- 40.** Solve the following equations for  $0^\circ \leq \theta \leq 360^\circ$ . (Give your answers correct to 1 decimal place if necessary.)

解下列各方程，其中  $0^\circ \leq \theta \leq 360^\circ$ 。（如有需要，取答案準確至一位小數。）

(a)  $\tan \theta \left( \tan \theta + \frac{1}{3} \right) = 0$

(b)  $(2 \cos \theta + 1)(3 \cos \theta - 1) = 0$

- 41.** Solve the following equations for  $0^\circ \leq \theta \leq 360^\circ$ . (Give your answers correct to 1 decimal place if necessary.)

解下列各方程，其中  $0^\circ \leq \theta \leq 360^\circ$ 。（如有需要，取答案準確至一位小數。）

(a)  $2 \sin \theta - 3 \cos \theta = 0$

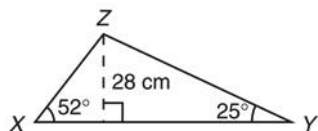
(b)  $3 \cos \theta - \sin \theta = 2 \sin \theta + \cos \theta$

## Level 2 Questions

### 程度 2 題目

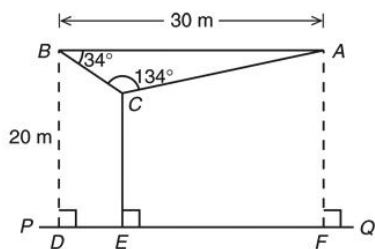
1. In  $\triangle XYZ$ ,  $\angle X = 52^\circ$ ,  $\angle Y = 25^\circ$  and the perpendicular from  $Z$  to  $XY$  is 28 m. Find  $XY$  and the area of  $\triangle XYZ$  correct to 3 significant figures.

在  $\triangle XYZ$  中， $\angle X = 52^\circ$  及  $\angle Y = 25^\circ$ ，而從  $Z$  至  $XY$  的垂直線長 28 m。求  $XY$  和  $\triangle XYZ$  的面積，準確至三位有效數字。



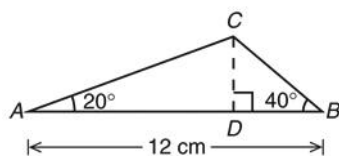
2. In the figure,  $AB$  is a horizontal line.  $D$ ,  $E$  and  $F$  are three points on the horizontal ground so that  $BD \perp PQ$ ,  $CE \perp PQ$  and  $AF \perp PQ$ . Find  $CE$  correct to 3 significant figures.

在圖中， $AB$  是一條水平線，而  $D$ 、 $E$  和  $F$  皆是地平線上的三點，使  $BD \perp PQ$ 、 $CE \perp PQ$  及  $AF \perp PQ$ 。求  $CE$ ，準確至三位有效數字。

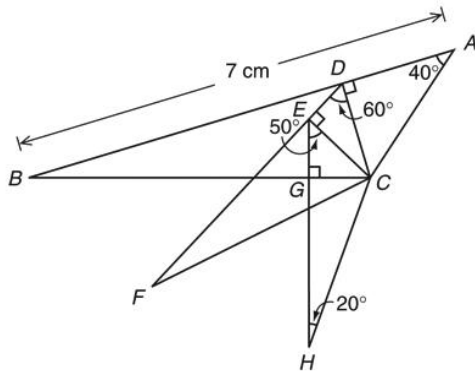


3. In an obtuse-angled triangle  $ABC$ ,  $\angle A = 20^\circ$ ,  $\angle B = 40^\circ$  and  $AB = 12$  cm. Find the length of the perpendicular from  $C$  to  $AB$  and the area of  $\triangle ABC$  correct to 3 significant figures.

在  $\triangle ABC$  中， $\angle A = 20^\circ$ ， $\angle B = 40^\circ$  及  $AB = 12$  cm。求從  $C$  至  $AB$  的垂直線的長度和  $\triangle ABC$  的面積，準確至三位有效數字。



4.



In the figure, find

- (a)  $\angle ACB$ ,
- (b)  $CD$ ,
- (c)  $EH$ .

(Give your answers correct to 3 significant figures if necessary.)

在圖中，求

- (a)  $\angle ACB$ ；
- (b)  $CD$ ；
- (c)  $EH$ 。

(如有需要，取答案準確至三位有效數字。)

5. If  $\tan \theta = -\frac{1}{2}$ , find the value of  $\frac{2 \sin \theta + 3 \cos \theta}{3 \cos \theta - 2 \sin \theta}$ .

若  $\tan \theta = -\frac{1}{2}$ ，求  $\frac{2 \sin \theta + 3 \cos \theta}{3 \cos \theta - 2 \sin \theta}$  的值。

6. Simplify  $\frac{\tan^2 \theta - \tan^2 (90^\circ - \theta)}{\sin^2 \theta - \cos^2 \theta} \cdot \sin^2 \theta \cos^2 \theta$ .

化簡  $\frac{\tan^2 \theta - \tan^2 (90^\circ - \theta)}{\sin^2 \theta - \cos^2 \theta} \cdot \sin^2 \theta \cos^2 \theta$ 。

7. If  $\sin \theta + \cos \theta = \frac{\sqrt{3}}{2}$ , find the value of  $\sin \theta \cos \theta$ .

若  $\sin \theta + \cos \theta = \frac{\sqrt{3}}{2}$ ，求  $\sin \theta \cos \theta$  的值。

8. Evaluate the expression below without using a calculator.

試不使用計算機，求以下數式的值。

$$\left( \frac{\cos 90^\circ + \sin 90^\circ}{\sin 60^\circ} \right)^{2(\sin 30^\circ + \cos 60^\circ)}$$

9. Evaluate the expression below without using a calculator.

試不使用計算機，求以下數式的值。

$$\frac{(\sin 0^\circ - \cos 180^\circ)^2 + (\sin 180^\circ + \tan 0^\circ)^2}{\tan 180^\circ + \cos 270^\circ - \sin 90^\circ}$$

10. Evaluate the expression below without using a calculator.

試不使用計算機，求以下數式的值。

$$\left[ \frac{\tan 180^\circ + \cos 360^\circ}{(\sin 45^\circ + \cos 45^\circ)^2} \right]^{-\frac{1}{2}} - \left( \frac{1}{\cos 60^\circ} \right)^{\frac{1}{\cos 0^\circ + \sin 90^\circ}}$$

11. Given that  $\cos^2 \theta = \frac{36}{121}$  and  $180^\circ < \theta < 270^\circ$ , find  $\sin \theta$  and  $\tan \theta$ .

