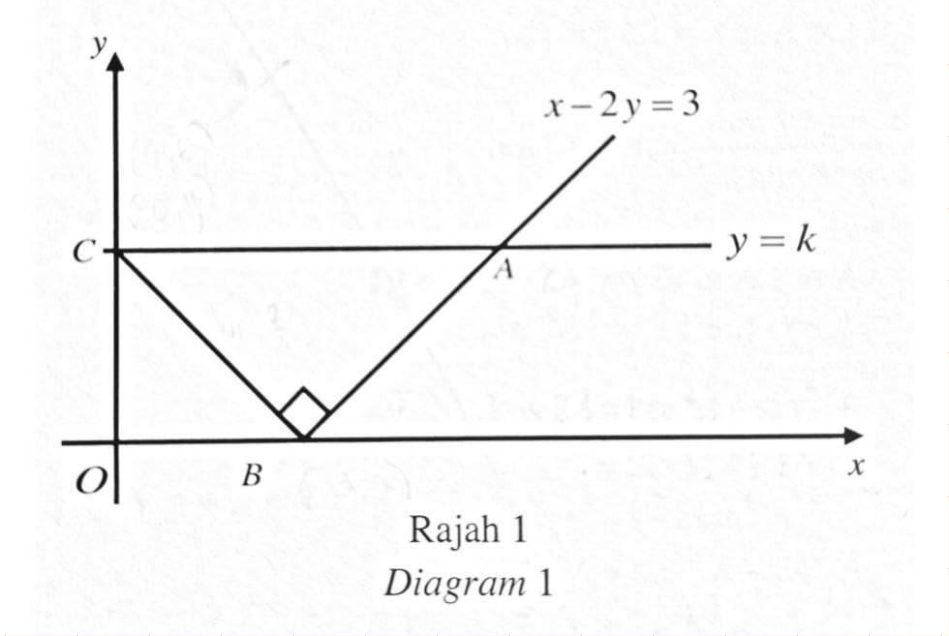
TRIAL SBP
ADDMATH PAPER 2

SOALAN 1

Rajah 1 menunjukkan garis lurus x-2y = 3 menyilang garis lurus y=k di A dan paksi-x di B. Titik C berada pada paksi-y dan <ABC= 90°.

Cari,

a) Nilai K, (3m)
b) Koordinat bagi titik A, (1m)
c) Luas segitiga ABC (2m)



Rajah 1
Diagram 1

a) Nilai k (3m)

① Cari kecerunan

$x - 2y = 3$

$2y = x - 3$

$y = \frac{x}{2} - \frac{3}{2}$

Kecerunan BA $m_1 = \frac{1}{2}$

Pintasan-y

② cari koordinat B

$\frac{-\text{pintasan } y}{\text{pintasan } x} = m$

$\frac{-\left(-\frac{3}{2}\right)}{x} = \frac{1}{2}$

$x = 3$

∴ koordinat B $= (3, 0)$

③ cari koordinat C

$m_1 \times m_2 = -1$

$\frac{1}{2} \times m_2 = -1$

$m_2 = -2$

90°

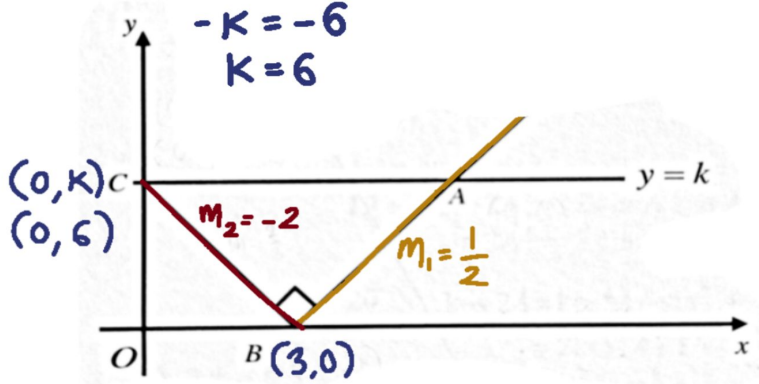
berserenjang

Kecerunan BC

$\frac{-k}{3} = -2$

$-k = -6$

$k = 6$



b) koordinat bagi titik A (1m)

Persamaan Linear Serentak

$x - 2y = 3 \ldots ①$ $A = (x, 6)$

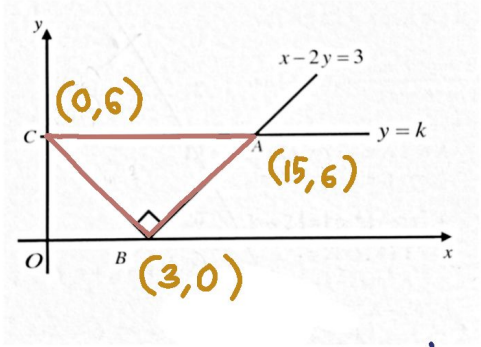
$y = 6 \ldots ②$

$x - 2(6) = 3$

$x - 12 = 3$ Koordinat

$x = 15$ $A = (15, 6)$

c) luas segitiga ABC (2m)



$$\text{luas } \Delta = \frac{1}{2}\left| \begin{matrix} 15 & 3 & 0 & 15 \\ 6 & 0 & 6 & 6 \end{matrix} \right|$$

$$= \frac{1}{2}\left|[18] - [18 + 90]\right|$$

$$= \frac{1}{2}\left|18 - 108\right|$$

$$= \frac{1}{2}\left|-90\right|$$

$$= 45 \text{ unit}^2$$

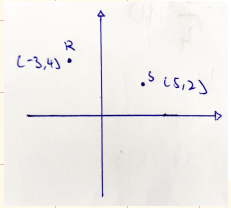
SOALAN 2

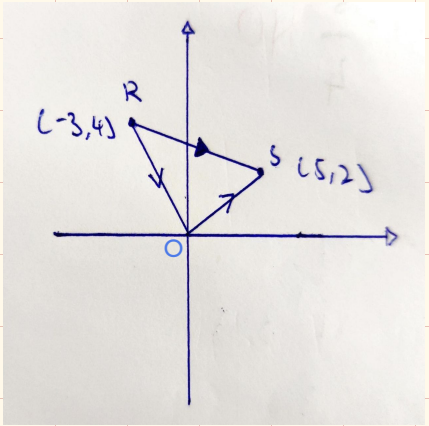
Cari

a) Nilai bagi h dan k

2 Diberi bahawa $\underset{\sim}{u} = \underset{\sim}{i} + 5\underset{\sim}{j}$ dan $\underset{\sim}{v} = 2\underset{\sim}{i} - 4\underset{\sim}{j}$. Koordinat bagi titik-titik R dan S masing-masing ialah $(-3,4)$ dan $(5,2)$. Diberi bahawa $\overrightarrow{RS} = h\underset{\sim}{u} + k\underset{\sim}{v}$, di mana h dan k ialah pemalar.

Given that $\underset{\sim}{u} = \underset{\sim}{i} + 5\underset{\sim}{j}$ *and* $\underset{\sim}{v} = 2\underset{\sim}{i} - 4\underset{\sim}{j}$. *The coordinates of the points R and S are* $(-3,4)$ *and* $(5,2)$ *respectively. Given that* $\overrightarrow{RS} = h\underset{\sim}{u} + k\underset{\sim}{v}$, *where* h *and* k *are constants.*





$\overrightarrow{OR} = -3\underset{\sim}{i} + 4\underset{\sim}{j}$

$\overrightarrow{OS} = 5\underset{\sim}{i} + 2\underset{\sim}{j}$

$\underset{\sim}{u} = \underset{\sim}{i} + 5\underset{\sim}{j}$

$\underset{\sim}{v} = 2\underset{\sim}{i} - 4\underset{\sim}{j}$

$\overrightarrow{RS} = h\underset{\sim}{u} + k\underset{\sim}{v}$

$\overrightarrow{RS} = \overrightarrow{RO} + \overrightarrow{OS}$

$= -(-3\underset{\sim}{i} + 4\underset{\sim}{j}) + (5\underset{\sim}{i} + 2\underset{\sim}{j})$

① $\overrightarrow{RS} = 8\underset{\sim}{i} - 2\underset{\sim}{j}$

$\overrightarrow{RS} = h(\underset{\sim}{i} + 5\underset{\sim}{j}) + k(2\underset{\sim}{i} - 4\underset{\sim}{j})$

$= h\underset{\sim}{i} + 5h\underset{\sim}{j} + 2k\underset{\sim}{i} - 4k\underset{\sim}{j}$

② $\overrightarrow{RS} = (h + 2k)\underset{\sim}{i} + (5h - 4k)\underset{\sim}{j}$

$h + 2k = 8$

$5h - 4k = -2$

$2h + 4k = 16$

$5h - 4k = -2$

$7h = 14$

$h = 2$

$8 = 2k + (2)$

$2k = 6$

$k = 3$

b) Vektor unit pada arah $\overrightarrow{RS}$

$$\hat{\underset{\sim}{r}} = \frac{x\,\underset{\sim}{i} + y\,\underset{\sim}{j}}{\sqrt{x^2 + y^2}}$$

$$\overrightarrow{RS} = 8\,\underset{\sim}{i} - 2\,\underset{\sim}{j}$$

$$\hat{\underset{\sim}{r}} = \frac{8\,\underset{\sim}{i} - 2\,\underset{\sim}{j}}{\sqrt{8^2 + (-2)^2}}$$

$$= \frac{8\,\underset{\sim}{i} - 2\,\underset{\sim}{j}}{\sqrt{68}}$$

$$= \frac{4\,\underset{\sim}{i} - \underset{\sim}{j}}{\sqrt{17}}$$

SOALAN 3

Diberi persamaan suatu lengkung ialah $y = \frac{x^2}{1-x}$ dan lengkung itu melalui titik $Q\left(-1;\frac{1}{2}\right)$.

It is given that the equation of a curve is $y = \frac{x^2}{1-x}$ *and the curve passes through point* $Q\left(-1,\frac{1}{2}\right)$

Cari
Find

(*a*) kecerunan lengkung pada titik Q, [4 *markah*]
the gradient of the curve at point Q, [4 *marks*]

(*b*) persamaan garis tangen kepada lengkung pada titik Q. [2 *markah*]
the equation of the tangent to the curve at point Q. [2 *marks*]

a) $u = x^2$ $\quad v = 1 - x$

$u' = 2x$ $\quad v' = -1$

$$\frac{dy}{dx} = \frac{vu' - uv'}{v^2}$$

$$= \frac{(1-x)(2x) - x^2(-1)}{(1-x)^2}$$

$$= \frac{(1-(-1))(2(-1)) - (-1)^2(-1)}{(1-(-1))^2}$$

$$= -\frac{3}{4}$$

b) $m_1 = m_2$ $\quad y = mx + c$ $\quad Q = (-1, \frac{1}{2})$

$$y = -\frac{3}{4}x + c$$

$$\frac{1}{2} = -\frac{3}{4}(-1) + c$$

$$c = -\frac{1}{4} \qquad y = -\frac{3}{4}x - \frac{1}{4}$$

SOALAN 4

4 Puan Melisa gemar bersarapan di Retro Coffee bersama keluarga dan rakan-rakannya. Pada hari Isnin, Puan Melisa bersama suaminya membayar RM25.20 bagi 2 cawan kopi, sebiji donut berserta tip. Pada hari berikutnya, dia bersama rakan-rakannya membayar RM55 bagi 4 cawan kopi, 5 biji donut berserta tip. Pada hujung minggu, dia berkunjung ke restoran tersebut bersama keluarganya dan membelanjakan sebanyak RM66.70 untuk 5 cawan kopi, 6 biji donut berserta tip. Jika dia memberi tip yang sama banyak setiap kali mengunjungi restoran itu, tentukan harga bagi secawan kopi dan sebiji donut serta tip yang diberi oleh Puan Melisa.

