

**SULIT**

Form Four

Additional Mathematics

Paper 1

2010

2 hours



3472/1

Nama Calon : .....

Tingkatan : .....

**PEPERIKSAAN AKHIR TAHUN 2010  
TINGKATAN 4**

**ADDITIONAL MATHEMATICS**

Paper 1

2 hours

**JANGAN BUKA KERTAS SOALAN INI  
SEHINGGA DIBERITAHU**

1. *Kertas soalan ini mengandungi 25 soalan.*
2. *Jawab semua soalan.*
3. *Bagi setiap soalan berikan SATU jawapan sahaja.*
4. *Jawapan hendaklah ditulis pada ruang yang disediakan dalam kertas soalan.*
5. *Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.*
6. *Sekiranya anda hendak menukar jawapan. Batalkan kerja mengira yang telah dibuat. Kemudian tuliskan jawapan yang baru.*
7. *Rajah yang mengiringi soalan ini tidak dilukiskan mengikut skala kecuali dinyatakan.*
8. *Markah yang diperuntukkan bagi setiap soalan atau ceraihan soalan ditunjukkan dalam kurungan.*
9. *Satu senarai rumus disediakan di halaman 2 hingga 3.*
10. *Buku sifir matematik empat angka disediakan.*
11. *Penggunaan kalkulator saintifik yang tidak boleh diprogramkan adalah dibenarkan.*
12. *Kertas soalan ini hendaklah diserahkan pada akhir peperiksaan.*

Kod Pemeriksa Soalan	Markah Penuh	Markah Diperoleh
1	2	
2	2	
3	3	
4	3	
5	2	
6	4	
7	3	
8	3	
9	3	
10	4	
11	3	
12	3	
13	4	
14	3	
15	4	
16	4	
17	3	
18	3	
19	4	
20	3	
21	4	
22	4	
23	3	
24	3	
25	3	
Jumlah	80	

Kertas soalan ini mengandungi 16 halaman bercetak

The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used.

Rumus-rumus berikut boleh digunakan untuk membantu anda menjawab soalan. .  
Simbol-simbol yang diberi adalah yang biasa digunakan.

## ALGEBRA

$$1. x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2. a^m \times a^n = a^{m+n}$$

$$3. a^m \div a^n = a^{m-n}$$

$$4. (a^m)^n = a^{mn}$$

$$5. \log_a mn = \log_a m + \log_a n$$

$$6. \log_a \frac{m}{n} = \log_a m - \log_a n$$

$$7. \log_a m^n = n \log_a m$$

$$8. \log_a b = \frac{\log_c b}{\log_c a}$$

$$9. T_n = a + (n-1)d$$

$$10. S_n = \frac{n}{2}[2a + (n-1)d]$$

$$11. T_n = ar^{n-1}$$

$$12. S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, \quad (r \neq 1)$$

$$13. S_\infty = \frac{a}{1 - r}, \quad |r| < 1$$

## CALCULUS

$$1. y = uv, \quad \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$2. y = \frac{u}{v}, \quad \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2},$$

$$3. \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

4. Area under a curve

$$= \int_a^b y \, dx \text{ or}$$

$$= \int_a^b x \, dy$$

5. Volume generated

$$= \int_a^b \pi y^2 \, dx \text{ or } \int_a^b \pi x^2 \, dy$$

## GEOMETRY

$$1. \text{ Distance} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

2. Midpoint

$$(x, y) = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$3. |r| = \sqrt{x^2 + y^2}$$

$$4. \hat{r} = \frac{xi + yj}{\sqrt{x^2 + y^2}}$$

5. A point dividing a segment of a line

$$(x, y) = \left( \frac{nx_1 + mx_2}{m + n}, \frac{ny_1 + my_2}{m + n} \right)$$

6. Area of a triangle =

$$\frac{1}{2} |(x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3)|$$

## STATISTICS

$$1 \quad \bar{x} = \frac{\sum x}{N}$$

$$2 \quad \bar{x} = \frac{\sum fx}{\sum f}$$

$$3 \quad \sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N}} = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{N}}{N}}$$

