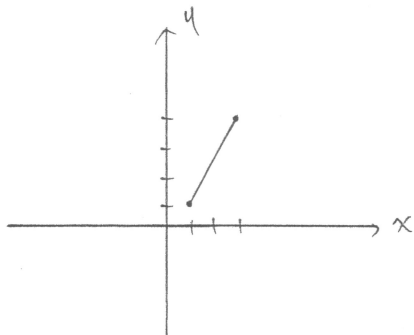


1. $\sqrt{(x-1)^2+(y-2)^2}$ 表示 (x,y) 到 $(1,2)$ 的距離
 $\sqrt{(x-3)^2+(y-4)^2}$ 表示 (x,y) 到 $(3,4)$ 的距離
 $\sqrt{(3-1)^2+(4-2)^2}$ 表示 $(3,4)$ 到 $(1,2)$ 的距離



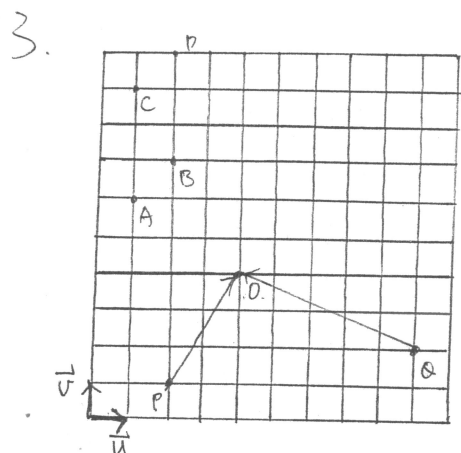
\Rightarrow P 表示 $(1,2)$ 到 $(3,4)$ 的連線段

(1) #

2. 1. 樹幹圓周長約 $170 \times 10 = 1700$ (公分) = 17 公尺

$$2\pi R = 17 \Rightarrow 2R \approx 5$$

(2) #

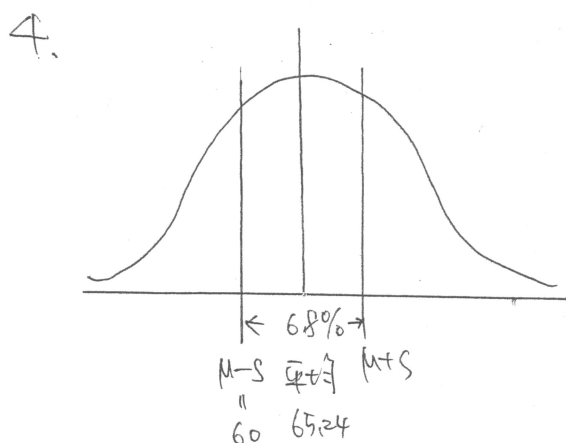


$$\begin{aligned} \vec{PO} + \vec{QO} &= (2\vec{u} + 3\vec{v}) + (-5\vec{u} + 2\vec{v}) \\ &= -3\vec{u} + 5\vec{v} \end{aligned}$$

$$\therefore \vec{CO} = 3\vec{u} - 5\vec{v}$$

$$\therefore \vec{PO} + \vec{QO} + \vec{CO} = 0$$

(3) #



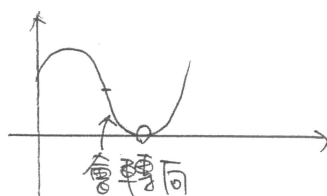
$$\therefore \text{低於 } 60 \text{ 分佔 } \frac{32\%}{2} = 16\%$$

$$\therefore 1000 \times 16\% = 160 \text{ (人)}$$

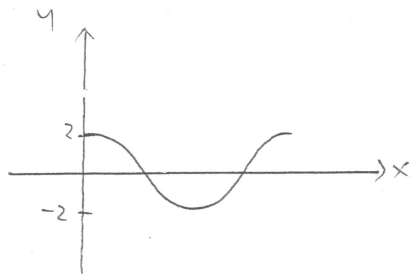
(2) #

5. (1) $(x-2)^2-2$ 表拋物線開口朝上 (不合)

