

**MAKTAB RENDAH SAINS MARA****PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSM 2018****MATEMATIK TAMBAHAN**

Kertas 1

Dua jam

**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. *Tulis nama dan kelas anda pada ruang yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman belakang buku soalan ini.*

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

Kertas soalan ini mengandungi 28 halaman bercetak.

[Lihat halaman sebelah

Answer all questions.  
Jawab semua soalan.

- 1 Diagram 1 shows a sector  $ROT$  of a circle with centre  $O$  and radius 12 cm.

Rajah 1 menunjukkan sektor  $ROT$  bagi sebuah bulatan berpusat  $O$  dan jejari 12 cm.

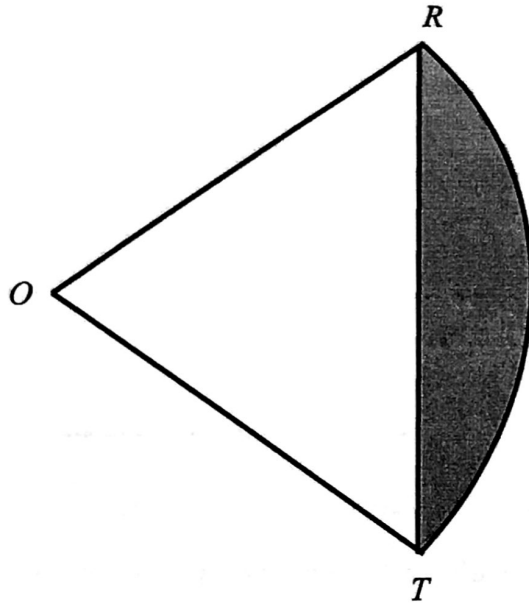


Diagram 1  
Rajah 1

Given that  $\angle ROT = 1.284$  radians, find the perimeter, in cm, of the shaded region.

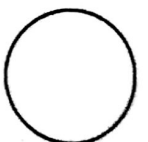
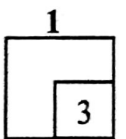
[3 marks]

Diberi bahawa  $\angle ROT = 1.284$  radian, cari perimeter, dalam cm, kawasan yang berlorek.

[3 markah]

[Use/Guna  $\pi = 3.142$ ]

Answer / Jawapan:



- 2 It is given that  $\tan \theta = k$ , such that  $\theta$  is an acute angle.  
Find  $\cos(-\theta)$  in terms of  $k$ .

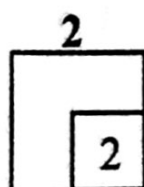
[2 marks]

*Diberi bahawa  $\tan \theta = k$ , dengan keadaan  $\theta$  adalah sudut tirus.*

*Cari  $\cos(-\theta)$  dalam sebutan  $k$ .*

[2 markah]

Answer / Jawapan:



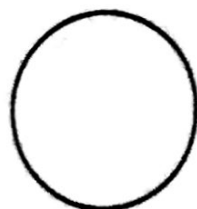
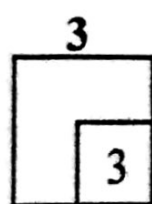
- 3 Solve the equation  $8 \sin x + \cos(180^\circ - x) = \cos x$  for  $0^\circ \leq x \leq 360^\circ$ .

[3 marks]

*Selesaikan persamaan  $8 \sin x + \cos(180^\circ - x) = \cos x$  untuk  $0^\circ \leq x \leq 360^\circ$*

[3 markah]

Answer / Jawapan:



- 4 Diagram 4 shows the position of three horses, Maisy, Ivone and Rylan, and the position of Johan when he fell off from his horse, Ivone. It is found that Johan and all three horses are collinear.

Rajah 4 menunjukkan kedudukan tiga ekor kuda, Maisy, Ivone dan Rylan, dan kedudukan Johan yang terjatuh dari kudanya, Ivone. Didapati Johan dan ketiga-tiga kuda tersebut adalah segaris.