已知  $\cos^2 \theta = \frac{36}{121}$ ，其中  $180^\circ < \theta < 270^\circ$ ，求  $\sin \theta$  和  $\tan \theta$ 。

12. Given that  $\tan^2 \theta = \frac{9}{64}$  and  $\theta$  lies in quadrant II, find  $\sin \theta$  and  $\cos \theta$ .

已知  $\tan^2 \theta = \frac{9}{64}$  且  $\theta$  屬於象限 II，求  $\sin \theta$  和  $\cos \theta$ 。

13. Given that  $\cos \theta = -\frac{17}{29}$  and  $\tan \theta < 0$ , find  $\sin \theta$  and  $\tan \theta$ .

已知  $\cos \theta = -\frac{17}{29}$  及  $\tan \theta < 0$ ，求  $\sin \theta$  和  $\tan \theta$ 。

14. Given that  $\sin \theta = \frac{16}{19}$  and  $\tan \theta > 0$ , find  $\cos \theta$  and  $\tan \theta$ .

已知  $\sin \theta = \frac{16}{19}$  及  $\tan \theta > 0$ ，求  $\cos \theta$  和  $\tan \theta$ 。

15. Given that  $\cos \theta = -\frac{6}{13}$ , find  $\tan \theta + \sin \theta$ .

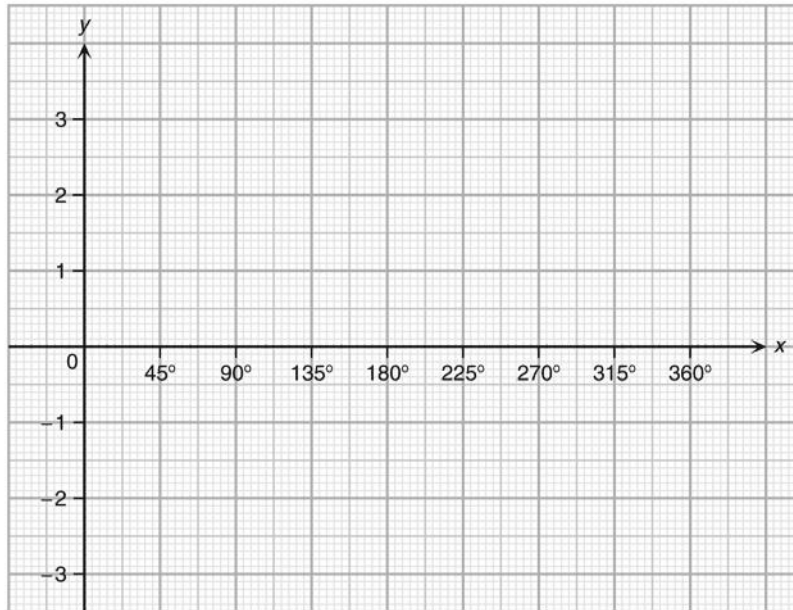
已知  $\cos \theta = -\frac{6}{13}$ ，求  $\tan \theta + \sin \theta$ 。

16. For the function  $y = 3 \cos 2x$ ,

對於函數  $y = 3 \cos 2x$ ，

(a) plot the graph of the function for  $0^\circ \leq x \leq 360^\circ$ ,

(a) 繪畫它的圖像，其中  $0^\circ \leq x \leq 360^\circ$ ；



(b) find the maximum and minimum values of the function,

求它的極大值和極小值；

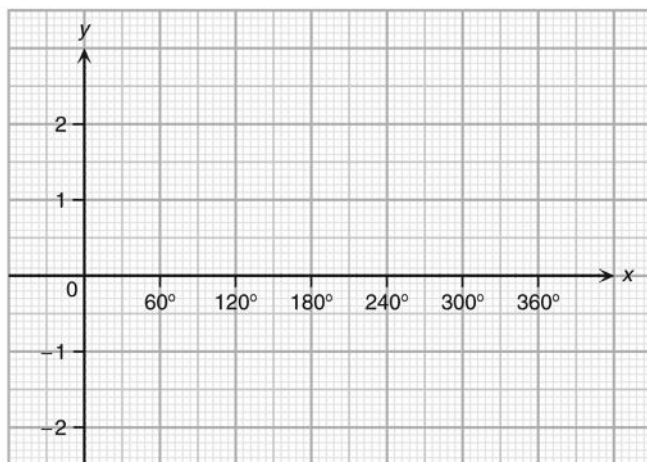
(c) determine whether it is a periodic function. If so, find its period.

