Hari: ..... Tarikh: .....

BAB 1

SUDUT DAN GARIS II

ANGLES AND LINES II

HEBAT MATEMATIK MODUL 1B

1.1 Sudut Berkaitan dengan Garis Rentas Lintang dan Garis Selari

Pautan Pantas

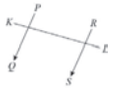
A. Kenal pasti garis rentas lintang.
Identify the tranversal.

HP1.1(i) BAND 1

1.

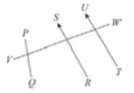
EF

2.



KL

3.



VW

B. Padankan.
Match.

HP1.1(i) BAND 1

d , *q*	Sudut sepadan *Corresponding angles*
a , *p*	Sudut pedalaman *Interior angles*
c , *p*	Sudut berselang-seli *Alternate angles*
c , *r*	
d , *p*	

C. Senaraikan pasangan garis yang selari.
List the pairs of parallel lines.

HP1.1(ii) BAND 1

PQ dan TU *CD dan EF*

Hari: ..... Tarikh: .....

FAKTA UTAMA

① $a = b$ ② $c = b$ ③ $c + d = 180°$

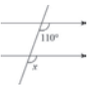
D. Semua garis dalam rajah berikut ialah garis lurus. Cari nilai *x*.
All the lines in the diagram are straight lines. Find the value of x.

HP1.1(iii) BAND 3

CONTOH

$85° + x = 180°$ ← Sudut pedalaman
$x = 180° - 85°$
$= 95°$

1.



$x = 110°$

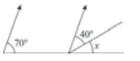
2.

$x + 115° = 180°$
$x = 180° - 115°$
$= 65°$

3.

$x = 65°$

4.



$x + 40° = 70°$
$x = 70° - 40°$
$= 30°$

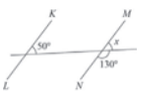
5.

$x + 35° + 100° = 180°$
$x = 180° - 135°$
$= 45°$

E. Semua garis dalam rajah berikut ialah garis lurus. Tentukan sama ada garis *KL* dan garis *MN* adalah selari atau tidak.
All the lines in the diagram are straight lines. Determine whether the lines KL and MN are parallel.

HP1.1(v) BAND 3

CONTOH



$x = 180° - 130°$
$= 50°$

x dan 50° ialah sudut sepadan.

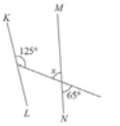
KL dan *MN* adalah selari.

1.

$x = 180° - 145°$
$= 35°$
x dan 35° ialah sudut sepadan.

KL dan *MN* adalah selari.

2.



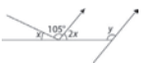
$x = 65°$
$65° + 125° = 190°$
x dan 125° bukan sudut pedalaman.
KL dan *MN* tidak selari.

Hari: ..... Tarikh: .....

F. Semua garis dalam rajah berikut ialah garis lurus. Cari nilai *x* dan nilai *y*.
All the lines in the diagram are straight lines. Find the values of x and y.

HP1.1(v) BAND 3

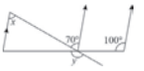
CONTOH



$x + 2x + 105° = 180°$
$3x = 75°$
$x = 25°$

$2x + y = 180°$
$2(25°) + y = 180°$
$y = 180° - 50°$
$= 130°$

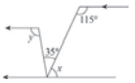
1.



$x = 70°$

$180° - 100° = 80°$
$y = 70° + 80°$
$= 150°$

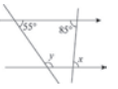
2.



$x + 115° = 180°$
$x = 65°$

$y = 65° + 35°$
$= 100°$

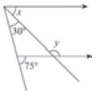
3.



$x = 85°$

$y + 55° = 180°$
$y = 180° - 55°$
$= 125°$

4.



$x + 30° = 75°$
$x = 45°$

$45° + y = 180°$
$y = 135°$

5.

$x = 180° - 140°$
$= 40°$

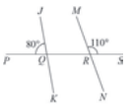
$y = 40° + x$
$= 40° + 40°$
$= 80°$

Hari: ..... Tarikh: .....

PRAKTIS PT3

Soalan 1

(a) (i) Dalam rajah di bawah, *PQRS*, *JK* dan *MN* ialah garis lurus.
In the diagram, PQRS, JK and MN are straight lines.

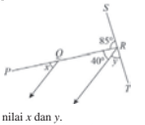


Adakah *JK* dan *MN* selari atau tidak? Tandakan (✓).
Are JK and MN parallel to each other? Mark (✓)

[1 markah/1 *mark*]

Selari *Parallel*	
Tidak selari *Not parallel*	✓

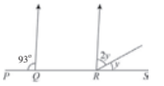
(ii) Dalam rajah di bawah, *PQR* dan *SRT* ialah garis lurus.
In the diagram, PQR and SRT are straight lines.



Cari nilai *x* dan *y*.
Find the values of x and y.
[2 markah/2 *marks*]

$x = 40°$
$y = 180° - 85° - 40°$
$= 55°$

(b) (i) Dalam rajah di bawah, *PQRS* ialah satu garis lurus.
In the diagram, PQRS is a straight line.



Cari nilai *y*.
Find the value of y.
[2 markah/2 *marks*]

HEBAT LEMBARAN PERAK

$3y + 93° = 180°$
$3y = 87°$
$y = 29°$

(ii) Dalam rajah di bwah, *JKLMN* ialah satu garis lurus.
In the diagram, JKLMN is a straight line.

Cari nilai *x*.
Find the value of x.
[2 markah/2 *marks*]

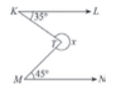
HEBAT LEMBARAN PERAK

$\frac{180° - 72°}{2} = 54°$

$x = 180° - 54°$
$= 126°$

Hari: ..... Tarikh: .....

(c) Dalam rajah di bawah, *KL* adalah selari dengan *MN*.
In the diagram, KL and MN are parallel.



Cari nilai *x*.
Find the value of x.

[3 markah/3 *marks*]

HEBAT LEMBARAN EMAS

$x = 360° - (35° + 45°)$
$= 360° - 80°$
$= 280°$

Elemen PAK-21

Fokus KBAT

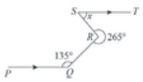
Elemen PAK-21

Video Tutorial

FOKUS KBAT

1.

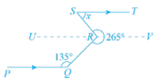
Kemahiran Kognitif: Mengaplikasi, Menganalisis
Konteks: Sudut Pedalaman dan Sudut Berselang-seli



Dalam rajah di sebelah, *PQ, QR, RS* dan *ST* ialah garis lurus. Cari nilai *x*.
In the diagram, PQ, QR, RS and ST are straight lines. Find the value of x.

[3 markah/3 *marks*]

HEBAT LEMBARAN EMAS



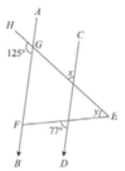
$\angle QRU + 135° = 180°$
$\angle QRU = 45°$

$\angle URS = 360° - 265° - 45°$
$= 50°$

$x = \angle URS = 50°$

2.

Kemahiran Kognitif: Mengaplikasi, Menganalisis
Konteks: Sudut Berselang-seli



Dalam rajah di sebelah, *AB, CD, EF* dan *EGH* ialah garis lurus. Cari nilai *x* dan *y*.
In the diagram, AB, CD, EF and EGH are straight lines. Find the values of x and y.

[3 markah/3 *marks*]

HEBAT LEMBARAN EMAS

$\angle EGF = 180° - 125°$
$= 55°$
$x = \angle EGF = 55°$

$\angle AFE = 77°$
Dalam Δ *EGF*,
$55° + 77° + y = 180°$
$y = 48°$

Hari: ..... Tarikh: .....

BAB 2

POLIGON II
POLYGONS II

HEBAT MATEMATIK MODUL 24

Elemen PAK-21

Pantas Pantas

2.1 Poligon Sekata

A. Tandakan (✓) pada poligon sekata dan (×) pada poligon tak sekata.
Mark (✓) for a regular polygon and (×) for a non-regular polygon.

HP2.1(i) BAND 1

1.

(×)

2.

(×)

3.

(×)

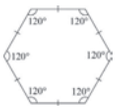
4.

(✓)

5.

(×)

6.

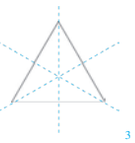


(✓)

B. Lukis dan nyatakan bilangan paksi simetri bagi poligon berikut.
Draw and state the number of axes of symmetry for the polygon.

HP2.1(ii)

1.

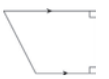


3

2.

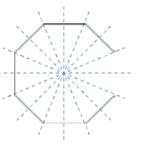
4

3.



0

4.



8

Hari: ..... Tarikh: .....

