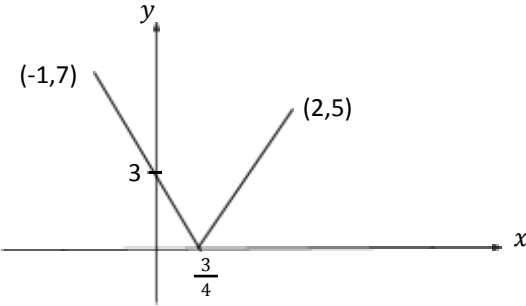
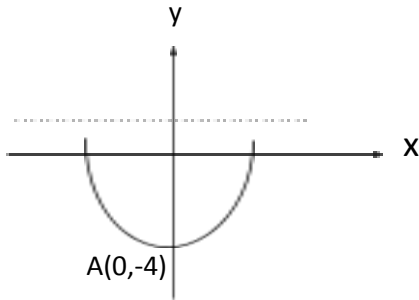


FUNGSI

No	Jawapan	Markah										
1.(a)	$g(x) = q^2 - 2x$ $g(q) = 3$ $q^2 - 2q = 3$ $q^2 - 2q - 3 = 0$ $(q - 3)(q + 1) = 0$ $(q - 3)(q + 1) = 0$ $q = -1, 3$	2M										
(b) i	$f(x) = 4x - 3 $ $f(-1) = 4(-1) - 3 $ $= 7$	1M										
ii	<table border="1" data-bbox="323 1066 807 1151"> <tr> <td>x</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td>y</td> <td>7</td> <td>3</td> <td>1</td> <td>5</td> </tr> </table> 	x	-1	0	1	2	y	7	3	1	5	2M
x	-1	0	1	2								
y	7	3	1	5								
2. (a)	$f(x) = 2x - 3 \quad fg(x) = 8 - 5x$ $f[g(x)] = 2[g(x)] - 3$ $8 - 5x = 2g(x) - 3$ $11 - 5x = 2g(x)$ $g(x) = \frac{11-5x}{2}$ $g(p) = \frac{11-5p}{2}$											

	$q = \frac{11-5p}{2}$ $p = \frac{11-2q}{5}$	3M
3(a)	<p>(b)</p> $f(x) = \frac{hx+2}{3}, f^{-1}(k) = 5$ $\therefore f(5) = k$ $\frac{h(5)+2}{3} = k$ $5h = 3k - 2$ $h = \frac{3k-2}{5}$	3M
	$a = f(5)$ $= 2(5) - 3$ $= 7$ $g^{-1}f(x) = 12$ $g^{-1}f(5) = 12$ $5(5) + b = 12$ $b = -13$	2M
(b)	$f(x) = 2x - 3$ $2y - 3 = x$ $f^{-1}(x) = \frac{x+3}{2}$ $g^{-1}(x) = g^{-1}ff^{-1}(x)$ $= g^{-1}f\left(\frac{x+3}{2}\right)$ $= 5\left(\frac{x+3}{2}\right) - 13$ $g^{-1}(x) = \frac{5x-11}{2}$ $\frac{5y-11}{2} = x$	

	$5y - 11 = 2x$ $y = \frac{2x+11}{5}$ $g(x) = \frac{2x+11}{5}$ $\frac{2x+11}{5} = x$ $x = \frac{11}{3}$	
4.	$f: x \rightarrow x + 5$ $x - 5 = y$ $f^{-1}(x) = x - 5$ $gf: x \rightarrow x^2 + 10x + 23$ $gff^{-1}(x) = (x - 5)^2 + 10(x - 5) + 23$ $g(x) = x^2 - 2$ $g(-2k) = f(k) - 2$ $(-2k)^2 - 2 = k + 5 - 2$ $4k^2 - k - 5 = 0$ $(4k - 5)(k + 1) = 0$ $k = \frac{5}{4}, -1$	4M
5. a)	$\frac{2}{3x-1} = \frac{1}{4}$ $3x - 1 = 8$ $x = 3$	5M
(b)	$f(p + 1) = \frac{1}{2} f g(q)$ $\frac{2}{3(p+1)-1} = \frac{1}{2} \left(\frac{2}{3q^2+1} \right)$	2M

	$\frac{2}{3p+2} = \frac{1}{3q^2+1}$	2M
(c)	$2(3q^2 + 1) = 3p + 2$ $3p = 6q^2$ $p = 2q^2$	
	$f(g(x)) = \frac{2}{3g(x)-1}$	
	$\frac{2}{3x^2+1} = \frac{2}{3g(x)-1}$	2M
	$3g(x) = 3x^2 + 2$	
6.	$g(x) = \frac{3x^2+2}{3}$	
(a)		2M
(b)	<p>Ujian Garis Mengufuk memotong graf fungsi m pada dua titik. Maka m bukan fungsi satu ke satu. Oleh itu m tidak mempunyai fungsi songsang.</p>	1M
(c)	$x \geq 0$	
	$m(x) = x^2 - 4$	2M
	$y^2 = x + 4$	
7(a)	$m^{-1}(x) = \sqrt{x + 4}$	
	$g(x) = - 2x - 6 $	
	$g(-2) = - 2(-2) - 6 $ $= -10$	

$$g(5) = -|2(5) - 6|$$

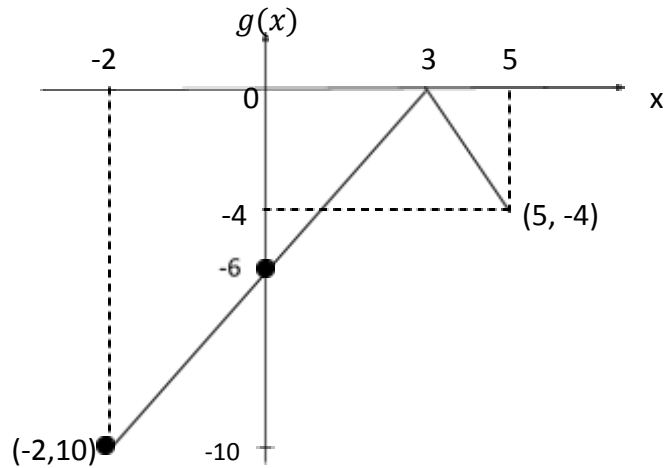
$$= -4$$

$$g(x) = 0$$

$$-|2x - 6| = 0$$

$$2x - 6 = 0$$

$$x = 3$$



(b)

$$\text{Julat : } -10 \leq g(x) \leq 0$$

(c)

Ujian Garis Mengufuk memotong graf fungsi $g(x)$ pada dua titik. Maka $g(x)$ bukan fungsi satu ke satu. Oleh itu fungsi *songsang bagi* $g(x)$ tidak wujud.

$$g(x) < 2$$

$$-|2x - 6| < 2$$

$$|2x - 6| > -2$$

$$-2 < 2x - 6 < 2$$

8(a)

$$2 < x < 4$$

$$g(x) = q + \frac{p}{x}$$

$$g^2(x) = q + \frac{p}{(q + \frac{p}{x})}$$

$$y = \frac{p}{x - q}$$

$$g^2(-1) = q + \frac{p}{(q - p)}$$

$$g^{-1}(x) = \frac{p}{x - q}$$

$$= \frac{q(q - p) + p}{q - p}$$

$$g^{-1}(p) = g^2(-1)$$

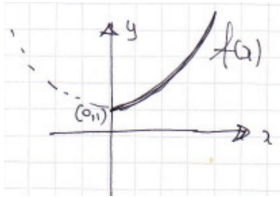
5M

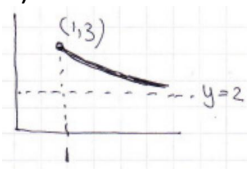
2M

3M

	$\frac{p}{p-q} = \frac{q(q-p)+p}{q-p}$ $p = \frac{(q^2-qp+p)(p-q)}{(q-p)}$ $p = \frac{(q^2-qp+p)(p-q)}{-(p-q)}$ $p = -(q^2 - qp + p)$ $2p = -q^2 + qp$ $2p - qp = -q^2$ $p(2 - q) = -q^2$ $p = \frac{-q^2}{-(q-2)}$ $p = \frac{q^2}{q-2}$	
(b)	(i) Banyak dengan satu	4M
	(ii) Ujian garis mencancang memotong fungsi pada satu titik. / fungsi adalah hubungan satu dengan satu atau banyak dengan satu	1M
9 (a)	(iii) $f: x \rightarrow x^2$	2M
(b)	$x = 1$ $f(-2) \quad \frac{m}{-2-1} + n = 1$ $\quad \quad \quad \frac{m}{-3} + n = 1$ $\quad \quad \quad m - 3n = -3 \dots\dots\dots(1)$ $f(4) \quad \quad \frac{m}{4-1} + n = 3$ $\quad \quad \quad m + 3n = 9 \dots\dots\dots(2)$ (1) + (2) $2m = 6$ $m = 3$	1M
(c)	Gantikan $m = 3$ dalam (1) $(3) - 3n = -3$	3M

Jawapan untuk latihan fungsi

1	<p>A).</p>	$f(x) = x^2 + 1$ $y = x^2 + 1$ $x = \pm \sqrt{y - 1}$ $f^{-1}(x) = \sqrt{x - 1}$										
	<p>B) .</p>											
		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>$f(x)$</th> <th>$f^{-1}(x)$</th> </tr> </thead> <tbody> <tr> <td>domain</td> <td>$x \geq 0$</td> <td>$x \geq 1$</td> </tr> <tr> <td>julat</td> <td>$f(x) \geq 1$</td> <td>$f^{-1}(x) \geq 0$</td> </tr> </tbody> </table>		$f(x)$	$f^{-1}(x)$	domain	$x \geq 0$	$x \geq 1$	julat	$f(x) \geq 1$	$f^{-1}(x) \geq 0$	
	$f(x)$	$f^{-1}(x)$										
domain	$x \geq 0$	$x \geq 1$										
julat	$f(x) \geq 1$	$f^{-1}(x) \geq 0$										
		<p>\therefore domain, $x \geq 1$ julat, $f^{-1}(x) \geq 0$</p>										
2	<p>A) . $f(x) \geq 0$ B) . $f\left(\frac{1}{x+2}\right) = \frac{4}{9}$</p>	$\left(\frac{1}{x+2}\right)^2 = \frac{4}{9}$ $x + 2 = \pm \frac{3}{2}$ $x = \frac{1}{2} @ -\frac{3}{2}$										
	<p>C) . $y = \frac{1}{x+2}$</p>	$g^{-1}(x) = \frac{1 - 2x}{x}$										
3	<p>A) . $f(x) = \frac{1}{1-x} + 4$</p>	$f(2) = 3$ $f(101) = 3.99$ $f(1001) = 3.999$										
	<p>B) . $3 \leq f(x) \leq 4$ C) $y = \frac{1}{1-x} + 4$</p>	$f^{-1}(x) = \frac{x - 5}{x - 4}$										
4	<p>A) . $f(x) = \frac{2x-3}{x-2}$</p>	$f^{-1}(x) = \frac{2x - 3}{x - 2}$										
	<p>B) . $f(f^{-1}(x)) = x$</p>											

	C) $f(f(k + 2)) = k + 2$									
5	<p>A) . $y = 2$ B)</p>  <p>C) . $y = \frac{1}{x} + 2$</p> $\therefore 2 < f(x) < 3$ $f^{-1}(x) = \frac{1}{x - 2}$ <p>D) .</p> <table border="1" data-bbox="279 705 1348 817"> <thead> <tr> <th></th> <th>$f(x)$</th> <th>$f^{-1}(x)$</th> </tr> </thead> <tbody> <tr> <td>domain</td> <td>$x > 1$</td> <td>$2 < x < 3$</td> </tr> <tr> <td>julat</td> <td>$2 < f(x) < 3$</td> <td>$f^{-1}(x) > 1$</td> </tr> </tbody> </table> <p>\therefore domain, $2 < x < 3$ julat, $f^{-1}(x) > 1$</p>		$f(x)$	$f^{-1}(x)$	domain	$x > 1$	$2 < x < 3$	julat	$2 < f(x) < 3$	$f^{-1}(x) > 1$
	$f(x)$	$f^{-1}(x)$								
domain	$x > 1$	$2 < x < 3$								
julat	$2 < f(x) < 3$	$f^{-1}(x) > 1$								
6	<p>A) . $f(x) > -4$ B) $y = e^{2x} - 4$</p> $y + 4 = e^{2x}$ $2x = \ln(y + 4)$ $f^{-1}(x) = \frac{1}{2} \ln(x + 4)$ <p>C) . $g(f(x)) = 1$</p> $g(e^{2x} - 4) = 1$ $1 = e^{2x} - 15$ $16 = e^{2x}$ $2x = \ln 16$ $x = 2 \ln 2$									
7	<p>A) . $f(x) \geq 2$ B) $f(x) = 17$</p> $(x - 3)^2 + 1 = 17$ $x = 7 @ -1$ $\therefore x = 7$ <p>C) . $y = (x - 3)^2 + 1$</p> $y - 1 = (x - 3)^2$ $f^{-1}(x) = 3 + \sqrt{x - 1}$									
8	<p>Jika</p> $f(x) + 2f(2 - x) = x^2$ $x = 2 - y$ $y = 2 - x$									

$$f(2 - y) + 2f(y) = (2 - y)^2$$

Tuliskan keduanya, dalam sebutan u

$$\begin{aligned} f(u) + 2f(2 - u) &= u^2 \\ f(2 - u) + 2f(u) &= (2 - u)^2 \end{aligned}$$

Menjadikannya

$$f(2 - u) = (2 - u)^2 - 2f(u)$$

Dengan penggantian,

$$f(u) + 2[(2 - u)^2 - 2f(u)] = u^2$$

$$f(u) + 2(2 - u)^2 - 4f(u) = u^2$$

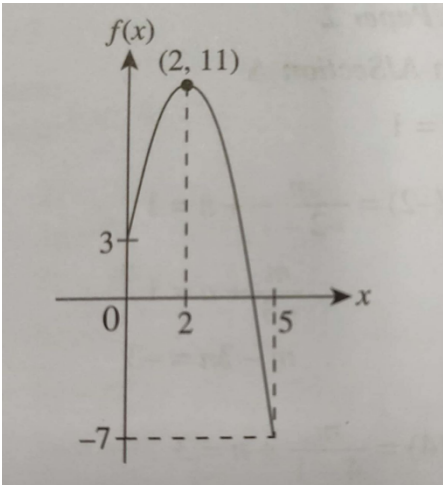
$$u^2 - 8u + 8 = 3f(u)$$

$$f(u) = \frac{1}{3}u^2 - \frac{8}{3}u + \frac{8}{3}$$

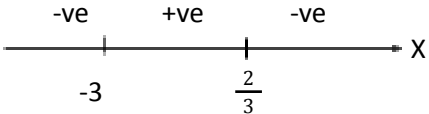
$$\therefore f(x) = \frac{1}{3}x^2 - \frac{8}{3}x + \frac{8}{3}$$

FUNGSI KUADRATIK

No	Jawapan	Markah
1(a)	$b^2 - 4ac < 0$ $(8)^2 - 4p(2) < 0$ $64 - 8p < 0$ $8p > 64$ $p > 8$	2M
(b)	$(x + w)^2 = 49$ $((-5) + w)^2 = 49$ $(w - 5)^2 = 49$ $w^2 - 10w + 25 = 49$ $w^2 - 10w - 24 = 0$ $(w + 2)(w - 12) = 0$ $w + 2 = 0 \quad \text{atau} \quad w - 12 = 0$ $w = -2 \quad \quad \quad w = 12$	2M
(c) i	<p>$f(x) = m(x - n)^2 + q$ mempunyai nilai maksimum . Maka nilai m mestilah negatif.</p> <p><i>The function $f(x) = m(x - n)^2 + q$ has a maximum value. Hence, the values of m must be negative.</i></p>	
ii	<p>$\therefore m < 0$</p> <p>Paksi simetri bagi graf $f(x) = m(x - n)^2 + q$ ialah $x = n$.</p>	
iii	<p><i>The axis of symmetry of the graph $f(x) = m(x - n)^2 + q$ ialah $x = n$.</i></p> <p>$\therefore n = 0$</p> <p>Fungsi $f(x) = m(x - n)^2 + q$ mempunyai nilai maksimum q.</p> <p><i>The function $f(x) = m(x - n)^2 + q$ has a maximum value of q</i></p> <p>$\therefore q = 7$</p>	3M
2(a)	$f(x) = 3 + 8x - 2x^2$ $= -2x^2 + 8x + 3$ $= -2\left[x^2 - 4x - \frac{3}{2}\right]$ $= -2\left[x^2 - 4x + \left(\frac{-4}{2}\right)^2 - \left(\frac{-4}{2}\right)^2 - \frac{3}{2}\right]$ $= -2\left[x^2 - 4x + (-2)^2 - (-2)^2 - \frac{3}{2}\right]$ $= -2\left[(x - 2)^2 - (-2)^2 - \frac{3}{2}\right]$ $= -2\left[(x - 2)^2 - \frac{11}{2}\right]$ $= -2(x - 2)^2 + 11$	

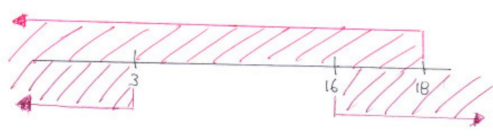
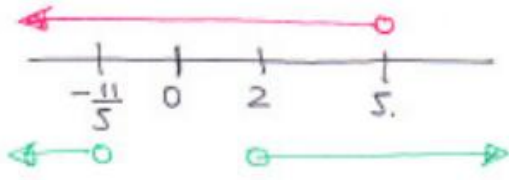
<p>(b)</p>	<p>$a = -2 < 0$ maka maksimum Titik maksimum (2,11) Maximum point (2, 11)</p> <p>$f(x) = -2(x - 2)^2 + 11$</p> <p>Apabila $x = 5$</p> <p>$= -2(5 - 2)^2 + 11$ $= -2(9) + 11$ $= -7$</p> <p>Paksi simetri ialah $x = 2$</p> 	<p>4M</p> <p>4M</p>
<p>3(a)</p> <p>(b)</p>	<p>$3x^2 + 2x - 7 = 0$</p> <p>$\alpha + \beta = -\frac{2}{3}$ $\alpha\beta = -\frac{7}{3}$</p> <p><u>HTP</u> <u>HDP</u></p> <p>$(\alpha + 1) + (\beta + 1)$ $(\alpha + 1)(\beta + 1)$ $\beta + \alpha + 2$ $\alpha\beta + (\alpha + \beta) + 1$ $-\frac{2}{3} + 2$ $-\frac{7}{3} + -\frac{2}{3} + 1$ $\frac{4}{3}$ -2</p> <p>$x^2 - \text{HTP} + \text{HDP} = 0$ $x^2 - \frac{4}{3}x + (-2) = 0$ $3x^2 - 4x - 6 = 0$</p> <p><u>HTP</u> <u>HDP</u></p> <p>$\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{\alpha^2 + \beta^2}{\alpha\beta}$ $\frac{\alpha}{\beta} \left(\frac{\beta}{\alpha} \right) = 1$</p> <p>$= (\alpha + \beta)^2 - 2\left(-\frac{7}{3}\right)$ $= \left(-\frac{2}{3}\right)^2 - 2\left(-\frac{7}{3}\right)$ $\left(-\frac{7}{3}\right)$ $= -\frac{46}{21}$</p>	<p>3M</p>

