Solution

(1) A. $9^x x^{2x}$.

$$\begin{aligned}(3x)^{2x} &= 3^{2x}x^{2x} \\ &= (3^2)^x x^{2x} \\ &= 9^x x^{2x}.\end{aligned}$$

(2) C. $\dfrac{5+y}{2(y-2)}$.

$$\begin{aligned}y &= \frac{4x+5}{2x-1} \\ y(2x-1) &= 4x+5 \\ 2xy-y &= 4x+5 \\ (2y-4)x &= 5+y \\ x &= \frac{5+y}{2(y-2)}.\end{aligned}$$

(3) A. $-\dfrac{1}{x+3}$.

$$\begin{aligned}\frac{-x}{(x+3)(x-3)}-\frac{3}{9-x^2} &= \frac{-x}{(x+3)(x-3)}+\frac{3}{x^2-9} \\ &= \frac{-x}{(x+3)(x-3)}+\frac{3}{(x+3)(x-3)} \\ &= \frac{-x+3}{(x+3)(x-3)} \\ &= \frac{-(x-3)}{(x+3)(x-3)} \\ &= -\frac{1}{x+3}.\end{aligned}$$

(4) D. $-4x^3+8x^2-11x+4$.

$$\begin{aligned}(1-2x)(2x^2-3x+4) &= 2x^2-3x+4-4x^3+6x^2-8x \\ &= -4x^3+8x^2-11x+4.\end{aligned}$$

(5) D. x^2+xy+y^2.

$$\begin{aligned}x^8-y^8 &= (x^4)^2-(y^4)^2 \\ &= (x^4+y^4)(x^4-y^4)\end{aligned}$$

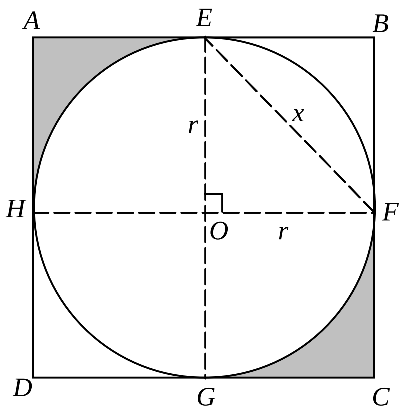
$$= (x^4 + y^4)\left[(x^2)^2 - (y^2)^2\right]$$
$$= (x^4 + y^4)(x^2 + y^2)(x^2 - y^2)$$
$$= (x^4 + y^4)(x^2 + y^2)(x + y)(x - y).$$

$\therefore$ $x^2 + xy + y^2$ is not a factor of $x^8 - y^8$.
$x^2 + xy + y^2$ 不是 $x^8 - y^8$ 的因式。

(6) B. $\dfrac{x-2}{x}$.

$$f(1-x) = \frac{-(1-x)-1}{1-(1-x)}$$
$$= \frac{-1+x-1}{1-1+x}$$
$$= \frac{x-2}{x}.$$

(7) C. $\left(\dfrac{4-\pi}{4}\right)x^2$.



Let r be the radius of the circle.
設圓的半徑爲 r。

In ΔOEF,
在 ΔOEF 中，

$$r^2 + r^2 = x^2$$
$$r^2 = \frac{x^2}{2}$$
$$r = \frac{x}{\sqrt{2}}.$$

$\therefore$ Shaded area (陰影面積) $= \dfrac{1}{2}\left[(2r)^2 - \pi r^2\right]$

$$= \frac{1}{2}(4-\pi)r^2$$
$$= \frac{1}{2}(4-\pi)\cdot\left(\frac{x}{\sqrt{2}}\right)^2$$
$$= \left(\frac{4-\pi}{4}\right)x^2.$$

(8) B. $\begin{cases} x = 1 \\ y = \dfrac{1}{2} \end{cases}$.

Let (設) $\begin{cases} \dfrac{1}{x} - \dfrac{2}{y} = -3 \quad \cdots\cdots (1) \\ \dfrac{4}{x} - \dfrac{6}{y} = -8 \quad \cdots\cdots (2) \end{cases}$.