FAKTA UTAMA

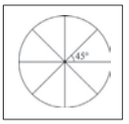
Melukis oktagon sekata/*Drawing a regular octagon*

i-THINK Peta Alir

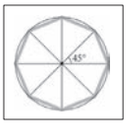
Cari sudut pada pusat bulatan.
Find the angle at the centre.

$\frac{360°}{8} = 45°$
Oktagon ada 8 sisi.
Octagon has 8 sides.

Lukis bulatan dan sudut.
Draw a circle and angles.



Sambungkan bucu.
Join the vertices.



C. Lukis poligon sekata berikut.
Draw the regular polygon.

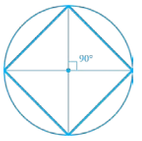
HP2.1(iv) BAND 4

1. Heksagon sekata
Regular hexagon

$\frac{360°}{6} = 60°$

2. Segi empat sama
Square

$\frac{360°}{4} = 90°$



3. Dekagon sekata
Regular decagon

$\frac{360°}{10} = 36°$

4. Pentagon sekata
Regular pentagon

$\frac{360°}{5} = 72°$

Hari: ..... Tarikh: .....

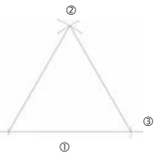
D. Dengan menggunakan jangka lukis dan pembaris, bina poligon sekata berikut.
Using a pair of compasses and a ruler, construct the regular polygon.

HP2.1(v) BAND 4

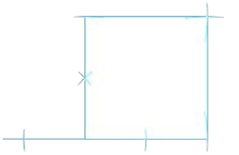
CONTOH

Segi tiga sama sisi dengan sisi 4 cm
An equilateral triangle of side 4 cm

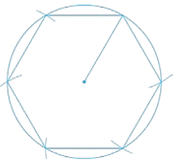
1. Bina satu tembereng garis 4 cm.
2. Bina dua lengkok 4 cm dari tembereng garis itu.
3. Sambungkan bucu.



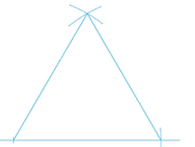
1. Segi empat sama dengan sisi 4 cm
A square of side 4 cm



2. Heksagon sekata dengan sisi 2.5 cm
A regular hexagon of side 2.5 cm



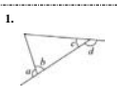
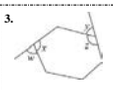
3. Segi tiga sama sisi dengan sisi 4.8 cm
An equilateral triangle of side 4.8 cm



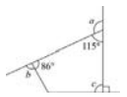
Hari: ..... Tarikh: .....

2.2 Sudut Peluaran dan Sudut Pedalaman Poligon

A. Namakan sudut pedalaman dan sudut peluaran bagi poligon berikut.
State the interior and exterior angles of the polygon. **HP2**.2(i)

	1. 	2. 	3. 
Sudut pedalaman *Interior angles*	*b, c*	*q, r*	*x, z*
Sudut peluaran *Exterior angles*	*a, d*	*p, s*	*w, y*

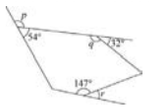
B. Cari nilai sudut yang berlabel bagi setiap poligon berikut.
Find the values of the labelled angles of the polygon. **HP2**.2(ii) **Band 4**

1. 

$a + 115° = 180°$
$a = 65°$

$b + 86° = 180°$
$b = 94°$

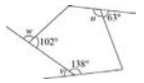
$c + 90° = 180°$
$c = 90°$

2. 

$p + 54° = 180°$
$p = 126°$

$q + 32° = 180°$
$q = 148°$

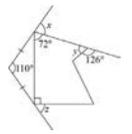
$r + 147° = 180°$
$r = 33°$

3. 

$w + 102° = 180°$
$w = 78°$

$u + 63° = 180°$
$u = 117°$

$v + 138° = 180°$
$v = 42°$

4. 

$(180° - 110°) \div 2 = 35°$
$x + 35° + 72° = 180°$
$x = 73°$

$y + 126° = 180°$
$y = 54°$

$z + 90° + 35° = 180°$
$z = 55°$

Hari: ..... Tarikh: .....

FAKTA UTAMA

① Hasil tambah sudut pedalaman poligon = $(n - 2) \times 180°$, di mana n ialah bilangan sisi poligon.
Sum of interior angles in a polygon = $(n - 2) \times 180°$, where n is the number of sides of the polygon.

② Hasil tambah sudut peluaran poligon sentiasa ialah 360°.
Sum of exterior angles of a polygon is always 360°.

C. Cari nilai x.
Find the value of x. **HP2**.2(iii) **Band 4**

1. 

$(5 - 2) \times 180° = 540°$
$x + 83° + 136° + 112° + 125° = 540°$
$x = 84°$

2. 

$(6 - 2) \times 180° = 720°$
$x + 256° + 42° + 158° + 90° + 106° = 720°$
$x + 652° = 720°$
$x = 68°$

D. Cari bilangan sisi bagi poligon, diberi hasil tambah sudut pedalaman berikut.
Find the number of sides of the polygon, given the sum of the interior angles. **HP2**.2(v) **BAND 4**

CONTOH

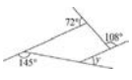
900°
$(n - 2) \times 180° = 900°$
$n - 2 = \frac{900°}{180°}$
$= 5$
$n = 7$
Bilangan sisi = 7

1. 1 260°
$(n - 2) \times 180° = 1\,260°$
$n - 2 = \frac{1\,260°}{180°}$
$= 7$
$n = 9$
Bilangan sisi = 9

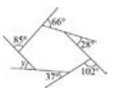
2. 720°
$(n - 2) \times 180° = 720°$
$n - 2 = \frac{720°}{180°}$
$= 4$
$n = 6$
Bilangan sisi = 6

E. Cari nilai y.
Find the value of y. **HP2**.2(iv) **BAND 4**

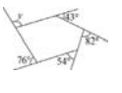
CONTOH



$y + 108° + 72° + 145° = 360°$
$y + 325° = 360°$
$y = 35°$

1. 

$y + 85° + 66° + 28° + 102° + 37° = 360°$
$y + 318° = 360°$
$y = 42°$

2. 

$y + 43° + 82° + 54° + 76° = 360°$
$y + 255° = 360°$
$y = 105°$

Hari: ..... Tarikh: .....

FAKTA UTAMA

① Sudut pedalaman poligon sekata bersisi n
The interior angle of a n-sided regular polygon
$= \frac{(n-2)\times 180°}{n}$

② Sudut peluaran poligon sekata bersisi n
The exterior angle of a n-sided regular polygon
$= \frac{360°}{n}$

F. Cari nilai sudut pedalaman bagi poligon sekata berikut.
Find the value of the interior angle of the regular polygon. **HP2**.2(v) **BAND 4**

CONTOH

Pentagon sekata
Regular pentagon

Sudut pedalaman $= \frac{(5-2)\times 180°}{5}$
$= 108°$

1. Oktagon sekata
Regular octagon

Sudut pedalaman $= \frac{(8-2)\times 180°}{8}$
$= 135°$

2. Heksagon sekata
Regular hexagon

Sudut pedalaman $= \frac{(6-2)\times 180°}{6}$
$= 120°$

G. Cari nilai sudut peluaran bagi poligon sekata berikut.
Find the value of the exterior angle of the regular polygon. **HP2**.2(v) **BAND 4**

CONTOH

Pentagon sekata
Regular pentagon

Sudut peluaran $= \frac{360°}{5} = 72°$

1. Dekagon sekata
Regular decagon

Sudut peluaran $= \frac{360°}{10} = 36°$

2. Heksagon sekata
Regular hexagon

Sudut peluaran $= \frac{360°}{6} = 60°$

H. Cari bilangan sisi poligon sekata berikut.
Find the number of sides of the regular polygon. **HP2**.2(v) **BAND 4**

CONTOH

Sudut pedalaman = 135°
Interior angle

Sudut peluaran = 180° − 135° = 45°
Bilangan sisi $= \frac{360°}{45°} = 8$

1. Sudut peluaran = 72°
Exterior angle

Bilangan sisi $= \frac{360°}{72°} = 5$

2. Sudut peluaran = 40°
Exterior angle

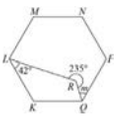
Bilangan sisi $= \frac{360°}{40°} = 9$

3. Sudut pedalaman = 144°
Interior angle

Sudut peluaran = 180° − 144° = 36°
Bilangan sisi $= \frac{360°}{36°} = 10$

Hari: ..... Tarikh: .....

I. Selesaikan masalah berikut.
Solve the problem. **HP2**.2(vi)

1. 

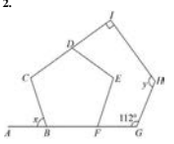
Dalam rajah di sebelah, *KLMNPQ* ialah sebuah heksagon sekata. Cari nilai m.
In the diagram, KLMNPQ is a regular hexagon. Find the value of m.