<p>(b)</p> <p>(c)</p>	$= 8\left(x - \frac{k}{16}\right)^2 - \frac{k^2}{32} + k - 5$ $-\frac{k^2}{32} + k - 5 = -\frac{25}{8}$ $k^2 - 32k + 60 = 0$ $(k - 2)(k - 30) = 0$ $k = 2 \text{ atau } k = 30$ $\therefore k = 2, k > 5$ $m(x) = 8x^2 - 2x - (5 - 2)$ $= 8x^2 - 2x - 3$ $n(x) = 7x^2 + p - 1$ $m(x) = n(x)$ $8x^2 - 2x - 3 = 7x^2 + p - 1$ $x^2 - 2x - p - 2 = 0$ $b^2 - 4ac > 0$ $(-2)^2 - 4(1)(-p - 2) > 0$ $4 + 4p + 8 > 0$ $4p > -12$ $p > -3$	<p>3M</p> <p>2M</p> <p>3M</p>
<p>6 (a)</p>	$g(x) = -(x + q)^2 + 16$ $x = -\frac{b}{2a} \qquad (x + q) = 0$ $= -\frac{(-6)}{2(1)} \qquad x = -q$ $x = 3 \qquad 3 = -q$ $\therefore q = -3$ $f(x) = x^2 - 6x + p \qquad g(x) = -(x + q)^2 + 16$ $=$ $-x^2 - 2qx - q^2 + 16$ $p = q^2 - 16$ $= (-3)^2 - 16$ $p = 9 - 16$	<p>3M</p>

<p>(b)</p> <p>(c)</p>	$p = -7$ $f(x) = x^2 - 6x + \left(\frac{-6}{2}\right)^2 - \left(\frac{-6}{2}\right)^2 - 7$ $= (x - 3)^2 - 9 + -7$ $= (x - 3)^2 - 16$ <p>Nilai minimum -16</p> <p>Ya, Pantulan titik (x, y) pada paksi $-x$ ialah $(x, -y)$ Titik max bagi $g(x)$ adalah $(3, 16)$ manakala titik min bagi $f(x)$ adalah $(3, -16)$</p>	<p>3M</p> <p>2M</p>
<p>7 .(a)</p> <p>(b)</p>	$6 - 7x - 3x^2$ $- 3x^2 - 7x + 6 < 0$ $(-3x + 2)(x + 3) < 0$  $x < -3, \quad x > \frac{2}{3}$ $y = \frac{1}{2}[(x + 5)^2 + (x - 7)^2]$ $= \frac{1}{2}[x^2 + 10x + 25 + x^2 - 14x + 49]$ $= \frac{1}{2}[2x^2 - 4x + 74]$ $= x^2 - 2x + 37$ $= x^2 - 2x + \left(\frac{-2}{2}\right)^2 - \left(\frac{-2}{2}\right)^2 + 37$ $= (x - 1)^2 + 36$ <p>Minimum point $(1, 36)$</p>	<p>3M</p> <p>3M</p>
<p>8. (a)</p>	$3hx^2 - 7kx + 3h = 0$ $a = 3h \quad b = -7k \quad c = 3h$	

	$(-7k)^2 - 4(3h)(3h) = 0$ $49k^2 - 36h^2 = 0$ $49k^2 = 36h^2$ $\frac{49}{36} = \frac{h^2}{k^2}$ $\frac{7}{6} = \frac{h}{k}$ $h : k = 7 : 6$ $3(7)x^2 - 7(6)x + 3(7) = 0$ $21x^2 - 42x + 21 = 0$ $x^2 - 2x + 1 = 0$ $(x - 1)(x - 1) = 0$ $x = 1$	
(b)	$h(t) = -4t^2 + 32t$ $= -4[t^2 - 8t]$ $= -4\left[t^2 - 8t + \left(\frac{-8}{2}\right)^2 - \left(\frac{-8}{2}\right)^2\right]$	4M
(i)	$= -4[(t - 4)^2 - 16]$ $= -4(t - 4)^2 + 64$	
(ii)	$t - 4 = 0$ $t = 4$ <p>Ketinggian maksimum ialah 64</p>	4M

Answer for quadratic exercises

1	<p>A) . $27 < \text{perimeter} < 52$</p> $27 < 2[(3x + 2) + (2x + 4)] < 52$ $1.5 < x < 4$ <p>B) . $\text{area} < 98$</p> $(2x + 4)(3x + 2) - 4x < 98$ $(x - 3)(x + 5) < 98$ $-5 < x < 3$ $\therefore x > 0,$ $1.5 < x < 3$
2	$x(x - 6) > 40$ $(x + 4)(x - 10) > 0$ $x < -4 \text{ or } x > 10$ $\therefore x > 10$
3	<p>a) . $8 + 3x > 4(x - 3) + 2$</p> $x < 18$ <p>b) . $(x - 10)(x - 4) > 5(x - 1) - 3$</p> $(x - 16)(x - 3) \geq 0$ $x \leq 3 \text{ or } x \geq 16$ <p>c) .</p>  $x \leq 3 \text{ or } 16 \leq x < 18$ $\therefore x \leq 3 \cup 16 \leq x < 18$
4	<p>A). $BC=5x$</p> <p>Perimeter $= 3x + 7x + 1 + 5x + 3x + 1$</p> $= 18x + 2$ <p>B) . $\frac{(3x+1)+(7x+1)}{2} \times 3x$</p> $15x^2 + 3x$ <p>C) perimeter < 92</p> $18x + 2 < 92$ $x < 5$ <p>area > 66</p> $15x^2 + 3x > 66$ $(5x + 11)(x - 2) > 0$ $x < -\frac{11}{5} \text{ or } x > 2$ 

	$\therefore 2 < x < 5$
5	$\left(\frac{1200}{x} - 10\right)(x - 10) \times 5 > 2850$ $x^2 - 73x + 1200 < 0$ $(x - 48)(x - 25) < 0$ $\therefore 25 < x < 48$
6	$(x - 1)y^2 - 2xy + x = 0$ $y^2 - \frac{2x}{x-1}y + \frac{x}{x-1} = 0$ $\left[y - \frac{x}{x-1}\right]^2 = \frac{x^2 - x(x-1)}{(x-1)^2}$ $y - \frac{x}{x-1} = \frac{\pm\sqrt{x}}{x-1}$ $y = \frac{x \pm \sqrt{x}}{x-1}$ $y = \frac{(\sqrt{x})^2 \pm \sqrt{x}}{(\sqrt{x})^2 - 1}$ $y = \frac{\sqrt{x}(\sqrt{x} \pm 1)}{(\sqrt{x} + 1)(\sqrt{x} - 1)}$ $y = \frac{\sqrt{x}}{\sqrt{x} + 1} \text{ or } y = \frac{\sqrt{x}}{\sqrt{x} - 1}$ <p>Untuk menentusahkan, pilih satu nilai yang sesuai, Cth, $x = 1, -2y + 1 = 0$</p> $y = \frac{1}{2}$ $\therefore y = \frac{\sqrt{x}}{\sqrt{x} + 1}$
7	$ax^2 + bx + c = 0, \text{ punca berbeza sebanyak 1}$ <p>Katakan punca – puncanya ialah x_2 dan $x_1, x_2 > x_1$</p> $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} - \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = 1$ $\frac{2\sqrt{b^2 - 4ac}}{2a} = 1$ $\sqrt{b^2 - 4ac} = a$ $b^2 - 4ac = a^2$
8	$(k + 1)x^2 - (k^2 + k + 1)x + k = 0$ $x^2 - \frac{k^2 + k + 1}{k + 1}x + \frac{k}{k + 1} = 0$

	$x^2 - \frac{k(k+1)+1}{k+1}x + \frac{k}{k+1} = 0$ $x^2 - \left(k + \frac{1}{k+1}\right)x + k \times \frac{1}{k+1} = 0$ $\therefore x = k @ x = \frac{1}{k+1}$
9	$b = a^2 - 6a + c \dots\dots\dots(I)$ $a = b^2 - 6b + c \dots\dots\dots(II)$ $27 = a^2 + 6a + c \dots\dots\dots(III)$ $b - a = a^2 - b^2 - 6a + 6b$ $b - a = (a - b)(a + b) - 6(a - b)$ $(a - b)(a + b) - 6(a - b) + (a - b) = 0$ $a + b = 5$ <p>Jika a=b,</p> $b + b = 5$ $b = \frac{5}{2}, a = \frac{5}{2}$ $c = \frac{45}{4}$ $\therefore y = x^2 - 6x + \frac{45}{4}$ <p>Jika a ≠ b,</p> $a + b = 5$ $b = a^2 - 6a + c$ $5 - a = a^2 - 6a + c$ $a^2 - 5a - 5 + c = 0$ $a^2 + 6a - 27 + c = 0$ $11a - 22 = 0$ $a = 2, b = 3, c = 11$ $\therefore y = x^2 - 6x + 11$
10	<p>S=18,</p> $x + y + 14 = 36$ $y = 22 - x$ $\text{Luas} = \sqrt{18(18 - 14)(18 - x)(18 - y)}$ $\text{Luas} = \sqrt{18(18 - 14)(18 - x)(18 - (22 - x))}$ $A = \sqrt{-72(x^2 - 22x + 72)}$ $A^2 = -72(x^2 - 22x + 72)$ <p>Penyempurnaan kuasa dua,</p> $A^2 = -72[(x - 11)^2 - 121 + 72]$ $A^2 = -72[(x - 11)^2 - 49]$ $\therefore \text{maks bagi } A^2 = 72 \times 49$ $\therefore \text{maks bagi } A = \sqrt{72 \times 49}$ $= 42\sqrt{2}, \text{ terjadi bila } x = 11$

11

$$(\sqrt{3} - 1)x^2 - 2\sqrt{3}x = 3 + 3\sqrt{3}$$

$$x^2 - \frac{2\sqrt{3}}{\sqrt{3} - 1}x = \frac{3 + 3\sqrt{3}}{\sqrt{3} - 1}$$

$$x^2 - \frac{2\sqrt{3}(\sqrt{3} + 1)}{(\sqrt{3} - 1)(\sqrt{3} + 1)}x = \frac{(3 + 3\sqrt{3})(\sqrt{3} + 1)}{(\sqrt{3} - 1)(\sqrt{3} + 1)}$$

$$x^2 - (3 + \sqrt{3})x - (6 + 3\sqrt{3}) = 0$$

$$x = \frac{(3 + \sqrt{3}) \pm \sqrt{(3 + \sqrt{3})^2 + 4(6 + 3\sqrt{3})}}{2}$$

$$x = 3 + 2\sqrt{3}, @x = -\sqrt{3}$$

PERATURAN PEMARKAHAN

BIL	PEMARKAHAN	SUB MARKAH	JUMLAH
9.	$10x + 20y + 40z = 550 \dots (1) \times 2$ $20x + 15y + 45z = 665 \dots (2)$ $5x + 35y + 30z = 560 \dots (3) \times 2$ $10x + 70y + 60z = 1120$ - $10x + 20y + 40z = 550$ * menggunakan kaedah penggantian / penghapusan $(3) - (1) : 5y + 2z = 57$ $(1) - (2) : 5y + 7z = 87$ $z = 6 \quad y = 9 \quad x = 13$ Kilang A = 13 hari Kilang B = 9 hari Kilang C = 6 hari	2 1 3	6
10.	$20x + 2y = 180$ $2xy + 12x^2 = 700$ $xy + 6x^2 = 350$ $y = 90 - 10x$ $x(90 - 10x) + 6x^2 = 350$ $2x^2 - 45x + 175 = 0$ $(x - 5)(2x - 35) = 0$ $x = 5, x = \frac{35}{2}$ $y = 40, y = -85$ Panjang dan lebar kedai ialah 40 m dan 5 m masing-masing	1 1 1 1 1	6

Jawapan/ Answer:

S.K: 4.1 Hukum Indeks

1. $2^{3x-5} = 2^{-2(x+1)}$

$$2^{3x-5} = 2^{-2x-2}$$

$$3x - 5 = -2x - 2$$

$$3x + 2x = 5 - 2$$

$$5x = 3$$

$$x = \frac{3}{5}$$

2. $4^x(4^3) - 4^x(4^2) = 3$

$$64(4^x) - 16(4^x) = 3$$

$$48(4^x) = 3$$

$$4^x = \frac{3}{48}$$

$$4^x = \frac{1}{16}$$

$$4^x = \frac{1}{4^2}$$

$$4^x = 4^{-2}$$

$$x = -2$$

S.K: 4.2 Hukum Surd

1. a) $(2^x)^2 + (\sqrt{2^x})^2 = (6\sqrt{2})^2$

$$(2^x)^2 + 2^x = 72$$

Let $a = 2^x$

$$a^2 + a - 72 = 0$$

$$(a + 9)(a - 8) = 0$$

$$a = -9, a = 8$$

$$2^x = 8$$

$$2^x = 2^3$$

$$x = 3$$

$$\text{b) } \frac{1}{2}(2 + \sqrt{3})h = 2(\sqrt{3} - 6)$$

$$h = \frac{4(\sqrt{3} - 6)}{2 + \sqrt{3}} \times \frac{2 - \sqrt{3}}{2 - \sqrt{3}}$$

$$h = \frac{4(2\sqrt{3} - 3 - 12 + 6\sqrt{3})}{2^2 - (\sqrt{3})^2}$$

$$h = \frac{4(8\sqrt{3} - 15)}{4 - 3}$$

$$h = 32\sqrt{3} - 60$$

$$h = -60 + 32\sqrt{3}$$

$$\text{2. a) } (\sqrt{3^x})^2 + (3^x)^2 = (2\sqrt{3})^2$$

$$3^x + (3^x)^2 = 12$$

$$\text{Let } a = 3^x$$

$$a^2 + a - 12 = 0$$

$$(a + 4)(a - 3) = 0$$

$$a = -4, a = 3$$

$$3^x = 3$$

$$x = 1$$

$$\text{b) } \frac{1}{2}(2 + \sqrt{5})h = 5(\sqrt{5} + 3)$$

$$h = \frac{10(\sqrt{5} + 3)}{2 + \sqrt{5}} \times \frac{2 - \sqrt{5}}{2 - \sqrt{5}}$$

$$h = \frac{10(2\sqrt{5} - 5 + 6 - 3\sqrt{5})}{2^2 - (\sqrt{5})^2}$$

$$h = \frac{10(1 - \sqrt{5})}{4 - 5}$$

$$h = -10(1 - \sqrt{5})$$

$$h = -10 + 10\sqrt{5}$$

SK: 4.3 Hukum Logaritma

1.(a) $\log_a x = p, \log_a y = q$

(b) $xy = a^p \times a^q$

$$xy = a^{p+q}$$

$$\log_a xy = p + q$$

$$\log_a xy = \log_a x + \log_a y$$

2.(a) $\log_a x = p, \log_a y = q$

(b) $\frac{x}{y} = \frac{a^p}{a^q}$

$$\frac{x}{y} = a^{p-q}$$

$$\log_a \frac{x}{y} = p - q$$

$$\log_a \frac{x}{y} = \log_a x - \log_a y$$

3. (a) $\log_a x = p$

(b) $x^n = a^{pn}$

$$\log_a x^n = pn$$

$$\log_a x^n = n \log_a x$$

4. $\log_2 y = 2 + \log_2(x - 2)$

$$\log_2 y - \log_2(x - 2) = 2$$

$$\log_2 \frac{y}{(x - 2)} = 2$$

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

$$y = 4(x - 2)$$

$$5. \log_2 y - \log_4 9 = 1$$

$$\log_2 y - \frac{\log_2 9}{\log_2 4} = 1$$

$$\log_2 y - \frac{\log_2 9}{\log_2 2^2} = 1$$

$$\log_2 y - \frac{\log_2 9}{2\log_2 2} = 1$$

$$\log_2 y - \frac{\log_2 3^2}{2} = 1$$

$$\log_2 y - \frac{2\log_2 3}{2} = 1$$

$$\log_2 y - \log_2 3 = 1$$

$$\log_2 \frac{y}{3} = 1$$

$$2^1 = \frac{y}{3}$$

$$y = 6$$

S.K: 6.2 Hukum Linear dan Hubungan Tak Linear

$$1. m = \frac{12-2}{1-6} = -2$$

$$12 = -2(1) + c$$

$$c = 14$$

$$\log_{10} y = -2 \log_{10} x + 14$$

$$\log_{10} y + 2 \log_{10} x = 14$$

$$\log_{10} y + \log_{10} x^2 = 14$$

$$\log_{10} x^2 y = 14$$

$$x^2 y = 10^{14}$$

$$y = \frac{10^{14}}{x^2}$$

$$2. m = \frac{3-1}{1-3} = -1$$

$$3 = -1(1) + c$$

$$c = 4$$

$$\log_{10} y = -\log_{10} x + 4$$

$$\log_{10} y + \log_{10} x = 4$$

$$\log_{10} y + \log_{10} x = 4$$

$$\log_{10} xy = 4$$

$$xy = 10^4$$

$$y = \frac{10^4}{x}$$

$$3. \log_{10} y = \log_{10} k(2.8)^{-\frac{m}{x}}$$

$$\log_{10} y = \log_{10} k + \log_{10}(2.8)^{-\frac{m}{x}}$$

$$\log_{10} y = \log_{10} k - \frac{m}{x} \log_{10}(2.8)$$

$$\log_{10} y = [-m \log_{10}(2.8)] \frac{1}{x} + \log_{10} k$$

JAWAPAN

<p>1.</p>	<p>(a) $T_7 - T_3 = 12$ $(a + 6d) - (a + 2d) = 12$ $d = 3$ $T_{11} = 42$ $a + 10d = 42$ $a + 10(3) = 42$ $a = 12$</p> <p>(b) $T_n = 177$ $12 + (n - 1)(3) = 177$ $3n = 168$ $n = 56$</p>
<p>2.</p>	<p>(a) $a = 6000, r = 1.022, n = 7$ $T_7 = (6000)(1.022^{7-1})$ $= 6836.86$</p> <p>(b) $T_n > 18000$ $(6000)(1.022)^{n-1} > 18000$ $(n - 1)\log_{10} 1.022 > \log_{10} 3$ $n - 1 > 50.48$ $n > 51.48$ $n = 52$</p> <p>(c) $T_5 = (6000)(1.022^{5-1}) = 6545.68$ $= 6545.68 - 6000$ $= 546$</p>

3.