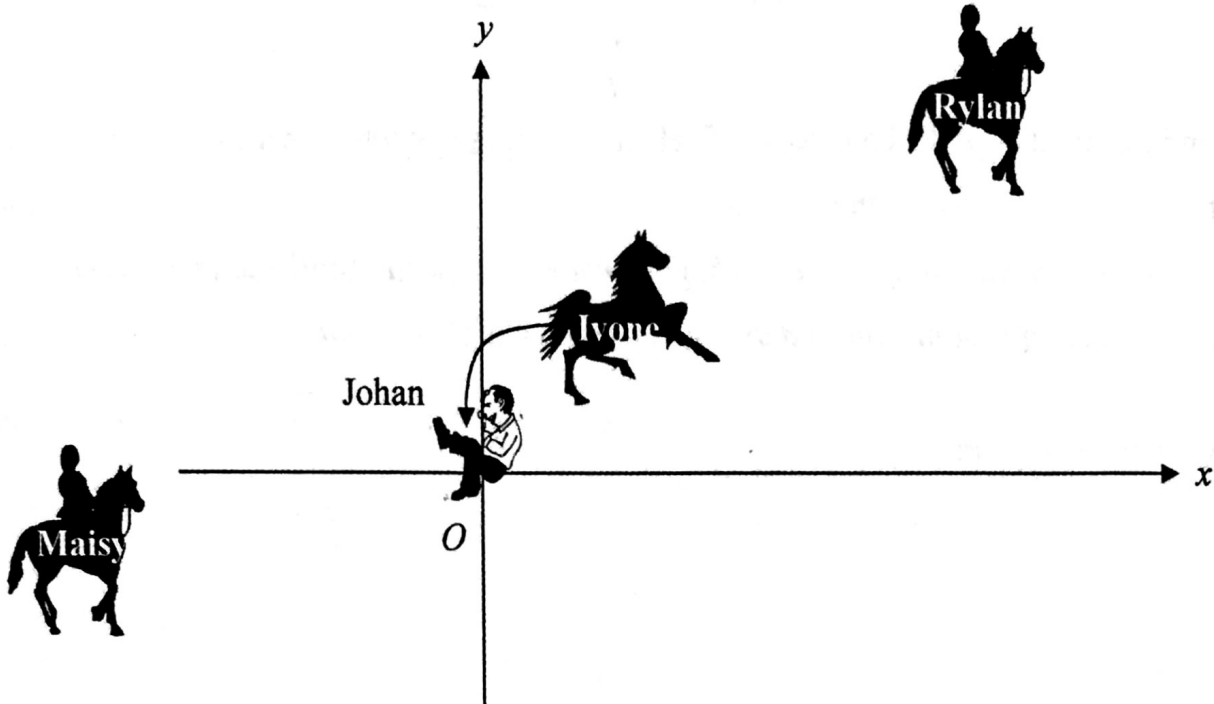
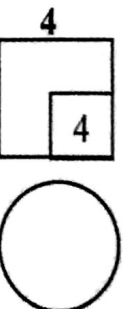


Diagram 4  
Rajah 4

Ivone is equidistant from Maisy and Rylan. The distance between Johan and Maisy is three times the distance between Johan and Ivone. Given that Rylan's coordinates is  $(20, 15)$ , find the coordinates of Ivone. [4 marks]

Ivone berada sama jarak di antara Maisy dan Rylan. Jarak Johan dari Maisy adalah tiga kali ganda jarak Johan dari Ivone. Diberi bahawa koordinat Rylan ialah  $(20, 15)$ , cari koordinat Ivone. [4 markah]

Answer / Jawapan:



- 5 Diagram 7 shows a vehicle registration number.