判斷它是否周期函數； 若是的話，求它的周期。

17. For the function  $y = \cos 3x + 1$ ,

對於函數  $y = \cos 3x + 1$ ,

- (a) plot the graph of the function for  $0^\circ \leq x \leq 360^\circ$ ,  
繪畫它的圖像，其中  $0^\circ \leq x \leq 360^\circ$ ;



- (b) find the maximum and minimum values of the function,  
求它的極大值和極小值;
- (c) determine whether it is a periodic function. If so, find its period.  
判斷它是否周期函數； 若是的話，求它的周期。

18. Find the maximum and minimum values of the function  $y = 3 \cos^2 x - 2 \sin^2 x$ .

求函數  $y = 3 \cos^2 x - 2 \sin^2 x$  的極大值和極小值。

19. Find the maximum and minimum values of the function  $y = -\frac{\cos^2 \frac{x}{4}}{4}$ .

求函數  $y = -\frac{\cos^2 \frac{x}{4}}{4}$  的極大值和極小值。

20. Find the maximum and minimum values of the function  $y = \frac{2a}{5 \sin 7ax + 6}$ , where  $a$  is a positive integer. Give your answers in terms of  $a$  if necessary.

求函數  $y = \frac{2a}{5 \sin 7ax + 6}$  的極大值和極小值，其中  $a$  是正整數。如有需要，以  $a$  表示答案。



21. Evaluate the following expressions without using a calculator. (Leave your answers in surd form if necessary.)

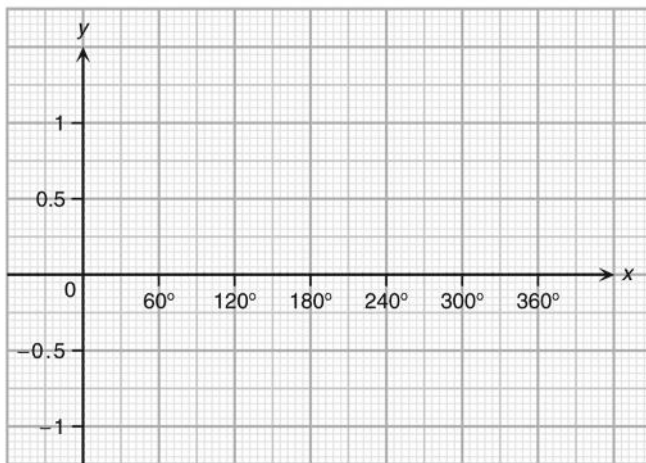
試不使用計算機，求下列各式的值。(如有需要，答案以根式表示。)

(a)  $\frac{\sin 450^\circ \cos 225^\circ}{\sin 45^\circ \cos 315^\circ}$

(b)  $\frac{\tan 210^\circ + \tan 240^\circ}{\tan 300^\circ + \sin 420^\circ}$

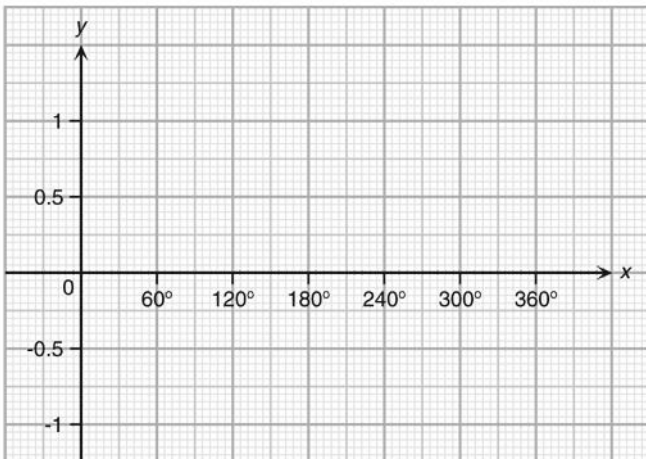
22. Solve the equation  $\sin(x + 30^\circ) = \frac{1}{2}$  for  $0^\circ \leq x \leq 360^\circ$  graphically.

利用圖解法解方程  $\sin(x + 30^\circ) = \frac{1}{2}$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。



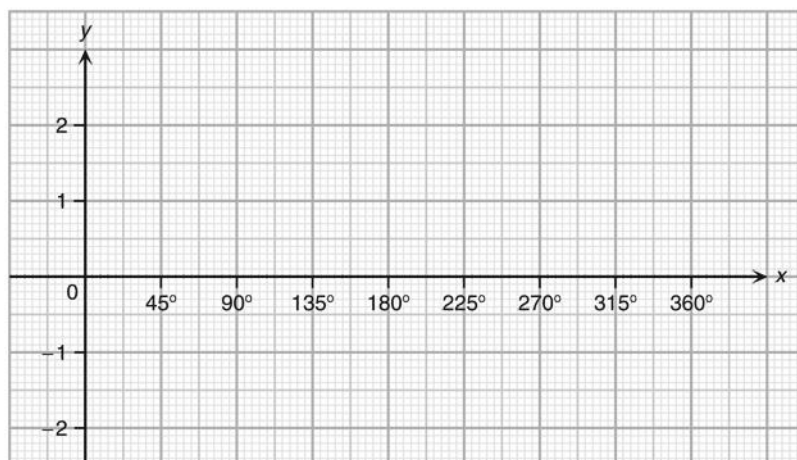
23. Solve the equation  $\cos 2x = -\frac{1}{2}$  for  $0^\circ \leq x \leq 360^\circ$  graphically.

利用圖解法解方程  $\cos 2x = -\frac{1}{2}$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。



24. (a) Solve the equation  $\cos x + \sin x = 1$  for  $0^\circ \leq x \leq 360^\circ$  graphically.

利用圖解法解方程  $\cos x + \sin x = 1$ ，其中  $0^\circ \leq x \leq 360^\circ$

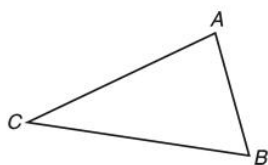


- (b) Hence, solve  $\cos(x + 30^\circ) + \sin(x + 30^\circ) = 1$  for  $0^\circ \leq x \leq 360^\circ$ .