$(1)\times 4$:

$$\frac{4}{x} - \frac{8}{y} = -12. \quad \cdots\cdots (3)$$

$(2)-(3)$:

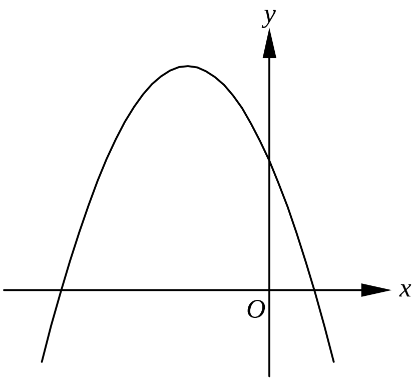
$$\begin{aligned} \left(\frac{4}{x} - \frac{6}{y}\right) - \left(\frac{4}{x} - \frac{8}{y}\right) &= -8 - (-12) \\ \frac{2}{y} &= 4 \\ y &= \frac{1}{2}. \end{aligned}$$

Put $y = \frac{1}{2}$ into (1),

把 $y = \frac{1}{2}$ 代入 (1)，

$$\begin{aligned} \frac{1}{x} - \frac{2}{\frac{1}{2}} &= -3 \\ \frac{1}{x} - 4 &= -3 \\ \frac{1}{x} &= 1 \\ x &= 1. \end{aligned}$$

(9) A.



As the y-intercept of the graph is 4, the answers (B) and (C) are not correct.
由於圖像的 y 軸截距爲 4，所以答案 (B) 及 (C) 不正確。

Furthermore, the equation of the line of symmetry is
再者，對稱軸方程爲

$$\begin{aligned} x &= -\frac{(-5)}{2(-2)} \\ &= -\frac{5}{4}. \end{aligned}$$

$\therefore$ (A) is the answer.

(10) D. $5x^2 - 54x + 128 \le 0$.

If $a \le x \le b$,
若 $a \le x \le b$，

$$\begin{aligned} -x^2 + 12x - 25 &\ge \frac{6x+3}{5} \\ -5x^2 + 60x - 125 &\ge 6x + 3 \\ 5x^2 - 54x + 128 &\le 0. \end{aligned}$$

(11) C. 73.

Let $T(n)$ be the number of dots in the nth pattern.
設第 n 個圖案的點數爲 $T(n)$。

$\therefore$ $T(1) = 1\times 2 + 1$, $T(2) = 2\times 3 + 1$, $T(3) = 3\times 4 + 1$.

$\therefore$

$$\begin{aligned} T(8) &= 8\times 9 + 1 \\ &= 73. \end{aligned}$$

(12) C. $1100.

Let $C be the cost of the article.
設該貨品的成本為 $C。

$$\begin{aligned}\text{Marked price (標價)} &= \$C(1+50\%)\\ &= \$1.5C\end{aligned}$$

and

$$\begin{aligned}\text{Selling price (售價)} &= \$1.5C(1-20\%)\\ &= \$1.2C\,.\end{aligned}$$

$$\therefore \quad \begin{aligned}1.2C - C &= 220\\ 0.2C &= 220\\ C &= 1100\,.\end{aligned}$$

∴ The cost of the article is $1100.
該貨品的成本為 $1100。

(13) C. $41566.

$$\begin{aligned}\text{Required interest (所求利息)} &= \$200000\left(1+\frac{15\%}{2}\right)^6 - \$200000\left(1+\frac{15\%}{2}\right)^4\\ &= \$41566\,.\end{aligned}$$

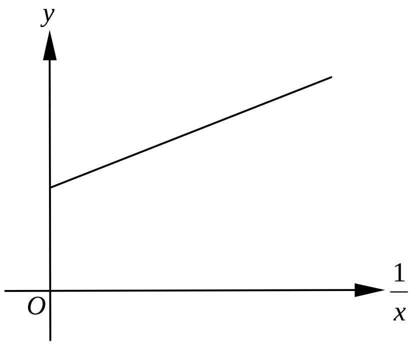
(14) D. $\dfrac{\sqrt{x+1}}{y^3 z}$.

$$\begin{aligned}z &= k\frac{\sqrt{x+1}}{y^3}\\ \frac{y^3 z}{\sqrt{x+1}} &= k\\ \frac{\sqrt{x+1}}{y^3 z} &= \frac{1}{k}\,.\end{aligned}$$

As k is a constant, $\dfrac{1}{k}$ is also a constant. Thus $\dfrac{\sqrt{x+1}}{y^3 z}$ is a constant.

由於 k 為常數，$\dfrac{1}{k}$ 亦為常數。所以 $\dfrac{\sqrt{x+1}}{y^3 z}$ 為常數。

(15) B.



$$
\begin{aligned}
y &= k_1 + \frac{k_2}{x} \\
&= k_1 + k_2\left(\frac{1}{x}\right).
\end{aligned}
$$

As y is a linear function of $\frac{1}{x}$, (B) is the answer.

由於 y 是 $\frac{1}{x}$ 的線性函數，(B) 是答案。

(16) D. $55000\ \text{m}^2$.

$$
\begin{aligned}
\text{Area of the field (土地面積)} &= 22\ \text{cm}^2 \\
&= \frac{22}{10000}\ \text{m}^2 \\
&= 0.0022\ \text{m}^2.
\end{aligned}
$$

$$
\therefore \quad \left(\frac{1}{5000}\right)^2 = \frac{0.0022\ \text{m}^2}{\text{Actual area (實際面積)}}
$$

$$
\text{Actual area (實際面積)} = 55000\ \text{m}^2
$$

(17) B. 0.036

$$
\begin{aligned}
3.604\% &= 3.604 \times \frac{1}{100} \\
&= 0.03604 \\
&= 0.036. \text{ (correct to 2 sig. fig.)}
\end{aligned}
$$

(18) B. 128 cm.

