

Format SPM 2021 (KSSM)

FORMAT INSTRUMEN PEPERIKSAAN SPM MULAI TAHUN 2021 MATA PELAJARAN MATEMATIK TAMBAHAN (3742)

Bil.	Perkara	Kertas 1 (3472/1)	Kertas 2 (3472/2)
1	Jenis instrumen	Ujian Bertulis	
2	Jenis item	<ul style="list-style-type: none"> • Subjektif Respons Terhad • Subjektif Respons Terhad Berstruktur 	
3	Bilangan soalan	<p>Bahagian A 12 soalan (64 markah) (Jawab semua soalan)</p> <p>Bahagian B 3 soalan (16 markah) (Jawab dua soalan)</p>	<p>Bahagian A 7 soalan (50 markah) (Jawab semua soalan)</p> <p>Bahagian B 4 soalan (30 markah) (Jawab tiga soalan)</p> <p>Bahagian C 4 soalan (20 markah) (Jawab dua soalan)</p>
4	Jumlah Markah	80	100
5	Konstruk	<ul style="list-style-type: none"> • Mengingat & Memahami • Mengaplikasi • Menganalisis • Menilai • Mencipta 	<ul style="list-style-type: none"> • Mengingat & Memahami • Mengaplikasi • Menganalisis • Menilai • Mencipta
6	Tempoh Ujian	2 jam	2 jam 30 minit
7	Cakupan Konstruk	Standard kandungan dan standard pembelajaran dalam Dokumen Standard Kurikulum dan Pentaksiran (DSKP) KSSM (Tingkatan 4 dan Tingkatan 5)	
8	Aras Kesukaran	Rendah : Sederhana : Tinggi 5 : 3 : 2	
9	Kaedah Penskoran	Analitik	
10	Alatan Tambahan	Kalkulator saintifik yang tidak boleh diprogram	

List of Formula

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

$$2 \quad \log_a b = \frac{\log_c b}{\log_c a}$$

$$3 \quad T_n = a + (n-1)d$$

$$4 \quad T_n = ar^{n-1}$$

$$5 \quad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$6 \quad S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, \quad r \neq 1$$

$$7 \quad Z = \frac{X - \mu}{\sigma}$$

$$8 \quad P(X=r) = {}^nC_r p^r q^{n-r}, \quad p + q = 1$$

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

$$10 \quad {}^nC_r = \frac{n!}{(n-r)!r!}$$

$$11 \quad I = \frac{Q_1}{Q_0} \times 100$$

$$12 \quad \bar{I} = \frac{\sum w_i I_i}{\sum w_i}$$

$$13 \quad \sin^2 A + \cos^2 A = 1$$

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

$$14 \quad \sec^2 A = 1 + \tan^2 A$$

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

$$15 \quad \operatorname{cosec}^2 A = 1 + \cot^2 A$$

$$\operatorname{kosek}^2 A = 1 + \cot^2 A$$

$$16 \quad \sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

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

$$17 \quad \cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

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

$$18 \quad \tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$19 \quad \sin 2A = 2 \sin A \cos A$$

$$\sin 2A = 2 \sin A \cos A$$

$$20 \quad \cos 2A = \cos^2 A - \sin^2 A$$

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

$$= 1 - 2 \sin^2 A$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

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

$$= 1 - 2 \sin^2 A$$

$$21 \quad \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$22 \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$23 \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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

$$24 \quad \text{Area of triangle / Luas segi tiga}$$

$$= \frac{1}{2} ab \sin C$$

List of Form 4 Chapter in Additional Mathematics KSSM.

Chapter 1	Functions
Chapter 2	Quadratic Functions
Chapter 3	System of Equations
Chapter 4	Indices, Surds and Logarithms
Chapter 5	Progressions
Chapter 6	Linear Law
Chapter 7	Coordinate Geometry
Chapter 8	Vectors
Chapter 9	Solutions of Triangles
Chapter 10	Index Numbers

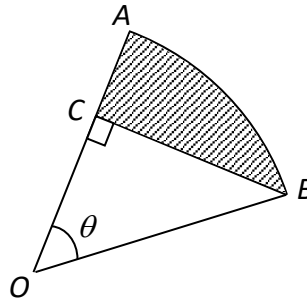
List of Form 5 Chapter in Additional Mathematics KSSM.