Puan Melisa loves to have breakfast at Retro Coffee with her family and friends. On Monday, Puan Melisa and her husband paid RM25.20 *for* 2 *cups of coffee, a doughnut and a tip. On the next day, she and her friends paid* RM55 *for* 4 *cups of coffee,* 5 *doughnuts and a tip. On the weekend, she visited the restaurant with her family and spent* RM66.70 *for* 5 *cups of coffee,* 6 *doughnuts and a tip. If she always gives the same amount of tips every time she visits the restaurant, determine the price for a cup of coffee, a doughnut and a tip.*

Jawapan

Anggap,

kopi = x

donut = y

tip = z

$2x + y + z = 25.20$

$4x + 5y + z = 55$

$5x + 6y + z = 66.70$

$2x + y + z = 25.20$ (−)

$4x + 5y + z = 55$

$-2x - 4y = -29.8$

$2x + y + z = 25.20$ (−)

$5x + 6y + z = 66.70$

$-3x - 5y = -41.5$

$2x + 4y = 29.8$

$3x + 5y = 41.5$

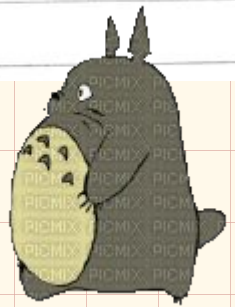
$x = \frac{29.8 - 4y}{2}$

$3\left(\frac{29.8 - 4y}{2}\right) + 5y = 41.5$

$89.4 - 12y + 10y = 83$

$-2y = -6.4$

$y = 3.20$



$2x + 4y = 29.8$

$2x + 4(3.20) = 29.8$

$2x = 17$

$x = 8.50$

$2x + y + z = 25.20$

$2(8.5) + (3.2) + z = 25.20$

$17 + 3.2 + z = 25.20$

$z = 5$

Harga kopi, x = RM 8.50

Harga donut, y = RM 3.20

Tip, z = RM 5.00

Seterusnya, jika Puan Melisa memperuntukkan RM100, tentukan bilangan maksimum set yang boleh dibeli olehnya jika setiap set terdiri daripada secawan kopi dan sebiji donut.

Hence, if Puan Melisa allocates RM100, *determine the maximum number of sets can be purchased if each set consists of a cup of coffee and a doughnut.*

[8 *markah*]

[8 *marks*]

1 set = 1 kopi + 1 donut

= 8.50 + 3.20

= 11.70

Duit yang ada = RM 100

$\frac{100}{11.70} = 8.547$

≈ 8 set

SOALAN 5a)

5a) Diberi a ialah sebutan pertama dan r ialah sebutan sepunya bagi suatu janjang geometri, tunjukkan bahawa hasil tambah n sebutan pertama bagi janjang itu ialah...

Menerbitkan rumus hasil tambah *n* sebutan pertama, S_n bagi janjang geometri

Pertimbangkan suatu janjang geometri dengan sebutan-sebutan berikut:

$$a, ar, ar^2, ar^3, \ldots, ar^{n-2}, ar^{n-1}$$

Katakan hasil tambah n sebutan pertama ialah S_n.

Maka, $S_n = a + ar + ar^2 + ar^3 + \ldots + ar^{n-2} + ar^{n-1}$ ... ①

① × r: $rS_n = ar + ar^2 + ar^3 + ar^4 + \ldots + ar^{n-1} + ar^n$ ... ②

A ① − ②:

$$\begin{aligned} S_n &= a + ar + ar^2 + ar^3 + \ldots + ar^{n-2} + ar^{n-1} \\ -rS_n &= ar + ar^2 + ar^3 + ar^4 + \ldots + ar^{n-1} + ar^n \end{aligned}$$

$$S_n - rS_n = a - ar^n$$

← Semua sebutan di tengah-tengah antara a dan ar^n dihapuskan

$$S_n(1-r) = a(1-r^n)$$

$$S_n = \frac{a(1-r^n)}{1-r}, \quad r \neq 1$$

← Biasanya digunakan apabila $|r| < 1$

B Jika ② − ①: $rS_n - S_n = ar^n - a$

$$S_n(r-1) = a(r^n - 1)$$

$$S_n = \frac{a(r^n-1)}{r-1}, \quad r \neq 1$$

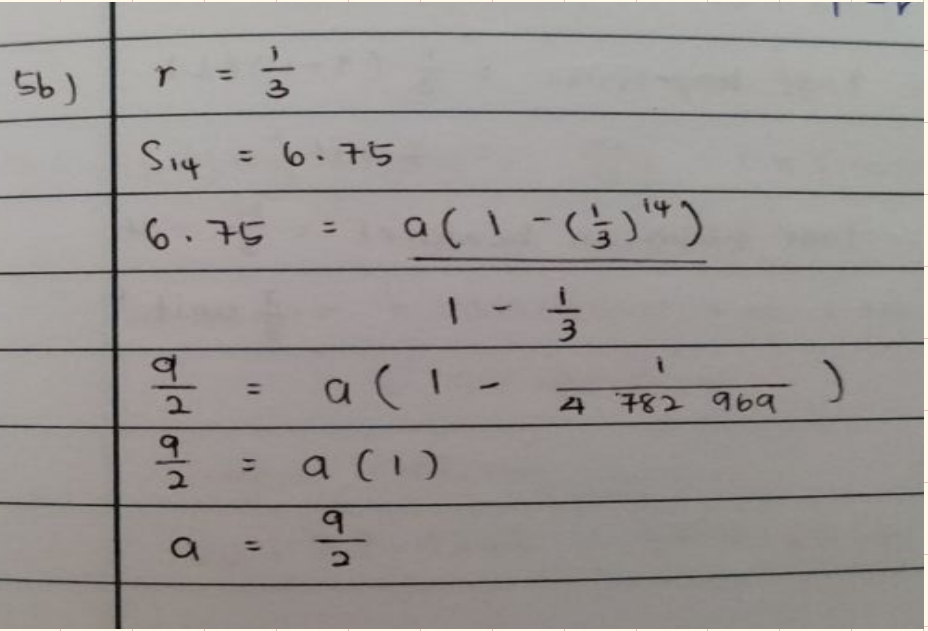
← Biasanya digunakan apabila $|r| > 1$

TIP PINTAR

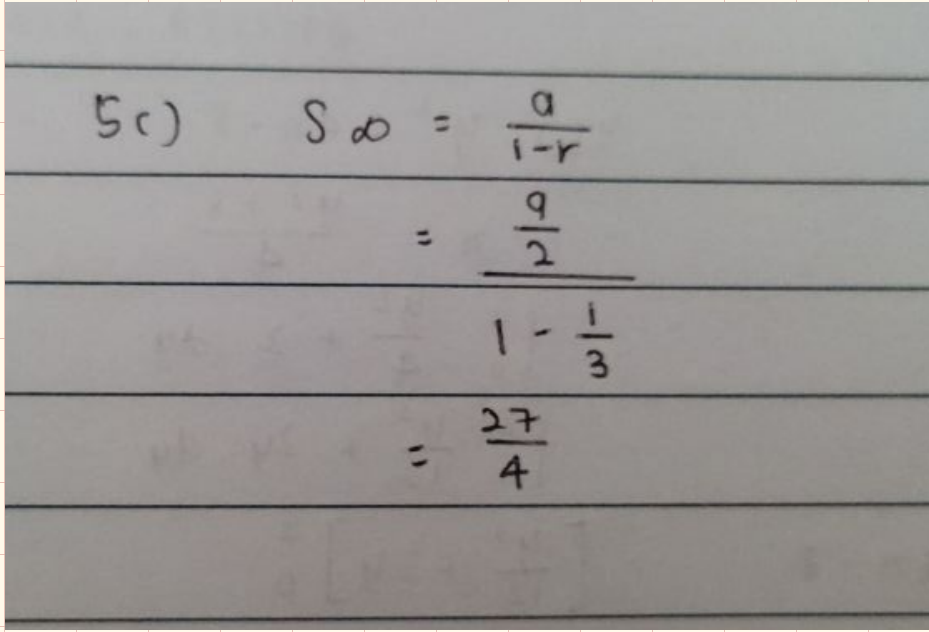
- $|r| < 1$ boleh ditulis sebagai $-1 < r < 1$.
- $|r| > 1$ boleh ditulis sebagai $r < -1$ dan $r > 1$.

SOALAN 5b) & 5c)

5b) Diberi nisbah sepunya bagi suatu janjang geometri ialah ⅓ dan S14 pertama ialah 6.75. Cari sebutan pertama janjang tersebut.