Let r cm be the measured radius of the sphere.
設該球體的量度半徑爲 r cm。

$$\frac{0.05}{r} = \frac{1}{2560}$$
$$r = 128.$$

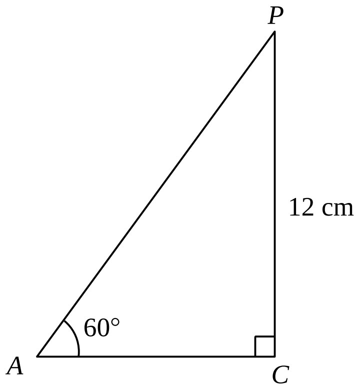
(19) C. $r : R = 3 : 2$.

$$\frac{\frac{1}{3}\pi r^2 \cdot r}{\frac{2}{3}\pi R^3} = \frac{27}{16}$$
$$\frac{r^3}{2R^3} = \frac{27}{16}$$
$$\left(\frac{r}{R}\right)^3 = \frac{27}{8}$$
$$\frac{r}{R} = \frac{3}{2}.$$

$\therefore\ r : R = 3 : 2$.

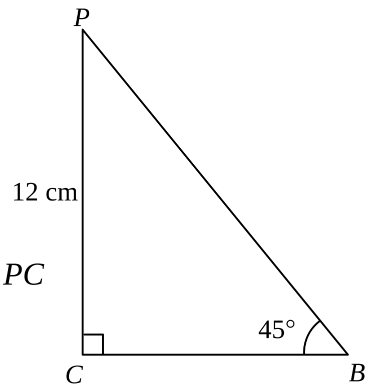
(20) A. $166\,\text{cm}^3$.

In ΔAPC,
在ΔAPC中，



$$\tan 60° = \frac{12}{AC}$$
$$\sqrt{3} = \frac{12}{AC}$$
$$AC = 4\sqrt{3}\text{ cm.}$$

In ΔPCB,
在ΔPCB中，



$$\tan 45° = \frac{12}{BC}$$
$$BC = 12\text{ cm.}$$

$\therefore$ Required volume (所求體積) $= \frac{1}{3} \times \text{Area of } \Delta ABC \times PC$

$$= \frac{1}{3} \times \frac{4\sqrt{3} \times 12}{2} \times 12$$
$$= 166\text{ cm}^3$$

(21) D. $\left(\dfrac{13}{4}, 7\right)$.

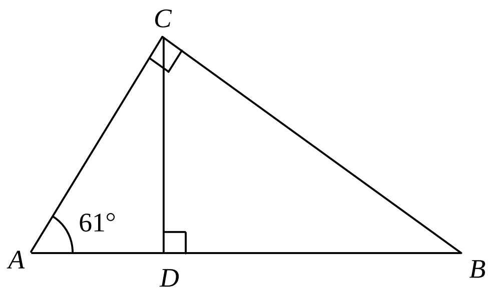
$$D = \left(\frac{0+2}{2}, \frac{2+11}{2}\right) = \left(1, \frac{13}{2}\right)$$

and

$$E = \left(\frac{2+9}{2}, \frac{11+4}{2}\right) = \left(\frac{11}{2}, \frac{15}{2}\right).$$

$\therefore$ Mid-point (中點) of $DE = \left(\dfrac{1+\frac{11}{2}}{2}, \dfrac{\frac{13}{2}+\frac{15}{2}}{2}\right) = \left(\dfrac{13}{4}, 7\right)$.

(22) A. $AB\cos 29^\circ \sin 29^\circ$.



Note that
留意到

$$\angle ACB = 29^\circ + 61^\circ = 90^\circ.$$

In ΔABC,
在ΔABC中，

$$\cos 61^\circ = \frac{AC}{AB}$$
$$AC = AB\cos 61^\circ.$$

In ΔACD,
在ΔACD中，

$$\begin{aligned} CD &= AC\sin 61^\circ \\ &= AB\cos 61^\circ \sin 61^\circ \\ &= AB\cos(90^\circ - 29^\circ)\sin(90^\circ - 29^\circ) \\ &= AB\cos 29^\circ \sin 29^\circ. \end{aligned}$$

(23) B. $\frac{1}{3}$.

$$\text{Maximum value (極大值)} = \frac{1}{3^{1+2(0)}} = \frac{1}{3}.$$

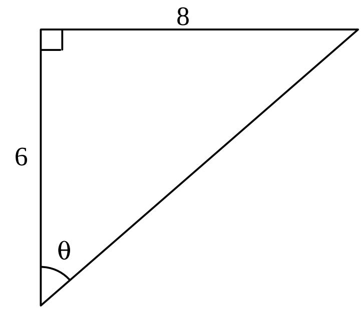
(24) B. I and II only.