*Rajah 7 menunjukkan nombor pendaftaran kenderaan.*



Diagram 5  
*Rajah 5*

Find the number of different ways of vehicle registration number that can be formed by using the 3 letters followed by the 4 digits. [3 marks]

*Cari bilangan cara yang berlainan bagi nombor pendaftaran kenderaan yang boleh dibentuk dengan menggunakan 3 huruf dan diikuti dengan 4 digit tersebut.* [3 markah]

Answer / Jawapan:



- 6 It is given that  $\underline{a} = 5\underline{i} - 7\underline{j}$  and  $\underline{b} = 4\underline{i} + 3\underline{j}$ .

Find the unit vector in the direction of  $\underline{a} - \underline{b}$ . [2 marks]

*Diberi bahawa  $\underline{a} = 5\underline{i} - 7\underline{j}$  dan  $\underline{b} = 4\underline{i} + 3\underline{j}$ .*

*Cari vektor unit dalam arah  $\underline{a} - \underline{b}$ .* [2 markah]

Answer / Jawapan:



- 7 Diagram 7 shows triangle  $ADF$ . Points  $B$  and  $E$  are the midpoint of  $AC$  and  $DF$  respectively.  
Rajah 7 menunjukkan segi tiga  $ADF$ . Titik  $B$  dan  $E$  masing-masing adalah titik tengah  $AC$  dan  $DF$ .

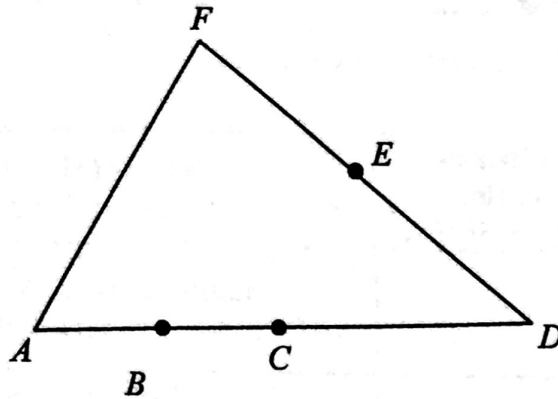


Diagram 7  
Rajah 7

It is given that  $\overrightarrow{AF} = \underline{p}$ ,  $\overrightarrow{DF} = 2\underline{q}$  and  $AB = \frac{1}{4}AD$ .

Express  $\overrightarrow{BE}$  in terms of  $\underline{p}$  and  $\underline{q}$ .

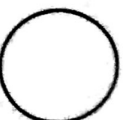
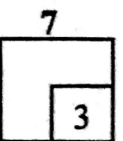
[3 marks]

Diberi bahawa  $\overrightarrow{AF} = \underline{p}$ ,  $\overrightarrow{DF} = 2\underline{q}$  dan  $AB = \frac{1}{4}AD$ .

Ungkapkan  $\overrightarrow{BE}$  dalam sebutan  $\underline{p}$  dan  $\underline{q}$ .

[3 markah]

Answer / Jawapan:



- 8 Table 8 shows the format of a Diagnostic Test consisting of 25 questions. Each correct answer is awarded one mark.

*Jadual 8 menunjukkan format suatu Ujian Diagnostik yang terdiri daripada 25 soalan. Setiap jawapan yang betul diperuntukkan satu markah.*

Section <i>Bahagian</i>	Number of Question <i>Bilangan Soalan</i>	Type of Question <i>Jenis Soalan</i>
I	13	Multiple-choice (A, B, C, D) <i>Aneka pilihan (A, B, C, D)</i>
II	7	Tick "✓ or ✗" <i>Tandakan "✓ atau ✗"</i>
III	5	Fill in the blank with the correct answer. <i>Isikan tempat kosong dengan jawapan yang betul.</i>

Table 8  
*Jadual 8*

Kalsom sits for the test and she answered all questions in Section I and II and only 3 questions from Section III. It is found that 9 of her answers in Section I, 5 answers in Section II and all her answers in Section III are correct.