(a) $T_n = 0, d = -15$

$$a + (n-1)d = 0$$

$$180 + (n-1)(-15) = 0$$

$$n = 13$$

(b) $a = x, d = -4$

$$x + (13-1)(-4) = 0$$

$$x = 48$$

(c) P

$$S_{13} = \frac{13}{2} [2(180) + (13-1)(-15)] = 1170$$

Q

$$S_{13} = \frac{13}{2} [2(48) + (13-1)(-4)] = 312$$

$$= 1170 - 312$$

$$= 858$$

4.

(a)

(i)	$T_6 = 500 + 5(50) = 70$ buku
(ii)	$T_n = 1000$ $500 + (n-1)(50) = 1000$ $50n = 550$ $n = 11$

(b) $S_{12} = \frac{12}{2} [2(500) + (12-1)(50)]$

$$= 9300$$

$$= 9300 \times 0.08$$

$$= 744$$

<p>5.</p>	<p>(a) $\frac{m}{768} = \frac{3072}{m}$ $m^2 = 2359296$ $m = 1536$</p> <p>(b) $S_6 = 756$ $\frac{a(2^6 - 1)}{2 - 1} = 756$ $a = 16$</p> <p>(c) $T_n > 13000$ $12(2)^{n-1} > 13000$ $(n-1)\log_{10} 2 > \log_{10} 1083.3333$ $n > 11.0813$ $n = 12$</p>
<p>6.</p>	<p>(a) $S_1 = \frac{1}{4} \left(9 + \frac{3}{2}(1) \right) = \frac{21}{8}$ $S_2 = \frac{2}{4} \left(9 + \frac{3}{2}(2) \right) = 6$ $T_2 = S_2 - S_1$ $= 6 - \frac{21}{8}$ $= \frac{27}{8}$ $d = T_2 - T_1$ $= \frac{27}{8} - \frac{21}{8}$ $= \frac{3}{4}$</p>

	<p>(b) $= S_{20} - S_5$</p> $= \frac{20}{4} \left[9 + \frac{3}{2}(20) \right] - \frac{5}{4} \left[9 + \frac{3}{2}(5) \right]$ $= 195 - \frac{165}{8}$ $= 174 \frac{3}{8}$
7.	<p>(a) $T_1 = 2(1) - 5 = -3$</p> $T_{20} = 2(20) - 5 = 35$ $S_{20} = \frac{20}{2} [(-3) + 35]$ $= 320$ <p>(b) $T_6 - T_3 = 120$</p> $[a + (6-1)d] - [a + (3-1)d] = 120$ $3d = 120$ $d = 40$ $T_{12} > 3500$ $a + (12-1)(40) > 3500$ $a > 3060$ $T_{11} > 3500$ $a + (11-1)(40) > 3500$ $a > 3100$ $3060 < a < 3100$
8.	

(a) $a = 80, r = \frac{3}{4}$

$$T_4 = 80 \left(\frac{3}{4} \right)^{4-1}$$
$$= 33 \frac{3}{4}$$

(b) $80 \left(\frac{3}{4} \right)^{n-1} = \frac{405}{16}$

$$\left(\frac{3}{4} \right)^{n-1} = \frac{81}{256}$$

$$\left(\frac{3}{4} \right)^{n-1} = \left(\frac{3}{4} \right)^4$$

$$n-1 = 4$$

$$n = 5$$

(c) $S_\infty = \frac{80}{1 - \frac{3}{4}}$

$$= 320$$

9.

(a) $a = 150000, r = 0.92$

$$S_\infty = \frac{150000}{1 - 0.92}$$
$$= 1875000$$

	(b)	<table border="1"> <tr> <td data-bbox="354 193 428 730">(i)</td> <td data-bbox="428 193 1338 730"> $T_n > 10000$ $150000(0.92)^{n-1} > 10000$ $(0.92)^{n-1} > \frac{1}{15}$ $\log(0.92)^{n-1} > \log \frac{1}{15}$ $n-1 < \frac{\log \frac{1}{15}}{\log 0.92}$ $n < 33.48$ $n = 33$ </td> </tr> <tr> <td data-bbox="354 730 428 1035">(ii)</td> <td data-bbox="428 730 1338 1035"> $S_{33} = \frac{150000(1-0.92^{33})}{1-0.92}$ $= 1755326$ </td> </tr> </table>	(i)	$T_n > 10000$ $150000(0.92)^{n-1} > 10000$ $(0.92)^{n-1} > \frac{1}{15}$ $\log(0.92)^{n-1} > \log \frac{1}{15}$ $n-1 < \frac{\log \frac{1}{15}}{\log 0.92}$ $n < 33.48$ $n = 33$	(ii)	$S_{33} = \frac{150000(1-0.92^{33})}{1-0.92}$ $= 1755326$
(i)	$T_n > 10000$ $150000(0.92)^{n-1} > 10000$ $(0.92)^{n-1} > \frac{1}{15}$ $\log(0.92)^{n-1} > \log \frac{1}{15}$ $n-1 < \frac{\log \frac{1}{15}}{\log 0.92}$ $n < 33.48$ $n = 33$					
(ii)	$S_{33} = \frac{150000(1-0.92^{33})}{1-0.92}$ $= 1755326$					
10.		$a = 100, r = 0.98$ $50 > 100(0.98)^{n-1}$ $0.5 > (0.98)^{n-1}$ $\log 0.5 > (n-1)\log 0.98$ $n-1 > 34.31$ $n > 35.31$ $n = 36$				
11.		$T_8 = 10p + 5, S_9 - S_3 = 55p + 1, d = 6$ $a + (8-1)(6) = 10 + 5$ $a = 10p - 37$ $\frac{9}{2}[2a + (9-1)(6)] - \frac{3}{2}[2a + (3-1)(6)] = 55p + 1$ $6a - 55p = -197$ $6(10p - 37) - 55p = -197$ $p = 5$				

<p>12.</p>	<p>(a) $a = 1.2, r = 1.05$</p> $S_4 = \frac{1.2(1.05^4 - 1)}{1.05 - 1}$ $= 5.172 \text{ juta}$ <p>(b) $= S_5 - S_2$</p> $= \frac{1.2(1.05^5 - 1)}{1.05 - 1} - \frac{1.2(1.05^2 - 1)}{1.05 - 1}$ $= 4.171 \text{ juta}$ <p>Keuntungan</p> $= 0.17(4.171)$ $= 0.709 \text{ juta}$
<p>13.</p>	<p>(a) $\frac{3p+q}{15p+q} = \frac{q-p}{3p+q}$</p> $9p^2 + 6pq + q^2 = 14pq - 15p^2 + q^2$ $24p^2 - 8pq = 0$ $8p(3p - q) = 0$ $p = 0, q = 3p$ $\therefore q = 3p$ <p>(b) $r = \frac{3p+q}{15p+q}$</p> $= \frac{3p+3p}{15p+3p}$ $= \frac{1}{3}$

	<p>(c) $15 = 3p$ $p = 5$, $a = 90$ $S_{\infty} = \frac{90}{1 - \frac{1}{3}} = 135$</p>
14.	<p>(a) $S_{20} = 123$ $\frac{20}{2} [2a + (20-1)d] = 123$ $20a + 190d = 123$ $S_5 = 12$ $\frac{5}{2} [2a + (5-1)d] = 12$ $5a + 10d = 12$ ($20a + 40d = 48$) Selesaikan $150d = 75$ $d = \frac{1}{2}$</p> <p>(b) $5a + 10d = 12$ $5a + 10\left(\frac{1}{2}\right) = 12$ $a = 1.4$</p> <p>(c) $T_{20} = 1.4 + (20-1)(0.5)$ $= 10.9$</p>
15.	<p>(a) $(15+x) - 2x = 10x - (12+x)$ $x = 3$</p>

	<p>(b) $\frac{p}{24} = \frac{q}{p}$</p> $(24)\left(\frac{p}{24}\right)^{5-1} = 1944$ $p = 72$ $\frac{72}{24} = \frac{q}{72}$ $q = 216$
16.	<p>(a) $C_1 = 2\pi r$</p> $C_2 = 2\pi(r+2) = 2\pi r + 4\pi$ $C_3 = 2\pi(r+4) = 2\pi r + 8\pi$ $d = 4\pi$ <p>(b) $S_6 = \frac{6}{2}[2(2\pi r) + (6-1)(4\pi)] = 150\pi$</p> $r = 7.5$ <p>(c) $T_9 = (2\pi \times 7.5) + (9-1)(4\pi)$</p> $= 47\pi$
17.	<p>(a) $a = 10, r = 0.95$</p> $T_7 = 10(0.95)^{7-1}$ $= 7.35$ <p>(b) $S_n = 100$</p> $\frac{10[1-(0.95)^n]}{1-0.95} = 100$ $0.95^n = 0.5$ $n \log 0.95 = \log 0.5$ $n = 13.5$

<p>18.</p>	<p><i>A</i></p> $T_8 = 30000(1.045)^{8-1}$ $= 40825.85$ <p><i>B</i></p> $T_8 = 30000 + (8-1)(1500)$ $= 40500$ <p>Beza</p> $= 40825.85 - 40500$ $= 325.85$		
<p>19.</p>	<p>(a) $16 - x = y - 16$ $x + y = 32$</p> <p>(b) $a + 2d = m \dots\dots\dots(1)$ $a + 4d = n \dots\dots\dots(2)$ $(2) - (1)$ $d = \frac{n - m}{2}, a = 2m - n$ $T_7 = 2m - n + 6\left(\frac{n - m}{2}\right)$ $T_7 = 2n - m$</p> <p>(c) $r = 0.3(2)^{5-1}$ $r = 4.8$</p>		
<p>20.</p>	<p>(a)</p> <table border="1" data-bbox="354 1585 1344 1837"> <tr> <td data-bbox="354 1585 423 1837">(i)</td> <td data-bbox="423 1585 1344 1837"> $S_1 = 3(1)^2 - 1 = 2$ $S_2 = 3(2)^2 - 2 = 10$ $T_2 = 8$ $d = 6$ </td> </tr> </table>	(i)	$S_1 = 3(1)^2 - 1 = 2$ $S_2 = 3(2)^2 - 2 = 10$ $T_2 = 8$ $d = 6$
(i)	$S_1 = 3(1)^2 - 1 = 2$ $S_2 = 3(2)^2 - 2 = 10$ $T_2 = 8$ $d = 6$		

	<p>(ii) $T_{n+1} = S_{n+1} - S_n$ $= [3(n+1)^2 - (n+1)] - [3n^2 - n]$ $= 6n + 2$</p> <p>(b) (i) $\frac{48}{x} = \frac{3x}{16}$ $3x^2 = 768$ $x = 16$</p> <p>(ii) $r = 3$ $= S_{10} - S_3$ $= \frac{16}{3}(3^{10} - 1) - \frac{16}{3}(3^3 - 1)$ $= \frac{16}{3} \frac{3^{10} - 1 - (3^3 - 1)}{3 - 1} = \frac{16}{3} \frac{3^{10} - 3^3}{3 - 1}$ $= 157392$</p>	
21.	<p>(a) $a = \frac{3(1-33)}{2}$ $a = -48$ $S_2 = \frac{3(2)(2-33)}{2}$ $S_2 = -93$ $a + T_2 = S_2$ $T_2 = -93 + 48$ $T_2 = -45$ $d = -45 - (-48)$ $d = 3$ $-48, -45, -42, \dots$ $T_3 = 42$</p>	

$$\begin{aligned}
 \text{(b)} \quad &= S_{20} - S_7 \\
 &= \frac{3(20)(20-33)}{2} - \frac{3(7)(7-33)}{2} \\
 &= -117
 \end{aligned}$$

$$\begin{aligned}
 \text{(c)} \quad &\frac{3n(n-33)}{2} > 100 \\
 &3n^2 - 99n - 200 > 0 \\
 &n > 34.9 \\
 &n = 35
 \end{aligned}$$

22.

(a)

(i)	$ \begin{aligned} T_n &= S_n - S_{n-1} \\ &= (5n - n^2) - (5(n-1) - (n-1)^2) \\ &= 6 - 2n \end{aligned} $
(ii)	$ \begin{aligned} T_{15} &= S_{15} - S_{14} \\ &= [5(15) - (15)^2] - [5(14) - (14)^2] \\ &= -24 \end{aligned} $

$$\begin{aligned}
 \text{(b)} \quad &S_n > 150 \\
 &\frac{n}{2} [2(1) + (n-1)(3)] > 150 \\
 &3n^2 - n - 300 > 0 \\
 &n > 10.16 \\
 &n = 11
 \end{aligned}$$

$$\begin{aligned}
 \text{(c)} \quad &T_{11} = 840 + 10(204) \\
 &= 2880
 \end{aligned}$$

23.

(a)

(i)	$T_n = 137781$ $(-7)(-3)^{n-1} = 137781$ $(-3)^{n-1} = (-3)^9$ $n-1 = 9$ $n = 10$
(ii)	$T_n = 0.9375$ $(60)\left(\frac{1}{2}\right)^{n-1} = 0.9375$ $\left(\frac{1}{2}\right)^{n-1} = \left(\frac{1}{2}\right)^6$ $n-1 = 6$ $n = 7$

(b) $\frac{2(6^n - 1)}{6 - 1} = 18862$
 $6^n = 6^6$
 $n = 6$

(c)

(i)	$S_6 = \frac{240000(1.12^6 - 1)}{1.12 - 1}$ $= 1947645.37$
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	<p>(ii) $T_n > 3000000$ $240000(1.12)^{n-1} > 3000000$ $\log(1.12)^{n-1} > \log \frac{25}{2}$ $n-1 > \frac{\log \frac{25}{2}}{\log 1.12}$ $n > 22.29$ $n = 24$</p>	
<p>24.</p>	<p>(a) $S_n = 2n^2 - 20n$ $T_n = S_n - S_{n-1}$ $= [2n^2 - 20n] - [2(n-1)^2 - 20(n-1)]$ $= [2n^2 - 20n] - [2n^2 - 24n + 22]$ $= 4n - 22$</p> <p>(b) $T_{10} = 4(10) - 22$ $= 18$</p>	
<p>25.</p>	$S_n = a + ar + ar^2 + \dots + ar^{n-2} + ar^{n-1}$ $rS_n = ar + ar^2 + ar^3 + \dots + ar^{n-1} + ar^n$ $1-2$ $S_n - rS_n = a - ar^n$ $S_n(1-r) = a(1-r^n)$ $S_n = \frac{a(1-r^n)}{1-r}$	

JAWAPAN

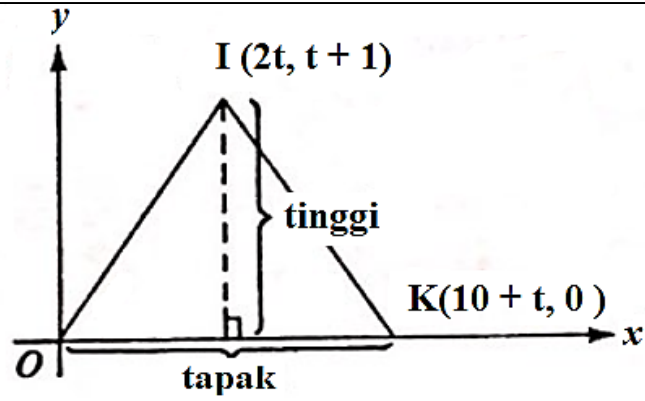
SOALAN	SKEMA	MARKAH
1.	<p>Diberi H adalah titik dalam garis EF yang paling hampir dengan G. Maka EF dan GH adalah serenjang.</p> $m_{EF} = \frac{6-3}{8-(-1)} = \frac{1}{3}$ $EF: (3) = \frac{1}{3}(-1) + c \rightarrow c = \frac{10}{3}$ $EF: y = \frac{1}{3}x + \frac{10}{3}$ $m_{GH} \times \left(\frac{1}{3}\right) = -1, \rightarrow m_{GH} = -3$ $GH: (-2) = -3(4) + c. \rightarrow c = 10$ $GH: y = -3x + 10$ <p>Cari koordinat H (x,y), persamaan serentak</p> $y = -3x + 10$ $(-) y = \frac{1}{3}x + \frac{10}{3}$ $0 = -\frac{10}{3}x + \frac{20}{3}$ $x = 2 \quad y = 4 \rightarrow H(2,4)$ <p>Jarak GH :</p> $\sqrt{(2-4)^2 + (4-(-2))^2} = \underline{6.325 \text{ meter.}}$	

SOALAN	SKEMA	MARKAH
2.	<p>a) Kecerunan PQ = $-3m = \frac{-4-1}{-1-1}$</p> $-3m = -\frac{3}{2}$ $m = \frac{1}{2}$	
	<p>b) Biarkan koordiant R sebagai (x, y)</p> <p>Kecerunan PR = $3m = \frac{y-1}{x-1}$</p> $3m = \frac{y-1}{x-1}$ <p>Gantikan $m = \frac{1}{2}$ ke dalam persamaan</p>	

	$\frac{3}{2} = \frac{y-1}{x-1}$ $3(x - 1) = 2(y - 1)$ $3x - 3 = 2y - 2$ $3x - 2y = 1 \dots \dots \dots (1)$ <p>Kecerunan $QR = m = \frac{y-4}{x+1}$</p> <p>Gantikan $m = \frac{1}{2}$ ke dalam persamaan</p> $\frac{1}{2} = \frac{y-4}{x+1}$ $x + 1 = 2(y - 4)$ $x + 1 = 2y - 8$ $x - 2y = -9 \dots \dots \dots (2)$ <p>Persamaan (1) – Persamaan (2)</p> $2x = 10$ $x = 5$ <p>Gantikan $x = 5$ ke dalam persamaan (1)</p> $15 - 2y = 1$ $2y = 14$ $y = \frac{14}{2} = 7$ <p>Koordinat R ialah (5, 7)</p>	
c)	$PR = \sqrt{(5 - 1)^2 + (7 - 1)^2}$ $= \sqrt{16 + 36}$ $= \sqrt{52}$ $= 2\sqrt{13}$ $PR = \sqrt{(5 - 1)^2 + (7 - 1)^2}$ $= \sqrt{16 + 36}$ $= \sqrt{52}$ $= 2\sqrt{13}$ $PQ = \sqrt{(4 - 1)^2 + (-1 - 1)^2}$ $= \sqrt{9 + 4}$ $= \sqrt{13}$ $PR = 2PQ$	

3.