$$4 \quad \sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}} = \sqrt{\frac{\sum fx^2 - \frac{(\sum fx)^2}{\sum f}}{\sum f}}$$

$$5 \quad M = L + \left[ \frac{\frac{1}{2}N - F}{f_m} \right] C$$

$$6 \quad I = \frac{P_1}{P_0} \times 100$$

$$7 \quad \bar{I} = \frac{\sum w_1 I_1}{\sum w_1}$$

$$8 \quad {}^n P_r = \frac{n!}{(n-r)!}$$

$$9 \quad {}^n C_r = \frac{n!}{(n-r)!r!}$$

$$10 \quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$11 \quad p(X=r) = {}^n C_r p^r q^{n-r}, \quad p + q = 1$$

$$12 \quad \text{Min(mean)} = np$$

$$13 \quad \sigma = \sqrt{npq}$$

$$14 \quad z = \frac{x - \mu}{\sigma}$$

## TRIGONOMETRY

$$1 \quad \text{Arc length, } s = r\theta$$

$$2 \quad \text{Area of a sector, } L = \frac{1}{2} r^2 \theta$$

$$3 \quad \sin^2 A + \cos^2 A = 1$$

$$4 \quad \sec^2 A = 1 + \tan^2 A$$

$$5 \quad \text{cosec}^2 A = 1 + \cot^2 A$$

$$6 \quad \sin 2A = 2 \sin A \cos A$$

$$7 \quad \begin{aligned} \cos 2A &= \cos^2 A - \sin^2 A \\ &= 2 \cos^2 A - 1 \\ &= 1 - 2 \sin^2 A \end{aligned}$$

$$8 \quad \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$9 \quad \sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$10 \quad \cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$11 \quad \tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$12 \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$13 \quad a^2 = b^2 + c^2 - 2bc \cos A$$

$$14 \quad \text{Area of triangle} = \frac{1}{2} ab \sin C$$

Answer **all** questions.  
Jawab **semua** soalan.

1.

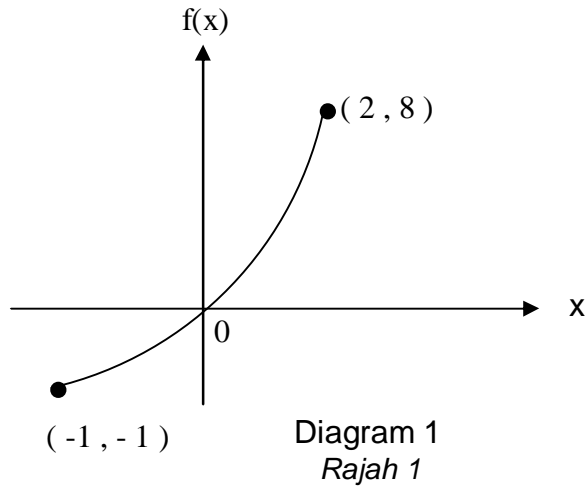


Diagram 1 shows part of the graph of the relation  $f(x)$ .  
Rajah 1 menunjukkan sebahagian graf bagi hubungan  $f(x)$ .

State,  
Nyatakan,

- ( a ) the domain of the relation.  
domain hubungan itu.
- ( b ) the type of relation.  
jenis hubungan itu.

[ 2 marks ]

Answer / Jawapan : ( a ).....  
( b ).....

1

2

2.

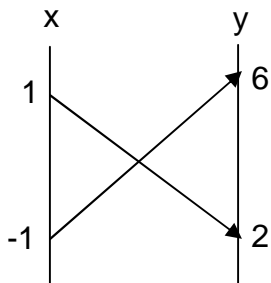
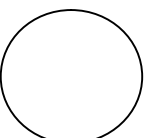


Diagram 2  
/ Rajah 2

The arrow diagram in Diagram 2 shows part of the function  
 $f : x \longrightarrow y$ , where  $f(x) = \frac{12}{ax+b}$ .