(2) $2\sin x + 2$ 圖形為

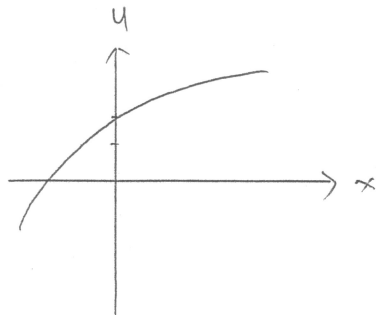


(3) $2 \cos x$



(4) $-0.5(x-2)^2 + 4$ 表拋物線開口朝下

(5) $3 - 2^x$



(4) *

7. $\because abc > 0$ 且 $ab + bc + ca > 0 \Rightarrow a, b, c$ 為一負二正.

$\therefore a > 0 > b > c$

$\because a + b + c > 0 \therefore |a| > |b| \Rightarrow a^2 > b^2$

(1)(4)(5) #

8. \therefore 每 5 秒前進 1 步 且 每 5 秒 1 循環.

即 第 $5k+1$ 秒的位置為 $k+1$, k 是非負整數.

$5k+2$	$k+2$
$5k+3$	$k+3$
$5k+4$	$k+2$
$5k+5$	$k+1$

$\Rightarrow P(3) = 3, P(5) = 1, P(16) = 2, P(101) = 21, P(103) = 23, P(104) = 22$

(1)(2)(3)(4) #

9. $\begin{cases} 2x + y + 3z = 0 \\ 4x + 3y + 6z = 0 \end{cases}$ 的解為直線

(1) $y=0$ 是平面 (x)

(2) $\begin{cases} 2x + y + 3z = 0 \dots ① \\ 4x + 3y + 6z = 0 \dots ② \end{cases} \Rightarrow \begin{cases} ①: 2x + y + 3z = 0 \\ ① \times 2 + ②: y = 0 \dots ③ \end{cases} \Rightarrow \begin{cases} ① - ③: 2x + 3z = 0 \\ ③: y = 0 \end{cases}$

只須加減消去 \therefore 解相同

(3) $x=y=0$ 中有一解 $(0,0,1)$.

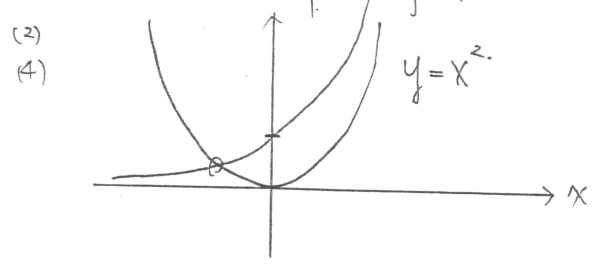
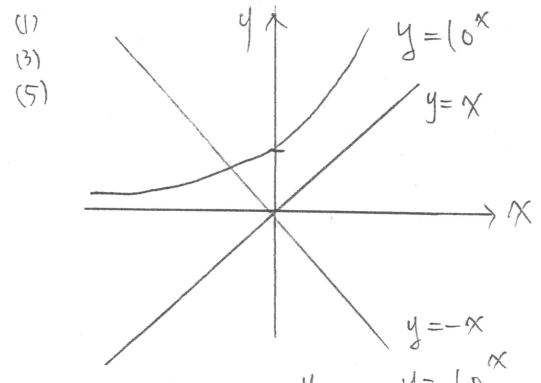
但 $(0,0,1)$ 不是 $\begin{cases} 2x+y+3z=0 \\ 4x+3y+6z=0 \end{cases}$ 的解.

(4) $\begin{cases} x+\frac{1}{2}y+\frac{3}{2}z=0 \\ 4x+3y+6z=0 \end{cases} \Rightarrow \begin{cases} 2x+y+3z=0 \\ 4x+3y+6z=0 \end{cases}$ 相同.