(a)



$$\text{Luas } \triangle IOK = \frac{1}{2} \times \text{tapak} \times \text{tinggi}$$

$$26 = \frac{1}{2} \times (10 + t) \times (t + 1)$$

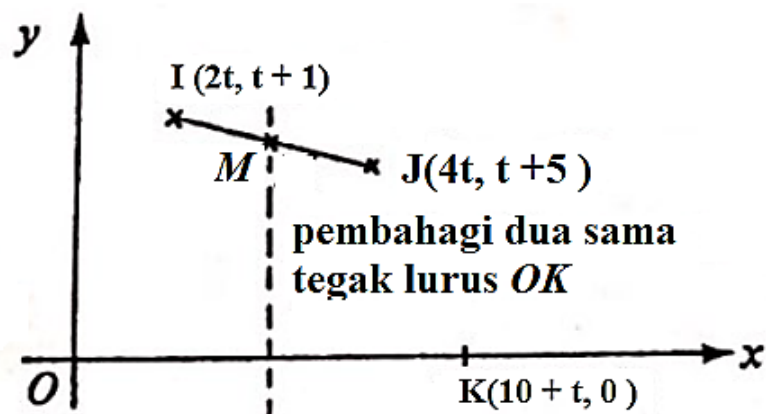
$$t^2 + 11t - 42 = 0$$

$$(t - 3)(t + 14) = 0$$

$$\therefore t = 3 \text{ atau } t = -14$$

$$t = 3 \text{ (kerana } t > 0)$$

(b)



Koordinat titik tengah IJ ialah,

$$M\left(\frac{6t}{2}, \frac{2t+6}{2}\right)$$

$$= M(3t, t + 3)$$

		<p>Bagi memastikan titik M adalah sama jarak dari O dan M, titik M mesti terletak di atas pembahagi dua sama serenjang untuk OK.</p> <p>\therefore Koordinat-x bagi M = $\frac{1}{2}$ (koordinat-x bagi K).</p> <p>$3t = \frac{1}{2}(10 + t)$</p> <p>$\therefore t = 2$</p>	
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4.	a)	$\frac{PK}{PL} = \frac{1}{2}$ $\frac{\sqrt{(x-1)^2+(y-0)^2}}{\sqrt{(x+2)^2+(y-0)^2}} = \frac{1}{2}$ $\frac{x^2-2x+1+y^2}{x^2+4x+4+y^2} = \frac{1}{4}$ $4x^2 - 8x + 4 + 4y^2 = x^2 + 4x + 4 + y^2$ $3x^2 + 3y^2 - 12x = 0$ $x^2 + y^2 - 4x = 0$	K1 N1
	b)	<p>Kecerunan KS = $\frac{2-0}{2-1} = 2$</p> <p>Persamaan KS</p> $y - 0 = 2(x - 1)$ $y = 2x - 2$	K1 N1
	c)	<p>Gantikan $y = 2x - 2$ ke dalam persamaan lokus P</p> $x^2 + (2x - 2)^2 - 4x = 0$ $x^2 + 4x^2 - 8x + 4 - 4x = 0$ $5x^2 - 12x + 4 = 0$ $(5x - 2)(x - 2) = 0$ $X = \frac{2}{5}; x = 2$ $X = \frac{2}{5}; y = 2(\frac{2}{5}) - 2$ $y = -\frac{6}{5}$ <p>N ($\frac{2}{5}, -\frac{6}{5}$)</p>	K1 K1 N1
	d)	<p>(a) Luas $\Delta KSN = \frac{1}{2} [\frac{12}{5} - (-\frac{6}{5})]$</p> $= \frac{9}{5} \text{ units}^2$	K1 N1
	e)	$(2)^2 + (-2)^2 - 4(2) = 0$ $0 = 0$ <p>Titik (2, -2) terletak pada lokus P kerana koordinat $x = 2$ dan $y = -2$ memuaskan persamaan lokus P</p>	K1 N1

5.	a)	(i)	masukkan $x = 7$ dan $y = 4$ ke dalam $2y = kx - 13 \Rightarrow 2(4) = k(7) - 13 \Rightarrow 7k = 21 \Rightarrow k = 3$	
		(ii)	$2y = 3x - 13 \Rightarrow y = -\frac{2}{3}x + \frac{13}{3}$ daripada (2) $y = -\frac{2}{3}(3) + \frac{13}{3} = -2 + \frac{13}{3} = \frac{7}{3}$ \therefore koordinat P adalah $(3, \frac{7}{3})$	
	b)	(i)	bila $y = 0$, $3x - 13 = 0 \Rightarrow 3x = 13 \Rightarrow x = \frac{13}{3}$ $\therefore Q(\frac{13}{3}, 0)$ Maka $m = \frac{0 - \frac{7}{3}}{\frac{13}{3} - 3} = \frac{-\frac{7}{3}}{\frac{4}{3}} = -\frac{7}{4}$	
		(ii)	$m_{RS} = -\frac{2}{3}$ persamaan garis lurus RS ialah $y - 4 = -\frac{2}{3}(x - 7) \Rightarrow 3y - 12 = -2x + 14 \Rightarrow 2x + 3y = 26$	
	c)		$AP = 2AR \Rightarrow (AP)^2 = 4(AR)^2 \Rightarrow (x - 3)^2 + (y + 2)^2 = 4[(x - 3)^2 + (y + 2)^2]$	

6.	a)	Koordinat bagi titik $Y = (2, -4)$. Katakan koordinat bagi titik $A = (x, y)$. Diberi $AW = \frac{1}{2} WM$ $2AW = WM$ $2(x - 2)^2 + (y - 4)^2 = (2 - 2)^2 + (4 - (-4))^2$ $4(x^2 - 4x + 4 + y^2 - 8y + 16) = 0 + 64$ $4x^2 - 16x + 16 + 4y^2 - 32y + 64 = 64$ $4x^2 + 4y^2 - 16x - 32y + 16 = 0$ $x^2 + y^2 - 4x - 8y + 4 = 0$	
	b)	$x^2 + y^2 - 4x - 8y + 4 = 0$ pada paksi- x , $y = 0$. $x^2 + 0 - 4x - 8(0) + 4 = 0$ $x^2 - 4x + 4 = 0$	

		$(x - 2)(x - 2) = 0$ $x = 2$	
7.	a)	$m_{AB} = \frac{8-6}{2-0} = 1$ $m_{AC} = -1$ $D(0, 6) = \left[\frac{1(x)+2(2)}{3}, \frac{1(y)+2(8)}{3} \right]$ $0 = \frac{x+4}{3} \quad \text{atau} \quad 6 = \frac{y+16}{3}$ $A(-4, 2)$ $y - 2 = -1[x - (-4)]$ $y = -x - 2$	
	b)	$26 = \frac{1}{2} -4 \cdot 2 \quad 2 \cdot 8 \quad x \cdot y \quad -4 \cdot 2 $ $26 = \frac{1}{2} (-4 \times 8) + (2 \times y) + (x \times 2) - (2 \times 2) + (8 \times x) +$ $26 = \frac{1}{2} -36 + 6y - 6x $ $-26 = -18 + 3y - 3x \quad \text{----- (1)}$ $y = -x - 2 \quad \text{----- (2)}$ $-26 = -18 + 3(-x - 2) - 3x$ $x = \frac{1}{3}$ $y = -\frac{1}{3} - 2$ $C\left(\frac{1}{3}, -\frac{7}{3}\right)$	

8.	a)	$\left(\frac{-1+x}{2}, \frac{10+y}{2}\right) = (1, 6)$ $\frac{-1+x}{2} = 1 \quad , \quad \frac{10+y}{2} = 6$ $-1 + x = 2 \quad , \quad 10 + y = 12$ $x = 3 \quad , \quad y = 2$ $\therefore \text{Rama } (3, 2)$	
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	<p>b) Apabila jalan dari rumah Ali ke rumah Anita berserenjang kepada jalan dari rumah Bong ke rumah Rama</p> $m_{AD} \times m_{BM} = -1$ $\frac{k-6}{h-1} \times \frac{2-10}{3-(-1)} = -1$ $\frac{k-6}{h-1} \times \frac{-8}{4} = -1$ $\frac{h-6}{k-1} = \frac{1}{2}$ $2k - 12 = h - 1$ $h = 2k - 11 \dots \dots \dots (1)$ $\frac{k-10}{h-(-1)} = -\frac{1}{3}$ $3(k - 10) = -(h + 1)$ $3k - 30 = -h - 1$ $3k = -h + 29 \dots \dots \dots (2)$ <p>Gantikan (1) ke dalam (2)</p> $3k = -(2k - 11) + 29$ $3k = -2k + 11 + 29$ $3k = -2k + 40$ $5k = 40$ $k = \frac{40}{5}$ $k = 8$ <p>Gantikan $k = 8$ dalam (1)</p> $h = 2(8) - 11$ $h = 5$ $\therefore h = 5, k = 8$	
	<p>c) (a) Kawasan yang disempadani oleh jalan rumah Ali, Bong dan Rama =</p> $= \frac{1}{2} 5 \ 8 \quad - \ 1 \ 3 \ 5 \ 10 \ 2 \ 8 $ $= \frac{1}{2} (50 - 2 - 24) - (-8 + 30 + 10) $	

		$= \frac{1}{2} 40 $ $= 20 \text{ unit}^2$	
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9.	a)	$(1,4) = \left(\frac{-5+3p}{4}, \frac{-2+18}{4} \right)$ $1 = \frac{-5+3p}{4}$ $p = 3$	<p>P1</p> <p>K1</p> <p>N1</p>
	b)	$\text{jarak} = \sqrt{(3-(-5))^2 + (6-(-2))^2}$	<p>K1</p> <p>N1</p>
	c)	$\text{jarak} = 8\sqrt{2} \text{ unit @ } 11.3137 \text{ unit}$ $m = \frac{6-(-2)}{3-(-5)}$ $-1 = 1(3) + c$ $y = x - 4$	<p>P1</p> <p>K1</p> <p>N1</p>

10.	a)	(i)	$R = \left(\frac{3(12)+2(0)}{5}, \frac{3(5)+2(0)}{5} \right)$ $= \left(\frac{36}{5}, 3 \right)$	<p>K1</p> <p>N1</p>
		(ii)	$m = \frac{1}{7}$ $y - 5 = \frac{1}{7}(x - 12) \text{ or equivalent OR } c = \frac{23}{7}$ $y = \frac{1}{7}x + \frac{23}{7}$	<p>P1</p> <p>K1</p> <p>N1</p>
		(ii)	$\frac{1}{2} 0(3) + (-2)(5) + 12(0) - (-2)(0) - 12(3) - 0(5) $ $= 23$	<p>K1</p> <p>N1</p>
	b)	$SQ = 2SP$ $\sqrt{(x-12)^2 + (y-5)^2} = 2\sqrt{(x-(-2))^2 + (y-3)^2}$		

			$3x^2 + 3y^2 + 40x - 14y - 117 = 0$	K1
				N1

11.	a)	(a) Titik tengah CD = $\left(\frac{-4+2}{2}, \frac{-1+1}{2}\right) = (-1, 0)$ $m_{CD} = \frac{-1-1}{-4-2} = \frac{1}{3}$ $m_{AB} \times m_{CD} = -1$ $m_{AB} = -3$ Titik tengah CD $(-1, 0)$ atau $m_{AB} = -3$ Persamaan garis lurus AB: $y - 0 = -3(x + 1)$ $y = -3x - 3$		1 1 1
	b)	(i) $y = -3x - 3 \dots (1)$ $y = 2x + 7 \dots (2)$ $(1) - (2) : 0 = -5x - 10$ $x = -2$ Apabila $x = -2, y = -3(-2) - 3$ $= 3$ Koordinat bagi lampu isyarat ialah $(-2, 3)$		1 1
		(ii) $y = -3x - 3$ $1 = -3\left(-\frac{4}{3}\right) - 3$ $1 = 1$ Jalan raya AB melalui bandar E.		1 1

12.	a)	$\frac{y-2t}{x-t^2} = -\frac{1}{t}$	
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		$yt - 2t^2 = t^2 - x$ $yt = 3t^2 - x \quad \text{----- (1)}$ $2y + x = 4 + 2t^2$ $x = 4 + 2t^2 - 2y \quad \text{----- (2)}$	
	b)	<p>Ganti (2) dalam (1)</p> $yt = 3t^2 - (4 + 2t^2 - 2y)$ $yt - 2y = t^2 - 4$ $y(t - 2) = (t - 2)(t + 2)$ $y = t + 2 \quad \text{(ditunjukkan)}$	
	c)	$x = 4 + 2t^2 - 2(t + 2)$ $x = 2t^2 - 2t$ $x = 2t(t - 1)$	
	d)	$y = t + 2$ $t = y - 2 \quad \text{----- (3)}$ $x = 2t(t - 1) \quad \text{----- (4)}$ <p>Ganti (3) dalam (4)</p> $x = 2(y - 2)(y - 2 - 1)$ $x = 2(y - 2)(y - 3)$ $x = 2y^2 - 10y + 12$ $2y^2 - 10y - x + 12 = 0$	

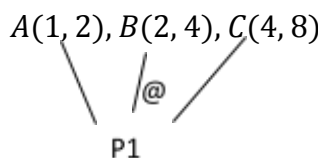
13.	a)	$M_{PQ} = M_{OR}$ $= \frac{3-0}{6-0}$ $= \frac{1}{2}$ <p>PQ : $y = \frac{1}{2}x + 5 \ominus 1$</p> $M_{QR} M_{OR} = -1$ $\frac{1}{2} M_{QR} = -1$ $M_{QR} = -2$ <p>QR: $y - y_1 = m(x - x_1)$</p>	1
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		$y - 3 = -2(x - 6)$ $y = -2x + 15 \quad \text{---} \textcircled{2}$ $\textcircled{1} = \textcircled{2},$ $\frac{1}{2}x + 5 = -2x + 15$ $x = 4$ <p>Gantikan $x = 4$ ke dalam $\textcircled{2}$,</p> $y = 7$ <p>Maka, koordinat Q ialah (4,7)</p>	1 1 1
	b)	$\text{Luas} = \frac{1}{2} 0 \ 6 \ 4 \ 0 \ 3 \ 7 \ 0 \ 0 \ 5 \ 0 $ $= \frac{1}{2} 42 + 20 - (12) $ $= \frac{1}{2} 50 $ $= 25 \text{ km}^2$	1 1
	c)	<p>Nisbah jarak TO : TQ = m : n</p> $3 = \frac{4m+n(0)}{m+n} \quad \text{atau} \quad \frac{21}{4} = \frac{7m+n(0)}{m+n}$ $3(m+n) = 4m \quad \quad \quad 21m + 21n = 28m$ $3m+3n=4m \quad \quad \quad 7m = 21n$ $m = 3n \quad \quad \quad m = 3n$ $\frac{m}{n} = \frac{3}{1}$ <p>TO : TQ = 3 : 1</p>	1 1

14.	a)	$Q(0, -2)$	1
	b)	<p>Anggap W sebagai titik penamat. Oleh itu, $W(-3,2)$</p> $PW = \sqrt{(3 - (-3))^2 + (-6 - 2)^2}$ $PW = 10 \text{ unit}$	1 1
	c)	$m_1 = m_{PQ}$ $= \frac{-6 - (-2)}{3 - 0} = -\frac{4}{3}$ $m_2 = \frac{-1}{-\frac{4}{3}} = \frac{3}{4}$	1

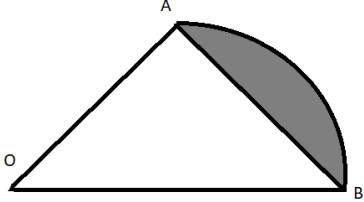
		$(0, -2), y - (-2) = \frac{3}{4}(x - 0)$ $y = \frac{3}{4}x - 2$	<p>1</p> <p>1</p>
	d)	$\left(\frac{PR}{QR}\right)^2 = \left(\frac{3}{2}\right)^2$ $4(PR)^2 = 9(QR)^2$ $4((X - 3)^2 + (Y + 6)^2) = 9((X - 0)^2 + (Y + 2)^2)$ $4(X^2 - 6X + 9 + Y^2 + 12Y + 36) =$ $9(X^2 + Y^2 + 4Y + 4)$ $4X^2 - 24X + 36 + 4Y^2 + 48Y + 144 =$ $9X^2 + 9Y^2 + 36Y + 36$ $5X^2 + 24X + 5Y^2 - 12Y - 144 = 0$	<p>1</p> <p>1</p> <p>1</p>