In I, both triangles are equilateral triangles. Hence, they are similar.
在 I 中，兩個三角形皆爲等邊三角形，所以它們相似。

In II, the angles in both triangles are 40°, 65° and 75°. Hence, they are similar.
在 II 中，兩個三角形內的角皆爲 40°、65°及 75°，所以它們相似。

In III, the angles of the second triangles are 30°, 60° and 90°.
在 III 中，第二個三角形內的角爲 30°、60°及 90°。

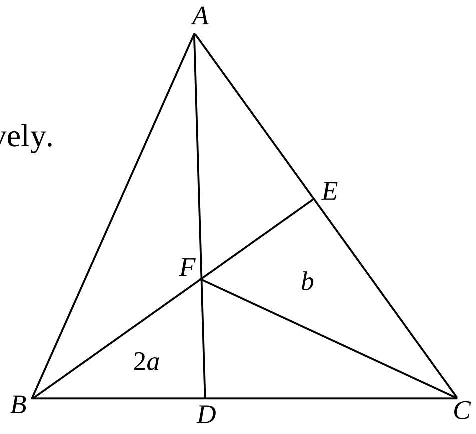
However, in the first triangle,
但在第一個三角形中，



$$\tan\theta = \frac{8}{6}$$
$$\theta = 53.13°.$$

Hence, they are not similar.
所以，它們並不相似。

(25) C. $\frac{3}{4}$.



Let the areas of ΔBDF and ΔFEC be $2a$ and b respectively.
設 ΔBDF 及 ΔFEC 的面積分別爲 $2a$ 及 b。

$\because BD : DC = 2 : 3$,

$\therefore$ Area of $\Delta DFC = 3a$.

$\because AE = EC$,

$$\text{Area of } \Delta AFE = b.$$

$\because BD : DC = 2 : 3$,

$$\begin{aligned}\frac{\text{Area of }\Delta ABD}{\text{Area of }\Delta ADC} &= \frac{2}{3}\\ \frac{2a+\text{Area of }\Delta AFB}{3a+2b} &= \frac{2}{3}\\ 6a+3(\text{Area of }\Delta AFB) &= 6a+4b\\ \text{Area of }\Delta AFB &= \frac{4b}{3}.\end{aligned}$$

$$\therefore \quad \frac{\text{Area of }\Delta AEF}{\text{Area of }\Delta AFB} = \frac{b}{\frac{4b}{3}} = \frac{3}{4}.$$

(26) C. 135°.

$$\text{Interior angle (內角)} = \frac{(8-2)\times 180^\circ}{8} = 135^\circ.$$

$$\therefore \quad \angle DCE = \frac{180^\circ - 135^\circ}{2} = 22.5^\circ. \qquad (\angle \text{ sum of } \Delta)\ (\Delta \text{ 內角和})$$

By symmetry (對稱性), $\angle CDB = 22.5^\circ$.

In ΔCPD,
在ΔCPD中，

$$\begin{aligned} x + 22.5^\circ + 22.5^\circ &= 180^\circ \qquad (\angle \text{ sum of } \Delta)\ (\Delta \text{ 內角和})\\ x &= 135^\circ.\end{aligned}$$

(27) D. $k > 6$.

$$\begin{aligned}(-12)^2 - 4(k)(6) &< 0\\ 144 - 24k &< 0\\ 24k &> 144\\ k &> 6.\end{aligned}$$

(28) A. $\frac{1}{4}x - \frac{1}{3}y + 2 = 0$.

Slope (斜率) of $4x + 3y + 2 = 0$ is $-\frac{4}{3}$.

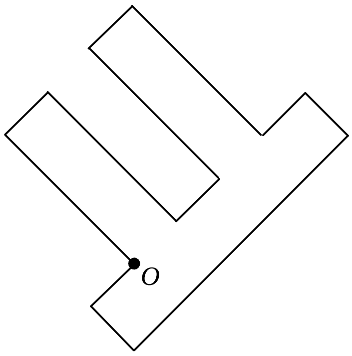
Slope (斜率) of $\frac{1}{4}x-\frac{1}{3}y+2=0$ is $-\frac{\frac{1}{4}}{\left(-\frac{1}{3}\right)}=\frac{3}{4}$.