(5) $\begin{cases} 2x+y+3z=0 \dots \textcircled{1} \\ 4x+3y+6z=0 \dots \textcircled{2} \end{cases} \Rightarrow \begin{cases} \textcircled{1}: 2x+y+3z=0 \\ \textcircled{1}+\textcircled{2}: 6x+4y+9z=0 \end{cases}$ 相同.

(2)(4)(5) #

(10) 解個數 \Rightarrow 畫圖之交點個數.



(2)(3)(4)(5) #

(11)

$A = 1000(1.005)^{12} + 1000(1.005)^{11} + \dots + 1000(1.005)^1 + 1000(1.005)$

$B = 2000(1.005)^{12} + 2000(1.005)^{10} + \dots + 2000(1.005)^2$

$= 1000(1.005)^{12} + 1000(1.005)^{11} + \dots + 1000(1.005)^1 + 1000(1.005)$

$(2000(1.005)^{12})^2 = (1000(1.005)^{12})^2 + (1000(1.005)^{12})^2 + \dots + 1000(1.005)^{12}$

(1)(2)(3)(4)(5) #

1°

(1) $A=B=C = \frac{\pi}{3}$ 即可.

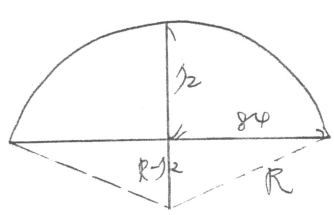
(2) $16^\circ, 16^\circ, 16^\circ$ 即可. ($\sin 30^\circ = \sin 150^\circ = \frac{1}{2}$)

(3) $\sin \theta > \frac{\sqrt{3}}{2}, 60^\circ < \theta < 120^\circ$.
三個角 A, B, C 若 $\sin \theta$ 值均大於 $\frac{\sqrt{3}}{2} \Rightarrow A+B+C > 180^\circ$ (不合)

(4) $30^\circ, 150^\circ$ 任意排三個 (可重覆), 無法湊到和為 180°
($\sin 30^\circ = \sin 150^\circ = \frac{1}{2}$)

(5) $A=B=36^\circ, C=108^\circ$ 即可. (1)(2)(5) #

A.



設此圓半徑 R.

$\Rightarrow R^2 = 84^2 + (R-x)^2$
 $\Rightarrow R^2 = 84^2 + R^2 - 144R + x^2$
 $\Rightarrow 144R = 84^2 + x^2 \Rightarrow R = x^2 + 6^2 = 85$

85 #

B. 設 d 為 $2^{20}-1$ 和 $2^{19}+1$ 的最大公因數

$\Rightarrow \begin{cases} d \mid 2^{20}-1 & \dots ① \\ d \mid 2^{19}+1 & \dots ② \end{cases}$ $① - ② \times 2 \Rightarrow d \mid -3 \Rightarrow d = 1 \text{ or } 3.$
(最大公因數為正)

考慮 $3 \mid 2^{20}-1$ 和 $3 \mid 2^{19}+1$ 若滿足前述條件, 則 $d=3$.
不滿足, 則 $d=1$.

$\therefore \begin{cases} 2^1 \div 3 \dots 1 \\ 2^2 \div 3 \dots 2 \\ 2^3 \div 3 \dots 1 \end{cases} \} = \text{次-循環}$ $\Rightarrow \begin{matrix} 2^{20} \div 3 \dots 1 \\ 2^{19} \div 3 \dots 2 \end{matrix}$ $\Rightarrow \begin{matrix} 3 \mid 2^{20}-1 \\ 3 \mid 2^{19}+1 \end{matrix} \Rightarrow d=3$
3

C. 設成長率 r. $\Rightarrow 48 = 6(1+r)^3 \Rightarrow (1+r)^3 = 8 \Rightarrow 1+r = 2 \Rightarrow r = 1$
 $\Rightarrow r = 100\%$