Calculate the chances Kalsom will score 80% in the Diagnostic Test. [4 marks]

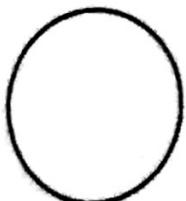
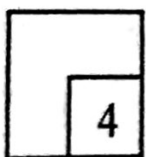
*Kalsom menduduki ujian tersebut dan dia menjawab semua soalan Bahagian I dan II dan hanya 3 soalan daripada Bahagian III. Didapati bahawa 9 jawapannya dalam Bahagian I, 5 jawapan dalam Bahagian II dan semua jawapannya dalam Bahagian III adalah betul.*

*Hitung peluang Kalsom untuk mendapat 80% dalam Ujian Diagnostik itu.*

[4 markah]

Answer / *Jawapan:*

8



- 9 In a survey carried out in a certain area, it is found that 4 out of 10 families own a car.  
The mean of the family that own a car is 150.

*Dalam satu kajian di suatu kawasan, didapati 4 daripada 10 keluarga mempunyai sebuah kereta. Min keluarga yang mempunyai sebuah kereta ialah 150.*

Find

*Cari*

- (a) the number of families that involve in the survey,  
*bilangan keluarga yang terlibat dalam kajian tersebut,*
- (b) the variance of the number of families who own a car.  
*varians bagi keluarga yang memiliki sebuah kereta.*

[3 marks]

[3 markah]

Answer / Jawapan:

(a)

(b)



10 The random variable  $X$  has a normal distribution with a mean of  $4.8$  and a standard deviation of  $\sigma$ . Given  $X = 6.6$  and  $Z = 1.2$ , find the value of

*Pembolehubah rawak  $X$  mempunyai taburan normal dengan min  $4.8$  dan sisihan piawai  $\sigma$ . Diberi  $X = 6.6$  dan  $Z = 1.2$ , cari nilai*

(a)  $\sigma$

(b)  $k$  if  $P(-k < Z < k) = \frac{1}{2}\sigma$ .

*k jika  $P(-k < Z < k) = \frac{1}{2}\sigma$ .*

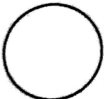
[4 marks]  
[4 markah]

Answer / Jawapan:

(a)

(b)

10



- 11 It is given that the relation between set  $X = \{4, 6\}$  and set  $Y = \{2, 3, 4, 5\}$  is defined as the following set of ordered pairs:

*Diberi bahawa hubungan antara set  $X = \{4, 6\}$  dan set  $Y = \{2, 3, 4, 5\}$  ditakrifkan dalam bentuk pasangan tertib seperti berikut:*

$$\{(4, 2), (4, 4), (6, 2), (6, 3)\}$$

State

*Nyatakan*

- (a) the images of 6,  
*imej-imej bagi 6,*
- (b) the range of the relation.  
*julat hubungan itu.*

[2 marks]

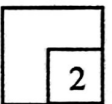
[2 markah]

Answer / Jawapan:

(a)

(b)

11



- 12 Given that  $f : x \rightarrow x + 3$  and  $gf^{-1} : x \rightarrow 7x - 27$ , find  $g^{-1}(x)$ .

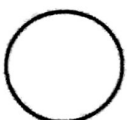
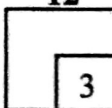
[3 marks]

*Diberi bahawa  $f : x \rightarrow x + 3$  dan  $gf^{-1} : x \rightarrow 7x - 27$ , cari  $g^{-1}(x)$ .*

[3 markah]

Answer / Jawapan:

12



13 Diagram 13 shows four functions and its graph.

Rajah 13 menunjukkan empat fungsi dan graf.