Sudut pedalaman $= \frac{(6-2)\times 180°}{6}$
$= 120°$

$\angle LRQ = 360° - 235° = 125°$

$\angle KQR + 120° + 42° + 125° = 360°$
$\angle KQR + 287° = 360°$
$\angle KQR = 73°$

$m + 73° = 120°$
$m = 47°$

2. 

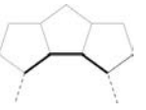
Dalam rajah di sebelah, *BCDEF* ialah sebuah pentagon sekata. *ABFG* dan *CDI* ialah garis lurus. Cari nilai $x + y$.
In the diagram, BCDEF is a regular pentagon. ABFG and CDI are straight lines. Find the value of x + y.

Sudut peluaran $= \frac{360°}{5} = 72°$
$x = 72°$

Sudut pedalaman = 180° − 72° = 108°

$y + 90° + 108° + 108° + 112° = 540°$
$y + 418° = 540°$
$y = 122°$

$x + y = 72° + 122°$
$= 194°$

3. 

Rajah di sebelah menunjukkan sebahagian daripada gabungan beberapa pentagon sekata yang disusun untuk membentuk sebuah poligon sekata bersisi n. Berapakah pentagon sekata yang diperlukan untuk membentuk poligon sekata itu?
The diagram shows part of several regular pentagons arranged to form an n-sided regular polygon. How many regular pentagons are needed to form the regular polygon?

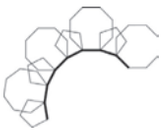
Sudut pedalaman $= \frac{(5-2)\times 180°}{5} = 108°$
Sudut pedalaman poligon sekata yang dibentuk = 360° − 108° − 108° = 144°
Sudut peluaran poligon sekata yang dibentuk = 180° − 144° = 36°
$n = \frac{360°}{36°}$
$= 10$
10 pentagon sekata diperlukan.

Hari: ..... Tarikh: .....

J. Selesaikan masalah berikut.
Solve the problem.

HP2 2.2(vi) **BAND 6**

Rajah 1 menunjukkan sebahagian daripada sebuah poligon sekata yang dibentuk daripada oktagon dan pentagon. Sepasang daripada oktagon dan pentagon itu diperbesarkan seperti yang ditunjukkan dalam Rajah 2. Diberi AB selari dengan PQ, $AE = AV$ dan BC memotong PQ pada X.
Diagram 1 shows part of a regular polygon formed by octagons and pentagons. One pair of the octagon and pentagon is enlarged as shown in Diagram 2. It is given that AB is parallel to PQ, AE = AV and BC cuts PQ at X.



Rajah 1
Diagram 1

Rajah 2
Diagram 2

Cari bilangan sisi poligon sekata itu.
Find the number of sides of the regular polygon.

Sudut pedalaman pentagon sekata $= \frac{(5-2)\times 180°}{5} = 108°$

Sudut pedalaman octagon sekata $= \frac{(8-2)\times 180°}{8} = 135°$

$\angle PAB = 180° - 135° = 45°$

$\angle PAE = 108° - 45° = 63°$

$\angle EAV$ (sudut cakah) $= 360° - 63° - 135° = 162°$

Sudut pedalaman poligon sekata itu ialah 162°.

Sudut peluaran poligon sekata $= 180° - 162° = 18°$

$n = \frac{360°}{18°} = 20$

Bilangan sisi poligon sekata = 20

Hari: ..... Tarikh: .....

PRAKTIS PT3

Soalan 1

(a) Rajah di bawah menunjukkan sebuah kombinasi poligon. Namakan tiga poligon itu.
The diagram shows a combination of polygons. Name the three polygons.

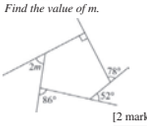
[3 markah/3 *marks*]

(i) Sisi empat/*Quadrilateral*

(ii) Heksagon/*Hexagon*

(iii) Oktagon/*Octagon*

(b) (i) Cari nilai m.
Find the value of m.

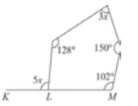


[2 markah/2 *marks*]

HEBAT LEMBARAN PERAK

$2m + 86° + 52° + 78° + 90° = 360°$
$2m = 360° - 306°$
$= 54°$
$m = 27°$

(ii) Dalam rajah di bawah, KLM ialah garis lurus.
In the diagram, KLM is a straight line.



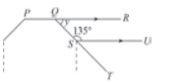
Cari nilai x.
Find the value of x.

[2 markah/2 *marks*]

HEBAT LEMBARAN PERAK

$180° - 5x + 102° + 150° + 3x + 128° = 540°$
$560° - 2x = 540°$
$2x = 20°$
$x = 10°$

(c) Rajah di bawah menunjukkan sebuah poligon sekata yang tidak lengkap. PQR dan QST ialah garis lurus.
The diagram shows an incomplete regular polygon. PQR and QST are straight lines.



(i) Cari nilai y.
Find the value of y.

[1 markah/1 *mark*]

$y = 180° - 135°$
$= 45°$

(ii) Tentukan bilangan sisi bagi poligon sekata yang tidak lengkap itu.
Determine the number of sides of the incomplete regular polygon.

[2 markah/2 *marks*]

$n = \frac{360°}{45°} = 8$
Bilangan sisi = 8

Soalan 2

(a) Dalam rajah di bawah, P, Q, R dan S ialah empat bucu bagi sebuah poligon sekata. O ialah pusat poligon itu.
In the diagram, P, Q, R and S are four vertices of a regular polygon. O is the centre of the polygon.

Cari bilangan sisi poligon itu.
Find the number of sides of the polygon.

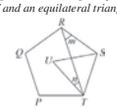
[2 markah/2 *marks*]

Sudut pada pusat $= \frac{72°}{3} = 24°$

Bilangan sisi, $n = \frac{360°}{24°} = 15$

Hari: ..... Tarikh: .....

(b) Rajah di bawah menunjukkan sebuah pentagon sekata $PQRST$ dan sebuah segi tiga sama sisi STU.
The diagram shows a regular pentagon PQRST and an equilateral triangle STU.



Cari nilai $m + n$.
Find the value of m + n.

[3 markah/3 *marks*]

HEBAT LEMBARAN EMAS

Sudut pedalaman pentagon sekata
$= \frac{(5-2)\times 180°}{5} = 108°$

$m = \frac{180° - 108°}{2} = 36°$

$n = 60° - 36° = 24°$

$m + n = 36° + 24° = 60°$

(c) Sebuah pusat membeli-belah berbentuk poligon sekata akan dibina bersebelahan dengan sebuah taman permainan seperti yang ditunjukkan dalam rajah.
A shopping mall in the shape of a regular polygon will be built next to the playground as shown in the diagram.

Hitung
Calculate

(i) nilai x,
the value of x,

(ii) bilangan sisi pusat membeli-belah.
the number of sides of the shopping mall.

[5 markah/5 *marks*]

HEBAT LEMBARAN EMAS

(i) $x = \frac{360°}{6} = 60°$

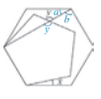
(ii) Sudut pedalaman taman permainan
$= 180° - 60°$
$= 120°$
Sudut pedalaman pusat membeli-belah
$= 360° - 120° - 132°$
$= 108°$
Sudut peluaran pusat membeli-belah
$= 180° - 108°$
$= 72°$
Bilangan sisi pusat membeli-belah
$= \frac{360°}{72°}$
$= 5$

Elemen PAK-21 Fokus KBAT

Elemen PAK-21 Video Tutorial

FOKUS KBAT

Kemahiran Kognitif: Mengaplikasi, Menganalisis
Konteks: Sudut Pedalaman



Rajah di sebelah menunjukkan sebuah pentagon sekata dan sebuah heksagon sekata. Cari nilai x dan y.
The diagram shows a regular pentagon and a regular hexagon. Find the values of x and y.

[4 markah/4 *marks*]

HEBAT LEMBARAN EMAS

Sudut pedalaman heksagon sekata $= \frac{(6-2)\times 180°}{6} = 120°$

Sudut pedalaman pentagon sekata $= \frac{(5-2)\times 180°}{5} = 108°$

$x = 120° - 108° = 12°$ $\quad a = \frac{180° - 120°}{2} = 30°$ $\quad b = 120° - 30° = 90°$

$y + 90° + 108° + 108° + 108° = 540°$
$y = 126°$

Hari: ..... Tarikh: .....