$\because \left(-\frac{4}{3}\right)\left(\frac{3}{4}\right)=-1$,

the line $\frac{1}{4}x-\frac{1}{3}y+2=0$ is perpendicular to the line $4x+3y+2=0$.

直線$\frac{1}{4}x-\frac{1}{3}y+2=0$垂直於直線$4x+3y+2=0$ 。

(29) C.



(30) A. I only.

(31) D. $(5, 300°)$.

(32) D. $2\sqrt{3}$.

Let (設) $AB=k$ and $BC=\sqrt{3}k$.

$$\begin{aligned} k^2+\left(\sqrt{3}k\right)^2 &= 4^2 \\ 4k^2 &= 16 \\ k^2 &= 4 \\ k &= 2. \end{aligned}$$

$\therefore$

$$\begin{aligned} \text{Area of } \Delta ABC &= \frac{AB\times BC}{2} \\ &= \frac{k\times\sqrt{3}k}{2} \\ &= \frac{2\times 2\sqrt{3}}{2} \end{aligned}$$

$$= 2\sqrt{3}.$$

(33) C. 20.9.

In ΔABC,
在ΔABC中，

$$AB = \sqrt{17^2 - 15^2}$$
$$= 8.$$

Consider the area of ΔABC,
考慮ΔABC的面積，

$$\frac{8 \times 15}{2} = \frac{17 \times BE}{2}$$
$$BE = \frac{120}{17}.$$

$\therefore$ Shaded area (陰影面積) $= \dfrac{8 \times 15}{2} - \dfrac{\pi\left(\frac{120}{17}\right)^2}{4}$
$= 20.9.$

(34) C. $\dfrac{7}{18}$.

(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

$\therefore$ Required probability (所求概率) $= \dfrac{14}{36}$
$= \dfrac{7}{18}.$

(35) B. III only.

Mean of the first group (第一組的平均) $= \dfrac{(x+1)+(x+3)+(x+5)+(x+7)+(x+9)}{5}$
$= x + 5$

and

$$\text{Mean of the second group (第二組的平均)} = \frac{(x+2)+(x+4)+(x+6)+(x+8)+(x+10)}{5} = x+6.$$

$\therefore$ I is not true.

$$\text{Median of the first group (第一組的中位數)} = x+5$$

and

$$\text{Median of the second group (第二組的中位數)} = x+6.$$

$\therefore$ II is not true.

$$\begin{aligned}\text{Range of the first group (第一組的分佈域)} &= (x+9)-(x+1)\\ &= 8\end{aligned}$$

and

$$\begin{aligned}\text{Range of the second group (第二組的分佈域)} &= (x+10)-(x+2)\\ &= 8\end{aligned}$$

$\therefore$ III is true.

(36) B. III only.

Clearly, the mode and median will remain unchanged.
明顯地，眾數及中位數維持不變。

As the lower quartile of the distribution increases and the upper quartile remains unchanged, the inter-quartile range will change.
由於下四分位數增加，而上四分位數維持不變，所以四分位數間距會改變。

(37) A. $x < -9$.

$$\begin{aligned}\frac{x}{4} < 1 \quad &\text{and (及)} \quad -x-7 > 2\\ x < 4 \quad &\text{and (及)} \quad x < -9.\end{aligned}$$

$\therefore\ x < -9$.

(38) C. $m+2n-1$.

$$\begin{aligned}\log 1.8 &= \log\frac{18}{10}\\ &= \log 18 - \log 10\\ &= \log(3^2 \times 2) - 1\end{aligned}$$

$$= 2\log 3 + \log 2 - 1$$
$$= m + 2n - 1.$$

(39) B. 2.

Let (設) $h(x) = 4f(x) - g(x)$.

$$\begin{aligned} h(x) &= 4(2x^2 + 3x + k) - (5x^2 + 4kx + 6) \\ &= 3x^2 + (12 - 4k)x + (4k - 6). \end{aligned}$$

$$\therefore \quad \begin{aligned} h(-2) &= 3k \\ 3(-2)^2 + (12 - 4k)(-2) + (4k - 6) &= 3k \\ k &= 2. \end{aligned}$$

(40) A. -58.

Let $T(n)$ be the nth term of the sequence and $S(n)$ be the sum of the first n terms of the sequence.
設數列的第 n 項爲 $T(n)$ 而首 n 項的和爲 $S(n)$。

$\therefore\ S(n) = n - 5n^2$.

$$\begin{aligned} T(2) + T(5) &= [S(2) - S(1)] + [S(5) - S(4)] \\ &= \{[2 - 5(2)^2] - [1 - 5(1)^2]\} + \{[5 - 5(5)^2] - [4 - 5(4)^2]\} \\ &= -58. \end{aligned}$$

(41) D. $-\frac{36}{65}$.

$$\begin{aligned} \frac{1}{1 - (-x^2)} &= \frac{9}{13} \\ 9(1 + x^2) &= 13 \\ x^2 &= \frac{4}{9}. \end{aligned}$$

$$\therefore \quad \begin{aligned} \text{Required sum (所求的和)} &= (-x^2) + (-x^6) + \cdots \\ &= \frac{-x^2}{1 - x^4} \\ &= \frac{-\frac{4}{9}}{1 - \left(\frac{4}{9}\right)^2} \end{aligned}$$

$$= -\frac{36}{65}.$$

(42) A. $\dfrac{\sin 75°}{\sin 40°}$.