由此，解  $\cos(x + 30^\circ) + \sin(x + 30^\circ) = 1$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。

25. In triangle  $ABC$ , express the following in terms of  $\angle C$ .

在三角形  $ABC$  中，試以  $\angle C$  表示下列各式。



- (a)  $\cos(\angle A + \angle B)$   
 (b)  $\sin 2(\angle A + \angle B)$

26. Evaluate the expression  $\frac{\cos^2 193^\circ + \tan^2 13^\circ \cos^2 347^\circ + \tan^2 405^\circ}{\sin 240^\circ \tan 120^\circ}$  without using a calculator. 試不使

用計算機，求  $\frac{\cos^2 193^\circ + \tan^2 13^\circ \cos^2 347^\circ + \tan^2 405^\circ}{\sin 240^\circ \tan 120^\circ}$  的值。

27. If  $\tan \theta = \frac{2}{3}$ , find the value of  $\frac{\sin(180^\circ - \theta) - \cos(180^\circ + \theta)}{\sin(180^\circ + \theta) - \cos(180^\circ - \theta)}$ .

若  $\tan \theta = \frac{2}{3}$ ，求  $\frac{\sin(180^\circ - \theta) - \cos(180^\circ + \theta)}{\sin(180^\circ + \theta) - \cos(180^\circ - \theta)}$  的值。

28. If  $\sin 15^\circ = a$  and  $\cos 25^\circ = b$ , express the following in terms of  $a$  and  $b$ .

若  $\sin 15^\circ = a$  及  $\cos 25^\circ = b$ ，試以  $a$  和  $b$  表示下列各式。

(a) 
$$\frac{\cos 105^\circ \sin 115^\circ}{1 - \tan 195^\circ \cos 345^\circ}$$

(b) 
$$\frac{\frac{\sin 335^\circ}{\tan 155^\circ} + \tan 345^\circ \cos 195^\circ}{\sin 115^\circ + \sin 165^\circ}$$

29. Simplify the following expressions.

化簡下列各式。

(a) 
$$\frac{\sin(180^\circ - \theta) \tan(90^\circ - \theta)}{\cos(360^\circ - \theta)} - 2 \sin^2(90^\circ - \theta) + \cos^2(180^\circ + \theta) \cos^2(-\theta)$$

(b) 
$$\frac{\sin 2\theta \cos(180^\circ + 2\theta)}{\tan(180^\circ + 2\theta)} - \cos(90^\circ - 2\theta) \tan(180^\circ + 2\theta) \cos(360^\circ + 2\theta)$$

30. If  $\tan 88^\circ = p$ , express the following in terms of  $p$ .

若  $\tan 88^\circ = p$ ，試以  $p$  表示下列各式。

(a) 
$$-\frac{\cos 358^\circ}{\cos 268^\circ} + \frac{\cos^2 336^\circ}{\tan^2 246^\circ} + \cos^2 204^\circ$$

(b) 
$$\frac{\sin 73^\circ (\sin^2 131^\circ + \sin^2 41^\circ)}{\tan 182^\circ \cos 197^\circ}$$

31. Solve the equation  $\sin x \cos x + \sin x - 2 \cos x = 2$  for  $0^\circ \leq x \leq 360^\circ$ .

解方程  $\sin x \cos x + \sin x - 2 \cos x = 2$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。

32. Solve the equation  $4 \sin^2 x - 12 \sin x \cos x + 9 \cos^2 x = 0$  for  $0^\circ \leq x \leq 360^\circ$ . Give your answers correct to 1 decimal place.

解方程  $4 \sin^2 x - 12 \sin x \cos x + 9 \cos^2 x = 0$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。答案須準確至一位小數。

33. Solve the equation  $\sin^2 x \tan^2 x - \sin^2 x = 2 \tan^2 x - 2$  for  $0^\circ \leq x \leq 360^\circ$ .

解方程  $\sin^2 x \tan^2 x - \sin^2 x = 2 \tan^2 x - 2$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。

34. Solve the equation  $\tan^2 x - 8 \tan x + 16 = 0$  for  $0^\circ \leq x \leq 360^\circ$ . Give your answers correct to 1 decimal place.

解方程  $\tan^2 x - 8 \tan x + 16 = 0$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。答案須準確至一位小數。

Question Bank

35. Solve the equation  $8 \tan x + 3 \cos x = 0$  for  $0^\circ \leq x \leq 360^\circ$ . Give your answers correct to 1 decimal place.

解方程  $8 \tan x + 3 \cos x = 0$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。答案須準確至一位小數。

36. Solve the equation  $2 \tan x \sin x + 3 = 0$  for  $0^\circ \leq x \leq 360^\circ$ .

解方程  $2 \tan x \sin x + 3 = 0$ ，其中  $0^\circ \leq x \leq 360^\circ$ 。

## Level 2+ Questions

### 程度 2+ 題目

1. If  $\sin^2 \theta - \cos^2 \theta = \frac{1}{2}$ , find

若  $\sin^2 \theta - \cos^2 \theta = \frac{1}{2}$ ，求

$$\left( \frac{\cos^2 \theta - \sin^2 \theta + 1}{\cos \theta} + 2 \sin \theta \right) \left[ \frac{\sin^2 \theta}{\tan \theta \cos(90^\circ - \theta)} + \frac{(\cos \theta + 1)(\cos \theta - 1)}{\sin \theta} \right].$$

2. Solve  $\frac{\cos^2 \theta - 3}{5 \cos \theta} = \sin \theta$  for  $0^\circ \leq \theta \leq 360^\circ$ . Give your answers correct to 1 decimal place if necessary.

解  $\frac{\cos^2 \theta - 3}{5 \cos \theta} = \sin \theta$ ，其中  $0^\circ \leq \theta \leq 360^\circ$ 。如有需要，取答案準確至一位小數。

3. Given that  $m$  and  $n$  are positive integers, find the maximum and minimum of the following functions in terms of  $m$  and  $n$ .