Anak panah pada Rajah 2 menggambarkan sebahagian  
daripada fungsi  $f : x \longrightarrow y$ , dengan  $f(x) = \frac{12}{ax+b}$ .



Find the values of a and b.  
*Hitung nilai a dan b.*

[ 2 marks ]

2

2

Answer / Jawapan : a = .....

b = .....

3. Given  $f(x) = \frac{3}{2-x}$ ,  $x \neq k$ , find

*Diberi  $f(x) = \frac{3}{2-x}$ ,  $x \neq k$ , cari*

( a ) the value of k  
*Nilai k.*

( b )  $f^2(x)$

[ 3 marks ]

3

3

Answer / Jawapan : ( a ).....

( b ).....

4. Given that 3 and k are the roots of quadratic equation  $x^2 + x = p$ , find the values of k and p.

*Diberi 3 dan k ialah punca persamaan kuadratik  $x^2 + x = p$ , cari nilai k dan p.*

[ 3 marks ]

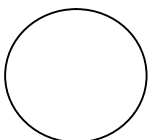
4

3

Answer / Jawapan : k = .....

p = .....

[ Lihat sebelah  
**SULIT**



5. Form the quadratic equation which has roots -2 and 5.  
*Bentukkan persamaan kuadratik yang mempunyai punca-punca -2 dan 5.*

[ 2 marks ]

Answer / Jawapan : .....

5

2

6. The quadratic function  $f(x) = x^2 + 2x - 4$  can be expressed in the form  $f(x) = (x + m)^2 - n$ , where  $m$  and  $n$  are constants .  
Find the values of  $m$  and  $n$

*Suatu fungsi kuadratik  $f(x) = x^2 + 2x - 4$  boleh diungkapkan dalam bentuk  $f(x) = (x + m)^2 - n$ , dimana  $m$  dan  $n$  adalah pemalar. Cari nilai  $m$  dan  $n$*

[4 marks]

Answer /Jawapan:  $m =$ .....

$n =$  .....

6

4

7. Find the range of values of  $k$ , such that the straight line  $y = 3x + k$  does not intersect the curve  $x^2 + y^2 - 8 = 0$

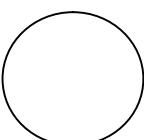
*Cari julat nilai  $k$ , dengan keadaan garis lurus  $y = 3x + k$  tidak bersilang dengan lengkung  $x^2 + y^2 - 8 = 0$*

[3 marks]

Answer /Jawapan: .....

7

3



8. Diagram 8 shows the graph of the function  $f(x) = 5(x + p)^2 + 2$ , where  $p$  is a constant.

Rajah 8 menunjukkan graf bagi fungsi  $f(x) = 5(x + p)^2 + 2$ , dengan keadaan  $p$  adalah pemalar

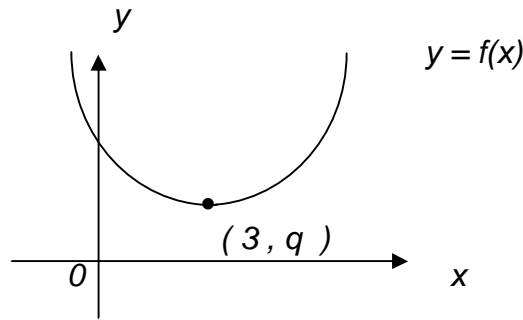


Diagram 8 / Rajah 8

The curve  $y = f(x)$  has the minimum value  $(3, q)$ , where  $q$  is a constant. State

Lengkung  $y = f(x)$  mempunyai titik minimum  $(3, q)$ , dengan keadaan  $q$  ialah pemalar. Nyatakan

- (a) the value of  $p$  / nilai  $p$
- (b) the value of  $q$  / nilai  $q$
- (c) the equation of the axis of symmetry / persamaan paksi simetri