In ΔACD,
在ΔACD中，

$$\begin{aligned}\frac{CD}{\sin 75°} &= \frac{AD}{\sin \angle ACD}\\ DA &= \frac{CD\sin \angle ACD}{\sin 75°}.\end{aligned}$$

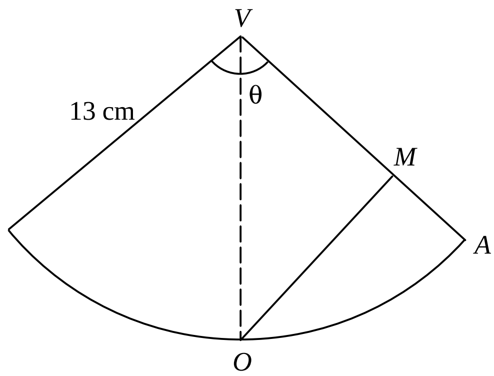
In ΔBCD,
在ΔBCD中，

$$\begin{aligned}\frac{CD}{\sin 40°} &= \frac{BD}{\sin \angle BCD}\\ BD &= \frac{CD\sin \angle BCD}{\sin 40°}.\end{aligned}$$

$\therefore$

$$\begin{aligned}\frac{BD}{DA} &= \frac{\dfrac{CD\sin \angle BCD}{\sin 40°}}{\dfrac{CD\sin \angle ACD}{\sin 75°}}\\ &= \frac{\sin 75°}{\sin 40°}.\end{aligned}$$

(43) B. 12.6.



$$\begin{aligned}VA &= \sqrt{12^2 + 5^2}\\ &= 13\text{ cm.}\end{aligned}$$

$\therefore$

$$\begin{aligned}2\pi(13)\times\frac{\theta}{360°} &= 2\pi(5)\\ \theta &= 138.46°.\end{aligned}$$

In ΔVOM ,
在ΔVOM 中，

$$\begin{aligned}OM &= \sqrt{13^2 + \left(13\times\frac{3}{5}\right)^2 - 2(13)\left(13\times\frac{3}{5}\right)\cos\left(\frac{138.46°}{2}\right)}\\ &= 12.6\text{ cm.}\end{aligned}$$

$\therefore$ The minimum distance is 12.6 cm.
最短距離爲 12.6 cm。

(44) D. $\begin{cases} x \le 2y \\ x + y \le 6 \\ x \ge 0 \end{cases}$.

(45) C. I and III only.

$$\begin{aligned} \angle ACE &= \angle BDE && (\angle\text{s in the same segment}) && (\text{同弓形內的圓周角}) \\ \angle AEC &= \angle BED. && (\text{vert. opp. } \angle\text{s}) && (\text{對頂角}) \\ AE &= BE && (\text{given}) && (\text{已給}) \\ \therefore \Delta ACE &\cong \Delta BDE. && (\text{SAA}) \end{aligned}$$

$$\begin{aligned} \therefore BC &= BE + EC \\ &= AE + DE && (\text{corr. sides, } \cong\Delta\text{s}) && (\text{全等 } \Delta \text{ 對應邊}) \\ &= AD. \end{aligned}$$

$\therefore$ I is true.

II is not true in general.
一般地說，II 並不正確。

$$\begin{aligned} \angle DAB &= \angle CBA && (\text{base } \angle\text{s, isos. } \Delta) && (\text{等腰 } \Delta \text{ 底角}) \\ &= \angle CDA. && (\angle\text{s in the same segment}) && (\text{同弓形內的圓周角}) \end{aligned}$$

$\therefore$ AB // CD. (alt. $\angle$s equal) (錯角相等)

$\therefore$ III is true.

(46) C. 3.

Let (設) $\begin{cases} y = \sin^2 x \quad \cdots\cdots (1) \\ y = \sin x \quad \cdots\cdots (2) \end{cases}$.