5c) Seterusnya, cari hasil tambah ketakterhinggaan bagi janjang tersebut



SOALAN 6(a)

6. (a) $(\text{kosek}^2 x) - 2\text{kos}^2 x - \text{kot}^2 x = -\text{kos}2x$

↳ $\text{kosek}^2 x = 1 + \text{kot}^2 x$

$= 1 + \text{kot}^2 x - 2\text{kos}^2 x - \text{kot}^2 x$

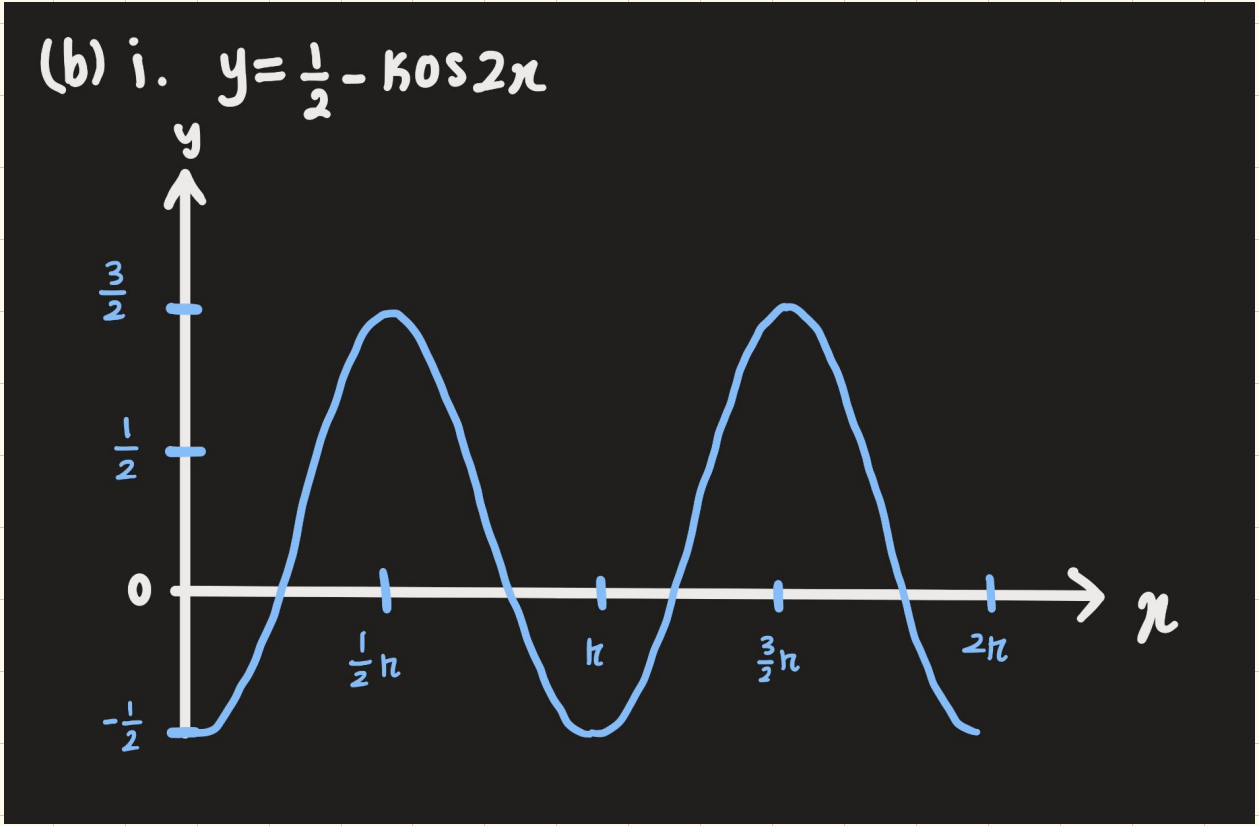
$= [1 - 2\text{kos}^2 x]$

↳ $\cos 2x = 2\cos^2 x - 1$

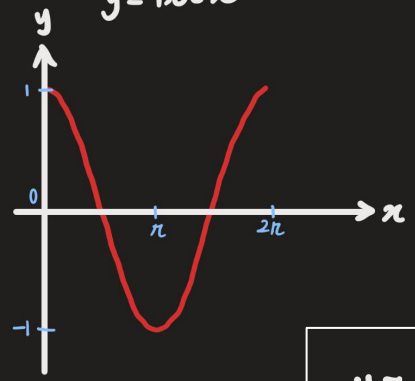
$-\cos 2x = 1 - 2\cos^2 x$

$= -\text{kos}2x$

SOALAN 6(b)i.

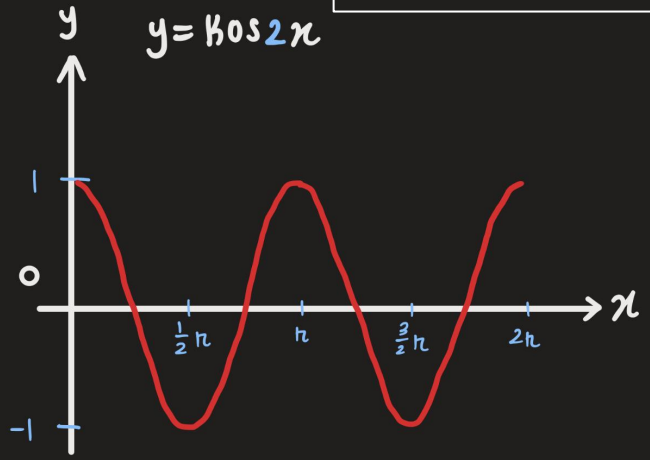

(b) i. $y = \frac{1}{2} - \cos 2x$
y
$\frac{3}{2}$
$\frac{1}{2}$
0
$-\frac{1}{2}$
$\frac{1}{2}\pi$
π
$\frac{3}{2}\pi$
2π
x

① $y = \cos x$

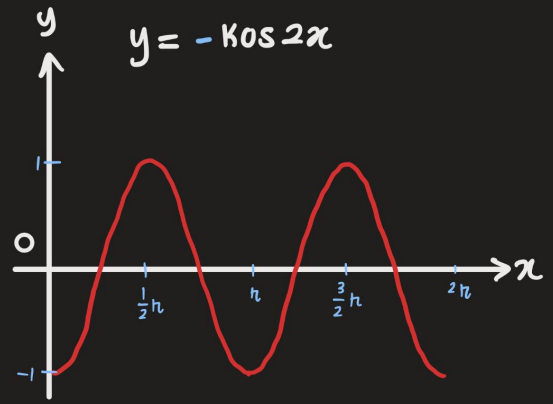


$$y = \frac{1}{2} - \cos 2x$$

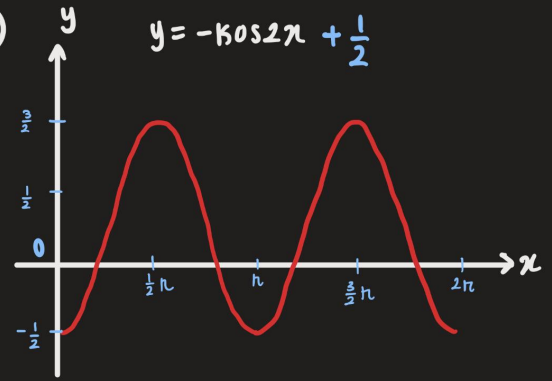
② $y = \cos 2x$



③ $y = -\cos 2x$



④ $y = -\cos 2x + \frac{1}{2}$



SOALAN 6(b)ii.

ii. $2(\text{kosek}^2 x - 2\text{kos}^2 x - \text{kot}^2 x) = -\frac{x}{\pi} + 1$

↳ $= -\text{kos}2x$

$2[-\text{kos}2x] = -\frac{x}{\pi} + 1$

↳ $-\text{kos}2x = y - \frac{1}{2}$

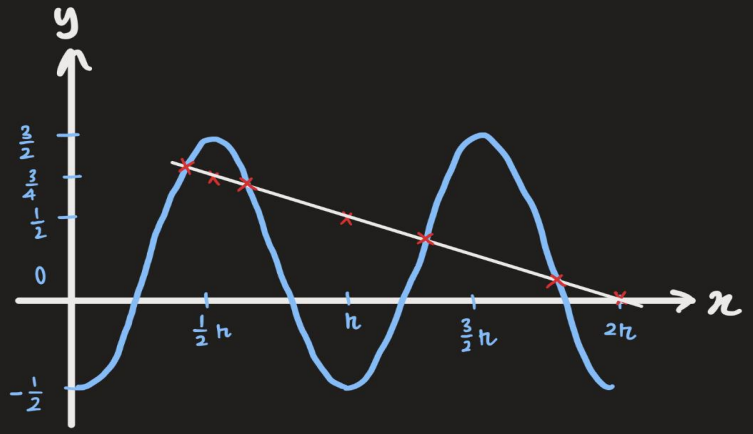
$2[y - \frac{1}{2}] = -\frac{x}{\pi} + 1$

$y - \frac{1}{2} = -\frac{x}{2\pi} + \frac{1}{2}$

$y = -\frac{x}{2\pi} + 1$

$y = \frac{1}{2} - \text{kos}2x$

x	$\frac{1}{2}\pi$	π	2π
y	$\frac{3}{4}$	$\frac{1}{2}$	0



4 penyelesaian

SOALAN 7

(a) Pada awal tahun 2020, populasi bagi sejenis binatang di dalam sebuah hutan simpan dianggarkan berjumlah 10 000. Bilangannya, N menurun selepas t tahun diberi oleh $N = 10000e^{-0.03t}$.

At the beginning of the year 2020, the population of a species of animals in a reserve forest was estimated at 10 000. This number decreased so that, after t years, the population of the animals, N is given by $N = 10000e^{-0.03t}$.

Anggarkan
Estimate

t = 2025 - 2020
t = 5

(i) populasi binatang tersebut pada awal tahun 2025,
the population at the beginning of the year 2025,

(ii) tahun di mana populasi binatang tersebut menurun kepada setengah dari populasi pada tahun 2020.
the year in which the population would be expected to decrease to half of the population in the year 2020.

[4 *markah*]
[4 *marks*]

AI

$$N = 10\,000e^{-0.03(t)}$$

$$N = 10\,000e^{-0.03(5)}$$

$$N = 8607.08$$

$$N = 8607$$

AII

$$10000e^{-0.03t} = 5000$$

$$e^{-0.03t} = \frac{5000}{10000}$$

$$log_e \frac{1}{2} = -0.03t$$

$$-0.6931 = -0.03t$$

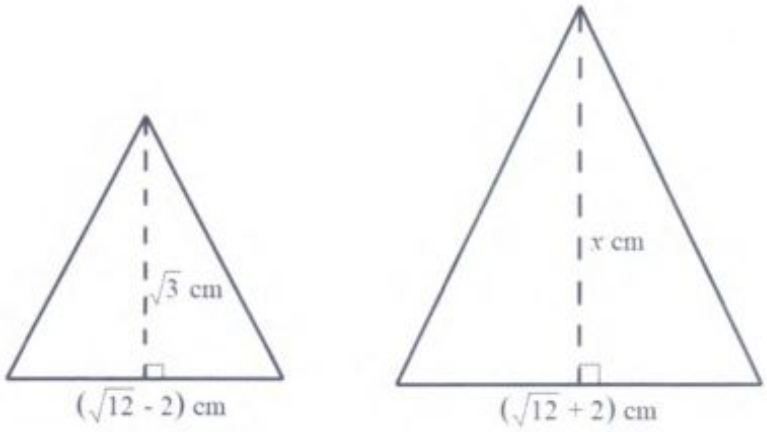
$$t = 23.1049$$

YEAR= 2020+23
= 2043

$$t = 23$$

(*b*) Rajah 2 menunjukkan dua buah segitiga *ABC* dan *PQR* yang kongruen.

Diagram 2 shows two congruent triangles ABC and PQR.



Rajah 2

Diagram 2

Cari panjang x dalam bentuk $a+b\sqrt{c}$ di mana a, b dan c ialah integer.