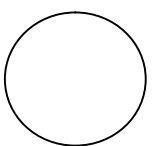
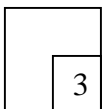
[3 marks]

Answer / Jawapan : (a)  $p = \dots\dots\dots$

(b)  $q = \dots\dots\dots$

(c)  $\dots\dots\dots$

8



9. Find the range of the values of  $x$  such that  $(x - 4)^2 < 6 - x$

*Cari julat nilai  $x$  bagi  $(x - 4)^2 < 6 - x$*

[3 marks]

Answer / Jawapan : .....

9

3

10. Given  $6 \log_3 x - 12 \log_9 y = 3$ . Express  $x$  in terms of  $y$   
*Diberi  $6 \log_3 x - 12 \log_9 y = 3$ . Ungkapkan  $x$  dalam sebutan  $y$*

[4 marks]

Answer / Jawapan: .....

10

4

11. Given  $\log_3 m = x$  and  $\log_3 n = y$ , express  $\log_3 \frac{27m}{n}$  in term of  $x$  and  $y$ .

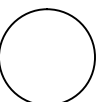
*Diberi  $\log_3 m = x$  dan  $\log_3 n = y$ , ungkapkan  $\log_3 \frac{27m}{n}$  dalam sebutan  $x$  dan  $y$ .*

(3 marks)

Answer / Jawapan: .....

11

3





12. Solve the equation  $3^{x+2} - 3^{x+1} = 54$  .  
Selesaikan persamaan  $3^{x+2} - 3^{x+1} = 54$  .

(3 marks )

12

3

Answer/Jawapan: .....

13. Solve the equation  $\log_2 16 + 2\log_x 3 = 3$   
Selesaikan persamaan  $\log_2 16 + 2\log_x 3 = 3$

(4 marks )

13

4

Answer/Jawapan: .....

14. Find the equation of the straight line that passes through point P(3, 6) and point Q(2, -1) .

Cari persamaan garis lurus yang melalui titik P(3, 6) dan Q(2, -1).

(3 marks )

14

3

Answer/Jawapan: .....

15. Given the points  $P(4, 5)$ ,  $Q(-2, 2)$  and  $R(6, t)$  are the vertices of triangle  $PQR$ . If the area of the triangle  $PQR$  is  $24 \text{ unit}^2$ , find the possible values of  $t$ .

*Diberi titik-titik  $P(4, 5)$ ,  $Q(-2, 2)$  dan  $R(6, t)$  ialah bucu-bucu sebuah segitiga  $PQR$ . Jika luas segitiga  $PQR$  ialah  $24 \text{ unit}^2$ , cari nilai-nilai yang mungkin bagi  $t$ .  
[4 marks]*

Answer/Jawapan: .....

15
4

16. The points  $P(g, 2g)$ ,  $Q(h, k)$  and  $R(2h, 3k)$  are on a straight line.  $Q$  divides  $PR$  internally in the ratio  $1 : 3$ . Express  $h$  in terms of  $k$ .

*Koordinat  $P(g, 2g)$ ,  $Q(h, k)$  dan  $R(2h, 3k)$  berada pada satu garis lurus. Koordinat  $Q$  membahagi  $PR$  dengan nisbah  $1 : 3$ . Nyatakan  $h$  dalam sebutan  $k$ .*

[ 4 marks]

Answer/Jawapan: .....

16
4

17. A set of 6 numbers has a mean of 16.  
*Suatu set yang mengandungi 6 nombor mempunyai meannya 16.*

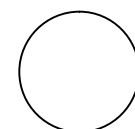
a) Find  $\sum x$ .  
*Carikan  $\sum x$ .*

b) When a number  $p$  is taken away from this set of numbers, the new mean is 14. Find the value of  $p$ .  
*Jika nombor  $p$  dikeluarkan dari set nombor itu, min barunya ialah 14. Carikan nilai  $p$ .*

[ 3 marks ]

Answer/Jawapan: .....