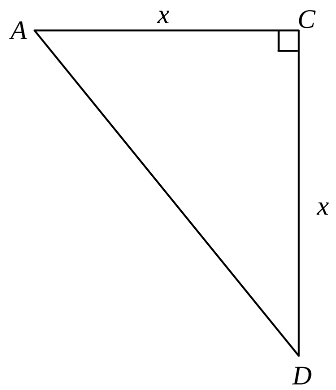
Put (1) into (2),
把 (1) 代入 (2)，

$$\begin{aligned} \sin^2 x &= \sin x \\ \sin x \cdot (\sin x - 1) &= 0 \\ \sin x = 0 \quad &\text{or (或)} \quad \sin x = 1 \\ x = 0^\circ, 180^\circ \quad &\text{or (或)} \quad x = 90^\circ. \end{aligned}$$

$\therefore$ There are 3 points of intersection.
有 3 個交點。

(47) A. $\dfrac{\sqrt{10}}{4}$.

Let (設) $AB = BC = AC = AE = x$.



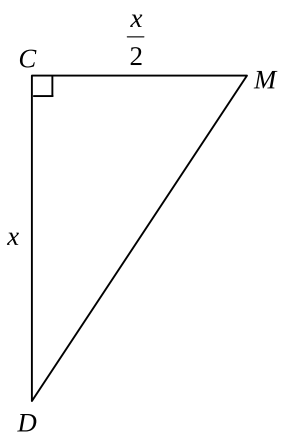
Let M be the mid-point of BC.
設 BC 的中點為 M。

$\therefore\ \theta = \angle ADM$.

In ΔACD,
在 ΔACD 中，

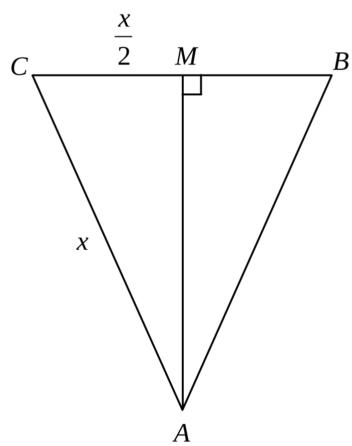
$$\begin{aligned} AD &= \sqrt{x^2 + x^2} \\ &= \sqrt{2}x. \end{aligned}$$

In ΔDCM,
在 ΔDCM 中，



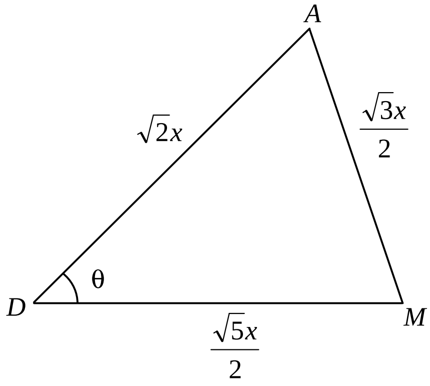
$$\begin{aligned} DM &= \sqrt{x^2 + \left(\frac{x}{2}\right)^2} \\ &= \sqrt{\frac{5x^2}{4}} \\ &= \frac{\sqrt{5}x}{2}. \end{aligned}$$

In ΔACM,
在 ΔACM 中，



$$\begin{aligned} AM &= \sqrt{x^2 - \left(\frac{x}{2}\right)^2} \\ &= \sqrt{\frac{3x^2}{4}} \\ &= \frac{\sqrt{3}x}{2}. \end{aligned}$$

In ΔADM ,
在ΔADM 中，



$$\begin{aligned}\left(\frac{\sqrt{3}x}{2}\right)^2 &= \left(\sqrt{2}x\right)^2 + \left(\frac{\sqrt{5}x}{2}\right)^2 - 2\left(\sqrt{2}x\right)\left(\frac{\sqrt{5}x}{2}\right)\cos\theta \\ \frac{3x^2}{4} &= 2x^2 + \frac{5x^2}{4} - \sqrt{10}x^2\cos\theta \\ -\sqrt{10}x^2\cos\theta &= -\frac{5x^2}{2} \\ \cos\theta &= \frac{5}{2\sqrt{10}}.\end{aligned}$$

∴

$$\begin{aligned}\cos\theta &= \frac{5}{2\sqrt{10}}\cdot\frac{\sqrt{10}}{\sqrt{10}} \\ &= \frac{5\sqrt{10}}{20} \\ &= \frac{\sqrt{10}}{4}.\end{aligned}$$

(48) B. II only.

$$\begin{aligned}\text{Centre (圓心)} &= \left(-\frac{6}{2}, -\frac{(-4)}{2}\right) \\ &= (-3, 2)\end{aligned}$$

and

$$\begin{aligned}\text{Radius (半徑)} &= \sqrt{(-3)^2 + 2^2} \\ &= \sqrt{13}.\end{aligned}$$

∴ I is not true.