已知  $m$  和  $n$  都是正整數，試以  $m$  和  $n$  表示下列各函數的極大值和極小值。

(a)  $y = \frac{m}{n} \sin \frac{x}{m}$

(b)  $y = \sin^{mn} x$

(c)  $y = \frac{m - n}{(n - m) \cos^2 x + mn}$

4. Solve  $6 \sin \theta \cos \theta + 4 \sin \theta - 3 \cos \theta - 2 = 0$  for  $0^\circ \leq \theta \leq 360^\circ$ . Give your answers correct to 1 decimal place if necessary.

解  $6 \sin \theta \cos \theta + 4 \sin \theta - 3 \cos \theta - 2 = 0$ ，其中  $0^\circ \leq \theta \leq 360^\circ$ 。如有需要，取答案準確至一位小數。

- 5 It is given that  $\sin \theta = \frac{2}{3}$  and  $0^\circ < \theta < 90^\circ$ .

(a) Find the values of  $\cos \theta$  and  $\tan \theta$  in surd form.

(b) Hence, without using a calculator, prove that

$$\frac{\sin \theta + \sin (90^\circ - \theta)}{\tan \theta} + \frac{1}{2} < \frac{18(\cos^2 \theta - \sin^2 \theta)}{\tan \theta}.$$

已知  $\sin \theta = \frac{2}{3}$  及  $0^\circ < \theta < 90^\circ$ 。

(a) 求  $\cos \theta$  和  $\tan \theta$  的值，答案以根式表示。

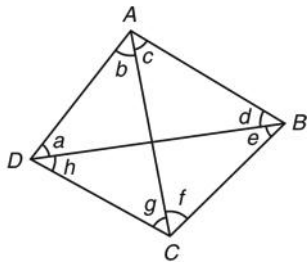
(b) 由此，試不使用計算機，證明

$$\frac{\sin \theta + \sin (90^\circ - \theta)}{\tan \theta} + \frac{1}{2} < \frac{18(\cos^2 \theta - \sin^2 \theta)}{\tan \theta}.$$

6. Solve  $\tan \theta = \frac{1 - \cos \theta}{1 + \sin \theta}$  for  $0^\circ \leq \theta \leq 360^\circ$ .

解  $\tan \theta = \frac{1 - \cos \theta}{1 + \sin \theta}$ ，其中  $0^\circ \leq \theta \leq 360^\circ$ 。

7.



In quadrilateral  $ABCD$ , find the values of the following expressions.

在四邊形  $ABCD$  中，求下列各式的值。

(a)  $\sin (a + c + e + g) + \sin (b + d + f + h)$

(b)  $\cos (a + b) + \cos (b + c) + \cos (c + d) + \cos (d + a)$

8. If  $\frac{\sin \theta}{\cos \theta + 1} = \frac{1}{\sqrt{3}}$ , find  $\frac{\sqrt{3} \sin \theta (1 - \cos \theta)}{\cos^2 \theta + 2 \cos \theta + 1}$ .

若  $\frac{\sin \theta}{\cos \theta + 1} = \frac{1}{\sqrt{3}}$ ，求  $\frac{\sqrt{3} \sin \theta (1 - \cos \theta)}{\cos^2 \theta + 2 \cos \theta + 1}$ 。

## Multiple Choice Questions

### 多項選擇題

1.  $\frac{\cos(90^\circ - \theta)}{\cos(180^\circ - \theta)} =$

- A.  $\tan \theta$   
 B.  $\tan(90^\circ - \theta)$   
 C.  $\tan(180^\circ - \theta)$   
 D.  $\tan(360^\circ + \theta)$

2. If  $\cos x = -\frac{5}{6}$  and  $\sin x > 0$ ,  $\tan x =$

若  $\cos x = -\frac{5}{6}$  及  $\sin x > 0$ ,  $\tan x =$

- A.  $-\frac{5}{11}$ .  
 B.  $\frac{\sqrt{11}}{6}$ .  
 C.  $-\frac{\sqrt{11}}{5}$ .  
 D.  $\frac{6}{11}$ .

3. If  $\tan \theta = -\frac{3}{4}$  and  $180^\circ < \theta < 270^\circ$ ,  
 $\cos \theta =$

若  $\tan \theta = -\frac{3}{4}$  及  $180^\circ < \theta < 270^\circ$ ,  $\cos \theta =$

- A.  $\frac{3}{5}$ .  
 B.  $-\frac{3}{5}$ .  
 C.  $\frac{4}{5}$ .  
 D.  $-\frac{4}{5}$ .

4.  $\frac{\sin(360^\circ - \theta)}{\tan(180^\circ - \theta)} \cdot \cos(180^\circ + \theta) =$

- A.  $-1$   
 B.  $\cos^2 \theta - 1$   
 C.  $1 - \sin^2 \theta$   
 D.  $-\cos^2 \theta$

5.  $\cos \theta - \frac{1}{\cos \theta} =$

- A.  $\sin \theta \cos \theta$   
 B.  $-\sin \theta \tan \theta$   
 C.  $-\tan^2 \theta$   
 D.  $\cos \theta \tan \theta$

6.  $\sin(180^\circ - \theta) \cos(360^\circ + \theta) \tan(90^\circ - \theta) =$

- A.  $\sin \theta \tan \theta$   
 B.  $\cos \theta \tan \theta$   
 C.  $\sin^2 \theta$   
 D.  $\cos^2 \theta$

7. If  $0^\circ < \theta < 90^\circ$  and  $\sin \theta = \frac{3}{5}$ , find the  
 value of  $\cos(180^\circ + \theta) - \tan(360^\circ - \theta)$ .