17
3



18. A set of data consists of eight numbers. The sum of the numbers is 112 and the sum of the squares of the numbers is 1856. Calculate  
*Suatu set data mengandungi 8 nombor. Hasil tambah nombor itu ialah 112 dan hasil tambah kuasa duanya ialah 1856. Kirakan*

- a) the mean  
*min*
  
- b) the standard deviation.  
*sisihan piawai*

[ 3 marks ]

Answer/Jawapan: .....

18
3

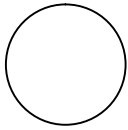
19. The mean of a set of numbers,  $m + 4$ ,  $2m + 5$ ,  $2m - 1$ ,  $m + 7$  and  $m - 3$  is 8. Find  
*Min suatu set nombor  $m + 4$ ,  $2m + 5$ ,  $2m - 1$ ,  $m + 7$  dan  $m - 3$  ialah 8. Carikan*

- a) the value of  $m$  / *nilai  $m$*
  
- b) the variance of the set of numbers / *varians bagi set nombor tersebut.*

[ 4 marks ]

Answer/Jawapan: .....

19
4



20.

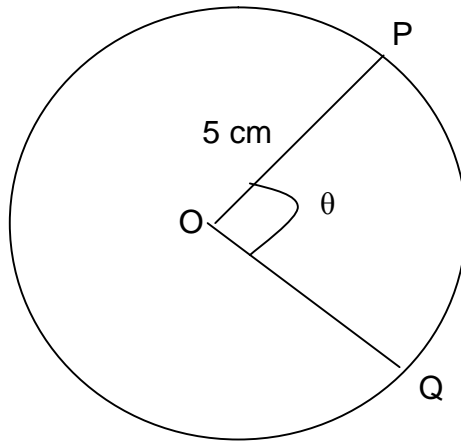


Diagram 20 / Rajah 20

Diagram 20 shows a sector OPQ with centre O and radius of 5 cm. Given the area of the sector is  $15 \text{ cm}^2$ . [Use / Guna  $\pi = 3.142$ ]

Rajah 20 menunjukkan sector OPQ berpusat O dan berjejari 5 cm. Diberi luas sector itu ialah  $15 \text{ cm}^2$ .

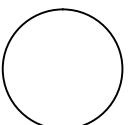
Find / Carikan,

- a) the value of  $\theta$ , in radians  
*nilai  $\theta$  dalam radian*
  
- b) the length of the major sector of the circle.  
*panjang lengkok major bagi bulatan di atas*

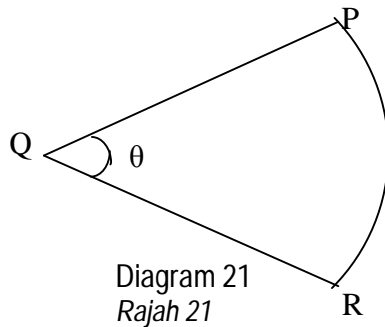
[ 3 marks ]

Answer/Jawapan: .....

20
3



21. The Diagram 21 shows a sector PQR with centre O.  
*Rajah 21 menunjukkan sebuah sektor PQR berpusat O.*



It is given that the area of the sector is  $7.5 \text{ cm}^2$  and the radius of sector is 5 cm.  
*Diberi luas sektor itu ialah  $7.5 \text{ cm}^2$  dan jejari sektor itu ialah 5 cm.*

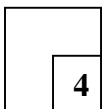
[Use / Guna  $\pi = 3.142$ ]

Find  
*Cari*

- (a) The value of  $\theta$  in radians,  
*Nilai  $\theta$  dalam radian,*
- (b) The perimeter, in cm, of sector PQR.  
*Perimeter, dalam cm, sektor PQR.*

[ 4 marks ]

21



Answer: (a) .....

(b).....