Determine the length of x *in the form of* $a+b\sqrt{c}$ *where* a, b *and* c *are integers.*

[4 *markah*]

[4 *marks*]

B

$$y(\sqrt{12}-2)=(\sqrt{12}+2)$$

$$y=\frac{(\sqrt{12}+2)(\sqrt{12}+2)}{(\sqrt{12}-2)(\sqrt{12}+2)}$$

$$y=\frac{12+2\sqrt{12}+2\sqrt{12}+4}{12+2\sqrt{12}-2\sqrt{12}-4}$$

$$y=\frac{16+8\sqrt{3}}{8}$$

$$y=\frac{\cancel{8}(2+\sqrt{3})}{\cancel{8}}$$

$$x=y\sqrt{3}$$

$$x=(\sqrt{3})(2+\sqrt{3})$$

$$x=3+2\sqrt{3}$$

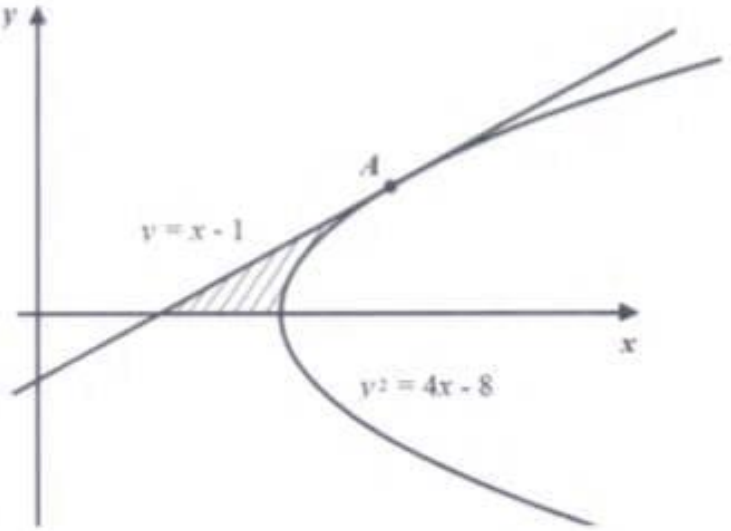
$$x=a+b\sqrt{c}$$

$$a=3 \quad b=2 \quad c=3$$

SOALAN 8

8 Rajah 3 menunjukkan garis lurus $y = x - 1$ menyentuh lengkung $y^2 = 4x - 8$ pada titik A.

Diagram 3 shows the straight line $y = x - 1$ *touches the curve* $y^2 = 4x - 8$ *at point A.*



Rajah 3

Diagram 3

Cari

(a) koordinat titik A,
the coordinates of point A,

$y = x - 1$ —— ①

$y^2 = 4x - 8$ —— ②

① $y^2 = (x-1)^2$

$y^2 = y^2$

$4x - 8 = (x-1)^2$ K1

$x^2 - 6x + 9 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(9)}}{2(1)}$$

$x = 3$

$y = x - 1$

$y = 3 - 1$

$y = 2$

$A(3, 2)$ N1

(b) luas kawasan berlorek.
the area of shaded region,

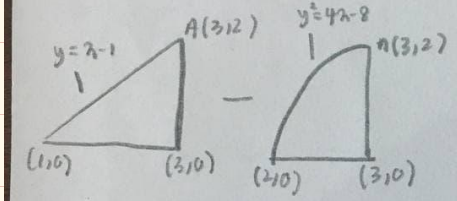
$(B,0)$ $(C,0)$

$y = x-1$ $y^2 = 4x-8$

$0 = B-1$ $0 = 4C-8$

$B = 1$ $C = 2$

$(1,0)$ $(2,0)$



$$= \int_1^2 (x-1)\,dx - \int_2^3 (4x-8)^{\frac{1}{2}}\,dx$$ K1

$$= \left[\frac{x^2}{2} - x\right]_1^3 - \left[\frac{(4x-8)^{\frac{3}{2}}}{\frac{3}{2}(4)}\right]_2^3$$ K1

$$= \left[\frac{x^2}{2} - x\right]_1^3 - \left[\frac{(4x-8)^{\frac{3}{2}}}{6}\right]_2^3$$

$$= \left[\left(\frac{3^2}{2} - 3\right) - \left(\frac{1^2}{2} - 1\right)\right] - \left[\left(\frac{\sqrt{(4(3)-8)^3}}{6}\right) - \left(\frac{\sqrt{(4(2)-8)^3}}{6}\right)\right]$$ K1

$$= 2 - \left(\frac{4}{3}\right)$$

$$= \frac{2}{3}\ \text{unit}^2$$ N1

(c) isipadu kisaran, dalam sebutan π, apabila rantau berlorek dikisarkan 360^0 pada paksi-x. [4 *markah*]

the volume of revolution, in terms of π, when the shaded region is revolved through 360^0 about the x-axis. [4 *marks*]

$$\pi \int_0^a y^2 \, dx \qquad y^2 = 4x - 8 \quad -(1)$$

$$y = x - 1$$

$$y^2 = (x-1)^2$$

$$= \pi \int_1^3 (x-1)^2 \, dx - \pi \int_2^3 (4x-8) \, dx$$

$$= \pi \int_1^3 (x^2 - 2x + 1) \, dx - \pi \int_2^3 (4x-8) \, dx \quad \text{K1}$$

$$= \pi \left[\frac{x^3}{3} - \frac{2x^2}{2} + x \right]_1^3 - \pi \left[\frac{4x^2}{2} - 8x \right]_2^3 \quad \text{K1}$$

$$= \pi \left[\frac{x^3}{3} - x^2 + x \right]_1^3 - \pi \left[2x^2 - 8x \right]_2^3$$

$$= \pi \left[\left(\frac{3^3}{3} - (3)^2 + 3 \right) - \left(\frac{1^3}{3} - 1^2 + 1 \right) \right] - \pi \left[\left(2(3)^2 - 8(3) \right) - \left(2(2)^2 - 8(2) \right) \right] \quad \text{K1}$$

$$= \pi \left(\frac{8}{3} \right) - \pi (2)$$

$$= \frac{2}{3} \pi \quad \text{N1}$$

SOALAN 9

Jadual 1 menunjukkan nilai-nilai pemboleh ubah x dan y yang diperoleh daripada suatu eksperimen. Pemboleh ubah x dan y dihubungkan oleh persamaan $y = a(x+1)^b$ dengan keadaan a dan b adalah pemalar.

Table 1 shows the values of two variables, x and y, obtained from an experiment. The variables x and y are related by the equation $y = a(x+1)^b$ *where a and b are constants.*

x	0.32	0.86	1.19	1.57	2.16	3.27
y	2.57	5.89	8.71	12.30	20.89	41.69

Jadual 1

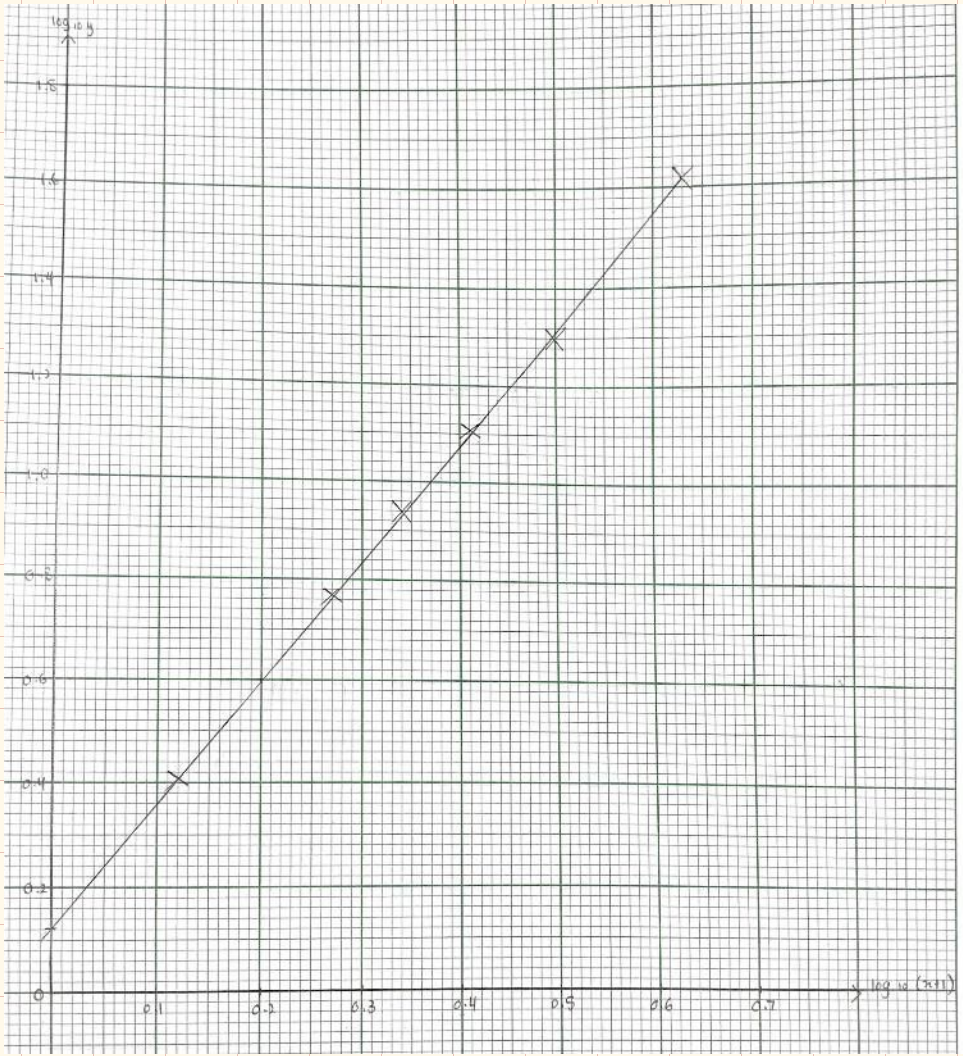
(*a*) Berdasarkan Jadual 1, bina satu jadual bagi nilai-nilai $\log_{10}(x+1)$ dan $\log_{10} y$.