Elemen PAK-21 Aktiviti PAK-21

AKTIVITI PAK-21

Aktiviti/*Activity* : Menggunakan Visualiser/ *Using Visualizer*

Konteks/*Context* : Poligon II (Poligon Sekata)/*Polygons II (Regular Polygons)*

Objektif/*Objective* : Membentang hasil dengan menggunakan visualiser
Present works by using the visualizer

Bahan/*Materials* : Pembaris, kertas kosong dan jangka lukis
Ruler, blank paper and a pair of compasses

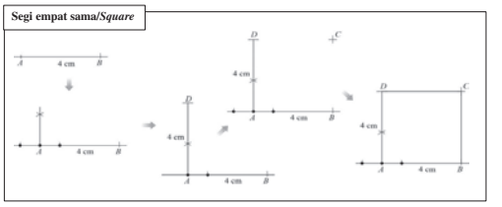
Arahan/*Instruction* : Lakukan secara berkumpulan.
Work in groups.

Visualiser
Visualizer

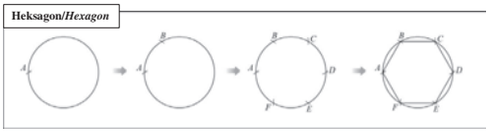
Prosedur/*Procedure* :
1. Guru menunjukkan langkah-langkah untuk membina tiga jenis poligon sekata dengan menggunakan Visualiser seperti yang ditunjukkan di bawah.
Teacher shows the steps to construct three types of regular polygons using the Visualizer as shown below.
2. Setiap kumpulan diberi kertas kosong untuk membina tiga jenis poligon itu.
Each group is given blank papers to construct the three types of polygons.
3. Setiap kumpulan membentangkan hasil kerja mereka dengan menggunakan Visualiser.
Each group present their work using the Visualizer.
4. Murid yang lain memberi komen.
Other students give their comments.

Segi tiga/*Triangle*

Segi empat sama/*Square*



Heksagon/*Hexagon*



Hari: ..... Tarikh: .....

BAB **3**

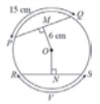
BULATAN II
CIRCLES II

HEBAT MATEMATIK MODUL 18

3.1 Ciri-ciri Bulatan

A. Dalam rajah di bawah, *O* ialah pusat bulatan. Jawab soalan berikut.
In the diagram, O is the centre of the circle. Answer the questions.
HP3.1(ii) BAND 2

1.



Diberi perentas *PQ* = perentas *RS*, cari
Given chord PQ = chord RS, find
(a) *ON*, 6 cm
(b) panjang lengkok *RVS*.
the length of arc RVS.
15 cm

2.

Cari panjang *OQ*.
Find the length of OQ.

$OQ = \sqrt{OR^2 - QR^2}$
$= \sqrt{5^2 - 4^2}$
$= 3$ cm

FAKTA UTAMA

Jejari yang berserenjang dengan perentas ialah pembahagi dua sama serenjang bagi perentas itu.
The radius which is perpendicular to the chord is the perpendicular bisector of the chord.

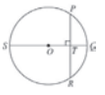
B. Selesaikan.
Solve.
HP3.1(iii) BAND 2

1. Dalam rajah di bawah, *O* ialah pusat bulatan yang berjejari 10 cm. *PQR* = 12 cm.
In the diagram, O is the centre of the circle with a radius of 10 cm. PQR = 12 cm.

Diberi *OQ* = 6 cm, cari panjang *QS*.
Given OQ = 6 cm, find the length of QS.

$OP = 10$ cm
$PQ = QR = 12 \div 2 = 6$ cm
$OQ = \sqrt{OP^2 - PQ^2}$
$= \sqrt{10^2 - 6^2}$
$= 8$ cm
$QS = OS - OQ$
$= 10 - 8$
$= 2$ cm

2. Dalam rajah di bawah, *O* ialah pusat bulatan yang berjejari 13 cm.
In the diagram, O is the centre of the circle with a radius of 13 cm.



Diberi *PTR* = 24 cm, cari panjang *SOT*.
Given PTR = 24 cm, find the length of SOT.

Sambung *OP*.
OP = 13 cm
$PT = TR = 24 \div 2 = 12$ cm

$OT = \sqrt{OP^2 - PT^2}$
$= \sqrt{13^2 - 12^2}$
$= 5$ cm
$SOT = SO + OT$
$= 13 + 5$
$= 18$ cm

Hari: ..... Tarikh: .....

3.2 Ciri-ciri Sudut dalam Bulatan

A. Dalam rajah di bawah, *O* ialah pusat bulatan. Nyatakan sudut yang tercangkum di pusat dan pada lilitan oleh lengkok *PQ*.
In the diagram, O is the centre of the circle. State the angles subtended at the centre and at the circumference by arc PQ.
HP3.2(i) BAND 1

1.

Sudut pada pusat / *Angle at the centre* [*a*]
Sudut pada lilitan / *Angle at the circumference* [*b*]

2.

Sudut pada pusat / *Angle at the centre* [*s*]
Sudut pada lilitan / *Angle at the circumference* [*r*]

3.

Sudut pada pusat / *Angle at the centre* [*x*]
Sudut pada lilitan / *Angle at the circumference* [*w*]

B. Cari nilai *x* .
Find the value of x.
HP3.2(ii) BAND 3

CONTOH

$x = 62°$

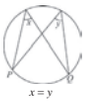
1.

$x = 47°$

2.

$x = 55°$

FAKTA UTAMA

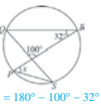


$x = y$

3.

$x = 38°$

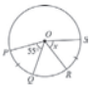
4.



$x = 180° - 100° - 32°$
$= 48°$

C. *O* ialah pusat bulatan. Cari nilai *x* .
O is the centre of the circle. Find the value of x.
HP3.2(iii) BAND 3

1.

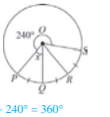


$x = 55°$

2.

$\frac{x}{25°} = \frac{6}{2}$
$x = \frac{6}{2} \times 25°$
$= 75°$

3.



$3x + 240° = 360°$
$3x = 120°$
$x = 40°$

Hari: ..... Tarikh: .....

D. *O* ialah pusat bulatan. Cari nilai *x*.
O is the centre of the circle. Find the value of of x.
HP3.2(iv) BAND 3

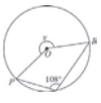
CONTOH

$x = 2 \times 60° = 120°$

1.

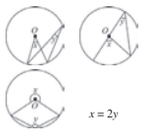
$x = \frac{84°}{2} = 42°$

2.

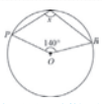


$x = 2 \times 108°$
$= 216°$

FAKTA UTAMA



3.



Refleks $\angle POR = 360° - 140°$
$= 220°$
$x = \frac{220°}{2} = 110°$

4.

$\angle POR = 2 \times 40° = 80°$
$x = \frac{180° - 80°}{2} = 50°$

E. *O* ialah pusat bulatan. Cari nilai *x*.
O is the centre of the circle. Find the value of x.
HP3.2(v) BAND 3

CONTOH

$x + 31° + 90° = 180°$
$x + 121° = 180°$
$x = 59°$

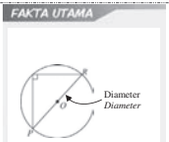
1.

$x + 42° + 90° = 180°$
$x + 132° = 180°$
$x = 48°$

2.

$\angle OQR = \angle ORQ = x$
$x + 52° = 90°$
$x = 38°$

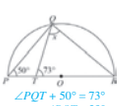
FAKTA UTAMA



3.

$\angle QPR = \angle QRP = x$
$x + x + 90° = 180°$
$2x = 90°$
$x = 45°$

4.



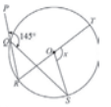
$\angle PQT + 50° = 73°$
$\angle PQT = 23°$

$\angle PQR = 90°$
$23° + x = 90°$
$x = 67°$

Hari: ..... Tarikh: .....

F. Selesaikan masalah berikut.
Solve the problem.
HP3.2(vi) BAND 5

1. Rajah di bawah menunjukkan sebuah bulatan berpusat *O*. *PQR* dan *ROT* ialah garis lurus.
The diagram shows a circle with centre O. PQR and ROT are straight lines.



Cari nilai *x*.
Find the value of x.

$145° + \angle RQS = 180°$
$\angle RQS = 35°$
$\angle ROS = 2 \times 35° = 70°$
$\angle ROS + x = 180°$
$70° + x = 180°$
$x = 110°$

2. Dalam rajah di bawah, *PTUR* ialah diameter bulatan. *SUQ* ialah garis lurus.
In the diagram, PTUR is a diameter of the circle. SUQ is a straight line.

Cari nilai *x*.
Find the value of x.

$\angle QSR = \angle QPR = 40°$
$\angle PSR = 90°$
$x + x + \angle QSR = 90°$
$2x + 40° = 90°$
$2x = 50°$
$x = 25°$

3. Rajah di bawah menunjukkan sebuah bulatan berpusat *O*.
The diagram shows a circle with centre O.

Diberi *PQ* = *QR* = *RS*, cari nilai *x*.
Given that PQ = QR = RS, find the value of x.