100% #

D. 設木樁編號 1~60

循環 10 4

第 1 次打在 1 號 $\Rightarrow 10 \Rightarrow 19 \Rightarrow 28 \Rightarrow 37 \Rightarrow 46 \Rightarrow 55 \Rightarrow 4 \Rightarrow 13 \Rightarrow 22 \Rightarrow 31 \Rightarrow 40$
 $\Rightarrow 49 \Rightarrow 58 \Rightarrow 7 \Rightarrow 16 \Rightarrow 25 \Rightarrow 34 \Rightarrow 43 \Rightarrow 52 \Rightarrow \underline{1}$

∴ 共 20 個

20 #

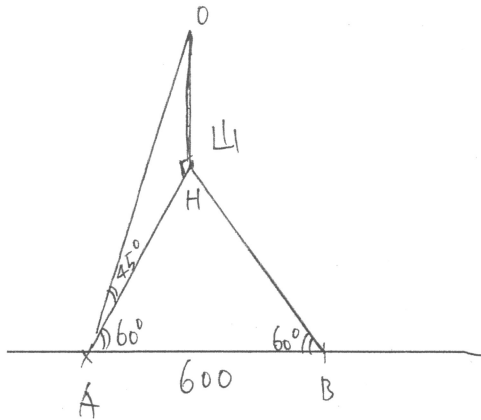
E.

第 1 輪	1 萬元	64 人
2	2	32
3	4	16
4	8	8
5	16	4
6	32	2
7	64	1
冠軍	128	1

共 $1 \times 64 + 2 \times 32 + 4 \times 16 + 8 \times 8 + 16 \times 4 + 32 \times 2 + 64 \times 1 + 128$
 $= 576$ (萬元)

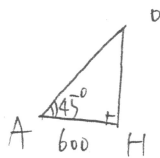
576 #

F.



設山頂為 O, 底部為 H.

$\Rightarrow \triangle ABH$ 為正三角形 $\therefore AH = 600$.



$\therefore \triangle OAH$ 為等腰直角

$\Rightarrow OH = 600$ (即山高)

600 #

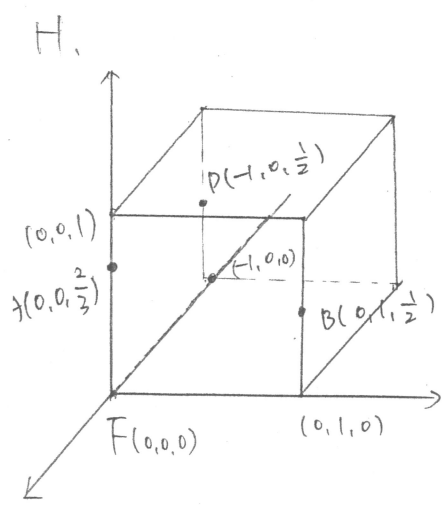
G. 三人平均 171 的方法 \Rightarrow ① 172, 178, 163 ② 174, 176, 163
 ③ 180, 163, 170

共 3 種

(※ 討論小孩巧: 160, 163, 166, 170, 172, 174, 176, 178, 180.)
 +1 -8 -5 -1 1 3 5 7 9
 再找 = 正 - 負 或 - 正 = 負 去取總和為 0.

$$\frac{3}{C_3^9} = \frac{3}{84} = \frac{1}{28}$$

$\frac{1}{28}$ #



$$\Rightarrow \cos \angle AB = \frac{\vec{AD} \cdot \vec{AB}}{|\vec{AD}| |\vec{AB}|} = \frac{(-1, 0, \frac{1}{6}) \cdot (0, 1, \frac{1}{6})}{\sqrt{1^2 + (\frac{1}{6})^2} \sqrt{1^2 + (\frac{1}{6})^2}}$$

$$= \frac{\frac{1}{36}}{\frac{37}{36}} = \frac{1}{37}$$

1/37 #