Chapter 1	Circular Measure
Chapter 2	Differentiation
Chapter 3	Integration
Chapter 4	Permutation and Combination
Chapter 5	Probability Distribution
Chapter 6	Trigonometric Function
Chapter 7	Linear Programming
Chapter 8	Kinematics of Linear Motion

Chapter 1: Circular Measure

Question 1.1

Diagram shows the sectors AOB , centre O with radius 15 cm. The point C on OA is such that $OC : OA = 3 : 5$



Calculate

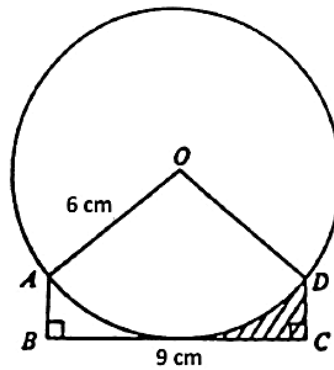
- the value of θ , in radian,
- the area of the shaded region, in cm^2 .

Answer

Question 1.2 (Kelantan 2021 Paper 1)

- 8 Rajah 6 menunjukkan sebuah bulatan berjejari 6 cm berpusat di O . Garis lurus BC sepanjang 9 cm merupakan tangen kepada bulatan. Diberi bahawa $AB = DC$ dan panjang lengkok major AD ialah 27.528 cm. Hitung

Diagram 6 shows a circle of radius 6 cm with centre O . A straight line BC of length 9 cm is tangent to the circle. Given that $AB = DC$ and the length of the major arc is 27.528 cm. Find



Rajah 6

- a) $\angle AOD$, dalam radian.
 $\angle AOD$, in radian.

[1 markah]

- b) Luas, dalam cm^2 , rantau berlorek.
 The area, in cm^2 , of the shaded region.

[4 markah]

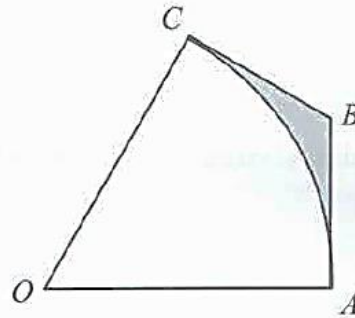
[4 marks]

Answer

Question 1.3 (Negeri Sembilan Paper 2)

- 11 Rajah 6 menunjukkan sebuah sektor OAC bagi sebuah bulatan berpusat O . Tangen AB dan CB pada bulatan bertemu di B . Panjang lengkok AC ialah 15 cm dan sudut AOC ialah $\frac{3}{7}\pi$ radian.

Diagram 6 shows a sector OAC of a circle with centre O . Tangents AB and CB to the circle meet at B . The arc AC is of length 15 cm and angle AOC is $\frac{3}{7}\pi$ radians.



Rajah 6
Diagram 6

Cari
Find

- | | | |
|-----|---|-------------------------|
| (a) | panjang OA , dalam cm,
the length of OA , in cm, | [2 markah]
[2 marks] |
| (b) | perimeter kawasan berlorek, dalam cm,
the perimeter of the shaded region, in cm, | [4 markah]
[4 marks] |
| (c) | luas kawasan berlorek, dalam cm^2 .
the area of the shaded region, in cm^2 . | [4 markah]
[4 marks] |

Answer

Chapter 2: Differentiation

Question 2.1

The volume of a sphere is decreasing at a constant rate of $20\pi \text{ cm}^3 \text{ s}^{-1}$. Find the radius, in cm, of the sphere at the instant when the radius is decreasing at a rate of 0.2 cm s^{-1} .

[Volume of sphere, $V = \frac{4}{3}\pi r^3$]

Answer

Question 2.2

The gradient to the curve $y = 2x^2 - 5x + 3$ which passes through the point A is 3. Find the coordinates of A.

Answer

Question 2.3 (Putrajaya 2021 Paper 1)

Given the equation of a curve is:

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

Find the gradient function of the curve.

Find the coordinates of the turning points.

Answer

Chapter 3: Integration**Question 3.1**

Given that $\frac{d}{dx}[2h(x)] = 3g(x)$ find $\int \frac{7g(x)}{2} dx$

Answer**Question 3.2 (Putrajaya 2021 - Paper 1)**

(b) Diberi $\frac{dy}{dx} = 6$ dan $\int_0^4 y \, dx = 12$. Cari y dalam sebutan x .

Given $\frac{dy}{dx} = 6$ and $\int_0^4 y \, dx = 12$. Find y in terms of x .

[3 markah/3 marks]

Question 3.3 (Sabah 2021 – Paper 1)

9. Diberi $\int_0^2 h(x)dx = 4$ dan $\int_1^u f(x)dx = 3$. Hitungkan

Given $\int_0^2 h(x)dx = 4$ and $\int_1^u f(x)dx = 3$. Calculate

(a) nilai bagi $\int_0^1 h(x)dx - \int_2^1 h(x)dx$.

the value of $\int_0^1 h(x)dx - \int_2^1 h(x)dx$.