$\angle POS = 2 \times 72° = 144°$
Sambung *OQ* dan *OR*.
$\angle POQ = \angle QOR = \angle ROS$
$\angle POQ = \frac{144°}{3} = 48°$
Dalam segi tiga *OPQ*.
$x = \frac{180° - 48°}{2} = 66°$

4. Dalam rajah di bawah, *QOT* ialah diameter bulatan dengan pusat *O*. Panjang lengkok *QR* dan *ST* masing-masing adalah 2 cm dan 4 cm.
In the diagram, QOT is a diameter of the circle with centre O. The lengths of arc QR and ST are 2 cm and 4 cm respectively.

Cari nilai *x*.
Find the value of x.

$\frac{\angle SPT}{\angle QPR} = \frac{\text{Lengkok } ST}{\text{Lengkok } QR} = \frac{4}{2} = 2$
$\angle SPT = 2\angle QPR$
$= 2x$
$x + 27° + 2x = 90°$
$3x + 27° = 90°$
$3x = 63°$
$x = 21°$

Hari: ..... Tarikh: .....

3.3 Sisi Empat Kitaran

A. Tandakan (✓) pada sisi empat kitaran dan (×) pada bukan sisi empat kitaran.
Mark (✓) for cyclic quadrilaterals and (×) for non-cyclic quadrilaterals.
HP3.3(i) **BAND 1**

1. 
(×)

2. 
(✓)

3. 
(✓)

4. 
(×)

B. Kenal pasti dua pasangan sudut pedalaman bertentangan. Isi tempat kosong.
Identify the two pairs of interior opposite angles. Fill in the blanks.
HP3.3(ii) **BAND 1**

1. 

∠*JML* dan/*and* ∠*JKL*
∠*MJK* dan/*and* ∠*MLK*

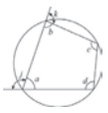
2. 

∠*BAD* dan/*and* ∠*BCD*
∠*ABC* dan/*and* ∠*ADC*

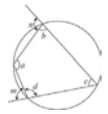
3. 

∠*PRS* dan/*and* ∠*PTS*
∠*RPT* dan/*and* ∠*RST*

C. Kenal pasti pasangan sudut peluaran dan sudut pedalaman bertentangan yang sepadan. Isi tempat kosong.
Identify the pairs of exterior angle and the corresponding interior opposite angle. Fill in the blanks.
HP3.3(iv) **BAND 1**

1. 

j dan/*and* *c*
k dan/*and* *d*

2. 

m dan/*and* *b*
n dan/*and* *d*

3. 

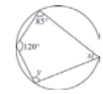
g dan/*and* *a*
h dan/*and* *b*

Hari: ..... Tarikh: .....

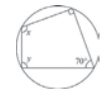
D. Cari nilai *x* dan nilai *y*.
Find the values of x and y.
HP3.3(iii) **BAND 3**

CONTOH

$x + 40° = 180°$
$x = 140°$
$y + 66° = 180°$
$y = 114°$

1. 

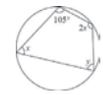
$x + 120° = 180°$
$x = 60°$
$y + 85° = 180°$
$y = 95°$

2. 

$x + 70° = 180°$
$x = 110°$
$y + 90° = 180°$
$y = 90°$

FAKTA UTAMA

$a + b =$ 180°
$c + d =$ 180°

3. 

$x + 2x = 180°$
$3x = 180°$
$x = 60°$
$y + 105° = 180°$
$y = 75°$

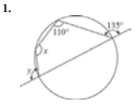
4. 

$x + 50° = 180°$
$x = 130°$
$2y + 120° = 180°$
$2y = 60°$
$y = 30°$

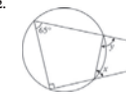
E. Cari nilai *x* dan nilai *y*.
Find the values of x and y.
HP3.3(v) **BAND 3**

CONTOH

$x = 85°$
$y = 130°$

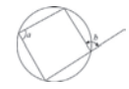
1. 

$x = 135°$
$y = 110°$

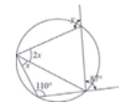
2. 

$x = 65°$
$y = 90°$

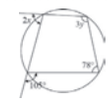
FAKTA UTAMA



$a = b$

3. 

$x + 2x = 87°$
$3x = 87°$
$x = 29°$
$y = 110°$

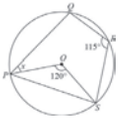
4. 

$2x = 78°$
$x = 39°$
$3y = 105°$
$y = 35°$

Hari: ..... Tarikh: .....

F. Selesaikan masalah berikut.
Solve the problem.
HP3.3(vi) **BAND 5**

1. Rajah di bawah menunjukkan sebuah bulatan berpusat *O*.
The diagram shows a circle with centre O.

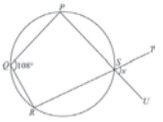


Cari nilai *x*.
Find the value of x.

$\angle OPS = \dfrac{180° - 120°}{2}$
$= 30°$

$\angle QPO + \angle OPS + \angle QRS = 180°$
$x + 30° + 115° = 180°$
$x + 145° = 180°$
$x = 35°$

2. Dalam rajah di bawah, *PQRS* ialah sisi empat kitaran. *PSU* dan *RST* ialah garis lurus.
In the diagram, PQRS is a cyclic quadrilateral. PSU and RST are straight lines.



Cari nilai *x*.
Find the value of x.

$\angle PSR + 108° = 180°$
$\angle PSR = 72°$

$x = \angle PSR$
$= 72°$

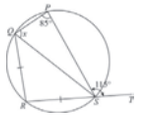
3. Dalam rajah di bawah, *O* ialah pusat bulatan.
In the diagram, O is the centre of the circle.

Cari nilai *x*.
Find the value of x.

$\angle QPS + 123° = 180°$
$\angle QPS = 57°$

Sambung *OP*.
$\angle OPQ = \angle OQP = 30°$
$\angle OPS = \angle OSP = x$
$\angle OPQ + \angle OPS = 57°$
$30° + x = 57°$
$x = 27°$

4. Dalam rajah di bawah, *RST* ialah garis lurus dan *RQ* = *RS*.
In the diagram, RST is a straight line and RQ = RS.



Cari nilai *x*.
Find the value of x.

$\angle QRS + 85° = 180°$
$\angle QRS = 95°$
$\angle RQS = \dfrac{180° - 95°}{2}$
$= 42.5°$
$\angle RQS + x = 115°$
$42.5° + x = 115°$
$x = 72.5°$

Hari: ..... Tarikh: .....

G. Selesaikan masalah berikut.
Solve the problem.
HP3.3(vii) **BAND 5**

1. Dalam rajah di bawah, *PQRS* ialah sebuah bulatan berpusat *O*. *POR* ialah diameter bulatan itu dan *QR* = *RS*.
In the diagram, PQRS is a circle with centre O. POR is a diameter of the circle and QR = RS.

Cari nilai *x*.
Find the value of x.

Sambung *OQ*.
QR = *RS*
$\angle QOR = \angle ROS = x$

$\angle QOR = 2 \times \angle QPR$
$= 2 \times 36°$
$= 72°$

$x = \angle QOR = 72°$

2. Rajah di bawah menunjukkan sebuah semibulatan.
The diagram shows a semicircle.

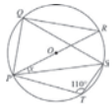
Cari nilai *x*.
Find the value of x.

$\angle QRS = 180° - 28° - 28°$
$= 124°$

$\angle QPS = 180° - 124°$
$= 56°$

$x = 180° - 90° - 56°$
$= 34°$

3. Rajah di bawah menunjukkan sebuah bulatan berpusat *O*. *POR* ialah diameter bulatan.
The diagram shows a circle with centre O. POR is a diameter of the circle.



Cari nilai *x*.
Find the value of x.

$\angle PQS + 110° = 180°$
$\angle PQS = 70°$

$\angle SQR = \angle SPR = x$

$70° + x = 90°$
$x = 20°$

4. Dalam rajah di bawah, *QT* ialah diameter bulatan.
In the diagram, QT is a diameter of the circle.

Diberi $\angle PQT = \angle RQT$, cari nilai *x*.
Given that $\angle PQT = \angle RQT$, *find the value of x.*

$\angle QPT = 90°$
$\angle PQT = 180° - 90° - 35°$
$= 55°$
$\angle PQT = \angle RQT = 55°$
$x + 55° = 180°$
$x = 125°$

Hari: ..... Tarikh: .....

PRAKTIS PT3

Soalan 1

(a) Dalam rajah di bawah, *EFGH* ialah sebuah sisi empat kitaran dan *GHJ* ialah satu garis lurus.
In the diagram, EFGH is a cyclic quadrilateral and GHJ is a straight line.

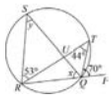
Nyatakan sama ada setiap pernyataan berikut adalah 'Betul' atau 'Salah'.
State whether each of the following statements is 'True' or 'False'.
[3 markah/3 *marks*]

(i) $\angle EHJ = r$ (Salah)

(ii) $p + s \neq 180°$ (Salah)

(iii) $q = r$ (Betul)

(b) (i) Dalam rajah di bawah, *PQR, SUQ* dan *TUR* ialah garis lurus.
In the diagram, PQR, SUQ and TUR are straight lines.