若  $0^\circ < \theta < 90^\circ$  及  $\sin \theta = \frac{3}{5}$ , 求  
 $\cos(180^\circ + \theta) - \tan(360^\circ - \theta)$  的值。

- A.  $-\frac{31}{20}$   
 B.  $-\frac{1}{20}$   
 C.  $\frac{1}{20}$   
 D.  $\frac{31}{20}$

8. If  $\tan\theta = \frac{7}{9}$ ,  $\frac{3\cos\theta - 2\sin\theta}{\sin\theta} =$

若  $\tan\theta = \frac{7}{9}$ ,  $\frac{3\cos\theta - 2\sin\theta}{\sin\theta} =$

- A.  $\frac{1}{9}$ .
- B.  $\frac{13}{9}$ .
- C.  $\frac{1}{7}$ .
- D.  $\frac{13}{7}$ .

9. If  $\tan\theta = -\frac{5}{6}$ ,  $\frac{2\sin\theta + \cos\theta}{3\sin\theta + \cos\theta} =$

若  $\tan\theta = -\frac{5}{6}$ ,  $\frac{2\sin\theta + \cos\theta}{3\sin\theta + \cos\theta} =$

- A. 1.
- B.  $\frac{4}{9}$ .
- C. -1.
- D.  $-\frac{4}{9}$ .

10. For  $0^\circ \leq x \leq 360^\circ$ , how many solutions does the equation  $2\sin^2 x - 3\sin x + 1 = 0$  have?

對於  $0^\circ \leq x \leq 360^\circ$ , 方程  $2\sin^2 x - 3\sin x + 1 = 0$  有多少個解?

- A. 1
- B. 2
- C. 3
- D. 4

11. If  $180^\circ \leq \theta \leq 360^\circ$ , solve  $5\sin\theta - 3\cos\theta = 0$  correct to the nearest degree.

若  $180^\circ \leq \theta \leq 360^\circ$ , 解  $5\sin\theta - 3\cos\theta = 0$ , 準確至最接近的度。

- A.  $31^\circ$

B.  $149^\circ$

C.  $211^\circ$

D.  $329^\circ$

12. If  $0^\circ \leq \theta \leq 360^\circ$ , solve  $\sqrt{2}\sin\theta + 1 = 0$ .

若  $0^\circ \leq \theta \leq 360^\circ$ , 解  $\sqrt{2}\sin\theta + 1 = 0$ 。

- A.  $45^\circ$  or  $135^\circ$
- B.  $45^\circ$  or  $225^\circ$
- C.  $135^\circ$  or  $315^\circ$
- D.  $225^\circ$  or  $315^\circ$

13. If  $\cos^2\theta = \frac{1}{2}$  and  $0^\circ \leq \theta \leq 360^\circ$ , then  $\theta =$

若  $\cos^2\theta = \frac{1}{2}$  及  $0^\circ \leq \theta \leq 360^\circ$ , 則  $\theta$  只等於

- A.  $45^\circ$  only.
- B.  $45^\circ$  or  $135^\circ$  only.
- C.  $135^\circ$  or  $225^\circ$  only.
- D.  $45^\circ$ ,  $135^\circ$ ,  $225^\circ$  or  $315^\circ$  only.

14. Find the maximum value of  $y = 3\cos^2 x - 8$ .

求  $y = 3\cos^2 x - 8$  的極大值。

- A. -1
- B. -3
- C. -5
- D. -7

15. For  $0^\circ \leq x \leq 360^\circ$ , how many solutions does the equation  $\cos x(3\cos x - 4) = 0$  have?

對於  $0^\circ \leq x \leq 360^\circ$ , 方程  $\cos x(3\cos x - 4) = 0$  有多少個解?

- A. 1
- B. 2
- C. 3
- D. 4



16. Find the maximum value of  $y = \frac{2}{5-3\sin x}$ .

求  $y = \frac{2}{5-3\sin x}$  的極大值。

- A.  $\frac{2}{3}$   
 B.  $\frac{1}{4}$   
 C.  $\frac{2}{5}$   
 D. 1

17. If  $\cos\theta - \sin\theta = \frac{2}{3}$ , find the value of  $\sin\theta\cos\theta$ .

若  $\cos\theta - \sin\theta = \frac{2}{3}$ , 求  $\sin\theta\cos\theta$  的值。

- A.  $\frac{4}{9}$   
 B.  $\frac{5}{9}$   
 C.  $\frac{4}{18}$   
 D.  $\frac{5}{18}$

18. Find the minimum value of  $y = \frac{1}{3-\cos^3 x}$ .

求  $y = \frac{1}{3-\cos^3 x}$  的極小值。

- A.  $\frac{1}{2}$   
 B.  $\frac{1}{3}$   
 C.  $\frac{1}{4}$   
 D.  $\frac{1}{5}$

19. For  $0^\circ \leq x \leq 360^\circ$ , how many solutions does the equation  $\sin x(\cos^2 x - 2) = 0$  have?

對於  $0^\circ \leq x \leq 360^\circ$ , 方程  $\sin x(\cos^2 x - 2) = 0$  有多少個解?

- A. 3  
 B. 4  
 C. 5  
 D. 6

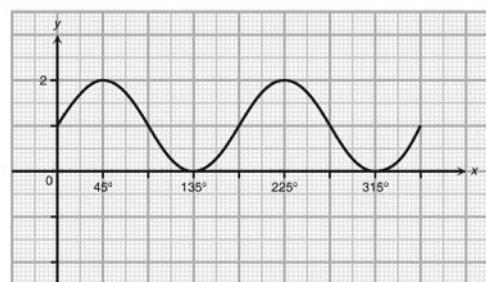
20. The maximum point of the graph of

$$y = \frac{2}{3} \sin 3x \quad (0^\circ \leq 3x \leq 360^\circ) \text{ is}$$

$y = \frac{2}{3} \sin 3x \quad (0^\circ \leq 3x \leq 360^\circ)$  的圖像的最高點是

- A.  $\left(90^\circ, \frac{2}{3}\right)$ .  
 B.  $\left(30^\circ, \frac{2}{3}\right)$ .  
 C.  $\left(0^\circ, \frac{2}{3}\right)$ .  
 D.  $\left(180^\circ, \frac{2}{3}\right)$ .