[1 markah / 1 mark]

(b) nilai bagi u dengan keadaan $u > 0$, jika $\int_0^2 2h(x)dx + \int_1^u [f(x) + x] dx = \frac{37}{2}$.

the value of u where $u > 0$ if $\int_0^2 2h(x)dx + \int_1^u [f(x) + x] dx = \frac{37}{2}$.

[3 markah / 3 marks]

Answer

Chapter 4: Permutation and Combination**Question 4.1**

Balqis has 7 tins of different coloured paints.

- (a) Find the number of different ways to arrange 4 of the tins in a row.
- (b) She then made a mixture of at least 4 of the different coloured paints. Find the number of different mixture of paints that can be made

Answer**Question 4.2**

A	B	C	D	5	6	7	8
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A code is to be formed using those letters and digits. The code must consists of 3 letters followed by 2 digits. How many codes can be formed if no letter or digit is repeated in each code ?

Answer

Question 4.3 (Sabah 2021 Paper 1)

- 10. (a)** Dalam satu majlis makan malam di sebuah hotel, Amin, Badrul, Chong, Deepak, Emma dan Faizal terpilih untuk duduk di suatu meja bulat. Tentukan bilangan cara mereka duduk, jika
In a dinner occasion in a hotel, Amin, Badrul, Chong, Deepak, Emma and Faizal are selected to sit together in a round table. Determine the number of ways they can sit, if
- (i) Emma dan Faizal mesti duduk sebelah menyebelah.
Emma and Faizal must sit side by side,
- (ii) Emma dan Faizal tidak boleh duduk sebelah menyebelah.
Emma and Faizal cannot sit side by side.

[4 markah / 4 marks]

Answer

Chapter 5: Probability Distribution

Question 5.1 (Putrajaya 2021 – Paper 1)

- 14 (a) Pembolehubah rawak X mewakili taburan Binomial dengan 10 percubaan dan kebarangkalian berjaya ialah $\frac{1}{3}$. Cari

The random variable X represents a binomial distribution with 10 trials and the probability of success is $\frac{1}{3}$. Find

- (i) sisihan piawai taburan itu,

the standard deviation of the distribution.

- (ii) kebarangkalian bahawa sekurang-kurangnya satu cubaan adalah berjaya.

the probability that at least one trial is success.

[4 markah/4 marks]

Answer

Question 5.2 (Putrajaya 2021 – Paper 1)

- (b) Jika sekumpulan murid sebuah sekolah mempunyai taburan normal dengan min 40 kg dan sisihan piawai 5 kg.

The masses of a group of students in a school have a normal distribution with a mean of 40 kg and a standard deviation of 5 kg.

Hitung kebarangkalian bahawa seorang murid yang dipilih secara rawak daripada kumpulan ini mempunyai jisim

Calculate the probability that a student chosen at random from this group has a mass of

- (i) melebihi 45 kg,

more than 45 kg,

- (ii) antara 35 kg dan 47.8 kg.

between 35 kg and 47.8 kg.

[4 markah/4 marks]

Answer

Question 5.3 (Sabah 2021 – Paper 1)

- 11.** 80% daripada murid sekolah tertentu berminat dalam subjek Matematik. Satu sampel yang terdiri daripada n murid diambil secara rawak dari sekolah itu.

80% of pupils in a certain school are interested in Mathematics. A sample of n pupils are randomly selected from the school.

- (a) Jika kebarangkalian bahawa semua murid itu berminat dalam subjek Matematik ialah 0.1342, cari nilai n .

If the probability that all the pupils selected are interested in Mathematics is 0.1342, find the value of n .

[3 markah / 3 marks]

- (b) Berdasarkan jawapan di (a), cari kebarangkalian bahawa kurang daripada 3 orang murid berminat dalam subjek Matematik.

Based on the answer in (a), find the probability that there are less than three pupils interested in Mathematics.

[3 markah / 3 marks]

Answer

Chapter 6: Trigonometric Function**Question 6.1 (Putrajaya 2021 - Paper 1)**

6. (a) Selesaikan persamaan trigonometri $6 \cot \theta = 7 - \tan \theta$ untuk $0^\circ \leq \theta \leq 360^\circ$.

Solve the trigonometric equation $6 \cot \theta = 7 - \tan \theta$ for $0^\circ \leq \theta \leq 360^\circ$.