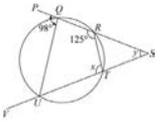
Cari nilai bagi x dan y.
Find the values of x and y.
[2 markah/2 *marks*]
HEBAT LEMBARAN PERAK

$\angle SQT = 53°$

$x + 53° + 70° = 180°$
$x + 123° = 180°$
$x = 57°$

$y = 44°$

(ii) Dalam rajah di bawah, *PQRS* dan *STUV* ialah garis lurus.
In the diagram, PQRS and STUV are straight lines.



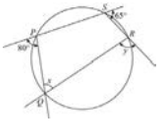
Cari nilai bagi x dan y.
Find the values of x and y.
[2 markah/2 *marks*]
HEBAT LEMBARAN PERAK

$x = 98°$

$\angle RTS = 180° - 98°$
$= 82°$

$y + 82° = 125°$
$y = 43°$

(c) Dalam rajah di bawah, *PQRS* ialah sisi empat kitaran.
In the diagram, PQRS is a cyclic quadrilateral.



Cari nilai $x + y$.
Find the value of x + y.
[3 markah/3 *marks*]
HEBAT LEMBARAN EMAS

$x = 65°$

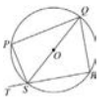
$\angle SRQ = 80°$
$y + \angle SRQ = 180°$
$y + 80° = 180°$
$y = 100°$

$x + y = 65° + 100°$
$= 165°$

Hari: ..... Tarikh: .....

Soalan 2

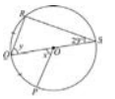
(a) Dalam rajah di bawah, *PQRS* ialah sebuah sisi empat kitaran. *QOS* ialah diameter bagi bulatan berpusat *O* dan *RST* ialah garis lurus.
In the diagram, PQRS is a cyclic quadrilateral. QOS is the diameter of the circle with centre O and RST is a straight line.



Nyatakan sama ada setiap pernyataan berikut adalah 'Betul' atau 'Salah'.
State whether each of the following statements is 'True' or 'False'.
[2 markah/2 *marks*]

(i) $\angle PSQ + \angle PQS = 90°$ (Betul)
(ii) $\angle SPQ + \angle QRS = 180°$ (Betul)

(b) (i) Dalam rajah di bawah, *O* ialah pusat bulatan. *QOS* ialah garis lurus.
In the diagram, O is the centre of the circle. QOS is a straight line.

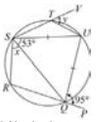


Cari nilai bagi x dan y.
Find the values of x and y.
[2 markah/2 *marks*]
HEBAT LEMBARAN PERAK

Sambung *PS*.
Lengkok *PQ* = Lengkok *QR*
$\angle PSQ = \angle QSR = 29°$
$x = 2 \times 29°$
$= 58°$

$\angle QRS = 90°$
$y = 180° - 90° - 29°$
$= 61°$

(ii) Dalam rajah, *STV* dan *RQP* ialah garis lurus.
In the diagram, STV and RQP are straight lines.

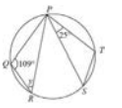


Cari nilai bagi x dan y.
Find the values of x and y.
[2 markah/2 *marks*]

$x + 53° = 95°$
$x = 42°$

$US = UQ$
$\angle UQS = \angle USQ = 53°$
$y = \angle UQS = 53°$

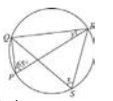
(c) (i) Rajah di bawah menunjukkan sebuah bulatan. Lengkok *QR* sama panjang dengan lengkok *ST*.
The diagram shows a circle. Arc QR and arc ST are equal in length.



Hitung nilai bagi y.
Find the value of y.
[2 markah/2 *marks*]
HEBAT LEMBARAN PERAK

$\angle QPR = 25°$
$y + 25° + 109° = 180°$
$y + 134° = 180°$
$y = 46°$

(ii) Dalam rajah di bawah, *PR* ialah diameter bulatan.
In the diagram, PR is a diameter of the circle.



Cari nilai x dan y.
Find the values of x and y.
[2 markah/2 *marks*]

$x = 65°$
$\angle PQR = 90°$
$y = 90° - 65° = 25°$

Hari: ..... Tarikh: .....

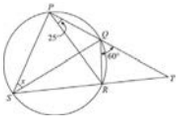
FOKUS KBAT

Elemen PAK-21 Fokus KBAT

Elemen PAK-21 Video Tutorial

1.

Kemahiran Kognitif: Mengaplikasi, Menilai
Konteks: Sudut dalam Semibulatan, Sisi Empat Kitaran



Dalam rajah di sebelah, *P, Q, R* dan *S* ialah empat titik pada lilitan sebuah bulatan. *PQT* dan *SRT* ialah garis lurus.
In the diagram, P, Q, R and S are four points on the circumference of a circle. PQT and SRT are straight lines.
(a) Cari nilai bagi x.
Find the value of x.
(b) Diberi $\angle RPS = 65°$. Ben mengatakan *QS* ialah diameter bulatan. Adakah Ben betul? Terangkan.
Given $\angle RPS = 65°$. Ben says that QS is the diameter of the circle. Is Ben correct? Explain.
[3 markah/3 *marks*]
HEBAT LEMBARAN EMAS

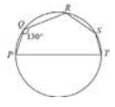
(a) $\angle PSR = 60°$
$\angle QSR = \angle QPR = 25°$
$x + \angle QSR = 60°$
$x + 25° = 60°$
$x = 60° - 25°$
$= 35°$

(b) $\angle SPQ = 65° + 25°$
$= 90°$

Oleh kerana sudut yang dicangkum pada lilitan ialah 90°, *QS* ialah diameter. Ben adalah betul.

2.

Kemahiran Kognitif: Mengaplikasi, Menilai
Konteks: Sudut dalam Semibulatan, Sisi Empat Kitaran



Dalam rajah di sebelah, *PT* ialah diameter bulatan.
'Jika $\angle PQR = 130°$, maka $\angle RPT = 40°$.' Adakah pernyataan ini benar. Beri justifikasi pada jawapan anda.
In the diagram, PT is a diameter of the circle.
'If $\angle PQR = 130°$, then $\angle RPT = 40°$.' Is it true? Justify your answer.
[3 markah/3 *marks*]
HEBAT LEMBARAN EMAS

Sambung *PS*.
$\angle RSP + 130° = 180°$
$\angle RSP = 180° - 130°$
$= 50°$

Sambung *PR*.
$\angle PST = 90°$
$\angle RSP + \angle PST + \angle RPT = 180°$
$50° + 90° + \angle RPT = 180°$
$140° + \angle RPT = 180°$
$\angle RPT = 40°$

Pernyataan ini adalah benar.

Hari: ..... Tarikh: .....

BAB 4

STATISTIK II
STATISTICS II

HEBAT MATEMATIK MODUL 4

Elemen PAK-21 Pautan Pantas

4.1 Carta Pai

A. Jawab soalan berdasarkan carta pai yang diberikan.
Answer the questions based on the given pie chart.
HP4.1(i)

1. Carta pai di bawah menunjukkan jualan telefon bimbit di sebuah kedai dalam 4 bulan.
The pie chart shows the sales of mobile phones in a shop in 4 months.

(a) Nyatakan sektor yang mewakili jualan yang paling banyak.
State the sector which represents the most sales.

Julai

(b) Hitung peratusan jualan telefon bimbit dalam bulan Mei.
Calculate the percentage of the sales of mobile phones in May.

$\frac{90°}{360°} \times 100\%$
$= 25\%$

(c) Cari nisbah jualan telefon bimbit dalam bulan Jun kepada jualan telefon bimbit dalam bulan Julai.
Find the ratio of the sales of mobile phones in June to the sales of mobile phones in July.

$360° - 30° - 90° - 100° = 140°$
$100 : 140 = \frac{100}{20} : \frac{140}{20}$
$= 5 : 7$

2. Carta pai di bawah menunjukkan 4 saiz baju yang dipakai oleh 90 orang murid.
The pie chart shows 4 sizes of shirts worn by 90 students.

(a) Apakah saiz baju dengan bilangan yang paling sedikit dipakai oleh murid?
What is the size of the shirt with the least number worn by the students?

Saiz XL

(b) Berapakah pecahan bilangan murid yang memakai baju bersaiz L?
What is the fraction of the number of students who wear L-sized shirts?

$\frac{80°}{360°} = \frac{2}{9}$

(c) Cari bilangan murid yang memakai baju bersaiz S.
Find the number of students who wear S-sized shirts.

$360° - 120° - 80° - 64° = 96°$

$\frac{96°}{360°} \times 90 = 24$

24 orang murid memakai baju bersaiz S.