Let d be the distance between $(0, 3)$ and the centre of C.
設$(0, 3)$與 C 的圓心的距離爲 d。

$$\begin{aligned}d &= \sqrt{(-3-0)^2 + (2-3)^2} \\ &= \sqrt{10} \\ &< \sqrt{13} \\ &= \text{Radius (半徑) of } C.\end{aligned}$$

∴ II is true.

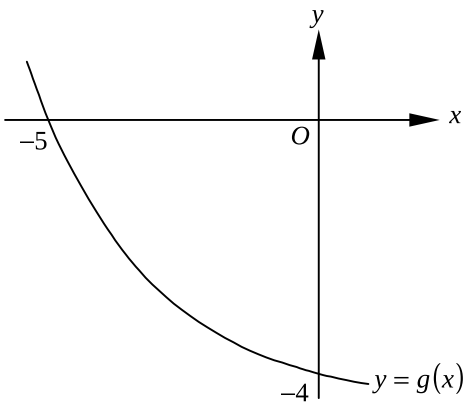
Put $y=0$ into C,
把 $y=0$ 代入 C，

$$\begin{aligned} x^2+6x &= 0 \\ x(x+6) &= 0 \\ x=0 \text{ or (或) } x &= -6. \end{aligned}$$

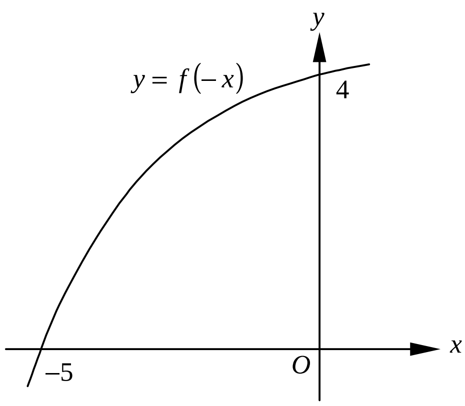
∴ C cuts the x-axis at two distinct points.
C 與 x 軸相交於兩相異點。

∴ III is not true.

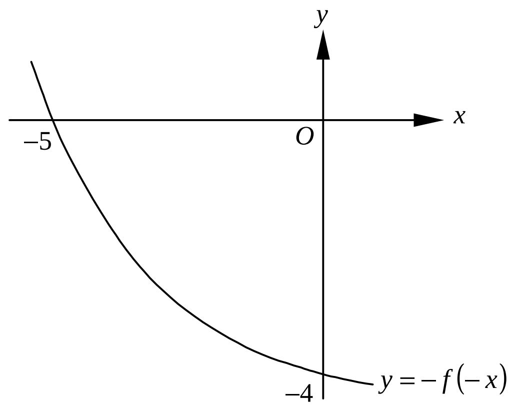
(49) C.



The graph of $y=f(-x)$:
$y=f(-x)$的圖像：



The graph of $y = -f(-x)$:
$y = -f(-x)$的圖像：



(50) C. $a = 2$ and $b = 1$.

When (當) $x = 0°$, $y = 2$,

$$\begin{aligned} 2 &= a\sin 30° + b \\ 2 &= a\left(\frac{1}{2}\right) + b \\ a + 2b &= 4 . \quad \cdots\cdots \quad (1) \end{aligned}$$

When (當) $x = 90°$, $y = 0$,

$$\begin{aligned} 0 &= a\sin[2(90°) + 30°] + b \\ 0 &= a\left(-\frac{1}{2}\right) + b \\ a - 2b &= 0 . \quad \cdots\cdots \quad (2) \end{aligned}$$

$(1) + (2)$:

$$\begin{aligned} 2a &= 4 \\ a &= 2 . \end{aligned}$$

Put $a = 2$ into (2),
把 $a = 2$ 代入 (2)，

$$\begin{aligned} 2 - 2b &= 0 \\ b &= 1 . \end{aligned}$$

(51) C. II and III only.

From the graph,
從圖中，

$$a > 1,\ 0 < b < 1 \text{ and } c = 1.$$

$\therefore$ II and III are true.

(52) C. $\quad D00080F010_{16}$.

(53) C. $\quad \dfrac{24}{49}$.

Required probability (所求概率) $= P(\text{First question correct} \mid \text{at most two questions correct})$

$$= \frac{P(\text{First question correct and at most two questions correct})}{P(\text{at most two questions correct})}$$

$$= \frac{\left(\frac{3}{5}\right)\left(1-\frac{3}{5}\right)\left(1-\frac{3}{5}\right)+\left(\frac{3}{5}\right)\left(\frac{3}{5}\right)\left(1-\frac{3}{5}\right)+\left(\frac{3}{5}\right)\left(1-\frac{3}{5}\right)\left(\frac{3}{5}\right)}{1-\left(\frac{3}{5}\right)\left(\frac{3}{5}\right)\left(\frac{3}{5}\right)}$$

$$= \frac{24}{49}.$$

(54) B.