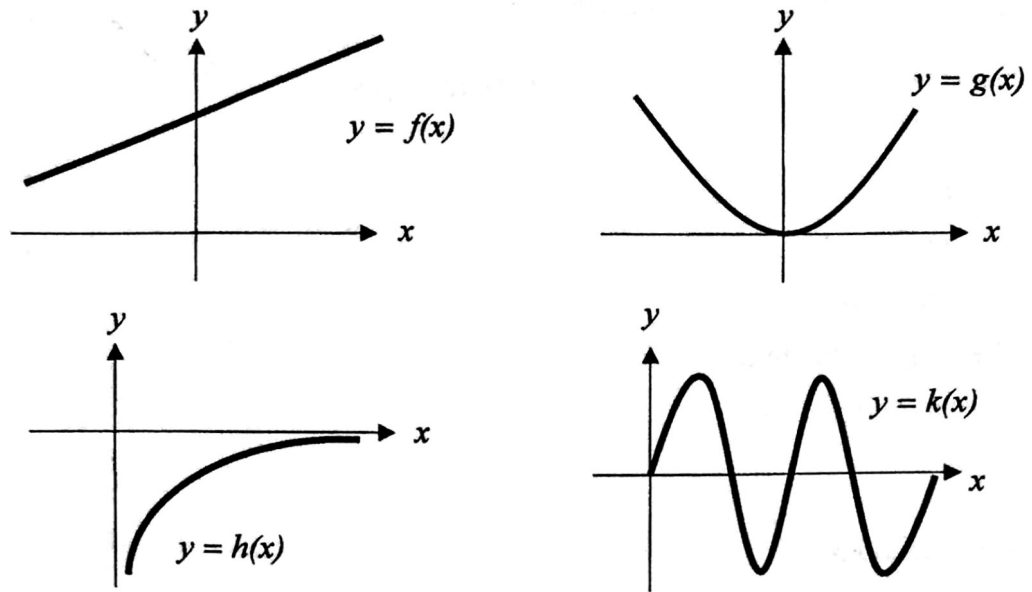


Diagram 13  
Rajah 13

State the graph(s) that

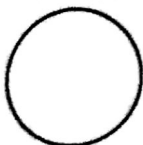
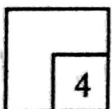
Nyatakan graf/graf-graf yang

- (a) represents a one-to-one relation. Give reason for your answer.  
*mewakili hubungan satu dengan satu. Beri alasan bagi jawapan anda.*
- (b) does not have an inverse. Give reason for your answer.  
*tidak mempunyai songsangan. Beri alasan bagi jawapan anda.*

[4 marks]  
[4 markah]

Answer / Jawapan:

13



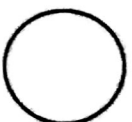
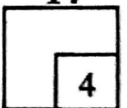
- 14 The straight line  $y = 2x + 1$  is a tangent to the curve  $y = x^2 + 2px + \frac{5}{2}p$ , where  $p$  is a constant.  
Find the values of  $p$ . [4 marks]

*Garis lurus  $y = 2x + 1$  adalah tangen kepada lengkung  $y = x^2 + 2px + \frac{5}{2}p$ , dengan keadaan  $p$  ialah pemalar.*

*Cari nilai-nilai  $p$ .* [4 markah]

Answer / Jawapan:

14



15 Diagram 15 shows a football player kicked a ball 5 m from the left of the half way line of football field.

*Rajah 15 menunjukkan seorang pemain bola sepak menendang sebiji bola 5 m dari sebelah kiri garisan tengah padang bola.*