Hari: ..... Tarikh: .....

FAKTA UTAMA

Jumlah semua sudut sektor dalam sebuah carta pai mesti 360°.
The sum of angles of all the sectors in a pie chart must be 360°.

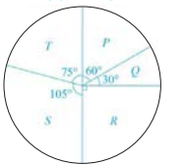
B. Lengkapkan jadual berikut. Kemudian, bina carta pai.
Complete the table. Then, construct a pie chart.

HP4.1(ii) **BAND 4**

1. Jadual di bawah menunjukkan bilangan komputer yang diagihkan kepada lima buah sekolah.
The table shows the number of computers distributed to five schools.

Sekolah *School*	Bilangan komputer *Number of computers*	Sudut sektor *Angle of sector*
P	4	$\frac{4}{24}\times360°=60°$
Q	2	$\frac{2}{24}\times360°=30°$
R	6	$\frac{6}{24}\times360°=90°$
S	7	$\frac{7}{24}\times360°=105°$
T	5	$\frac{5}{24}\times360°=75°$

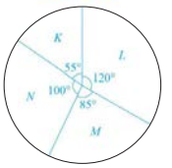
Pengagihan Komputer



2. Jadual di bawah menunjukkan bilangan durian yang dijual di empat buah gerai.
The table shows the number of durians sold in four stalls.

Gerai *Stall*	Bilangan durian *Number of durians*	Sudut sektor *Angle of sector*
K	110	$\frac{110}{720}\times360°=55°$
L	240	$\frac{240}{720}\times360°=120°$
M	170	$\frac{170}{720}\times360°=85°$
N	200	$\frac{200}{720}\times360°=100°$

Jualan Durian



Hari: ..... Tarikh: .....

C. Selesaikan masalah berikut.
Solve the problems.

HP4.1(iii) **BAND 5**

1. Carta pai di bawah menunjukkan makanan kegemaran sekumpulan 320 orang murid.
The pie chart shows the favourite food of a group of 320 students.

Makanan Kegemaran
Favourite Food

(a) Jika 128 orang murid gemar makan nasi ayam, hitung nilai *m*.
If 128 students like to eat chicken rice, calculate the value of m.

Sudut sektor nasi ayam $=\frac{128}{320}\times360°$
$=144°$
$4m+3m+144°+90°=360°$
$7m=360°-234°$
$m=18°$

(b) Berapakah pecahan bilangan murid yang gemar makan mi goreng?
What is the fraction of the number of students who like to eat fried noodles?

$3m=3\times18°$
$=54°$
$\frac{54°}{360°}=\frac{3}{20}$

(c) Hitung bilangan murid yang gemar makan burger.
Calculate the number of students who like to eat burger.

$4m=4\times18°=72°$
Bilangan murid yang gemar makan burger
$=\frac{72°}{360°}\times320$
$=64$

2. Carta pai di bawah menunjukkan pengagihan buku SPBT kepada empat buah sekolah, *P*, *Q*, *R* dan *S*.
The pie chart shows the distribution of SPBT books to four schools, P, Q, R and S.

Pengagihan Buku SPBT
Distributions of SPBT Books

(a) Diberi bilangan buku yang diterima oleh sekolah *S* adalah separuh daripada bilangan buku yang diterima oleh sekolah *Q*, cari nilai *x*.
Given the number of books received by school S is half of the number of books received by school Q, find the value of x.

$x+2x+6x+108°=360°$
$9x=252°$
$x=28°$

(b) Cari nisbah bilangan buku yang diterima oleh sekolah *P* kepada bilangan buku yang diterima oleh sekolah *Q*.
Calculate the ratio of the number of books received by school P to the number of books received by school Q.

$2x=2\times28°=56°$
$108:56=\frac{108}{4}:\frac{56}{4}$
$=27:14$

(c) Diberi sekolah *R* menerima 840 buah buku, hitung jumlah bilangan buku yang diterima oleh empat buah sekolah itu.
Given school R received 840 books, calculate the total number of books received by the four schools.

$6x=6\times28°=168°$
Jumlah bilangan buku yang diterima oleh empat buah sekolah $=\frac{360°}{168°}\times840$
$=1\,800$

Hari: ..... Tarikh: .....

4.2 Mod, Median dan Min

A. Kenal pasti mod.
Identify the mode.

HP4.2(i) **BAND 2**

1. 43, 42, 55, 40, 57, 41, 41, 43, 40, 41, 42, 41

Mod/*Mode* = 41

2.

Umur (tahun) *Age (years)*	15	16	17	18	19
Kekerapan *Frequency*	5	7	3	2	3

Mod/*Mode* = 16 tahun

B. Tentukan mod dan kekerapannya.
Determine the mode and its frequency.

HP4.2(ii) **BAND 2**

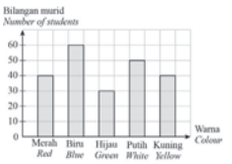
1. **Bilangan Minuman dalam Tin yang Dihasilkan oleh Sebuah Kilang**
Number of Canned Drinks Produced by a Factory

Mei *May*	
Jun *June*	
Julai *July*	
Ogos *August*	

mewakili 5 000 tin
represents 5 000 cans

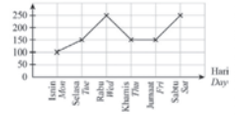
Mod/*Mode* = Jun
Kekerapan/*Frequency* = 45 000

2. **Warna Kegemaran Murid**
Favourite Colours of the Students



Mod/*Mode* = Biru
Kekerapan/*Frequency* = 60

3. **Keuntungan daripada Jualan Sate**
Profit from the Sales of Satay



Mod/*Mode* = RM150
Kekerapan/*Frequency* = 3

4. **Jenis Kenderaan yang Digunakan oleh 72 orang Murid ke Sekolah**
Types of Vehicles Used by 72 Students to School

Mod/*Mode* = Kereta
Kekerapan/*Frequency* = 24

Hari: ..... Tarikh: .....

FAKTA UTAMA

$\text{Min}=\frac{\text{Jumlah nilai}}{\text{Jumlah kekerapan}}$ $\qquad$ $Mean=\frac{Total\ values}{Total\ frequencies}$

C. Cari median dan min bagi data berikut.
Find the median and mean of the data.

HP4.2(iii),(v) **BAND 3**

1. 9 kg, 12 kg, 8 kg, 32 kg, 27 kg, 18 kg, 13 kg

8 kg, 9 kg, 12 kg, (13 kg) 18 kg, 27 kg, 32 kg
Median = 13 kg

Min
$=\frac{9\text{ kg}+12\text{ kg}+8\text{ kg}+32\text{ kg}+27\text{ kg}+18\text{ kg}+13\text{ kg}}{7}$
$=\frac{119\text{ kg}}{7}$
$=17\text{ kg}$

2. 72, 35, 98, 83, 106, 60, 58, 66, 49, 57

35, 49, 57, 58, (60, 66) 72, 83, 98, 106
Median $=\frac{60+66}{2}=63$

Min
$=\frac{72+35+98+83+106+60+58+66+49+57}{10}$
$=\frac{684}{10}$
$=68.4$

D. Cari median dan min bagi data berikut.
Find the median and mean of the data.

HP4.2(iv),(v) **BAND 3**

1.

Wang saku (RM) *Pocket money (RM)*	2	3	4	5	6
Kekerapan *Frequency*	3	8	6	5	3

Jumlah kekerapan = 3 + 8 + 6 + 5 + 3
$=25$
Median = Kedudukan ke-$\frac{25+1}{2}$
= Kedudukan ke-13
= RM4

Min $=\frac{(2\times3)+(3\times8)+(4\times6)+(5\times5)+(6\times3)}{25}$
$=\frac{97}{25}$
$=\text{RM}3.88$

2.

Umur (Tahun) *Age (Years)*	13	14	15	16	17
Bilangan perempuan *Number of girls*	2	0	3	4	1

Jumlah kekerapan = 2 + 0 + 3 + 4 + 1
$=10$
Median = Kedudukan ke-$\frac{10+1}{2}$
= Kedudukan ke-5.5

Median $=\frac{15+16}{2}=15.5$ tahun

Min
$=\frac{(13\times2)+(14\times0)+(15\times3)+(16\times4)+(17\times1)}{10}$
$=\frac{152}{10}$
$=15.2$ tahun

Hari: ..... Tarikh: .....

E. Selesaikan masalah berikut.
Solve the problem.

HP4.2(vi) **BAND 5**

1.

10, 3, 14, 6, *x*, 17, 11, 6

Rajah di sebelah menunjukkan satu set data.
The diagram shows a set of data.
(a) Cari nilai *x* jika min bagi data itu ialah 9.
Find the value of x if the mean of the data is 9.
(b) Hitung beza antara median dan mod bagi data itu.
Calculate the difference between the median and the mode of the data.