22. Diagram 22 shows a sector BOC of a circle with centre O.  
*Rajah 22 menunjukkan sebuah sektor BOC berpusat O.*

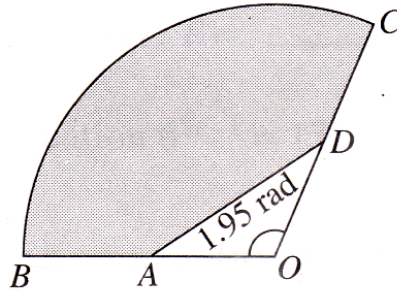


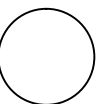
Diagram 22  
*Rajah 22*

Given  $AD = 16$  cm and  $OA = OD = DC = 10$  cm. Find  
*Diberi  $AD = 16$  cm and  $OA = OD = DC = 10$  cm. Cari*

- (a) the length, in cm of the arc BC,  
*panjang, dalam cm lengkok BC,*
- (b) the area in  $\text{cm}^2$ , of the shaded region.  
*luas dalam  $\text{cm}^2$ , kawasan berlorek.*

[ 4 marks ]

Answer: (a) .....  
(b).....



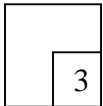
23. Differentiate  $\frac{3}{2}x^2 - 6x + 8$  with respect to  $x$ .

*Bezakan  $\frac{3}{2}x^2 - 6x + 8$  terhadap  $x$ .*

[3 marks]

Answer: .....

23



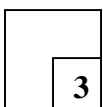
24. Given that  $f(x) = (5x - 4)^4$  find  $f'(1)$ .

*Diberi bahawa  $f(x) = (5x - 4)^4$  cari  $f'(1)$ .*

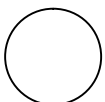
[ 3 marks]

Answer: .....

24



[ Lihat sebelah  
**SULIT**



25. Two variables,  $x$  and  $y$ , are related by the equation  $y = 4x - \frac{9}{x}$ . Given that  $y$  decrease at a constant rate of 10 units per second, find the rate of change of  $x$  when  $x = 3$  units.

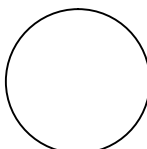
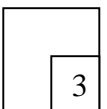
*Dua pembolehubah,  $x$  dan  $y$  dihubung oleh persamaan  $y = 4x - \frac{9}{x}$*

*Diberi  $y$  berkurang dengan kadar tetap 10 unit persaat, cari kadar perubahan bagi  $x$ , bila  $x = 3$  unit.*

[3 marks ]

Answer: .....

25



**END OF QUESTION PAPER**



3472/1  
Form 4  
Additional Mathematics  
Paper 1  
2010



**PEPERIKSAAN AKHIR TAHUN 2010**

**TINGKATAN 4**

**ADDITIONAL MATHEMATICS**

**Paper 1**

**MARKING SCHEME**

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**This marking scheme consists of 6 printed pages**

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Number	Solution and marking scheme	Submarks	Full marks
1	(a) $-1 \leq x \leq 2$ (b) One-to-one	1 1	2
2	$a = 2$ $b = 4$	1 1	2
3	(a) $k = 2$ (b) $f^2(x) = \frac{3(2-x)}{1-2x}$ , $x \neq \frac{1}{2}$ <b>B1</b> : $ff(x) = \frac{3}{2 - (\frac{3}{2-x})}$	1 2	3
4	$k = -4$ $p = 12$ <b>B1</b> : $3^2 + 3 = p$	1 2	3
5	$X^3 - 3x - 10 = 0$ <b>B1</b> : $(x + 2)(x - 5) = 0$ Or $x^2 - (-2 + 5)x + (-2)(5) = 0$	2	2