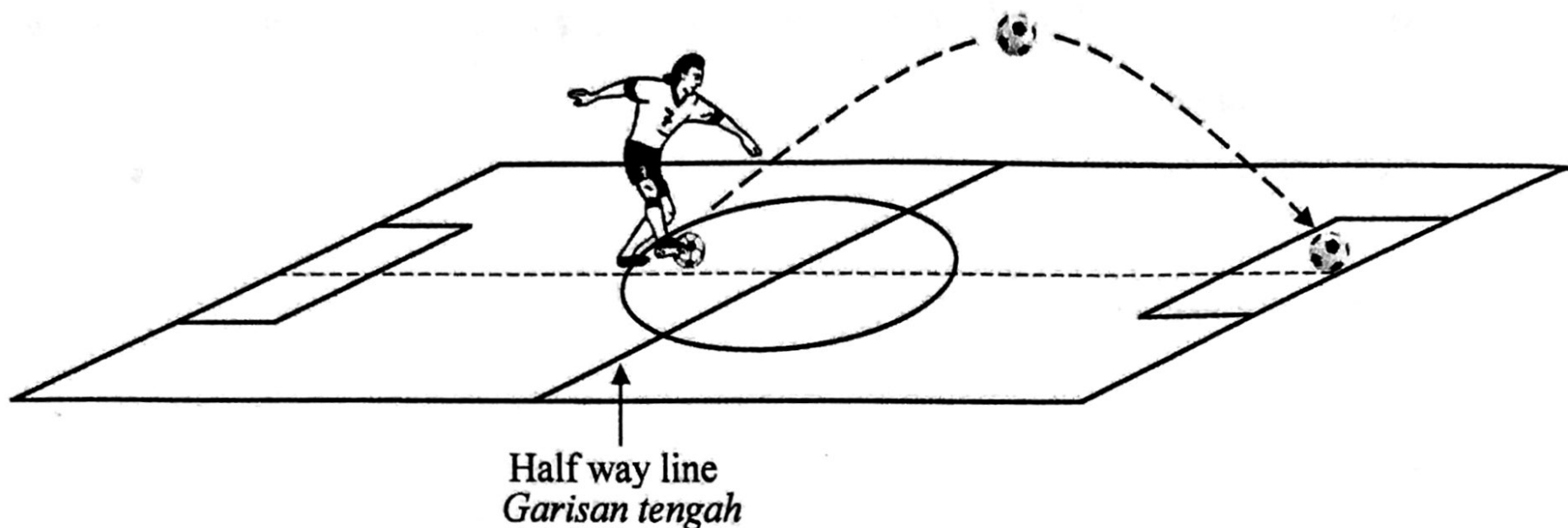


Diagram 15  
Rajah 15

The locus of the ball is represented by the function  $h(x) = -\frac{1}{100}x^2 + 4px - 2q + 5$ . The ball reaches the maximum height of 9 m and touches the ground 60 m from where it was kicked.

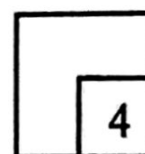
Find the value of  $p$  and of  $q$ . [4 marks]

*Lokus bola itu diwakili oleh fungsi  $h(x) = -\frac{1}{100}x^2 + 4px - 2q + 5$ . Bola itu mencapai ketinggian maksimum 9 m dan menyentuh permukaan padang 60 m dari bola itu ditendang.*

*Cari nilai  $p$  dan nilai  $q$ .* [4 markah]

Answer / Jawapan:

15

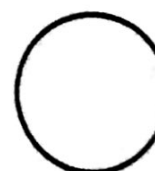
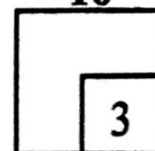


- 16 Find the range of values of  $x$  such that the quadratic function  $f(x) = (x-5)^2 - 16$  is positive. [3 marks]

*Cari julat nilai  $x$  dengan keadaan fungsi kuadratik  $f(x) = (x-5)^2 - 16$  ialah positif.* [3 markah]

*Answer / Jawapan:*

16



- 17 Diagram 17 shows the first 3 sets of squares built from matchsticks.  
*Rajah 17 menunjukkan 3 set pertama segi empat sama yang dibina daripada batang mancis.*