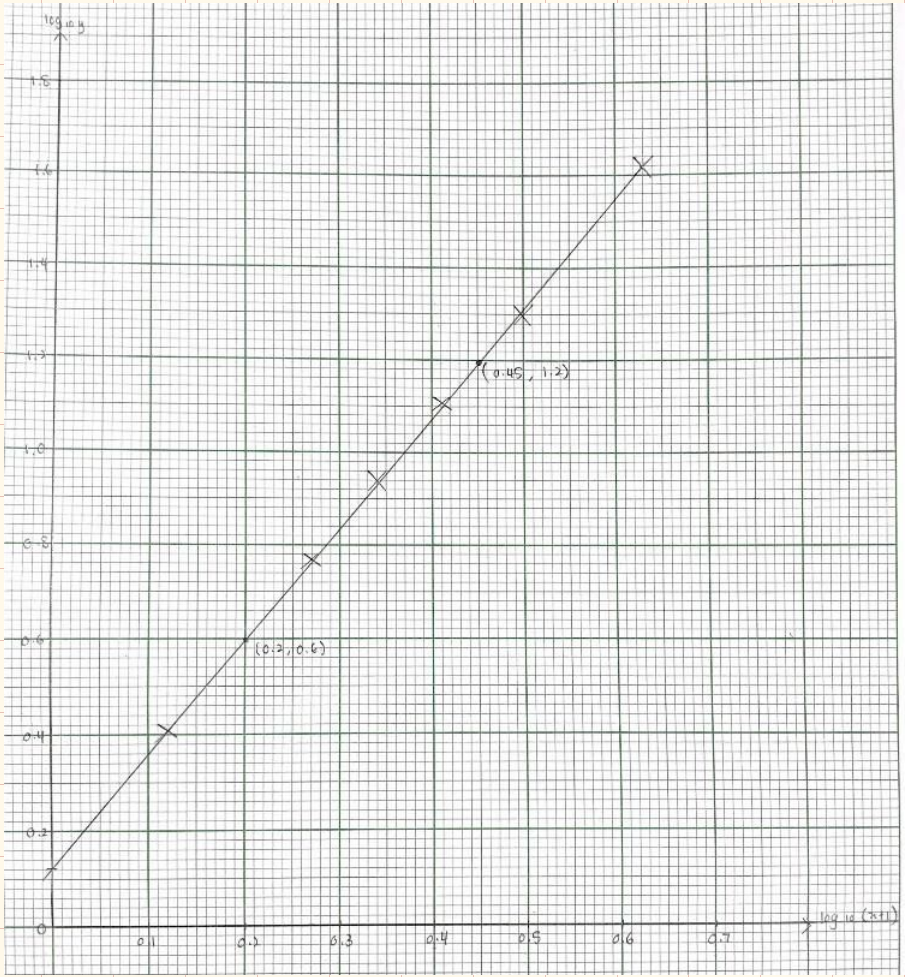
[2 *markah*]

a)

$\log_{10}(x+1)$	0.1206	0.2695	0.3404	0.4099	0.4997	0.6304
$\log_{10} y$	0.4099	0.7701	0.9400	1.0899	1.3199	1.620

(*b*) Plot $\log_{10} y$ melawan $\log_{10}(x+1)$, menggunakan skala 2 cm kepada 0.1 unit pada paksi-$\log_{10}(x+1)$ dan 2 cm kepada 0.2 unit pada paksi-$\log_{10} y$.
Seterusnya, lukis garis lurus penyuaian terbaik. [3 *markah*]





(c) Menggunakan graf di **9**(*b*), cari nilai
Using the graph in **9**(*b*), *find the value of*

(i) *a*,
(ii) *b*.

$y = a(x+1)^b$

$\log_{10} y = \log_{10} a + \log_{10} (x+1)^b$

$\log_{10} y = \log_{10} a + b \log_{10} (x+1)$

$Y = m X + c$

$\log_{10} y = b \log_{10} (x+1) + \log_{10} a$

c i) cari a

$c = \log_{10} a$

$0.12 = \log_{10} a$

$\log_{10} a = 0.12$

$a = 1.3183$

ii) cari b

$m = b$

$\frac{0.6 - 1.2}{0.2 - 0.45} = b$

$\frac{12}{5} = b$

$b = \frac{12}{5}$

SOALAN 10

10 Di sebuah sekolah, seramai 255 orang murid telah menduduki peperiksaan akhir tahun. Purata markah, dalam peratus yang diperoleh adalah mengikut taburan normal dengan min, μ dan varians, σ^2.

In a school, a total of 255 students sat for the year end examination. The average mark, in percentage obtained follows the normal distribution with a mean, μ and variance, σ^2.

(a) Berdasarkan analisis yang dibuat oleh Setiausaha Peperiksaan, Puan Rahimah, didapati 3.03% murid mendapat purata markah kurang daripada 50 dan 10.56% murid mendapat purata markah lebih daripada 75 . Tentukan nilai bagi μ dan σ^2. [5 *markah*]

Based on the analysis made by the Examination Secretary, Puan Rahimah, it was found that 3.03% of the students got an average mark less than 50 and 10.56% of students got an average mark more than 75. Determine the values of μ and σ^2. [5 *marks*]

10a) jumlah murid, n = 255

peratus = kebarangkalian

$p(x < 50) = \frac{3.03}{100}$

$= 0.0303$

$p(x > 75) = \frac{10.56}{100}$

$= 0.1056$

z-score

$z = \frac{x - M}{6}$ ← mean

↖ standard deviation

$p\left(z > \frac{50 - M}{6}\right) = 0.0303$

z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
														Minus / Tolak					
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451	3	7	10	13	16	19	23	26	29
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148	3	6	9	12	15	18	21	24	27
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867	3	5	8	11	14	16	19	22	25
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611	3	5	8	10	13	15	18	20	23
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379	2	5	7	9	12	14	16	19	21
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170	2	4	6	8	10	12	14	16	18
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985	2	4	6	7	9	11	13	15	17
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823	2	3	5	6	8	10	11	13	14
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681	1	3	4	6	7	8	10	11	13
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559	1	2	4	5	6	7	8	10	11
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455	1	2	3	4	5	6	7	8	9
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367	1	2	3	4	4	5	6	7	8
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294	1	1	2	3	4	4	5	6	6

① ② ③

$\frac{50 - M}{6} = -1.875$

$6 = \frac{50 - M}{-1.875}$ ①

$$P\left(z > \frac{75-M}{6}\right) = 0.1056$$

z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
											Minus / *Tolak*								
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451	3	7	10	13	16	19	23	26	29
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148	3	6	9	12	15	18	21	24	27
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867	3	5	8	11	14	16	19	22	25
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611	3	5	8	10	13	15	18	20	23
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379	2	5	7	9	12	14	16	19	21
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170	2	4	6	8	10	12	14	16	18
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985	2	4	6	7	9	11	13	15	17

① ② ③

$$\frac{75-M}{6} = 1.25$$

$$6 = \frac{75-M}{1.25} \quad ④$$

$$\frac{75-M}{1.25} \times \frac{50-M}{-1.875}$$

$$\Rightarrow (75-M)(-1.875) = (50-M)(1.25)$$

$$\Rightarrow -140.625 + 1.875M = 62.5 - 1.25M$$

$$\Rightarrow 1.875M + 1.25M = 62.5 + 140.625$$

$$\Rightarrow 3.125M = 203.125$$

$$M = 65$$

$$6 = \frac{75-65}{1.25}$$

$$6 = 8$$

$$6^2 = 8^2$$

$$= 64$$

(*b*) Pihak sekolah bercadang untuk memberikan anugerah mengikut tiga kategori iaitu Anugerah Platinum, Anugerah Perak dan Anugerah Gangsa.
The school intends to give awards based on three categories which are the Platinum Award, Silver Award and Bronze Award.

Jadual 2 menunjukkan ketiga-tiga kategori anugerah mengikut julat purata markah, dalam peratus yang tertentu.
Table 2 shows the three categories according to the specific range of average marks, in percentage.

Kategori *Category*	Gangsa *Bronze*	Perak *Silver*	Platinum *Platinum*
Purata Markah *Average marks*	≥ 65	≥ 80	≥ 90

Jadual 2 $80 \leq x < 90$
Table 2

Cari
Find

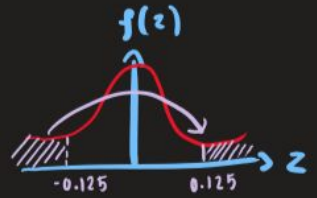
(i) kebarangkalian murid yang tidak menerima sebarang anugerah,
the probability of student not getting any award.

bi) $P(x < 65)$

$P\left(z < \frac{64 - 65}{8}\right)$

$= P(z < -0.125)$

$= P(z > 0.125)$



z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
											Minus / *Tolak*								
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31

$= 0.4522$
↳ minus 20

$= 0.4502$

(ii) bilangan murid yang mendapat Anugerah Perak dalam peperiksaan tersebut.

the number of students who receive the Silver Award in the examination.

$P(80 \leq x \leq 89)$

$= P\left(\frac{80-65}{8} \leq z \leq \frac{89-65}{8}\right)$

$= P(1.875 \leq z \leq 3.00)$

$= P(z \geq 1.875) - P(z \geq 3.00)$

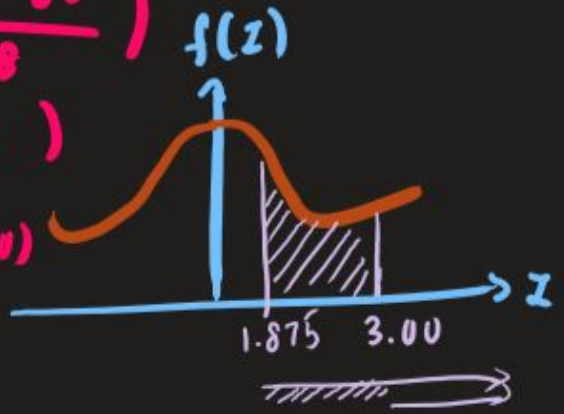
$= 0.0303 - 0.00135$

$= 0.02895 \times 255 = 7.38$

probability

total student

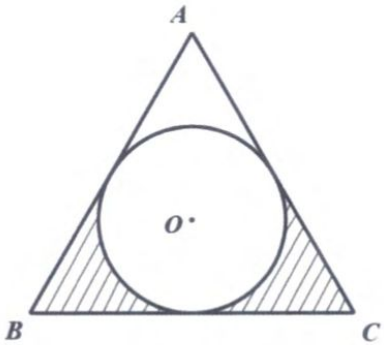
= 7 students



SOALAN 11

11 Rajah 5 menunjukkan sekeping kad, *ABC* berbentuk segitiga yang dihasilkan oleh Serina. Dia melukis sebuah bulatan berpusat *O* di dalam segitiga sama sisi tersebut. Kesemua sisi segitiga merupakan tangen kepada bulatan.

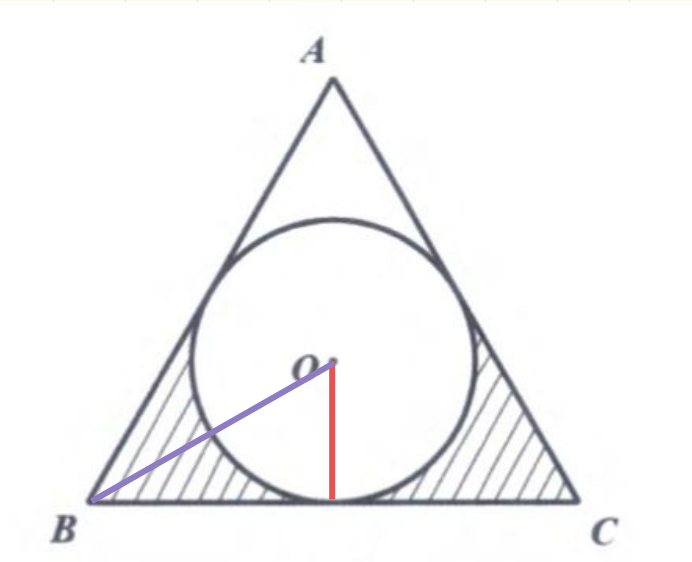
Diagram 5 shows a triangular card, ABC made by Serina. She draws a circle with centre O inside the equilateral triangle. All sides of the triangle are tangent to the circle.