[3 markah / marks]

- (b) Diberi $\cos \theta = m$ bagi $0^\circ \leq \theta \leq 90^\circ$, ungkapkan $\cos(90^\circ - \theta)$ dalam sebutan m .

Given $\cos \theta = m$ for $0^\circ \leq \theta \leq 90^\circ$, express $\cos(90^\circ - \theta)$ in terms of m .

[2 markah / marks]

Answer

Question 6.2 (SBP 2021 – Paper 2)

- 6 (a) Buktikan bahawa $\operatorname{cosec}^2 x - 2\cos^2 x - \cot^2 x = -\cos 2x$.

Prove that $\operatorname{cosec}^2 x - 2\cos^2 x - \cot^2 x = -\cos 2x$.

[2 markah]

[2 marks]

- (b) (i) Lakarkan graf $y = \frac{1}{2} - \cos 2x$ untuk $0 \leq x \leq 2\pi$.

Sketch the graph of $y = \frac{1}{2} - \cos 2x$ for $0 \leq x \leq 2\pi$.

- (ii) Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan

$$2(\operatorname{cosec}^2 x - 2\cos^2 x - \cot^2 x) = -\frac{x}{\pi} + 1 \text{ untuk } 0 \leq x \leq 2\pi.$$

Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation

$$2(\operatorname{cosec}^2 x - 2\cos^2 x - \cot^2 x) = -\frac{x}{\pi} + 1 \text{ for } 0 \leq x \leq 2\pi.$$

[6 markah]

Answer

Chapter 7: Linear Programming

Question 7.1 (Penang 2021 – Paper 2)

A shop produces two types of sport shoes, M and N. A pair of sport shoes M requires 25 minutes to be produced by machine P and 35 minutes to be produced by machine Q. A pair of sport shoes N requires 15 minutes to be produced by machine P and 45 minutes to be produced by machine Q. Machines P and Q can only operate for 1200 minutes and 2520 minutes a day respectively. The factory produces x pairs of sport shoes M and y pairs of sport shoes N in a day. The number of pairs of sport shoes M produced is not more than twice the number of pairs of sport shoes N.

- (a) Tuliskan tiga ketaksamaan, selain $x \geq 0$ dan $y \geq 0$ yang memuaskan semua kekangan diatas.
Write down three inequalities, other than $x \geq 0$ and $y \geq 0$ that satisfy all the above constraints.

[3 markah / marks]

- (b) Menggunakan skala 2 cm kepada 10 pasang pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas.
Using a scale of 2 cm to 10 pairs on both axes, construct and shade the region R which satisfies all the above constraints.

[3 markah / marks]

- (c) Dengan menggunakan graf yang dibina di 13(b), cari
Using the graph constructed in 13(b), find

- (i) julat bilangan pasang kasut sukan N yang perlu dihasilkan jika bilangan kasut sukan M yang dihasilkan dalam satu hari ialah 30 pasang.
the range of the number of pairs of sport shoes N produced if exactly 30 pairs of sport shoes M are produced in a day
- (ii) Jumlah keuntungan maksimum sehari jika Keuntungan daripada jualan sepasang kasut sukan M dan sepasang kasut sukan N masing-masing ialah RM 30 dan RM 35.
the maximum total profit per day if the profit from a pair of sport shoes M and a pair of sport shoes N are RM 30 and RM 35 respectively.

[4 markah / marks]

Answer

Chapter 8: Kinematics of Linear Motion

Question 8.1

9. Suatu zarah bergerak di sepanjang satu garis lurus dan melalui satu titik tetap O dengan halaju 10ms^{-1} . Pecutannya, $a\text{ms}^{-2}$, diberi oleh $a = 4t - 12$, dengan keadaan t ialah masa, dalam saat, selepas melalui O .

A particle moves along a straight line and passes through a fixed point O with a velocity of 10ms^{-1} . The acceleration, $a\text{ms}^{-2}$, is given by $a = 4t - 12$, where t is the time, in seconds, after passing through O .

Cari / Find

- (a) pecutan awal, dalam ms^{-2} , zarah itu,
the initial acceleration, in ms^{-2} , of the particle, [1 markah / mark]
- (b) halaju minimum, dalam ms^{-1} , zarah itu,
the minimum velocity, in ms^{-1} , of the particle, [3 markah / marks]
- (c) nilai t , dalam saat, apabila zarah itu berhenti untuk seketika,
the value of t , in seconds, when the particle is instantaneously at rest, [2 markah / marks]
- (d) jumlah jarak, dalam m , yang dilalui oleh zarah itu dalam 4 saat pertama.
the total distance, in m , travelled by the particle in the first 4 seconds. [4 markah / marks]

Answer