21.

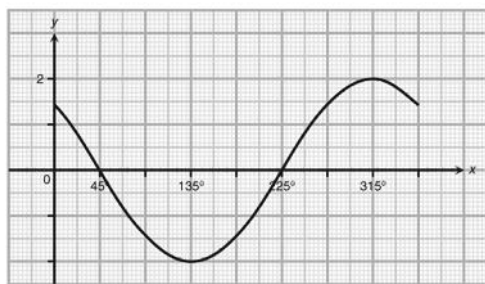


The figure above shows the graph of the function

上圖為下列哪個函數的圖像?

- A.  $y = 2 \sin x$ .  
 B.  $y = \sin x + 1$ .  
 C.  $y = 2 \sin 2x$ .  
 D.  $y = \sin 2x + 1$ .

22.



The figure above shows the graph of the function

上圖為下列哪個函數的圖像?

A.  $y = 2\cos(x + 45^\circ)$ .

B.  $y = \cos(2x + 45^\circ)$ .

C.  $y = 2\cos(x - 45^\circ)$ .

D.  $y = \cos(2x - 45^\circ)$ .

23. If  $\sin\theta + 1$  and  $\cos\theta + 1$  are the roots of  $x^2 - 2x + k = 0$ , then  $k =$

若  $\sin\theta + 1$  及  $\cos\theta + 1$  是  $x^2 - 2x + k = 0$  的根，則  $k =$

A. 1.

B.  $\frac{1}{2}$ .

C. 2.

D.  $2\frac{1}{2}$ .

24. If  $\tan\theta = \frac{1}{3}$  and  $\cos\theta < 0$ , then

$\sin\theta\cos\theta =$

若  $\tan\theta = \frac{1}{3}$  及  $\cos\theta < 0$ ，則

$\sin\theta\cos\theta =$

A.  $\frac{3}{10}$ .

B.  $-\frac{3}{10}$ .

C.  $\frac{1}{10}$ .

D.  $-\frac{1}{10}$ .

25. If  $\cos\theta = -\frac{2}{3}$  and  $\sin\theta > 0$ , then  $\tan\theta =$

若  $\cos\theta = -\frac{2}{3}$  及  $\sin\theta > 0$ ，則  $\tan\theta =$

A.  $-\frac{\sqrt{5}}{3}$ .

B.  $\frac{\sqrt{5}}{3}$ .

C.  $-\frac{\sqrt{5}}{2}$ .

D.  $\frac{\sqrt{5}}{2}$ .

26. If  $\tan\theta\cos\theta > 0$ , in which quadrant does  $\theta$  lie?

若  $\tan\theta\cos\theta > 0$ ， $\theta$  屬於哪(些)象限?

A. quadrant I or quadrant II

B. quadrant I or quadrant III

C. quadrant I or quadrant IV

D. quadrant II or quadrant IV

A. 象限 I 或象限 II

B. 象限 I 或象限 III

C. 象限 I 或象限 IV

D. 象限 II 或象限 IV

27. If  $\sin \theta = \frac{1}{3}$  and  $\theta$  lies in quadrant II, then

$$\cos \theta =$$

若  $\sin \theta = \frac{1}{3}$  且  $\theta$  屬於象限 II，則  $\cos \theta$

=

A.  $-\frac{\sqrt{8}}{3}$ .

B.  $\frac{\sqrt{8}}{3}$ .

C.  $\frac{\sqrt{10}}{3}$ .

D.  $-\frac{\sqrt{10}}{3}$ .

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28. If  $\sin \theta = \frac{p^2 - 1}{p^2 + 1}$  ( $p > 1$ ) and  $0^\circ < \theta < 90^\circ$ ,

$$\text{then } \tan(90^\circ - \theta) =$$

若  $\sin \theta = \frac{p^2 - 1}{p^2 + 1}$  ( $p > 1$ ) 及

$0^\circ < \theta < 90^\circ$ ，則  $\tan(90^\circ - \theta) =$

A.  $\frac{p^2 - 1}{2p}$ .

B.  $\frac{2p}{1 - p^2}$ .

C.  $\frac{4p^2}{p^2 - 1}$ .

D.  $\frac{2p}{p^2 - 1}$ .

29. If  $\tan \theta = \frac{a+b}{a-b}$  ( $a > b > 0$ ) and

$$0^\circ < \theta < 90^\circ, \text{ then } \sin^2 \theta - \cos^2 \theta =$$

若  $\tan \theta = \frac{a+b}{a-b}$  ( $a > b > 0$ ) 及

$$0^\circ < \theta < 90^\circ, \text{ 則 } \sin^2 \theta - \cos^2 \theta =$$

A.  $\frac{2ab}{a^2 + b^2}$ .

B. 1.

C.  $\frac{1}{a^2 + b^2}$ .

D.  $\frac{a+b}{a^2 + b^2}$ .

30. Which of the following is true if

$$0^\circ < \theta < 90^\circ?$$

若  $0^\circ < \theta < 90^\circ$ ，以下哪一項是正確的？

A.  $\cos \theta < 0$

B.  $\cos(90^\circ - \theta) < 0$

C.  $\sin(270^\circ - \theta) < 0$

D.  $\sin(180^\circ - \theta) < 0$

31. If  $2\cos^2 \theta - 1 = \frac{p^2}{2}$  and  $0^\circ < \theta < 45^\circ$ , then

$$4\sin^4 \theta - 4\sin^2 \theta + 2\cos^2 \theta =$$

A.  $\frac{p^2}{4}$ .

B.  $\frac{p^4}{4}$ .

C.  $\frac{p^4 + 2p^2}{2}$ .

D.  $\frac{p^4 + 2p^2}{4}$ .

32. If  $a < 0$ , the minimum value of  $\frac{\sin x}{a}$  is

若  $a < 0$ ， $\frac{\sin x}{a}$  的極小值是

A. 0.

B.  $\frac{1}{a}$ .

C.  $-\frac{1}{a}$ .

D.  $\frac{1}{a}$ .

33. If  $P+Q+R=180^\circ$ , then  $\sin \frac{P+Q}{2} =$

若  $P+Q+R=180^\circ$ , 則  $\sin \frac{P+Q}{2} =$

- A.  $\sin \frac{R}{2}$ .  
 B.  $-\sin \frac{R}{2}$ .  
 C.  $\cos \frac{R}{2}$ .  
 D.  $-\cos \frac{R}{2}$ .