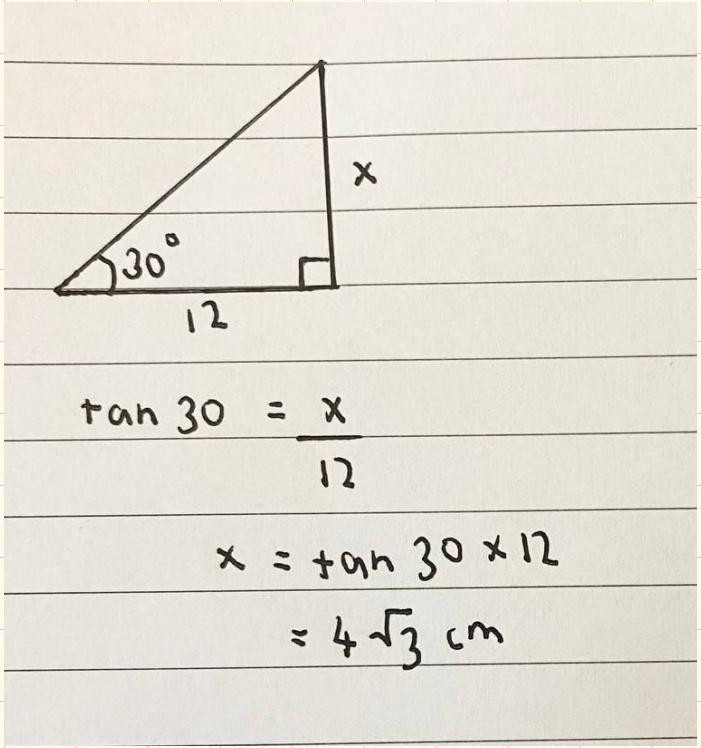


Rajah 5
Diagram 5

Diberi bahawa panjang sisi segitiga itu ialah 24 cm.
Given that the length of sides of the triangle is 24 cm.
[Guna / *Use* $\pi = 3.142$]

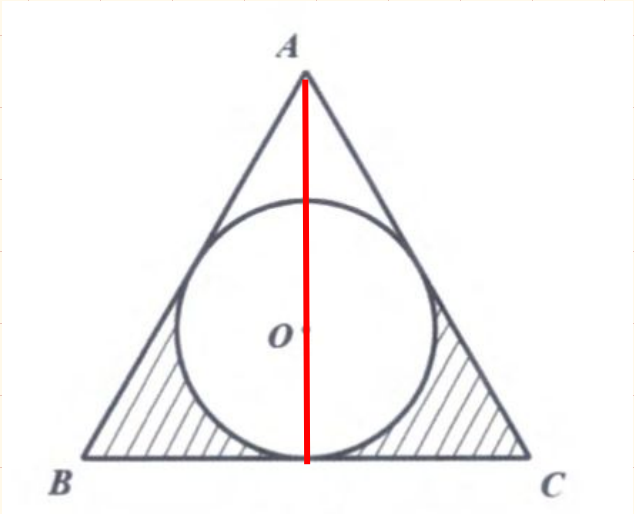
(a) panjang, dalam cm, jejari bulatan, [2 *markah*]
the radius, in cm, *of the circle,* [2 *marks*]

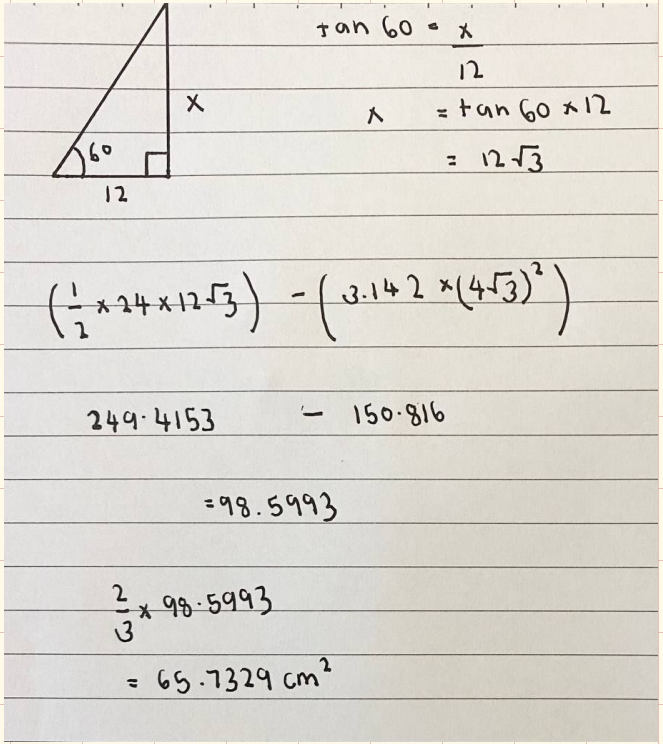




(*b*) luas, dalam cm^2, bagi kawasan berlorek, [4 *markah*]

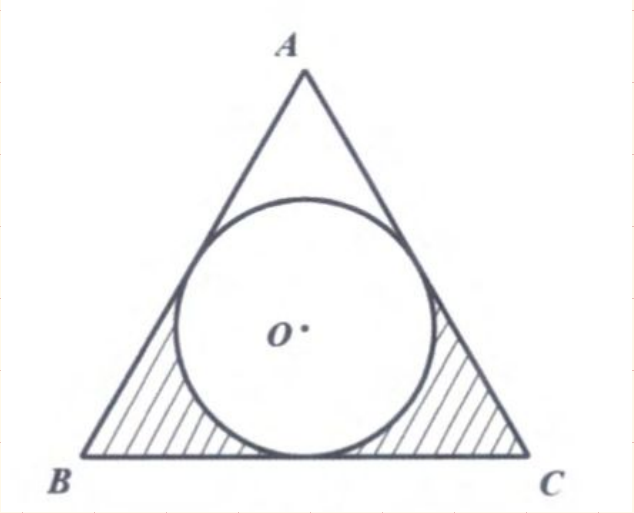
the area in cm^2, *of the shaded region,* [4 *marks*]





(c) baki reben yang tinggal jika Serina mempunyai reben sebanyak 1 meter untuk diletakkan di sekeliling bahagian kad yang berlorek. [4 *markah*]

the remaining ribbon if Serina has a 1 metre *ribbon to be placed around the shaded part of the card.* [4 *marks*]



$\frac{2}{3} \times 4\sqrt{3} \times 2(3.142)$

$= 29.02455$

$12 + 12 + 24 + 29.02455$

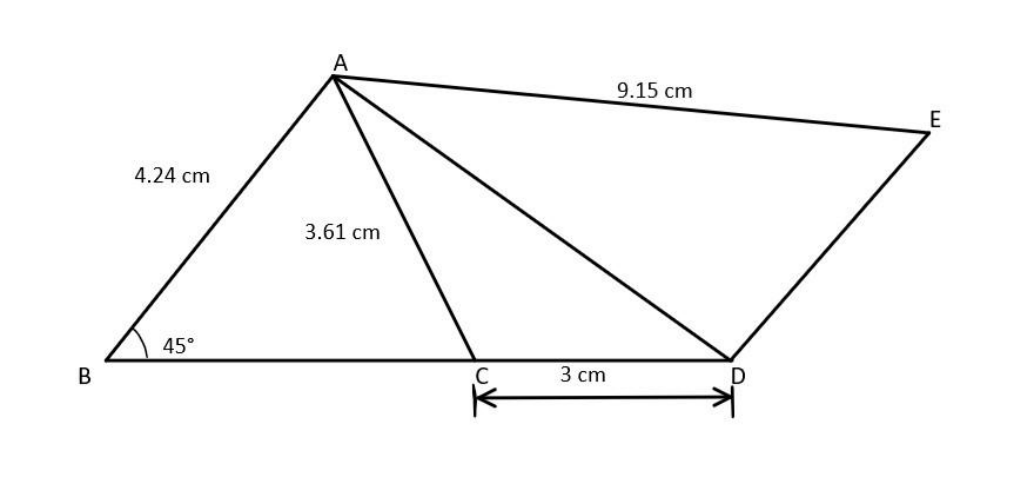
$= 77.02455$

$100 - 77.02455$

$= 22.97545 \text{ cm}$

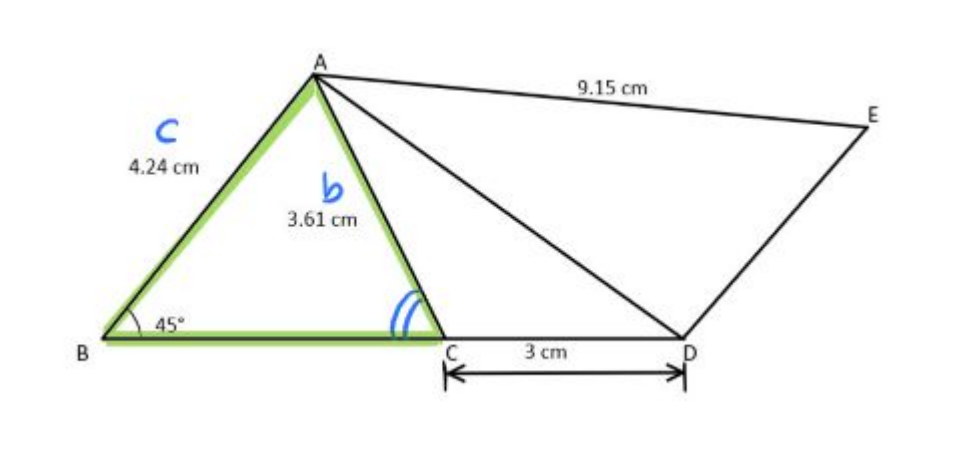
SOALAN 12

Rajah menunjukkan sisi bagi segiempat ABDE.
Diagram shows a quadrilateral ABDE.