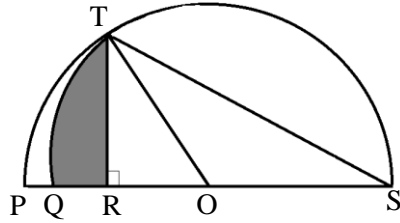
15.	a)	$\frac{x}{a} + \frac{y}{b} = 1$ $\frac{\log x}{-6} + \frac{\log y}{3} = 1$ $-\log x + 2 \log y = 6$ $2 \log y = \log x + 6$ $\log y = \frac{1}{2} \log x + 3$	K1
	b)	$\log y = \frac{1}{2} \log x + 3$ $\log y = \log x^{\frac{1}{2}} + \log 10^3$ $\log y = \log 1000 x^{\frac{1}{2}}$ $y = 1000 x^{\frac{1}{2}}$	<p>K1</p> <p>N1</p>
	c)	$4PQ = 3PR$ $\frac{PQ}{PR} = \frac{3}{4}$ $PQ : QR$	

		$3 : 1$ $\frac{-6(1)+3X}{4} = 0$ ATAU $\frac{0+3Y}{4} = 3$ $X = 2$ $Y = 4$ Koordinate R (2,4)	P1 K1 N1
	d)	Luas POQ = $\frac{1}{2} \times 3 \times 6$ $= 9$ atau $PQ = \sqrt{3^2 + 6^2}$ $= \sqrt{45}$ Luas : $\frac{1}{2} \times \sqrt{45} \times t = 9$ Jarak terpendek , $t = 2.6833$	K1 K1 N1
16.	a)	$\left(\frac{1(r+3)+2q}{1+2}, \frac{1(p+4)+2(r+1)}{1+2} \right) = (2q, p) \dots\dots\dots P1$ $\frac{r+3+2q}{3} = 2q$ $\frac{p+4+2r+2}{3} = p$ $r + 3 + 2q = 6q$ $p + 2r + 6 = 3p$ $r + 3 = 4q$ $2r + 6 = 2p$ $r = 4q - 3$ $r + 3 = p$ $p = 4q - 3 + 3$ $p = 4q$	N1
	b)	(i) $r = 1, \quad 4q - 3 = 1 \quad p = 4(1)$ $\quad \quad \quad 4q = 4 \quad \quad p = 4$ $\quad \quad \quad \quad \quad \quad q = 1$ $A(1, 2), B(2, 4), C(4, 8)$ $m_{AC} = \frac{8-2}{4-1}$  $\quad \quad \quad m_{AC} = 2$ $\quad \quad \quad -\frac{t}{3} = 2$ $\quad \quad \quad t = -6$	K1

		<p>Koordinat $A = (0, 4)$ $y = 0, 16 - 8x = 0, x = 2$ Koordinat $B = (2, 0)$ Kecerunan $AB = \frac{4-0}{0-2} = -2$ Persamaan garis lurus $AB \quad y = -2x + 4$</p>	<p>P1</p> <p>P1</p> <p>N1</p>
	b)	<p>Kecerunan $BC = \frac{1}{2}$ Persamaan BC: $0 = \frac{1}{2}(2) + c$ $c = -1$ $y = \frac{1}{2}x - 1$</p>	<p>K1</p> <p>N1</p>
	c)	<p>$y = \frac{1}{2}x - 1 \quad 1, \quad y^2 = 16 - 8x \quad 2$ ganti pers 1 ke dalam pers 2: $\left(\frac{1}{2}x - 1\right)^2 = 16 - 8x$ $\frac{1}{4}x^2 - x + 1 = 16 - 8x$ $x^2 - 4x + 4 = 64 - 32x$ $x^2 + 28x - 60 = 0$ $(x - 2)(x + 30) = 0$ $x = 2$ (abaikan) @ $x = -30$ $y = \frac{1}{2}(-30) - 1 = -16$ Koordinat $C = (-30, -16)$</p>	<p>P1</p> <p>K1</p> <p>N1</p>

SKEMA SUKATAN MEMBULAT

NO. SOALAN	SOALAN	MARKAH
1	<div style="text-align: center;">  </div> <p> $s = r\theta$ $5\pi = 12\theta$ $\theta = \frac{5\pi}{12} \dots N1$ </p> <p> $\text{Luas sektor} = \frac{1}{2}(12)^2\theta$ $= \frac{1}{2}(12)^2\left(\frac{5\pi}{12}\right)$ $= 30\pi \dots K1$ </p> <p> $\angle AOB = \frac{5\pi}{12} \times \frac{180^\circ}{\pi} = 75^\circ$ </p> <p> $\text{Luas segitiga} = \frac{1}{2}(12)^2 \sin 75^\circ$ $= 69.55 \text{ cm}^2 \dots K1$ </p> <p>atau</p> <p> $\text{Luas kawasan berlerek} = \frac{1}{2}(12)^2\left(\frac{5\pi}{12}\right) - \sin 75^\circ \dots K1K1$ </p> <p> $\text{Luas kawasan berlerek} = (30\pi - 9.55) \text{ cm}^2 \dots N1 \text{ (dalam sebutan } \pi \text{)}$ </p>	[4m]



$$(a) \cos \angle TOR = \frac{4}{8} // \cos \theta = \frac{1}{2} \dots K1$$

$$\angle TOR = 60^\circ$$

$$\angle TOR = \frac{\pi}{3} \text{ rad} \dots N1$$

$$(b) TS^2 = 8^2 + 8^2 - 2(8^2) \cos 120^\circ \dots K1$$

$$TS = 13.86 \text{ cm} \dots N1$$

$$\angle S = 30^\circ \times \frac{\pi}{180^\circ} = \frac{\pi}{6} \text{ rad} \dots P1$$

$$TQ = (13.86) \left(\frac{\pi}{6} \right) \dots K1$$

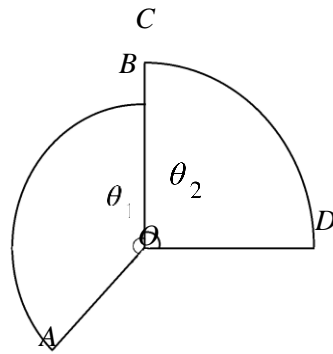
$$TQ = 2.31\pi \dots N1$$

(c) Luas kawasan berlorek =

3	<p>(a) $\sin \frac{\theta}{2} = \frac{AB}{2j} \dots K1$</p> <p>$2j \sin \frac{\theta}{2} = AB \dots N1$</p> <p>(b) $\angle AOB = 1.2 \text{ rad} = 68.75^\circ \dots P1$</p> <p><i>Beza</i></p> <p><i>= Panjang lengkok AB – Panjang perentas AB</i></p> <p>$= 5(1.2) - 2(5) \sin 34.38^\circ \dots K1K1$</p> <p>$= 0.353 \text{ cm} \dots N1$</p>	[6m]
4	<p>$12 = j(2.4)$</p> <p>$j = 5 \dots P1$</p> <p>$A = \frac{1}{2}(5^2)(2.4) \dots K1$</p> <p>$= 30 \text{ cm}^2 \dots N1$</p>	[3m]

5

[4m]



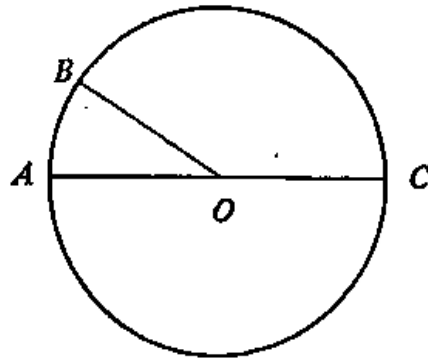
$$r\theta + 2r = 54 \text{ dan } \frac{1}{2}r^2\theta = 180 \text{ or } r = \frac{54}{2 + \theta} \dots K1$$

$$\frac{1}{2} \left(\frac{54}{2 + \theta} \right)^2 \theta = 180 \dots K1$$

$$(2\theta - 5)(5\theta - 8) = 0 \text{ or } \theta = \frac{5}{2}, \frac{8}{5} \dots K1$$

$$\frac{5}{2} // 2.5 \dots N1$$

6



6

$$\begin{aligned} \text{(a)} \quad s &= r\theta \\ 10 &= 20\theta \\ \theta &= 0.5 \text{ rad} \end{aligned}$$

$$\begin{aligned} \angle BOC &= 3.142 - 0.5 \\ &= 2.642 \text{ rad} \text{ ---- P1} \end{aligned}$$

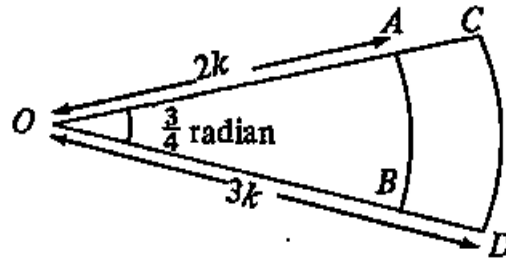
$$\begin{aligned} \text{luas sektor BOC} &= \frac{1}{2}(20)^2(2.642) \text{ ---- K1} \\ &= 528.4 \text{ cm}^2 \text{ ---- N1} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad \angle BOA &= 0.5 \times \frac{180^\circ}{3.142} \\ &= 28.64^\circ \text{ ---- P1} \end{aligned}$$

$$\begin{aligned} X &= \text{jarak seranjang dari B ke AO} \\ \sin 28.64^\circ &= \frac{X}{20} \text{ ---- K1} \\ X &= 9.586 \text{ cm} \text{ ---- N1} \end{aligned}$$

Jarak seranjang dari B ke AO = 9.586 cm.

7



$$(a) \quad \left. \begin{aligned} \text{luas sektor } OCD &= \frac{1}{2}(3k)^2 \left(\frac{3}{4}\right) = 9k^2 \\ \text{luas sektor } OAB &= \frac{1}{2}(2k)^2 \left(\frac{3}{4}\right) = 4k^2 \end{aligned} \right\} \text{ Mana-mana satu ----- K1}$$

$$\begin{aligned} \text{luas sektor } ABDC &= 30 \text{ cm}^2 \\ 9k^2 - 4k^2 &= 30 \text{ -----K1} \\ 5k^2 &= 80 \\ k^2 &= 16 \\ k &= \pm 4 \end{aligned}$$

$$\begin{aligned} k &> 0, \\ \text{maka } k &= 4 \text{ ----- N1} \end{aligned}$$

$$(b) \quad \begin{aligned} OD &= 3(4) = 12 \text{ cm} \\ OA &= 2(4) = 8 \text{ cm} \end{aligned}$$

$$\left. \begin{aligned} \text{Panjang lengkok } AB &= 12 \left(\frac{3}{4}\right) \\ &= 9 \text{ cm} \\ \text{Panjang lengkok } CD &= 8 \left(\frac{3}{4}\right) \\ &= 6 \text{ cm} \end{aligned} \right\} \text{ Mana-mana satu ----- K1}$$

$$\begin{aligned} \text{Perbedaan di antara panjang lengkok } AB \text{ dengan } CD &= 9 \text{ cm} - 6 \text{ cm} - \text{K1} \\ &= 3 \text{ cm} \text{ ----- N1} \end{aligned}$$

6

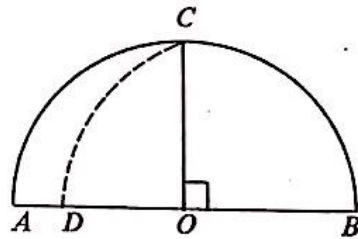
8

$$(a) \quad \left. \begin{aligned} \text{luas sektor } OCD &= \frac{1}{2}(8)^2 \theta = 32\theta \\ \text{luas sektor } OAB &= \frac{1}{2}(2)^2 (2\pi) = 4\pi \end{aligned} \right\} \text{ Mana-mana satu ----- K1}$$

$$\begin{aligned} \text{luas sektor } OCD &= \text{luas bulatan } ABP \\ 32\theta &= 4\pi \text{ -----K1} \\ \theta &= \frac{\pi}{8} \text{ rad} \\ \theta &= \frac{\pi}{8} \times \frac{180^\circ}{\pi} \\ \theta &= 22.5^\circ \text{ ----- N1} \end{aligned}$$

6

	<p>(b) Panjang lengkok AB = $2(0.39275)$ $= 0.7855 \text{ cm}$ Panjang lengkok CD = $8(0.39275)$ $= 3.142 \text{ cm}$ } Mana-mana satu ----- K1</p> <p>Perimeter rajah ACDB = $0.7855 + 3.142 + 6 + 6$ ----- K1 $= 15.9275 \text{ cm}$ $= 15.93 \text{ cm}$ ----- N1</p>	
9	<p>(a) $\tan \angle PAB = \frac{6}{8}$ $\angle PAB = 36.87^\circ$ $= 36.87^\circ \times \frac{3.142}{180^\circ}$ $= 0.6436 \text{ rad}$ ----- P1</p> <p>$\angle PBO = 180^\circ - 90^\circ - 36.87^\circ$ $= 53.13^\circ$ $\angle POB = 180^\circ - 2(53.13^\circ)$ -----K1 $= 73.74^\circ$ $= 73.74^\circ \times \frac{3.142}{180^\circ}$ $= 1.287 \text{ rad}$ ----- N1</p> <p>(b) $AB^2 = AP^2 + PB^2$ $AB = \sqrt{6^2 + 8^2} = 10$</p> <p>$OB = \frac{10}{2} = 5 \text{ cm}$ ----- P1 luas sektor = $\frac{1}{2} (5)^2 (1.287)$ ---- K1 $= 16.09 \text{ cm}^2$ ----- N1</p>	6
10	<p>$BC^2 = r^2 + r^2$ ---- K1 $BC^2 = 2r^2$ $BC = \sqrt{2} r$ --- N1</p> <p>luas sektor BCD $= \frac{1}{2} (BC)^2 \theta$ $= \frac{1}{2} (2r^2) \left(40^\circ \times \frac{3.142}{180^\circ} \right)$ --- K1 $= \frac{1}{4} \pi r^2$ ---N1</p>	4



Pengamiran

1. (a) $y = 4x + c$
 (b) (i) $y = \frac{3x^3}{3} + \frac{3x^2}{2} - 4x + c \Rightarrow (1)^3 + \frac{3(1)^2}{2} + 4(1) + c = -\frac{9}{2}y = x^3$
 (ii) $y = (-1)^3 + \frac{3(-1)^2}{2} + 4(-1) - \frac{9}{2}y = -8$

2. (a) $\int 3(2x + 7)^{-3} = \frac{3(2x+7)^{-2}}{-2(2)} + c = -\frac{3}{4(2x+7)^2} + c$
 (b) $\frac{dy}{dx} = 3x^2 + 4x - 3y = \frac{3x^3}{3} + \frac{4x^2}{2} - 3x + c \Rightarrow (1)^3 + (1)^2 - 3(1) + c = 0$

3. (a) $\frac{dy}{dx} = \frac{3x(2x-4)}{4x} = \frac{3}{2}x - 3y = \frac{3x^2}{4} - 3x + c$
 (b) $y = \int (x^3 - 1) dx = \frac{x^4}{4} - x + c \Rightarrow 1 = \frac{(2)^4}{4} - 2 + c \Rightarrow c = 0$

4. (a) $\int 2g(x) dx = f(x) \int g(x) dx = \frac{1}{2}f(x)$
 (b) (i) $y = \int (6x - 5) dx = \frac{6x^2}{2} - 5x + c \Rightarrow 3 = 3(2)^2 - 5(2) + c \Rightarrow c = -5$
 (ii) $(0, -5)$

5. (a) $f(x) = \int (2x + 6) dx = \frac{2x^2}{2} + 6x + c = x^2 + 6x + c \Rightarrow 10 = (2)^2 + 6(2) + c \Rightarrow c = 0$
 (b) (i) $k(2) - 6 = 0 \Rightarrow k = 3$
 (ii) $y = \int (3x - 6) dx = \frac{3x^2}{2} - 6x + c \Rightarrow 0 = \frac{3(2)^2}{2} - 6(2) + c \Rightarrow c = 0$
 $3x\left(\frac{1}{2}x - 2\right) = 0 \Rightarrow x = 0, x = 4 \Rightarrow (0, 0), (4, 0)$

6. (a) $-3x - 6 = 0 \Rightarrow x = -2$
 $y = \int (-3x - 6) dx = -\frac{3x^2}{2} - 6x + c \Rightarrow -\frac{3(-2)^2}{2} - 6(-2) + c = 0 \Rightarrow c = 0$
 (b) $\frac{(2x+1)-x(2)}{(2x+1)^2} = \frac{1}{(2x+1)^2} \Rightarrow \int_1^4 \frac{1}{(2x+1)^2} = 144 \left[\frac{4}{2(4)+1} - \frac{1}{2(1)+1} \right]$

7. (a) $-4x + 8 = 0 \Rightarrow x = 2$
 $2y = \int (-4x + 8) dx = -\frac{4x^2}{2} + 8x + c \Rightarrow 0 = -\frac{4(2)^2}{2} + 8(2) + c \Rightarrow c = 0$