34. If  $A+B+C=180^\circ$ , then  $1+\sin(2A+B+C)\sin(B+C) =$

若  $A+B+C=180^\circ$ , 則

$$1+\sin(2A+B+C)\sin(B+C) =$$

- A.  $\sin^2 A$ .  
 B.  $\cos^2 A$ .  
 C.  $1+\sin^2 A$ .  
 D.  $1+\cos^2 A$ .

35. If  $h > 0$ , the maximum value of  $h \tan \theta$  ( $0^\circ \leq \theta \leq 60^\circ$ ) is

若  $h > 0$ ,  $h \tan \theta$  ( $0^\circ \leq \theta \leq 60^\circ$ ) 的極大值是

- A.  $h$ .  
 B.  $\sqrt{3}h$ .  
 C.  $0$ .  
 D.  $\frac{h}{\sqrt{3}}$ .

36. The period of the function  $y = \tan \frac{8x}{3}$  is

函數  $y = \tan \frac{8x}{3}$  的周期是

- A.  $67.5^\circ$ .  
 B.  $90^\circ$ .

C.  $135^\circ$ .

D.  $180^\circ$ .

37. The period of the function  $y = \sin \frac{2x}{5}$  is

函數  $y = \sin \frac{2x}{5}$  的周期是

- A.  $360^\circ$ .  
 B.  $540^\circ$ .  
 C.  $720^\circ$ .  
 D.  $900^\circ$ .

38. If the graph of  $y = 8 \sin x + \tan x - 2$  is given, which of the following straight lines should be drawn on the graph for solving  $8 \sin x \cos x + \sin x = 0$ ?

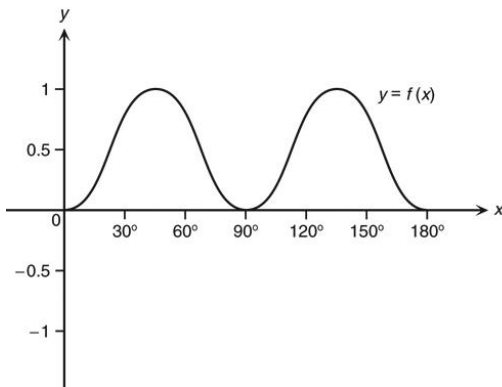
假設已知  $y = 8 \sin x + \tan x - 2$  的圖像。

在該圖像中應加上以下哪一條直線才可解  $8 \sin x \cos x + \sin x = 0$ ?

- A.  $y = \frac{1}{2}$   
 B.  $y = -\frac{1}{2}$   
 C.  $y = -2$   
 D.  $y = 2$

39. The figure below shows the graph of a periodic function  $y = f(x)$ .

下圖所示為周期函數  $y = f(x)$ 。

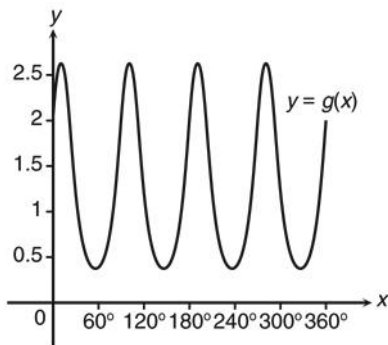


The period of  $y = f(x)$  is

$y = f(x)$  的周期是

- A.  $30^\circ$ .  
 B.  $60^\circ$ .  
 C.  $90^\circ$ .  
 D.  $120^\circ$ .
40. The figure below shows the graph of a periodic function  $y = g(x)$ .

下圖所示為周期函數  $y = g(x)$ 。



The period of  $y = g(x)$  is

$y = g(x)$  的周期是

- A.  $30^\circ$ .  
 B.  $60^\circ$ .  
 C.  $90^\circ$ .  
 D.  $120^\circ$ .

41. If the graph of  $y = 2\cos\theta + 3\sin\theta + 3$  is given, which of the following is FALSE?

假設已知  $y = 2\cos\theta + 3\sin\theta + 3$  的圖像。

以下哪一項是不正確的?

- A.  $y = 3$  should be drawn on the graph for solving  $2\cos\theta + 3\sin\theta = 0$ .  
 在該圖像中加上  $y = 3$  的圖像，可解  $2\cos\theta + 3\sin\theta = 0$ 。
- B.  $y = -3$  should be drawn on the graph for solving  $2\cos\theta + 3\sin\theta = -6$ .  
 在該圖像中加上  $y = -3$  的圖像，可解  $2\cos\theta + 3\sin\theta = -6$ 。
- C.  $y = \sin\theta$  should be drawn on the graph for solving  $\cos\theta + \sin\theta = -\frac{3}{2}$ .  
 在該圖像中加上  $y = \sin\theta$  的圖像，可解  $\cos\theta + \sin\theta = -\frac{3}{2}$ 。
- D.  $y = \cos\theta$  should be drawn on the graph for solving  $\cos\theta + \sin\theta = -1$ .  
 在該圖像中加上  $y = \cos\theta$  的圖像，可解  $\cos\theta + \sin\theta = -1$ 。