Diberi bahawa $\angle ACD$ adalah sudut cakah dan luas segi tiga ADE ialah 14.5 cm^2
Given that $\angle ACD$ is an obtuse angle and the area of the triangle ADE is 14.5 cm^2

(a) (i) Hitung $\angle ACB$,
Calculate $\angle ACB$,

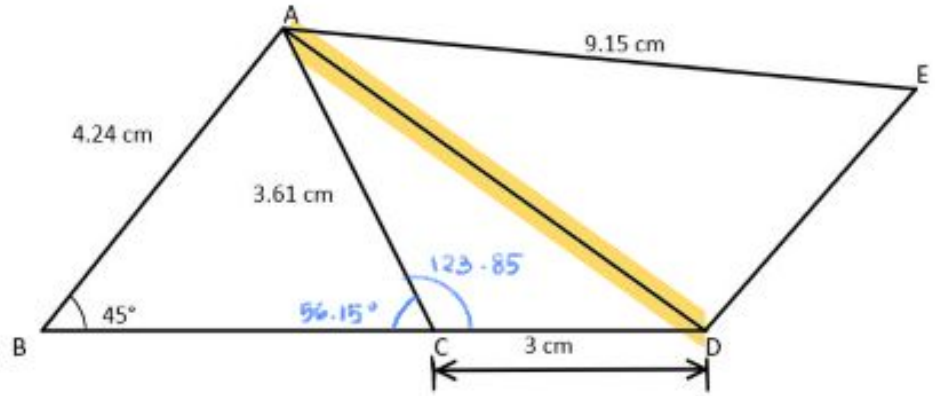


(a) (i) $\frac{\sin C}{c} = \frac{\sin B}{b}$

$\frac{\sin \angle ACB}{4.24} = \frac{\sin 45°}{3.61}$ ✓K1

$\angle ACB = 56.15°$ ✓N1

(ii) panjang, dalam cm, bagi AD
the length, in cm, of AD



(ii)

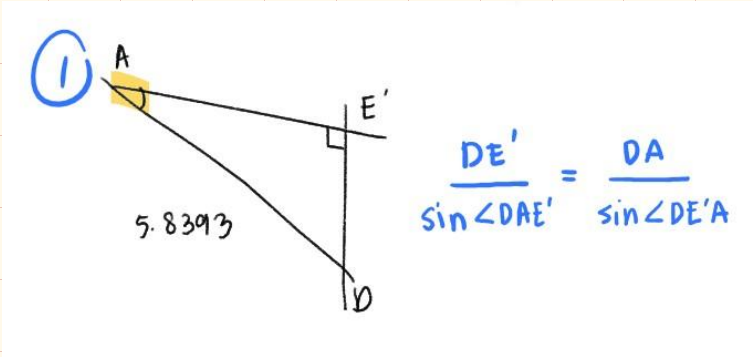
$q^2 = b^2 + c^2 - 2bc \cos A$

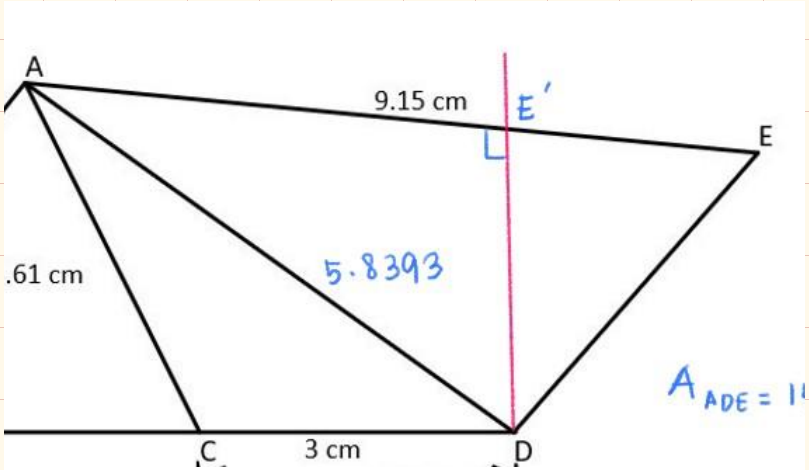
$AD^2 = 3^2 + 3.61^2 - 2(3)(3.61)\cos 123.85$ P1 K1

$AD^2 = 34.0972$

$AD = 5.8393$ cm N1

(iii) jarak terpendek, dalam cm, dari titik D ke garis lurus AE.
the shortest distance, in cm, from point D to straight line AE.





② $A = \frac{1}{2}ab\sin C$

$14.5 = \frac{1}{2}(5.8393)(9.15)\sin\angle EAD$

$\angle EAD = 32.87°$

$\angle DAE' = 32.87°$

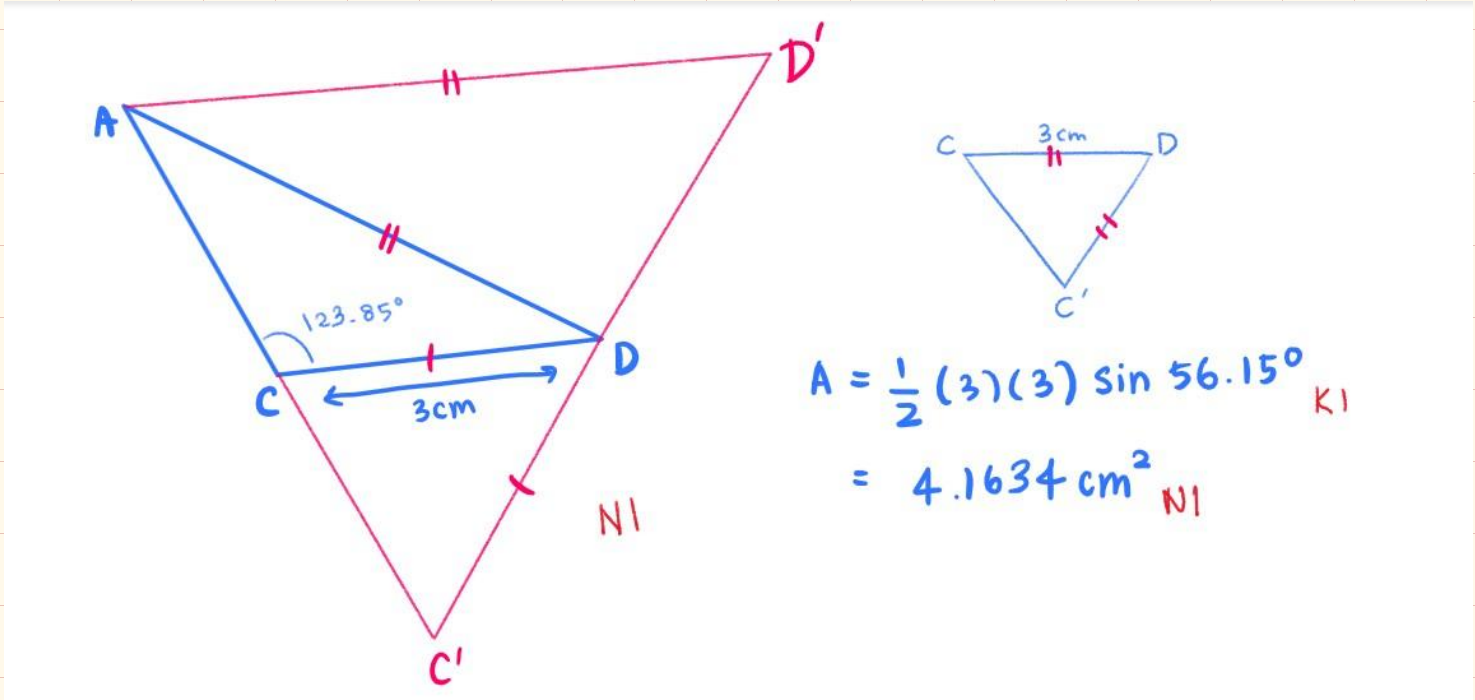
③ $\frac{DE'}{\sin 32.87°} = \frac{5.8393}{\sin 90°}$

$DE' = 3.1692$ cm

jarak t'pendek = 3.1692 cm

(b) (i) Lakar sebuah segi tiga A'C'D' yang mempunyai bentuk berbeza daripada segi tiga ACD dengan keadaan CD=C'D, AD=AD' dan $\angle CAD = \angle C'AD$.

(ii) Seterusnya, cari luas, dalam cm^2, segi tiga DCC'.

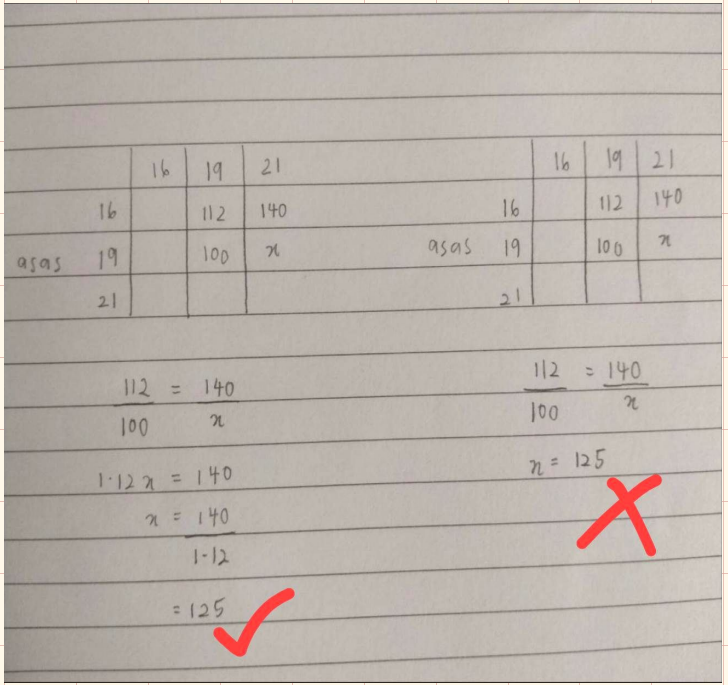


SOALAN 13

Jadual menunjukkan indeks harga bagi tiga jenis bahan yang digunakan dalam pembuatan kerepek ubi kayu

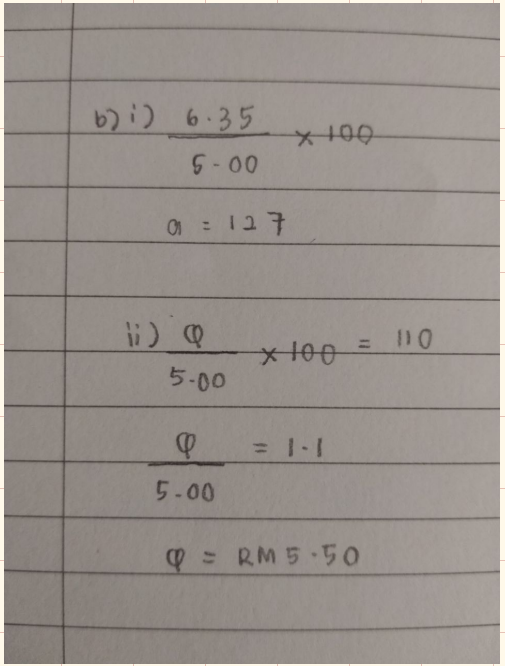
Bahan	**Indeks harga pada tahun 2019 berasaskan tahun 2016**	**Indeks harga pada tahun 2021 berasaskan tahun 2016**
P	112	140
Q	110	*a*
R	*b*	110

a) Cari indeks harga bahan P pada tahun 2021 berasaskan tahun 2019

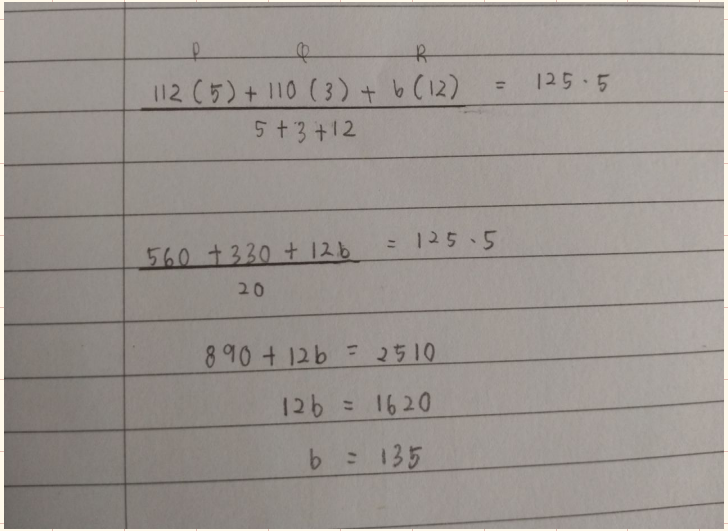


b) harga bahan Q pada tahun 2016 ialah RM5.00 dan harganya pada tahun 2021 ialah RM6.35