- (b) $4(2x - 1)^3(2) = 8(2x - 1)^3 \int_1^2 (2x - 1)^4 = \frac{1}{8}[(2(2) - 1)^4 - (2(1) - 1)^4]$
8. (a) $8(-5) = -40$
 (b) $\int_2^9 f(x)dx = \int_2^5 f(x)dx + \int_5^9 f(x)dx = 5 + 3 = 8$
 (c) $\int_5^2 f(x) + \int_5^2 p dx = 4 - 5 + [px]_5^2 = 4p(2) - p(5) = 4 + 5 - 3p = 9p = -$
9. (a) $\int_2^4 g(x) - \int_2^4 3dx = 10 - 3[x]_2^4 = 10 - 3(4 - 2)$
 (b) $\int_2^4 kx - \int_2^4 g(x)dx = 14k \left[\frac{x^2}{2} \right]_2^4 - 10 = 14k \left[\frac{(4)^2}{2} - \frac{(2)^2}{2} \right] = 14 + 10k \left(\frac{16}{2} - \right)$
10. (a) (i) $p(2)^2 - (-2) = 10p = 2$
 (ii) $y = \int (2x^2 - x) dx = \frac{2x^3}{3} - \frac{x^2}{2} + c - 8 = \frac{2(-2)^3}{3} - \frac{(-2)^2}{2} + c = -\frac{2}{3}y =$
 (b) $M_{\text{tangen}} \times \frac{1}{5-2x} = -1M_{\text{tangen}} = 2x - 5y = \int (2x - 5) dx = \frac{2x^2}{2} - 5x + c = 5 = ($
11. (a) $-2(kx - 2) = -1kx - 2 = \frac{1}{2}k(5) = \frac{5}{2}k = \frac{1}{2}$
 (b) $y = \int \left(\frac{1}{2}x - 2 \right) dx = \frac{1}{2(2)}x^2 - 2x + c = \frac{1}{4}(5)^2 - 2(5) + c = \frac{19}{4}y =$
12. (a) -3
 (b) $\int_3^7 f(x)dx = \int_3^5 f(x)dx + \int_5^7 f(x)dx = 3 + 1 = 4$
 (c) $2 \int_3^5 f(x) - m \int_3^5 x dx = 22(3) - m \left[\frac{x^2}{2} \right]_3^5 = 26 - m \left[\frac{(5)^2}{2} - \frac{(3)^2}{2} \right] = 2 - m \left[\frac{26}{2} \right]$
13. (a) $\int_2^3 f(x)dx + \int_2^3 k dx = 3k3 + [kx]_2^3 = 3k3 + k(3 - 2) = 3kk = \frac{3}{2}$
 (b) $\int_2^3 kf(x)dx + \int_2^3 g(x)dx - \int_2^3 4 dx = 10k(3) + 5 - 4[x]_2^3 = 103k + 5 - 4(3)$
14. (a) $-2[x]_1^h = -4 - 2(h - 1) = -4h = 3$

$$(b) \quad (i) \quad -10$$

$$(ii) \quad \int_2^7 f(x) dx - \int_2^7 k dx = 2510 - k[x]_2^7 = 25 - k(7 - 2) = 25 - 10k =$$

$$15. \quad (a) \quad y = \int (4x + 1)^5 dx = \frac{(4x+1)^6}{6} \times \frac{1}{4} + cy = \frac{(4x+1)^6}{24} + c$$

$$(b) \quad y = \int (6x - 5)^{-3} dx = \frac{(6x-5)^{-2}}{-2} \times \frac{1}{6} + cy = -\frac{1}{12(6x-5)^2} + c$$

$$16 \quad (a) \quad Luas/Area = \int_0^3 3x - x^2 + 2$$

$$= \left[\frac{3x^2}{2} - \frac{x^3}{3} + 2x \right]_0^3$$

$$= \left[\frac{3(3)^2}{2} - \frac{(3)^3}{3} + 2(3) \right] - 0$$

$$= \frac{21}{2} \text{unit}^2$$

$$(b) \quad a) \quad Luas/Area = \left| \int_{-2}^1 y^2 + y - 6 dy \right|$$

$$= \left| \left[\frac{y^3}{3} + \frac{y^2}{2} - 6y \right]_{-2}^1 \right|$$

$$= \left| \left[\frac{(1)^3}{3} + \frac{(1)^2}{2} - 6(1) \right] - \left[\frac{(-2)^3}{3} + \frac{(-2)^2}{2} - 6(-2) \right] \right|$$

$$= \frac{33}{2} \text{unit}^2$$

$$17 \quad (a) \quad x^2 + 2x = -x$$

$$x(x + 3) = 0$$

$$x = 0, x = -3$$

$$y = -(-3) = 3$$

$$A(-3, 3)$$

$$(b) \quad \int_{-3}^0 (-x) dx$$

$$\left[-\frac{x^2}{2} \right]_{-3}^0$$

$$\left[0 - \left(-\frac{(-3)^2}{2} \right) \right]$$

$$\frac{9}{2}$$

$$(c) \quad \pi \int_{-3}^0 (-x) dx - \pi \int_{-3}^{-2} (x^2 + 2x) dx$$

$$\pi \left[-\frac{x^2}{2} \right]_{-3}^0 - \pi \left[\frac{x^3}{3} + \frac{2x^2}{2} \right]_{-3}^{-2}$$

$$\pi \left[0 - \left(-\frac{(-3)^2}{2} \right) \right] - \pi \left[\frac{(-2)^3}{3} + \frac{2(-2)^2}{2} - \left(\frac{(-3)^3}{3} + \frac{2(-3)^2}{2} \right) \right]$$

$$\frac{97}{15} \pi$$

18. (a) $\frac{1}{3}x = \sqrt{x} \frac{1}{9}x^2 = x \frac{1}{9}x^2 - x = 0x \left(\frac{1}{9}x - 1 \right) = 0$

$x = 0$ atau $x = 9$

Apabila $x = 9$, $y = \frac{1}{3}(9) = 3$

Maka, koordinat A ialah $(9, 3)$.

(b) $\int_0^9 \left(\sqrt{x} - \frac{1}{3}x \right) dx = \int_0^m \left(\frac{1}{3}x - \sqrt{x} \right) dx$

$$\left[\frac{2}{3}x^{\frac{3}{2}} - \frac{1}{6}x^2 \right]_0^9 = \left[\frac{1}{6}x^2 - \frac{2}{3}x^{\frac{3}{2}} \right]_0^m$$

$$18 - \frac{27}{2} = \frac{1}{6}m^2 - \frac{2}{3}m^{\frac{3}{2}} - \left(\frac{27}{2} - 18 \right)$$

$$\frac{1}{6}m^2 = \frac{2}{3}m^{\frac{3}{2}}$$

$$\sqrt{m} = \frac{2}{3}(6)m = 16$$

19. (a) $x^3 + 3x^2 - 2 = x + 1$

$$x^3 + 3x^2 - x - 3 = 0$$

$$x^2(x + 3) - (x + 3) = 0$$

$$(x + 3)(x^2 - 1) = 0$$

$$(x + 3)(x + 1)(x - 1) = 0$$

$x = -3$ atau $x = -1$ atau $x = 1$

Apabila $x = -3$, $y = -3 + 1$
 $= -2$

Apabila $x = -1$, $y = -1 + 1$
 $= 0$

Apabila $x = 1$, $y = 1 + 1$
 $= 2$

Maka, $A(-3, -2)$, $B(-1, 0)$ dan $C(1, 2)$.

(b) Jumlah luas

$$\begin{aligned} &= \int_{-3}^{-1} [x^3 + 3x^2 - 2 - (x + 1)] dx + \int_{-1}^1 [x + 1 - (x^3 + 3x^2 - 2)] dx \\ &= \int_{-3}^{-1} (x^3 + 3x^2 - x - 3) dx + \int_{-1}^1 (-x^3 - 3x^2 + x + 3) dx \\ &= \left[\frac{1}{4}x^4 + x^3 - \frac{1}{2}x^2 - 3x \right]_{-3}^{-1} - 1 - 3 + \left[-\frac{1}{4}x^4 - x^3 + \frac{1}{2}x^2 + 3x \right]_{-1}^1 - 1 \\ &= \left[\frac{1}{4} - 1 - \frac{1}{2} + 3 - \left(\frac{81}{4} - 27 - \frac{9}{2} + 9 \right) \right] + \left[-\frac{1}{4} - 1 + \frac{1}{2} + 3 - \left(-\frac{1}{4} + 1 \right) \right] \\ &= 4 + 4 = 8 \end{aligned}$$

20 (a) $3(x - 2)^2 = x(4 - x)$
 $(x - 1)(x - 3) = 0$

$P(1, 3), Q(3, 3)$

(b) $\int_1^3 [4x - x^2 - (3(x - 2))^2] dx$

$$\begin{aligned} &\left[\frac{16}{2}x^2 - \frac{4}{3}x^3 - 12x \right]_1^3 \\ &\left[\frac{16}{2}(3)^2 - \frac{4}{3}(3)^3 - 12(3) - \left(\frac{16}{2}(1)^2 - \frac{4}{3}(1)^3 - 12(1) \right) \right] \\ &\frac{16}{3} \end{aligned}$$

21. (a) $x^3 = 4x$
 $x^3 - 4x = 0$
 $x(x^2 - 4) = 0$
 $x(x + 2)(x - 2) = 0$
 $x = 0$ atau $x = -2$ atau $x = 2$
Apabila $x = -2, y = 4(-2)$
 $= -8$
Apabila $x = 2, y = 4(2)$
 $= 8$

Maka, $P(-2, -8)$ dan $Q(2, 8)$.

(b) Jumlah luas = $\int_{-2}^0 (x^3 - 4x) dx + \int_0^2 (4x - x^3) dx$

$$\begin{aligned} &= \left[\frac{1}{4}x^4 - 2x^2 \right]_{-2}^0 - 2 + \left[2x^2 - \frac{1}{4}x^4 \right]_0^2 \\ &= -(4 - 8) + (8 - 4) \\ &= 8 \text{ unit}^2 \end{aligned}$$

$$\begin{aligned}
 \text{(c) Isi padu} &= \pi \int_0^2 (16x^2 - x^6) dx \\
 &= \pi \left[\frac{16}{3}x^3 - \frac{1}{7}x^7 \right]_0^2 \\
 &= \pi \left(\frac{128}{3} - \frac{128}{7} \right) \\
 &= \frac{512}{21} \pi \\
 &= 24 \frac{8}{21} \text{ unit}^3
 \end{aligned}$$

$$\text{22 (a) } \frac{1}{2} \left(\frac{1}{2}k \right) (2 + 4)$$

$$\begin{aligned}
 \text{(b) } &\int_{\frac{1}{2}k}^k (4x^2 - 10x + 8) dx \\
 &\left[\frac{4x^3}{3} - \frac{10x^2}{2} + 8x \right]_{\frac{1}{2}k}^k \\
 &\left[\frac{4k^3}{3} - \frac{10k^2}{2} + 8k - \left(\frac{4\left(\frac{1}{2}k\right)^3}{3} - \frac{10\left(\frac{1}{2}k\right)^2}{2} + 8\left(\frac{1}{2}k\right) \right) \right] \\
 &\frac{7}{6}k^3 - \frac{15}{4}k^2 + 4k
 \end{aligned}$$

$$\begin{aligned}
 \text{23. (a) } \frac{dy}{dx} &= 2x - 6 \\
 y &= x^2 - 6x + c \\
 32 &= (-3)^2 - 6(-3) + c \\
 y &= x^2 - 6x + 5
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) } y &= (x-3)^2 - 4 - 12 \\
 y &= (x-3)^2 - 16 \\
 \text{Luas} &= \left| \int_{-1}^7 x^2 - 6x - 7 dx \right| \\
 &= \left[\frac{x^3}{3} - 3x^2 - 7x \right]_{-1}^7 \\
 &= \left| \left[\frac{7^3}{3} - 3(7^2) - 7(7) \right] - \left[\frac{(-1)^3}{3} - 3(-1)^2 - 7(-1) \right] \right| \\
 &= 94.33 @ 94 \frac{1}{3} @ \frac{283}{3}
 \end{aligned}$$

24. (a) $3x = 9$
 $x = 3$

$$\text{Luas segitiga} = \frac{1}{2} \times 3 \times 9 = \frac{27}{2} \quad @ \quad \int_0^3 3x dx = \frac{3(3)^2}{2} - 0 = \frac{27}{2}$$

$$\text{Luas kawasan berlorek} = 18 - \frac{27}{2} = 4.5$$

(b) (i) $\frac{dy}{dx} = 6 - 2x$, gantikan (3,9)

$$y = 6x - x^2 + c$$

$$9 = 6(3) - (3)^2 + c$$

$$y = -x^2 + 6x$$

(b) (ii) Isipadu di bawah lengkung $= \pi \int_0^3 (-x^2 + 6x)^2 dx$

$$= \pi \int_0^3 x^4 - 12x^3 + 36x^2 dx$$

$$= \pi \left[\frac{x^5}{5} - 3x^4 + 12x^3 \right]$$

$$= \pi \left[\left(\frac{3^5}{5} - 3(3)^4 + 12(3)^3 \right) - \left(\frac{0^5}{5} - 3(0)^4 + 12(0)^3 \right) \right]$$

$$= \pi(129.6 - 0)$$

$$= 129.6\pi$$

Isipadu di bawah garis $y = 3x$

$$= \pi \int_0^3 (3x)^2 dx \quad @ \quad \frac{1}{3} \pi (9)^2 \times 3$$

$$= \pi \int_0^3 9x^2 dx$$

$$= \pi [3x^3] = \pi [3(3)^3 - 3(0)^3]$$

$$= 81\pi$$

$$\text{Isipadu kisanan} = 129.6\pi - 81\pi$$

$$= 48.6\pi$$

25. (a) $\frac{dh}{dt} = -0.75t$

$$h = -0.375t^2 + 24$$

$$h = -0.375(5)^2 + 24$$

$$h = 14.625$$

(b) $h = 0$

$$-0.375t^2 + 24 = 0$$

$$t = 8$$

$$\begin{aligned}
 26. \quad \int_a^b 2f(x)dx &= 2 \left[\int_a^b f(x)dx \right] \\
 &= 2[5] \\
 &= 10 \text{ unit}^2
 \end{aligned}$$

$$\begin{aligned}
 27. \quad (a) \quad \left(-\frac{2}{5}x\right)^2 &= x + 9 \\
 4x^2 - 25x - 225 &= 0 \\
 (x + 5)(4x - 45) &= 0 \\
 x = -5, x = \frac{45}{4} \\
 x < 0, x = -5, y &= 2 \\
 A(-5, 2)
 \end{aligned}$$

$$\begin{aligned}
 (b) \quad \text{Luas / Area} &= \int_0^2 (y^2 - 9)dy - \frac{1}{2}(2)(5) \\
 &= \left[\frac{y^3}{3} - 9y \right]_0^2 - 5 \\
 &= \left[\frac{(2)^3}{3} - 9(2) - 0 \right] - 5 \\
 &= \frac{31}{3} \text{unit}^2
 \end{aligned}$$

$$\begin{aligned}
 (c) \quad \text{Isipadu / Volume} &= \pi \int_2^3 (y^2 - 9)^2 dy \\
 &= \pi \left[\frac{y^5}{5} - \frac{18y^3}{3} + 81y \right]_2^3 \\
 &= \pi \left[\left(\frac{(3)^5}{5} - \frac{18(3)^3}{3} + 81(3) \right) - \left(\frac{(2)^5}{5} - \frac{18(2)^3}{3} + 81(2) \right) \right] \\
 &= 9 \frac{1}{5} \pi \text{unit}^2
 \end{aligned}$$

$$28. \quad (a) \quad \frac{dy}{dx} = 4x$$

$$\int dy = \int 4x dx$$

$$y = 2x^2 + c, L(1,6)$$

$$6 = 2(1)^2 + c$$

$$4 = c$$

$$y = 2x^2 + 4$$

$$(b) \quad \text{Luas} = [P \times L] - \int_0^1 y dx$$

$$\text{Luas} = [1 \times 6] - \int_0^1 2x^2 + 4 \, dx$$

$$\text{Luas} = 6 - \left[\frac{2x^3}{3} + 4x \right]_0^1$$

$$\text{Luas} = 6 - \left[\frac{2(1)^3}{3} + 4(1) - \left(\frac{2(0)^3}{3} + 4(0) \right) \right]$$

$$\text{Luas} = \frac{4}{3} \text{ unit}^2$$

(c)
$$\text{Isipadu} = \int_4^6 \pi x^2 \, dy$$

$$y = 2x^2 + 4$$

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

$$\text{Isipadu} = \int_4^6 \pi \left(\frac{y-4}{2} \right) dy$$

$$\text{Isipadu} = \pi \int_4^6 \frac{y}{2} - 2 \, dy$$

$$\text{Isipadu} = \pi \left[\frac{y^2}{4} - 2y \right]_4^6$$

$$\text{Isipadu} = \pi \left[\frac{(6)^2}{4} - 2(6) - \left(\frac{(4)^2}{4} - 2(4) \right) \right]$$

$$\text{Isipadu} = \pi \text{ unit}^3$$

29. (a)
$$y = 3x^2 - 6x.$$

$$\frac{dy}{dx} = 6x - 6$$

$$0 = 6x - 6$$

$$x = 1$$

$$y = 3(1)^2 - 6(1)$$

$$y = -3$$

$$(1, -3)$$

(b)
$$\text{Luas} = [P \times L] - \int_0^1 y \, dy$$

$$\text{Luas} = [1 \times 3] - \int_0^1 3x^2 - 6x \, dx$$

$$\text{Luas} = 3 - \left[\frac{3x^3}{3} - \frac{6x^2}{2} \right]_0^1$$

$$\text{Luas} = 3 \cdot [1^3 - 3(1)^2 - (0^3 - 3(0)^2)]$$

$$\text{Luas} = 5 \text{ unit}^2$$

(c)

$$\text{Isipadu} = \int_0^1 \pi y^2 dx$$

$$y = 3x^2 - 6x$$

$$\text{Isipadu} = \int_0^1 \pi(3x^2 - 6x)^2 dx$$

$$\text{Isipadu} = \pi \int_0^1 9x^4 - 36x^2 + 36x dx$$

$$\text{Isipadu} = \pi \left[\frac{9x^5}{5} - \frac{36x^3}{3} + \frac{36x^2}{2} \right]_0^1$$

$$\text{Isipadu} = \pi \left[\frac{9(1)^5}{5} - \frac{36(1)^3}{3} + \frac{36(1)^2}{2} - \left(\frac{9(0)^5}{5} - \frac{36(0)^3}{3} + \frac{36(0)^2}{2} \right) \right]$$

$$\text{Isipadu} = 7 \frac{4}{5} \pi \text{ unit}^3$$

30. (a) $a = -2, b = 3$

(b)

$$\int_{-2}^7 f(x) dx = 4$$

$$\int_{-2}^3 f(x) dx + \int_3^7 f(x) dx = 4$$

$$13 + \int_3^7 f(x) dx = 4$$

$$\int_3^7 f(x) dx = -9$$

31. (a) $A(k, y), x = k, y = 6x - x^2$

$$\frac{dy}{dx} = 6 - 2x,$$

$$\frac{dy}{dx} = m_T = 6 - 2k,$$

$$A(k, 6x - x^2), B(3, 10)$$

$$6 - 2k = \frac{10 - (6x - x^2)}{3 - k}$$

$$k^2 - 6k + 8 = 0$$

$$(k - 2)(k + 4) = 0$$

$$k = 2$$

$$(b) \quad x = k = 2, \quad y = 6(2) - (2)^2 = 8, \quad A(2, 8)$$

$$\text{Luas} = \frac{1}{2}(8 + 10)(1) - \int_2^3 (6x - x^2) dx$$

$$\text{Luas} = 9 - \left[3x^2 - \frac{x^3}{3} \right]_2^3$$

$$\text{Luas} = 9 - \left[3(3)^2 - \frac{3^3}{3} - \left(3(2)^2 - \frac{2^3}{3} \right) \right]$$