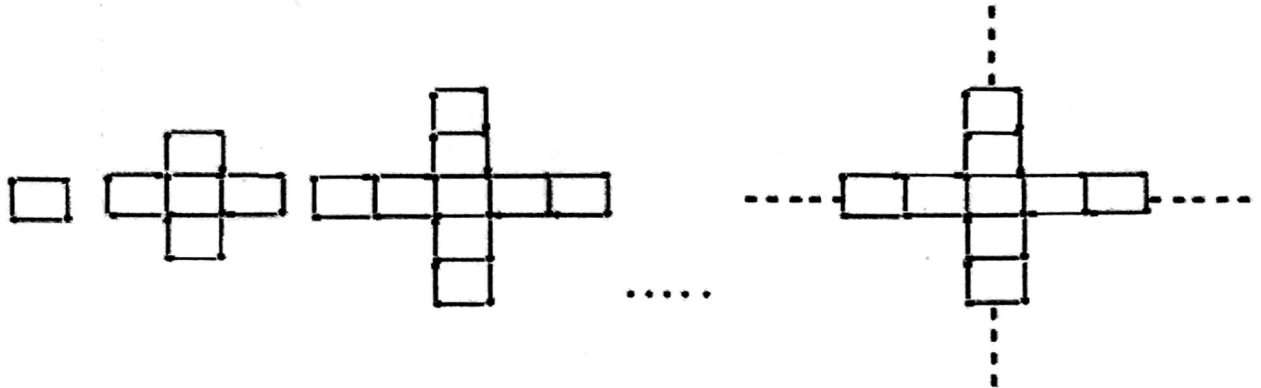


Diagram 17  
*Rajah 17*

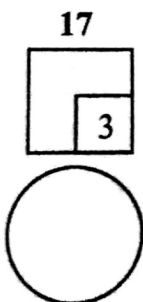
Find the maximum number of set of squares that can be formed using 290 matchsticks.

[3 marks]

*Cari bilangan maksimum set segi empat sama yang boleh dibentuk menggunakan 290 batang mancis.*

[3 markah]

Answer / *Jawapan:*



- 18 A geometric progression has 10 terms and the common ratio,  $r$ . It is given that the seventh term is 4 times the fifth term and the sum of all terms is  $-4092$ .

If  $r < 0$ , find the first term of the progression.

[3 marks]

*Suatu jangjang geometri mempunyai 10 sebutan dan nisbah sepunya,  $r$ . Diberi bahawa sebutan ketujuh adalah 4 kali sebutan kelima dan hasil tambah semua sebutan ialah  $-4092$ .*

*Jika  $r < 0$ , cari sebutan pertama bagi jangjang itu.*

[3 markah]

Answer / Jawapan:

18

3



19 Solve the equation:

*Selesaikan persamaan:*

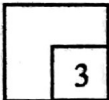
$$3^{2+x} - 12(3^x) + \frac{1}{27} = 0$$

[3 marks]

[3 markah]

Answer / Jawapan:

19



20 Given that  $\log_b m + 9\log_m b = 6$ , express  $m$  in terms of  $b$ .

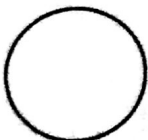
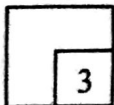
[3 marks]

*Diberi bahawa  $\log_b m + 9\log_m b = 6$ , ungkapkan  $m$  dalam sebutan  $b$ .*

[3 markah]

Answer / Jawapan:

20



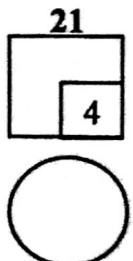
21 Given that  $\log_p(x^2y^3) = 7$  and  $p^5 = y$ , find the value of  $\log_p x$ .

[4 marks]

Diberi  $\log_p(x^2y^3) = 7$  dan  $p^5 = y$ , cari nilai bagi  $\log_p x$ .

[4 markah]

Answer / Jawapan:



22 Diagram 22 shows an empty cylindrical container with a radius of 3 cm is filled with water. The water rises to 8 cm in 4 seconds.