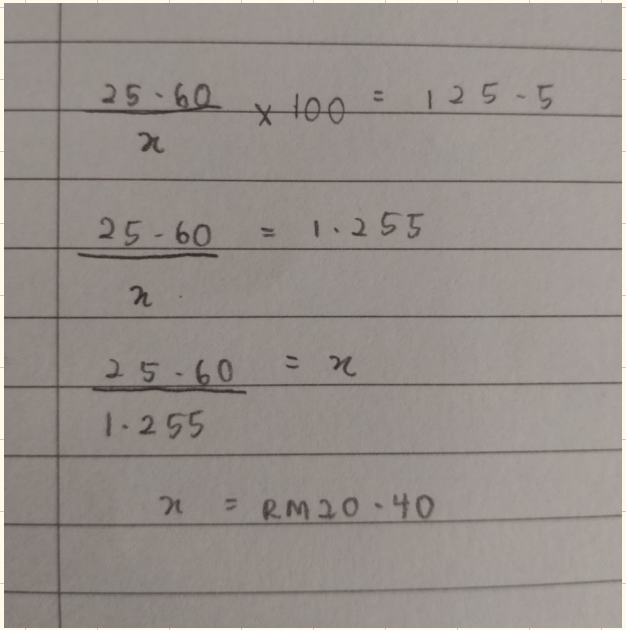
(i) cari nilai a
(ii) hitung harga bahan Q pada tahun 2019



c) Indeks gubahan bagi kos pembuatan kerepek ubi kayu itu pada tahun 2019 berasaskan tahun 2016 ialah 125.5. Nisbah kos bahan-bahan yang digunakan ialah 5:3:12. Cari nilai b.



d) cari harga sebungkus kerepek ubi kayu itu pada tahun 2019 ialah RM25.60



SOALAN 14

Aida ingin membeli lukisan bersaizA dan B untuk dipamerkan di galeri seninya. Harga bagi seunit lukisan bersaiz A dan seunit lukisan bersaiz B masing-masing ialah RM300 dan RM200. Aida membeli x unit lukisan bersaiz A dan y unit lukisan bersaiz B. Pembelian itu adalah berdasarkan kepada kekangan berikut:

I : Jumlah wang yang diperuntukkan ialah RM9000.

II : Jumlah bilangan lukisan bersaiz A dan B mesti lebih daripada 15.

III : Bilangan lukisan bersaiz B mesti melebihi atau sama dengan bilangan lukisan bersaiz A.

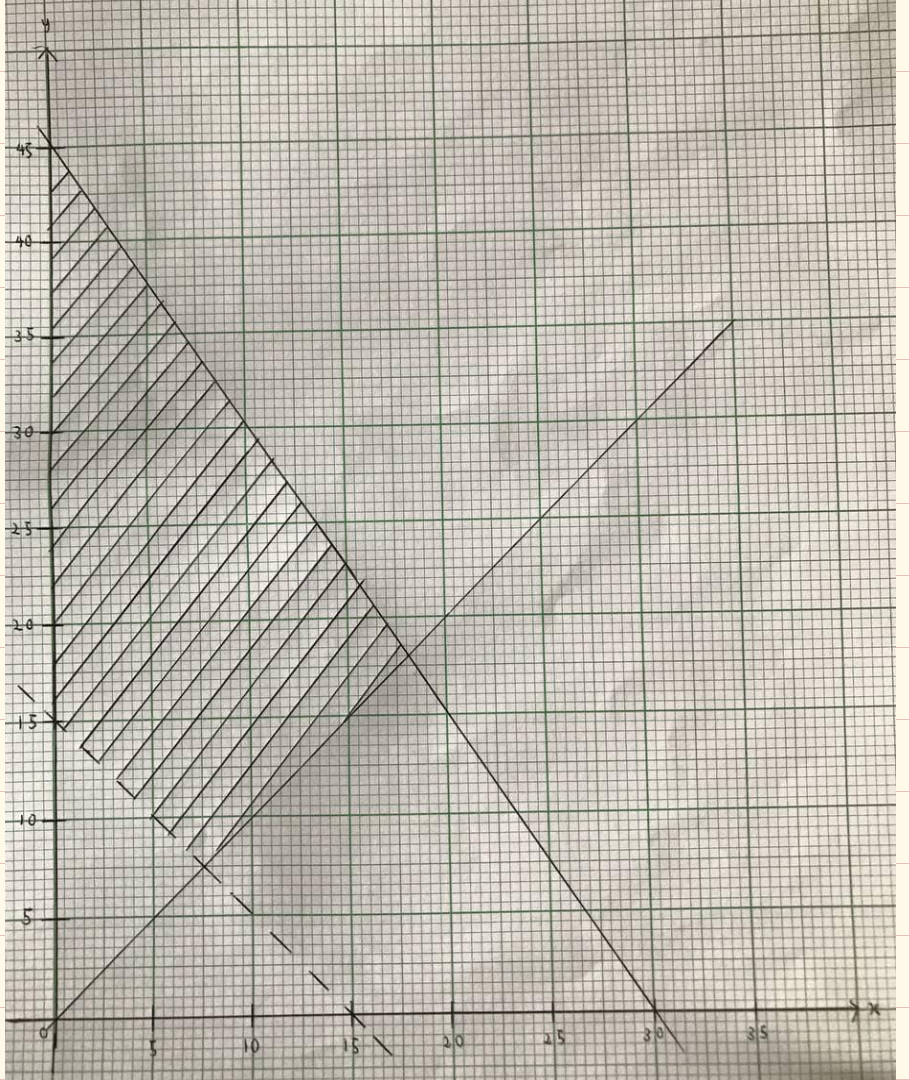
a) Bentukkan tiga model matematik, selain daripada $x \geq 0$ dan $y \geq 0$ yang memenuhi kekangan di atas.

$$300x + 200y \leq 9000$$

$$x + y > 15$$

$$y \geq x$$

b) Menggunakan skala 2 cm kepada 5 unit pada kedua dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas.



c) Menggunakan graf yang dibina di 14(b), cari

i) julat bagi bilangan lukisan bersaiz A jika 10 unit lukisan bersaiz B dibeli

$$5 < x \leq 10$$

ii) jumlah penjimatan yang boleh diperolehi oleh Aida jika dia membeli bilangan lukisan bersaiz A dan B secara maksimum, diberi potongan harga masing-masing sebanyak RM20 dan RM10 bagi lukisan bersaiz A dan B

$280x + 190y$

$280(18) + 190(18) = 8460$

$300x + 200y$

$300(18) + 200(18) = 9000$

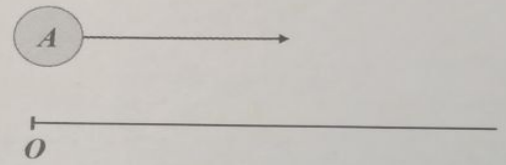
$9000 - 8460 = 540$

$= RM540.00$

SOALAN 15

15 Rajah 8 menunjukkan kedudukan dan arah gerakan zarah A yang bergerak di sepanjang suatu garis lurus dan melalui satu titik tetap O.

Diagram 8 shows the position and direction of motions of particle A that moves along a straight line passes through a fixed point O.



Rajah 8

Diagram 8

Halaju zarah A, $v\,\text{ms}^{-1}$, diberi oleh $v_A = 6 + 4t - 2t^2$.

The velocity of particle A , $v\,\text{ms}^{-1}$, is given by $v_A = 6 + 4t - 2t^2$.

[Anggapkan gerakan ke arah kanan sebagai positif]

[*Assume motion to the right is positive*]

(a) Cari
Find

(i) halaju, dalam ms^{-1}, bagi zarah *A* ketika melalui titik *O* pada kali pertama,
the velocity, in ms^{-1}, *of particle A when passes through point O for the first time*,

a) i) $t = 0$

$V = 6 + 4t - 2t^2$

$= 6 + 4(0) - 2(0)^2$

$= 6$

(ii) masa, dalam saat, apabila zarah *A* bertukar arah pergerakannya,
the time, in seconds, when the particle A changes its direction,

ii)

$$v = 0$$

$$6 + 4t - 2t^2 = 0$$

$$-2t^2 + 4t + 6 = 0$$

$$\frac{-4 \pm \sqrt{(-2)^2 - 4(-2)(6)}}{2(-2)}$$

$$t = 3$$

(iii) jarak, dalam m, yang dilalui oleh zarah *A* dalam saat ke-6.
the distance, in m, *travelled by the particle A in the* 6th *second.*

$$S = \int_5^6 -2t^2 + 4t + 6 \, dt$$

$$\left[\frac{-2t^3}{3} + \frac{4t^2}{2} + 6t \right]_5^6$$

$$\left[\frac{-2(6)^3}{3} + \frac{4(6)^2}{2} + 6(6) \right] - \left[\frac{-2(5)^3}{3} + \frac{4(5)^2}{2} + 6(5) \right]$$

$$-36 - \left(\frac{-10}{3} \right) = 32\frac{2}{3}$$

(*b*) Suatu zarah B mula bergerak pada masa yang sama dengan zarah A. Halaju awal zarah B ialah $5\,\text{ms}^{-1}$ dan pecutannya, diberi oleh $a_B = 9 - 4t$ dengan keadaan t ialah masa, dalam saat, selepas melalui O. Ungkapkan fungsi halaju bagi zarah B, v, dalam sebutan t. Seterusnya, cari halaju, dalam ms^{-1} bagi zarah B ketika halaju zarah A adalah maksimum. [4 *markah*]

b) $v = 5$

$a = 9 - 4t$

$v = \int 9 - 4t \, dt$

$= 9t - \frac{4t^2}{2} + C$

$v = 5 \quad C = 5$

$v_B = -2t^2 + 9t + 5$

$v_A = -2t^2 + 4t + 6$

$\frac{dv}{dt} = -4t + 4$

$a_1 = -4t + 4$

$a = 0$

$-4t + 4 = 0$

$t = 1$

$\rightarrow v_B = -2(1)^2 + 9(1) + 5$

$= 12 \text{ ms}^{-1}$