$$\text{Luas} = \frac{1}{3} \text{ unit}^2$$

$$32. \quad (a) \quad (12, 12) : x = 12, y = 12$$

$$y = ax^2$$

$$12 = a(12)^2$$

$$\frac{12}{12^2} = a$$

$$\frac{1}{12} = a$$

$$(b) \quad \text{Isipadu} = \pi \int_0^8 x^2 dy$$

$$y = ax^2$$

$$y = \frac{1}{12}x^2$$

$$12y = x^2$$

$$\text{Isipadu} = \pi \int_0^8 12y dy$$

$$\text{Isipadu} = \pi \left[\frac{12y^2}{2} \right]_0^8$$

$$\text{Isipadu} = \pi [6(8)^2 - 6(0)^2]$$

$$\text{Isipadu} = 384 \pi \text{ unit}^3$$

$$33. \quad (a) \quad 3y = 2x$$

$$x = y^2 - 1$$

$$3y = 2(y^2 - 1)$$

$$2y^2 - 3y - 2 = 0$$

$$(y - 2)(2y + 1) = 0$$

$$y = 2, y = -\frac{1}{2}$$

$$y = 2$$

$$x = 2^2 - 1$$

$$x = 3$$

$$A(3, 2)$$

$$(b) \quad \text{Isipadu} = \pi \int_0^2 x^2 dy - \pi \int_0^1 x^2 dy$$

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

$$x = y^2 - 1$$

$$\text{Isipadu} = \pi \int_0^2 \left(\frac{3y}{2}\right)^2 dy - \pi \int_0^1 (y^2 - 1)^2 dy$$

$$\text{Isipadu} = \pi \left[\frac{9y^3}{4(3)} \right]_0^2 - \pi \left[\frac{y^5}{5} - \frac{2y^3}{3} + 1 \right]_0^1$$

$$\text{Isipadu} = \pi \left[\frac{3(2)^3}{4} - \frac{3(0)^3}{4} \right] -$$

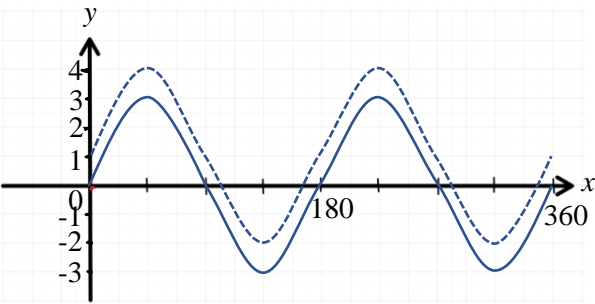
$$\pi \left[\frac{1^5}{5} - \frac{2(1)^3}{3} + 1 - \left(\frac{(0)^5}{5} - \frac{2(0)^3}{3} + 1 \right) \right]$$

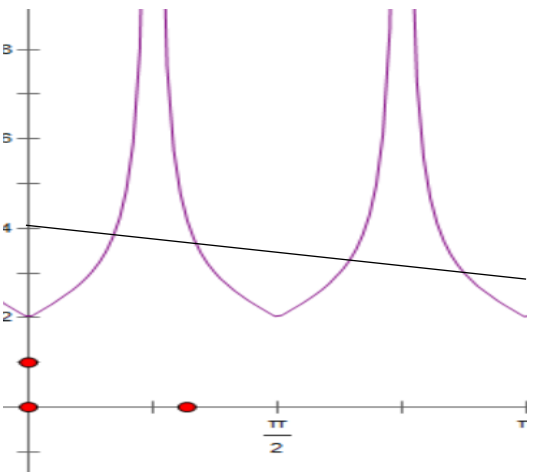
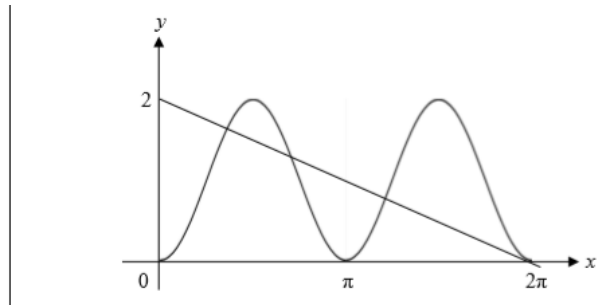
$$\text{Isipadu} = \pi(6) - \pi\left(\frac{8}{15}\right)$$

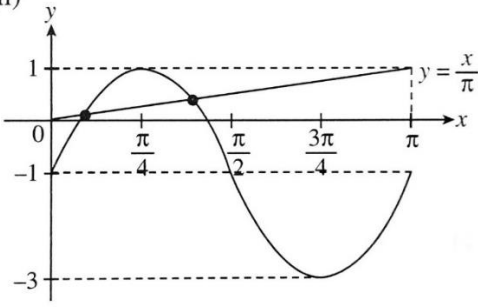
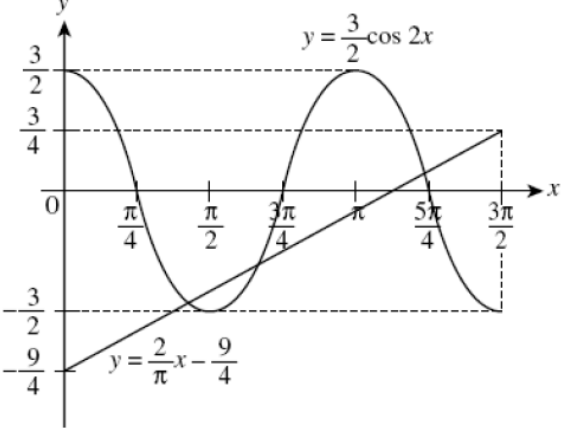
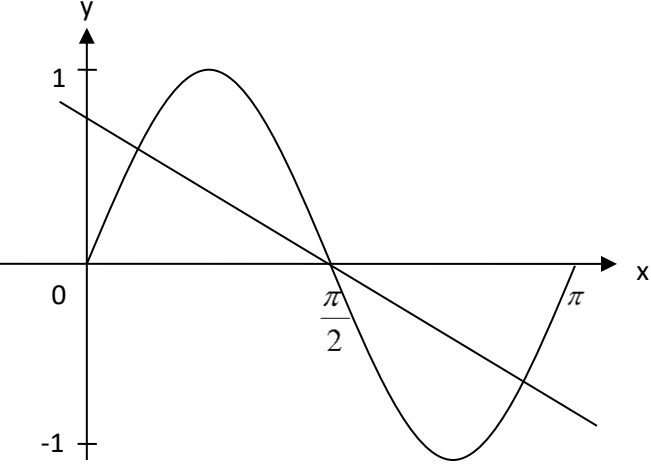
$$\text{Isipadu} = \frac{82}{15} \pi \text{ unit}^3$$

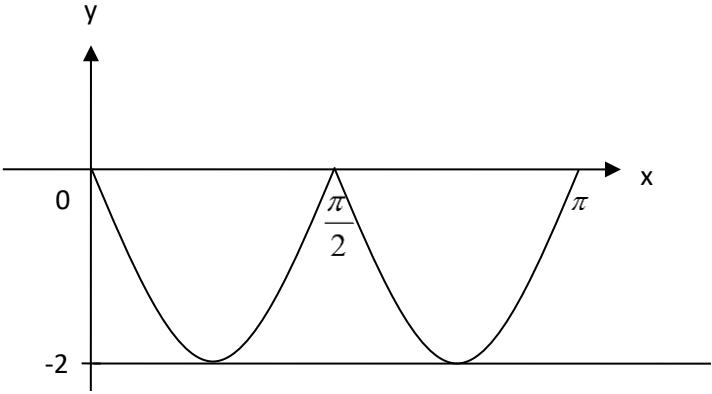
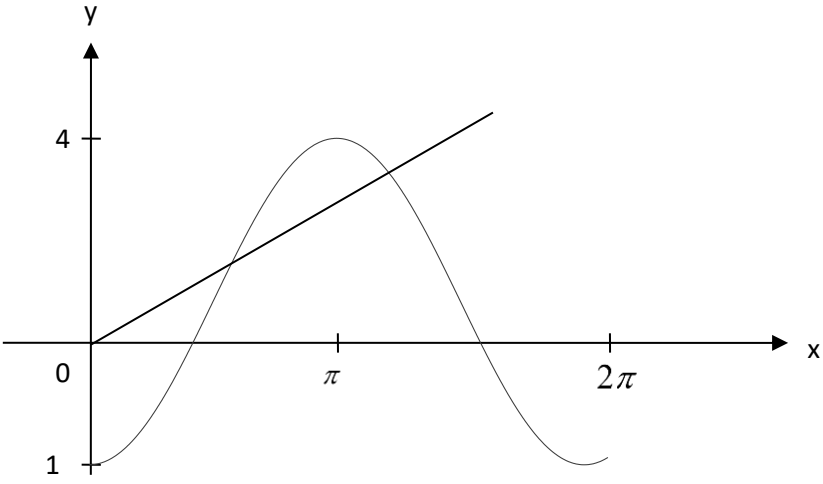
FUNGSI TRIGONOMETRI
TRIGONOMETRIC FUNCTIONS

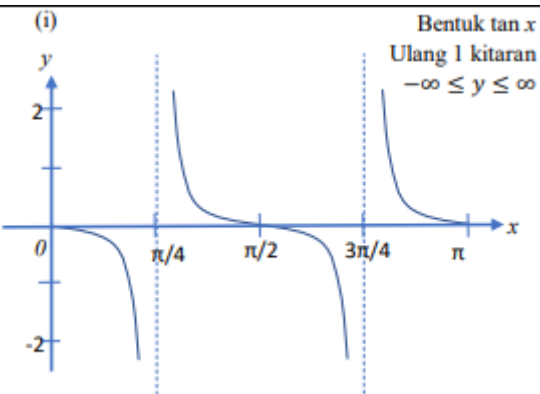
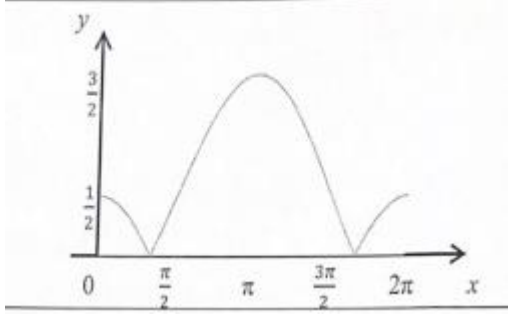
1	<p>(a) $(\sin \theta)^2 = \sin \theta \times \sin \theta$</p> $= \frac{2}{\sqrt{5}} \times \frac{2}{\sqrt{5}}$ $= \frac{4}{5}$	1 1	2
	<p>(b) $\frac{\sin \theta}{\tan \theta - \cos \theta} = \frac{\frac{2}{\sqrt{5}}}{2 - \frac{1}{\sqrt{5}}}$</p> $= \frac{(\frac{2}{\sqrt{5}})(2 + \frac{1}{\sqrt{5}})}{(2 - \frac{1}{\sqrt{5}})(2 + \frac{1}{\sqrt{5}})}$ $= \frac{2 + 4\sqrt{5}}{19}$	1 1 1	3
2	<p>(a) $\tan 195^\circ = \tan(60 + 135)$</p> $= \frac{\tan 60 + \tan 135}{1 - \tan 60 \tan 135}$ $= \frac{\sqrt{3} - 1}{1 - (\sqrt{3})(-1)}$ $= \frac{\sqrt{3} - 1}{\sqrt{3} + 1}$	P1 K1 N1	3
	<p>(b) $\tan Y = 5 - 4 \tan X \dots \dots \dots (1)$</p> $\tan(X - Y) = -1$ $\frac{\tan X - \tan Y}{1 + \tan X \tan Y} = -1$ $\tan X - \tan Y = -1 - \tan X \tan Y \dots \dots (2)$ <p>Sub (1) into (2)</p> $\tan X - 5 + 4 \tan X = -1 - \tan X (5 - 4 \tan X)$ $4 \tan^2 X + 10 \tan X - 4 = 0$ $2 \tan^2 X + 5 \tan X - 2 = 0$ $(2 \tan X - 1)(\tan X - 2) = 0$ $\tan X = \frac{1}{2} \text{ atau } \tan X = 2$ $X = 26.75, \quad X = 63.43$ $\tan X = \frac{1}{2} \qquad \qquad \qquad \tan X = 2$	P1 K1 K1 N1	

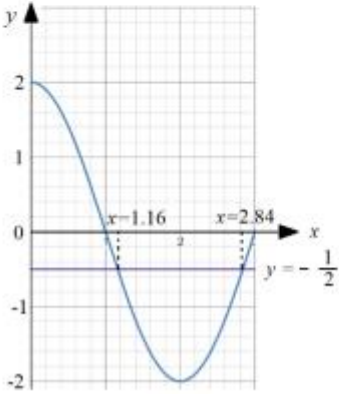
	$\tan Y = 5 - 4\left(\frac{1}{2}\right)$ $Y = 71.57$ $X = 26.75, Y = 71.57$	$\tan Y = 5 - 4(2)$ $Y = 108.43(\text{ignore})$	N1	5
3	<p>(a) $(\sin x - \cos x)(\tan x + \cot x) = (\sin x - \cos x) \left(\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x} \right)$</p> $= (\sin x - \cos x) \left(\frac{\sin^2 x + \cos^2 x}{\sin x \cos x} \right)$ $= (\sin x - \cos x) \left(\frac{1}{\sin x \cos x} \right)$ $= \frac{\sin x}{\sin x \cos x} - \frac{\cos x}{\sin x \cos x}$ $= \frac{1}{\cos x} - \frac{1}{\sin x}$ $= \sec x - \operatorname{cosec} x$		K1	
	<p>(a) (i) $a=2$ $b=2$ $c=-1$</p> <p>(ii) $k>1$ $k<-3$</p>		N1 n1	4
4	<p>(a) 2</p> <p>(b) 3</p> <p>(c) $(45,3), (135,-3), (225,3), (315,-3)$</p> <p>(d)(e)</p> 		1 1	

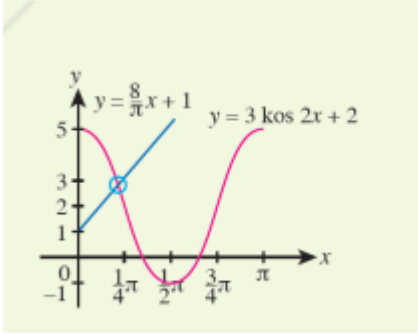
5		P1 P1 P1										
	$y = 4 - \frac{x}{\pi}$ <p>4 solutions</p>	n1 N1										
6	<p>a) LHS $= 1 - 2 \sin^2 x$ $= 1 - 2(1 - \cos^2 x)$ $= 1 - 2 + 2 \cos^2 x$ $= 2 \cos^2 x - 1$</p> <p>b)</p>  <p>c) Persamaan $y = 2 - \frac{x}{\pi}$ Lukis Garis lurus $y = 2 - \frac{x}{\pi}$ Bilangan penyelesaian = 4</p> <table border="1" data-bbox="335 1400 1021 1489"> <tbody> <tr> <td>(i)</td> <td>Bentuk kosinus</td> <td>P1</td> </tr> <tr> <td></td> <td>Amplitud</td> <td>P1</td> </tr> <tr> <td></td> <td>Bilangan kitaran</td> <td>P1</td> </tr> </tbody> </table>	(i)	Bentuk kosinus	P1		Amplitud	P1		Bilangan kitaran	P1	K1 N1 N1 K1 N1	
(i)	Bentuk kosinus	P1										
	Amplitud	P1										
	Bilangan kitaran	P1										
7	<p>(a) $\frac{2}{\tan x + \cot x}$</p> $= \frac{2}{\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}}$ $= \frac{2 \sin x \cos x}{\sin^2 x + \cos^2 x}$ $= \sin 2x$ <p>(b) (i) $h=2, k=2, p=-1$</p>	1 1 1 2 1,1	3 2 2									

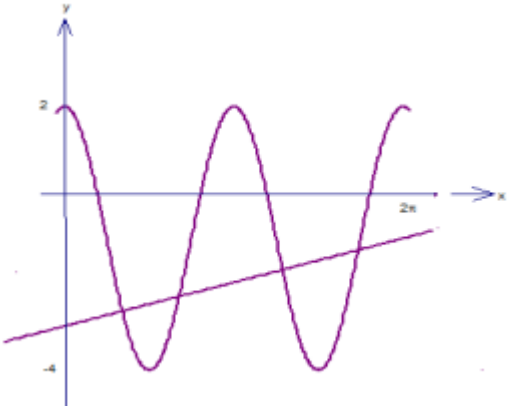
	<p>(ii)</p>  <p>2 solutions</p>	1	4
8	 <p>Number of solutions = 3</p>	P1 P1 P1 K1 N1 N1	6
9.	 <p>$y = \frac{3}{4} - \frac{3x}{2\pi}$ Number of solutions = 3</p>	P1 P1 P1 K1 N1 N1	6

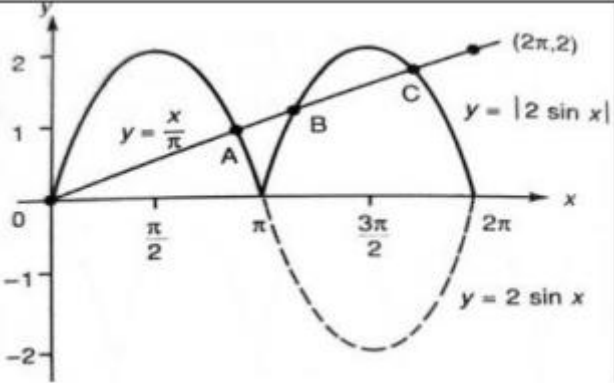
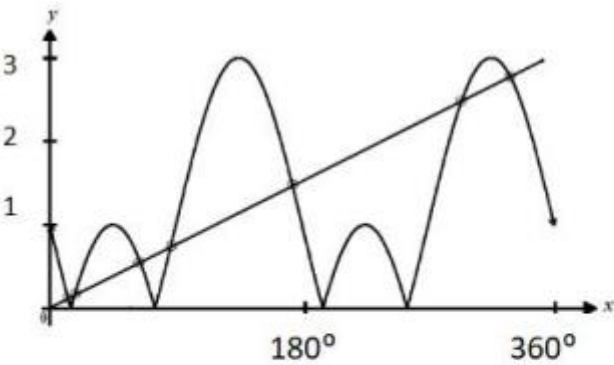
10	<p>(a)</p>  <p>(b) $y = -2$</p> <p>(c) $-2 < y < 0$</p>		
11	 <p>Number of solutions = 2</p>		
12	<p>(a) $\frac{2 \sin x \cos x}{-(1-2\sin^2 x)}$</p> <p>$-\frac{\sin 2x}{\cos 2x}$</p>	K1	2