*Rajah 22 menunjukkan sebuah bekas silinder yang kosong berjari 3 cm diisikan dengan air. Aras air meningkat kepada 8 cm dalam masa 4 saat.*

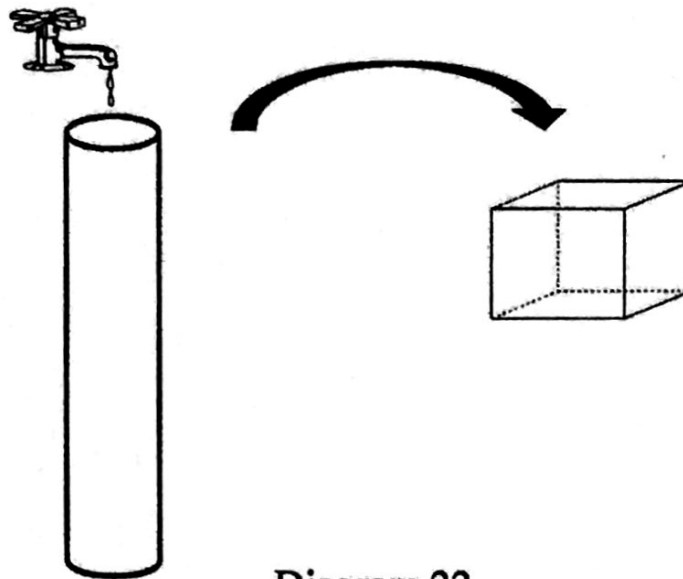


Diagram 22  
Rajah 22

After 54 seconds, all the amount of water in the cylindrical container is poured into a cubical container as shown in Diagram 22.

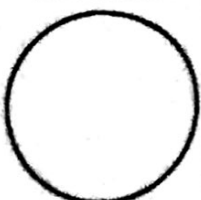
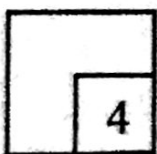
Find the minimum length of the cubical container (correct to two decimal places) that can fill all the amount of water from the cylindrical container. [4 marks]

*Selepas 54 saat, semua air dalam bekas silinder itu dimasukkan ke dalam sebuah bekas berbentuk kubus seperti Rajah 22.*

*Cari panjang minimum bekas kubus (betul kepada dua tempat perpuluhan) yang dapat mengisi semua air dari bekas silinder tersebut.* [4 markah]

Answer / Jawapan:

22



- 23 Find the equation of the tangent to the curve  $y = 5x^2 - x^3 + 8$  at point (1, 12).

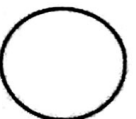
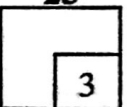
[3 marks]

*Cari persamaan tangen kepada lengkung  $y = 5x^2 - x^3 + 8$  pada titik (1, 12).*

[3 markah]

Answer / Jawapan:

23

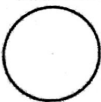


24 Given that  $y = \frac{2x}{(x+3)^3}$  and  $\frac{dy}{dx} = \frac{6-4x}{(x+3)^4}$ , find  $\int_{-1}^0 \frac{3-2x}{(x+3)^4} dx$ . [3 marks]

Diberi bahawa  $y = \frac{2x}{(x+3)^3}$  dan  $\frac{dy}{dx} = \frac{6-4x}{(x+3)^4}$ , cari  $\int_{-1}^0 \frac{3-2x}{(x+3)^4} dx$ . [3 markah]

Answer / Jawapan:

24



25 The gradient function of a curve is  $\frac{10}{(2-x)^3}$ .

Find the equation of the curve if the curve passes through point (1, 2).

[3 marks]

*Fungsi kecerunan suatu lengkung ialah  $\frac{10}{(2-x)^3}$ .*

*Cari persamaan lengkung tersebut jika lengkung itu melalui titik (1, 2).*

[3 markah]

Answer / Jawapan:

**END OF QUESTION PAPER**  
**KERTAS SOALAN TAMAT**