6	<p>(a) <math>m = 1</math></p> <p>(b) <math>n = 5</math></p> <p>B2 : <math>(x + 1)^2 - 5</math></p> <p>B1 : <math>x^2 + 2x + \left(\frac{2}{2}\right)^2 - \left(\frac{2}{2}\right)^2 - 4</math></p>	4
7	<p><math>k &lt; -\sqrt{80}</math> , <math>k &gt; \sqrt{80}</math></p> <p>B2 : <math>-4k^2 &lt; -320</math> is seen</p> <p>B1 : <math>[6k]^2 - 4(10)(k^2 - 8) &lt; 0</math></p>	3
8	<p>a) <math>p = -3</math>    b) <math>q = 2</math></p> <p>B1 : <math>p = -3</math> or <math>q = 2</math></p> <p>c) <math>x = 3</math></p>	3
9	<p><math>2 &lt; x &lt; 5</math></p> <p>B2 : <math>(x - 2)(x - 5) &lt; 0</math></p> <p>B1: <math>x^2 - 7x + 10 &lt; 0</math></p>	3
10	<p><math>x = \sqrt{3}y</math></p> <p>B3 : <math>(3)^{\frac{1}{2}} y</math></p> <p>B2 : <math>\text{Log}_3 \left[ \frac{x}{y} \right] = \frac{1}{2}</math></p> <p>B1 : <math>6 \log_3 x - 12 \left[ \frac{\log_3 y}{2} \right] = 3</math></p>	4

11.	$3 + x - y$ $3\log_3 3 + \log_3 m - \log_3 n$ $\log_3 27 + \log_3 m - \log_3 n$	3 B2 B1	3
12.	$X = 2$ $3^x = 9$ $3^x(9) - 3^x(3) = 54$	3 B2 B1	3
13.	$x = \frac{1}{9}$ $\log_x 9 = -1$ $4 + \log_x 3^2 = 3$ $\log_2 2^4 + \log_x 3^2 = 3$	4 B3 B2 B1	4
14.	$y = 7x - 15$ $6 = 7(3) + c$ $m = 7$	3 B2 B1	3
15.	$t = -2, 14$ $18 - 3t = \pm 24$ $\frac{1}{2}(38 - 2t - 4t - 2)$	4 B2 B1	4
16	$h = \frac{k}{4}$ $h = \frac{3(1/6) + 2h}{4}$ $g = \frac{k}{6}$ $k = \frac{6g + 3k}{4}$	4 B3 B2 B1	4

17	a) $\sum x = 96$ b) $p = 26$ $\frac{96-p}{5} = 14 @ 96 - p = 70$	1 2 B1	3
18	a) 14 b) 6 $\sqrt{\frac{1856}{8} - 14^2}$	1 2 B1	3
19	a) $m = 4$ $\frac{7m+12}{5} = 8$ b) 16.8 $\frac{404}{5} - 8^2$	2 B1 2 B1	4
20	a) $\theta = 1.2 \text{ rad}$ b) $S = r\theta$ $= 5 [ 2\pi - 1.2 \text{ rad} ]$ $= 5 [ 5.084 ]$ $= 25.4$	1 1 1	3
21	(a) $\theta = 0.6 \text{ rad}$ $\frac{1}{2}(5)^2\theta = 7.5$ (b) 13 Arc of PR = 3	2 B1 2 B1	4
22	(a) 39 cm (b) 343.55 $\frac{1}{2}(20)^2(1.95) -$ $\frac{1}{2}(10)^2 \sin 1.95 \text{ rad}$	1 3 B2	4

	$\frac{1}{2}(20)^2(1.95) \text{ or}$ $\frac{1}{2}(10)^2 \sin 1.95 \text{ rad}$	B1	
23	$3x - 6$ $2\left(\frac{3}{2}\right) - 6$	2 B1	3
24	$20$ $20[5(1) - 4]$ $20(5x - 4)$	3 B2 B1	3
25	$-2 \text{ units s}^{-1}$ $\frac{1}{\frac{dy}{dx}} X (-10)$ $\frac{dy}{dx} = 4 + \frac{9}{x^2}$	3 B2 B1	3