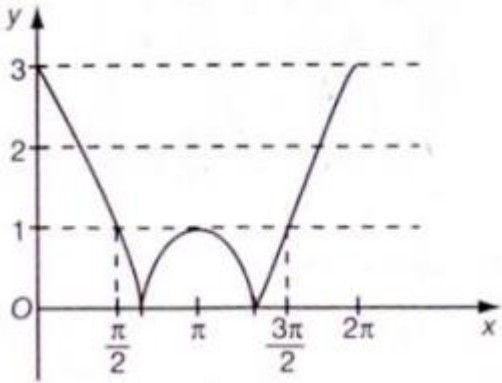
	<p>(b)</p> <p>(i)</p>  <p>(ii) $p = 0$</p>	<p>P1 P1 P1</p> <p>N1</p>	<p>4</p>
<p>13</p>	<p>(a)</p>  <p>Graph $\cos x$ Graph $y = \left \cos x - \frac{1}{2} \right$ Label amplitude Label $0, 2\pi$</p>	<p>P1 P1 P1 P1</p>	<p>4</p>
	<p>(b) $y = k - \pi$ $\pi < k \leq \frac{1}{2} + \pi$</p>	<p>K1 N1</p>	<p>2</p>
<p>14</p>	<p>(a)</p> <p><i>LHS</i></p> $\tan^2 x - \cot^2 x = (\sec^2 - 1) - (\operatorname{cosec}^2 - 1) \quad \text{K1}$ $\sec^2 - \operatorname{cosec}^2 \quad \text{N1}$ <p>OR</p> <p><i>RHS</i></p> $(1 + \tan^2 x) - (1 + \cot^2 x) \quad \text{K1}$ $\tan^2 x - \cot^2 x \quad \text{N1}$		

	<p>(b)</p> $y = 2 \cos \frac{\pi}{2} x$ <table border="1" data-bbox="323 353 1187 465"> <tr> <td>x</td> <td>0</td> <td>0.5</td> <td>1</td> <td>1.5</td> <td>2.0</td> <td>2.5</td> <td>3</td> </tr> <tr> <td>y</td> <td>2</td> <td>1.41</td> <td>0</td> <td>-1.41</td> <td>-2</td> <td>-1.41</td> <td>0</td> </tr> </table> <p>Refer to the graph</p> <p>Shape of cosines graph K1 7 points plotted correctly N1 Correct axes and uniform scales K1</p>	x	0	0.5	1	1.5	2.0	2.5	3	y	2	1.41	0	-1.41	-2	-1.41	0		
x	0	0.5	1	1.5	2.0	2.5	3												
y	2	1.41	0	-1.41	-2	-1.41	0												
	<p>(c)</p> $\cos \frac{\pi}{2} x + \frac{1}{4} = 0$ $2 \times \left(\cos \frac{\pi}{2} x \right) = \left(-\frac{1}{4} \right) \times 2$ $2 \cos \frac{\pi}{2} x = -\frac{1}{2}$ $y = -\frac{1}{2} \quad \text{K1}$ <p>From the graph,</p> <p>*$x = 1.16$, *$x = 2.84$ N1</p> <p>*follow the x values from their graph.</p>  <p>The graph shows a cosine wave on a grid. The x-axis ranges from 0 to 3, and the y-axis ranges from -2 to 2. The curve starts at (0, 2), crosses the x-axis at x = 1, reaches a minimum at x = 2, and crosses the x-axis again at x = 3. A horizontal line is drawn at y = -1/2. Two vertical dashed lines are drawn from the points where the curve intersects this horizontal line down to the x-axis, labeled x = 1.16 and x = 2.84.</p>																		
15	<p>(a)</p> $\sin x \cos \left(\frac{\pi}{6} \right) + \cos x \sin \left(\frac{\pi}{6} \right) - \left(\sin x \cos \left(\frac{\pi}{6} \right) - \cos x \sin \left(\frac{\pi}{6} \right) \right)$ $2 \cos x \sin \left(\frac{\pi}{6} \right)$ $2 \cos x \left(\frac{1}{2} \right)$ $\cos x$	K1	N1																

	<p>(b)</p> <table border="1" data-bbox="272 248 1094 398"> <tr> <td>x</td> <td>0</td> <td>$\frac{\pi}{4}$</td> <td>$\frac{\pi}{2}$</td> <td>$\frac{3\pi}{4}$</td> <td>π</td> </tr> <tr> <td>y</td> <td>5</td> <td>2</td> <td>-1</td> <td>2</td> <td>5</td> </tr> </table> <p>$y = \frac{8x}{\pi} + 1$</p>  <ol style="list-style-type: none"> 1. Bentuk kos 2. Titik maks / min 3. Kitaran atau pusingan / Anjakan <p>1 Penyelesaian</p>	x	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	y	5	2	-1	2	5	K1 P1 P1 P1 N1	
x	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π										
y	5	2	-1	2	5										
	<p>(c)</p> <p>$\cos x(2\sin x + 1) = 0$</p> <p>$\cos x = 0, \quad 2\sin x + 1 = 0$</p> <p>$x = 90^\circ, \quad x = 270^\circ$</p> <p>$x = 180^\circ + 30^\circ, \quad x = 360^\circ - 30^\circ$</p>	K1 N1 N1													
16	<p>(a)</p> <p><i>LHS</i></p> <p>$= 2 \cos^2 x + (\tan^2 x - \sec^2 x)$ OR other valid method</p> <p>$= 2 \cos^2 x - 1$</p> <p>$= \cos 2x$</p>	K1 N1													

	<p>(b)</p>  <p>Shape of cosine Amplitude ($y_{min} = -4, y_{max} = 2$) Number of cycles in $0 \leq x \leq 2\pi \text{ rad} = 2$</p> $3\cos^2 x - 1 = \frac{x}{\pi} - 3 \quad \text{or} \quad y = \frac{x}{\pi} - 3$ <p>Number of solutions = 4</p>	K1 K1 K1 K1 N1	
17	<p>(a)(i)</p> $\text{LHS: } \frac{(1 + \sin A)(1 + \sin A)}{\cos A(1 + \sin A)} + \frac{\cos A(\cos A)}{\cos A(1 + \sin A)} \quad \text{or}$ $\frac{1 + 2\sin A + \sin^2 A + \cos^2 A}{\cos A(1 + \sin A)}$ $\sin^2 A + \cos^2 A = 1 \quad \text{or} \quad \frac{1 + 2\sin A + 1}{\cos(1 + \sin A)}$ $\frac{2}{\cos A} = 2 \sec A \quad (\text{shown})$	K1 K1 N1	
	<p>(a)(ii)</p> $\sec 30^\circ = \frac{1}{\cos 30} = \sqrt{2}$	N1	

	<p>(b)(i)</p> 	P1	
	<p>(b)(ii)</p> <p>Draw the straight line correctly for $y = \frac{x}{\pi}$</p> <p>Number of solutions for $2\pi \sin x = x$ are 4 OR</p> <p>Number of solutions for $2\pi \sin x = x$ are 2.</p> <p>Number of solutions for $2\pi \sin x = x$ are 4 AND</p> <p>Number of solutions for $2\pi \sin x = x$ are 2.</p>	K1	
18	<p>(a)</p>  <p>Shape and cycle</p> <p>Amplitude and negative sin</p> <p>Shifted</p> <p>modulus</p>	P1	P1
	<p>(b)</p> <p>$y = \frac{3x}{2\pi}$</p> <p>Draw $y = \frac{3x}{2\pi}$</p> <p>No. of solution = 7</p>	K1	K1

19	<p>(a)</p> $\operatorname{cosec} \Theta = q$ $\sin \Theta = \frac{1}{q}$ $\sec(-\Theta) = \frac{1}{\cos \theta}$ $= \frac{q}{\sqrt{q^2 - 1}}$	K1 N1	2
	<p>(b)</p>  <p>Shape and sycle Amplitude Shifted Modulus</p> <p>Daripada graf/From the graph:</p> $0 < k < 1$	P1 P1 P1 P1 N1	
	<p>(c)</p> $6 \sec^2 \Theta - 20 \tan \Theta = 0$ $\frac{6}{\cos^2 \theta} - \frac{20 \sin \theta}{\cos \theta} = 0$ $6 - 20 \sin \Theta \cos \Theta = 0$ $20 \sin \Theta \cos \Theta = 6$ $2 \sin \Theta \cos \Theta = 0.6$ $\sin 2\Theta = 0.6$ $2\Theta = 36.87, 143.13, 396.87, 503.13$ $\Theta = 18.44, 71.57, 198.44, 251.57$ <p>Cara 2/ Method 2:</p> $6(1 + \tan^2 \Theta) - 20 \tan \Theta = 0$ $6 \tan^2 \Theta - 20 \tan \Theta + 6 = 0$ $3 \tan^2 \Theta - 10 \tan \Theta + 3 = 0$ $(3 \tan \Theta - 1)(\tan \Theta - 3) = 0$ $\tan \Theta = \frac{1}{3}, \tan \Theta = 3$ $\Theta = 18.44, 71.57, 198.44, 251.57$	K1 K1 K1 N1	

20	<p>(a) $\cos\left(\frac{y}{2} + \frac{y}{2}\right) = 3\sin\frac{y}{2} - 1$</p> $1 - 2\sin^2\left(\frac{y}{2}\right) = 3\sin\frac{y}{2} - 1$ $2\sin^2\frac{y}{2} + 3\sin\frac{y}{2} - 2 = 0$ $\sin\frac{y}{2} = \frac{1}{2}$ $y = 60, 300$	K1	
		K1	
		K1	
		K1	
		N1	

PERATURAN PEMARKAHAN

BIL	PEMARKAHAN	SUB MARKAH	JUMLAH
1.	(a) ${}^8P_8 \times 2$ 80 640 (b) $8! \times 3!$ 241 920 (c) $10! - (6! \times 5!)$ 3 542 400	1 1 1 2 1	 7
2.	(a) $\frac{n!}{(n-2)!2!} = 66$ $(n-12)(n+11) = 0$ $n = 12$ (b) (i) $\frac{(9-1)!}{2}$ 20 160 (ii) $\frac{{}^9P_6}{6(2)} + \frac{{}^9P_7}{7(2)} + \frac{{}^9P_8}{8(2)} + \frac{{}^9P_9}{9(2)}$ 60 840	1 1 1 1 2 1	 8
3.	(a) ${}^1C_1 \times {}^5C_2$ 10 (b) (i) $\frac{6!}{2!}$ 360 (ii) $\frac{4!}{2!} \times 3!$ 360 - 72 288	1 1 1 1 1 1	 6

PERATURAN PEMARKAHAN

BIL	PEMARKAHAN	SUB MARKAH	JUMLAH
4.	(a) ${}^{15}C_2$ 105 (b) 3C_2 $105-{}^3C_2$ 102	1 1 1 1 1	5
5.	(a) ${}^6C_3 \times {}^7C_3$ 700 (b) $({}^6C_3 \times {}^2C_2 \times {}^5C_1) + ({}^6C_3 \times {}^2C_0 \times {}^5C_3)$ 300 (c) $2 \times 5!$ $6! - 240$ 480	1 1 1 1 1 1 1	7
6.	(a) PARAH : $\frac{5!}{2!} = 60$ PERAH : $5! = 120$ Tidak sama kerana perkataan PARAH mempunyai objek secaman. (b) $({}^8C_5 \times {}^4C_2 \times {}^6C_6) + ({}^8C_4 \times {}^4C_2 \times {}^7C_7)$ 756	1 1 1 1 1	5
7.	(a) $7 \times 3!$ 30 240 (b) $({}^{12}C_5 \times {}^7C_7) + ({}^{12}C_6 \times {}^6C_6) + ({}^{12}C_7 \times {}^5C_5)$ 2 508	1 1 2 1	5

PERATURAN PEMARKAHAN

BIL	PEMARKAHAN	SUB MARKAH	JUMLAH
8.	(a) (i) $6! = 720$ (ii) $4 \times 3!$ 144 (b) $\frac{4!}{2!}$ $\frac{4!}{2!} \times \frac{4!}{2!} \times 2$ 288	1 1 1 1 1 1	6
9.	(a) $3 \times \frac{2!}{2!} = 6$ $\frac{4!}{2!} - 6$ 6 (b) ${}^5P_2 \times {}^{10}P_1 \times {}^{12}P_4$ $2\,376\,000$	1 1 1 1 1	5
10.	(a) $({}^7C_7 \times {}^5C_3) + ({}^7C_6 \times {}^5C_4) + ({}^7C_5 \times {}^5C_5)$ 66 (b) $({}^3C_3 \times {}^5C_0) + ({}^3C_2 \times {}^5C_1)$ 16	2 1 1 1	5

TABURAN KEBARANGKALIAN

1. a) $P(\text{Kedua-dua berwarna biru})$

$$= \left(\frac{6}{20}\right)\left(\frac{5}{19}\right) = \frac{3}{38}$$

- b) $P(\text{berbeza warna})$

$$= \left(\frac{6}{20}\right)\left(\frac{14}{19}\right) + \left(\frac{14}{20}\right)\left(\frac{6}{19}\right) = \frac{42}{95}$$

2. a) $\{LL, LP, PL, PP\}$

b) $X = \{0, 1, 2\}$

3. $P('3') = \frac{1}{3}$

$$P(1) = P(2) = P(4) = P(5) = P(6) = \left(1 - \frac{1}{3}\right) \div 5 = \frac{2}{15}$$

$P(\text{Nombor berlainan})$

$$= 1 - P(11) - P(22) - P(33) - P(44) - P(55) - P(66)$$

$$= 1 - 5\left(\frac{2}{15}\right)\left(\frac{2}{15}\right) - \left(\frac{1}{3}\right)\left(\frac{1}{3}\right)$$

$$= \frac{36}{45}$$

$$= \frac{4}{5}$$

4. $50 = np$

$$25 = npq$$

$$25 = (50)q$$

$$q = \frac{1}{2}$$

$$p = k = 1 - \frac{1}{2}$$

$$= \frac{1}{2}$$

$$50 = n\left(\frac{1}{2}\right)$$

$$n = 100$$

$$\begin{aligned} 5. \text{ a) } P(X \geq 2) &= 1 - [P(X=0) + P(X=1)] \\ &= 1 - {}^{10}C_0 (0.6)^0 (0.4)^{10} - {}^{10}C_1 (0.6)^1 (0.4)^9 \\ &= 0.9983 \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{2}{5} \times 800 \\ &= 320 \end{aligned}$$

$$\begin{aligned} 6. \text{ a) } X &\sim N(\mu, \sigma^2) \\ \frac{(3-\mu)}{\sigma} &= 0.674 \\ 3 - \mu &= 0.674\sigma \dots (\text{Persamaan 1}) \end{aligned}$$

$$\begin{aligned} \frac{(-3-\mu)}{\sigma} &= -0.674 \\ -3 - \mu &= -0.674\sigma \dots (\text{Persamaan 2}) \end{aligned}$$

$$\begin{aligned} (\text{Persamaan 1}) - (\text{Persamaan 2}) : 6 &= 2(0.674\sigma) \\ \sigma &= 4.451 \end{aligned}$$

$$\begin{aligned} \text{b) } P(\text{Lewat}) &= P(X > 5) \\ &= P\left[Z > \frac{(5-0)}{4.451}\right] \\ &= 0.1308 \end{aligned}$$

$$\begin{aligned} 7. \text{ a) } X &\sim B(5, p) \\ p^5 &= 0.01024 \\ p &= 0.4 \end{aligned}$$

$$\begin{aligned}
 \text{b) } P(X > 3) &= P(X = 4) + P(X = 5) \\
 &= {}^5C_4 (0.4)^4 (0.6)^1 + {}^5C_5 (0.4)^5 (0.6)^0 \\
 &= 0.0870
 \end{aligned}$$

$$8. \text{ a) } X \sim N(2, t^2)$$

$$P(X > 2.6) = 0.1841$$

$$P(Z > \frac{2.6-2}{t}) = 0.1841$$

$$\frac{2.6-2}{t} = 0.9$$

$$t = 0.6667$$

$$\begin{aligned}
 \text{b) } P(1.2 < X < 2.6) &= P\left(\frac{1.2-2}{0.6667} < Z < \frac{2.6-2}{0.6667}\right) \\
 P(-2 < Z < 0.900) &= 1 - 0.0228 - 0.1841 \\
 &= 0.7931
 \end{aligned}$$

$$9. \text{ a) i) } X \sim B(20, 0.40)$$

$$P(X = 10) = {}^{20}C_{10} (0.4)^{10} (0.6)^{10} = 0.1171$$

$$\text{ii) } P(X < 4) = P(X = 0) + P(X = 1) + P(X = 2) + P(X = 3)$$

$$= {}^{20}C_0 (0.4)^0 (0.6)^{20} + {}^{20}C_1 (0.4)^1 (0.6)^{19} + {}^{20}C_2 (0.4)^2 (0.6)^{18}$$

$$+ {}^{20}C_3 (0.4)^3 (0.6)^{17}$$

$$= 0.01596$$

$$\text{b) } \text{min} = np = 20(0.4) = 8$$

$$\text{varians} = npq = 8(0.6) = 4.8$$

$$10. \text{ a) } X \sim N(56, 8^2)$$

$$P(X > 40) = P\left(Z > \frac{40-56}{8}\right)$$

$$= P(Z > -2)$$

$$= 1 - 0.0228$$

$$= 0.9772$$

$$\frac{x}{400} = 0.9772$$

$x = 390$ (Bilangan pelajar lulus)

b) $P(X > a) = 0.15$

$$P(Z > \frac{a-56}{8}) = 0.15$$

$$\frac{a-56}{8} = 1.37$$

$a = 67$ (Markah minimum gred A)