(a) $\frac{10+3+14+6+x+17+11+6}{8} = 9$

$x + 67 = 72$

$x = 72 - 67$

$= 5$

(b) 3, 5, 6, (6, 10) 11, 14, 17

Median $= \frac{6+10}{2} = 8$

Mod = 6

Beza antara median dan mod
$= 8 - 6$
$= 2$

2.

Jisim (kg) *Mass (kg)*	Kekerapan *Frequency*
40	6
45	2*m*
50	4
55	*m* + 1
60	2
65	1

Jadual di sebelah menunjukkan jisim, dalam kg, bagi sekumpulan 20 orang murid.
The table shows the mass, in kg, of a group of 20 students.
(a) Cari nilai *m*.
Find the value of m.
(b) Cari median jisim murid-murid itu.
Find the median mass of the students.
(c) Hitung min jisim, dalam kg, murid-murid itu.
Find the mean mass, in kg, of the students.

(a) $6 + 2m + 4 + (m + 1) + 2 + 1 = 20$

$3m = 6$

$m = 2$

(b) Median = Kedudukan ke-$\frac{20+1}{2}$

= Kedudukan ke-10.5

$= \frac{45+50}{2}$

= 47.5 kg

(c) Min $= \frac{(40\times6)+(45\times4)+(50\times4)+(55\times3)+(60\times2)+(65\times1)}{20} = \frac{970}{20} = 48.5$ kg

3. Min umur bagi lima orang ahli keluarga ialah 28 tahun. Jika min umur bagi tiga orang anak ialah 16 tahun, cari min umur bagi suami isteri itu.
The mean age of five family members is 28 years. If the mean age of the three children is 16 years, find the mean age of the husband and wife.

Jumlah umur 5 orang ahli keluarga = 28 × 5 = 140 tahun
Jumlah umur 3 orang anak = 16 × 3 = 48 tahun
Jumlah umur suami isteri = 140 – 48 = 92 tahun

Min umur suami isteri $= \frac{92}{2} = 46$ tahun

Hari: ..... Tarikh: .....

PRAKTIS PT3

Soalan 1

(a) Tandakan (✓) bagi mod yang betul dan (×) bagi mod yang salah.
Mark (✓) for the correct mode and (×) for the incorrect mode.

[2 markah/2 *marks*]

(i)

12, 13, 11, 12, 15, 11, 14, 12, 13

Mod/*Mode* = 12 (✓)

(ii)

Skor *Score*	5	6	7	8	9
Kekerapan *Frequency*	7	9	5	6	8

Mod/*Mode* = 9 (×)

(b) Rajah di bawah ialah piktogram yang tidak lengkap yang menunjukkan bilangan guru di tiga buah sekolah. Diberi bahawa bilangan guru di sekolah *Q* adalah tiga kali bilangan guru di sekolah *S*.
The diagram is an incomplete pictogram which shows the number of teachers in three schools. It is given that the number of teachers in school Q is thrice the number of teachers in school S.

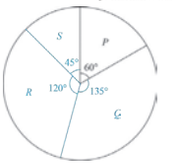
Sekolah *School*	Bilangan guru *Number of teachers*
P	◯◯◯◯
Q	◯◯◯◯◯◯◯◯◯
R	◯◯◯◯◯◯◯◯
S	◯◯◯

(i) Lengkapkan piktogram.
Complete the pictogram.

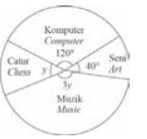
[1 markah/1 *mark*]

(ii) Lengkapkan carta pai di bawah untuk mewakili bilangan guru di sekolah itu.
Complete the pie chart to represent the number of teachers in the schools.

[3 markah/3 *marks*]



(c) Carta pai di bawah menunjukkan bilangan ahli bagi empat buah kelab.
The pie chart shows the number of members in four clubs.



Diberi bilangan ahli Kelab Komputer ialah 108 orang. Berapakah bilangan ahli Kelab Muzik?
Given that the number of members in Computer Club is 108 students. How many members are there in the Music Club?

[4 markah/4 *marks*]

$120° + 40° + 3y + y = 360°$

$4y = 360° - 160°$

$y = 50°$

Andaikan jumlah bilangan ahli bagi empat buah kelab itu ialah *x*.

$\frac{120}{360} \times x = 108$

$x = 324$

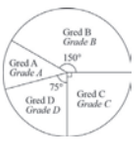
Bilangan ahli Kelab Muzik $= \frac{150}{360} \times 324$

$= 135$

Hari: ..... Tarikh: .....

Soalan 2

(a) Carta pai di bawah menunjukkan keputusan bagi 48 orang murid dalam suatu peperiksaan.
The pie chart shows the results obtained by 48 students in an examination.



Nyatakan 'Betul' atau 'Salah' bagi pernyataan berikut.
State 'True' or 'False' for the following statements.

[3 markah/3 *marks*]

(i) Sektor yang mewakili gred A ialah 45°.
The sector representing grade A is 45°.

(Betul)

(ii) Bilangan murid yang mendapat gred B adalah dua kali bilangan murid yang mendapat gred D.
The number of students who obtained grade B is twice the number of students who obtained grade D.

(Betul)

(iii) 18 orang murid mendapat gred C.
18 students obtained grade C.

(Salah)

(b) Jadual di bawah menunjukkan bilangan anak dalam setiap keluarga di sebuah kampung. Terdapat 120 buah keluarga di kampung itu.
The table shows the number of children in each family in a village. There are 120 families in the village.

Bilangan anak *Number of children*	Kekerapan *Frequency*
0	8
1	14
2	20
3	4*m*
4	6*m*
5	3*m*

(i) Jika data dalam jadual itu diwakili oleh carta pai, hitung sudut sektor yang mewakili 4 orang anak.
If the data in the table is represented by a pie chart, calculate the angle of the sector which represents 4 children.

[2 markah/2 *marks*]

$8 + 14 + 20 + 4m + 6m + 3m = 120$

$13m = 120 - 42$

$m = \frac{78}{13}$

$= 6$

Sudut sektor yang mewakili 4 orang anak
$= \frac{(6\times6)}{120} \times 360° = 108°$

(ii) Cari min bilangan anak dalam setiap keluarga.
Find the mean number of children in each family.

[2 markah/2 *marks*]

Min bilangan anak dalam setiap keluarga
$= \frac{(0\times8)+(1\times14)+(2\times20)+(3\times24)+(4\times36)+(5\times18)}{120}$

$= \frac{360}{120}$

$= 3$

(c) Min wang simpanan Encik Rahman, Puan Haslina dan empat orang anak mereka ialah RM1 680. Min wang simpanan bagi Encik Rahman dan Puan Haslina ialah RM3 420. Hitung min wang simpanan bagi empat orang anak mereka.
The mean savings of Encik Rahman, Puan Haslina and their four children is RM1 680. The mean savings of Encik Rahman and Puan Haslina is RM3 420. Calculate the mean savings of their four children.

[3 markah/3 *marks*]

Jumlah wang simpanan Encik Rahman, Puan Haslina dan empat orang anak
= RM1 680 × 6
= RM10 080

Jumlah wang simpanan Encik Rahman dan Puan Haslina
= RM3 420 × 2
= RM6 840

Min wang simpanan empat orang anak
$= \frac{\text{RM10 080} - \text{RM6 840}}{4}$

= RM810

Hari: ..... Tarikh: .....

BAB **5**

INDEKS
INDICES

HEBAT MATEMATIK MODUL 31

Pautan Pantas

5.1 Indeks

A. Lengkapkan jadual di bawah.
Complete the table.

HP5.1(i)

Tatatanda indeks *Index notation*	Pendaraban berulang *Repeated multiplication*
1. 4^5	4 × 4 × 4 × 4 × 4
2. $(-7)^3$	(−7) × (−7) × (−7)
3. $\left(\frac{2}{5}\right)^6$	$\frac{2}{5}\times\frac{2}{5}\times\frac{2}{5}\times\frac{2}{5}\times\frac{2}{5}\times\frac{2}{5}$
4. $(-0.6)^4$	(−0.6) × (−0.6) × (−0.6) × (−0.6)
5. p^7	p × p × p × p × p × p × p

B. Cari nilai bagi setiap berikut.
Find the value of each of the following.

HP5.1(ii)

1. $2^6 = 2\times2\times2\times2\times2\times2$
$= 64$

2. $\left(\frac{3}{4}\right)^4 = \frac{3}{4}\times\frac{3}{4}\times\frac{3}{4}\times\frac{3}{4}$
$= \frac{81}{256}$

3. $(-0.3)^3 = (-0.3)\times(-0.3)\times(-0.3)$
$= -0.027$

C. Ungkapkan nombor dalam tatatanda indeks dengan asas yang diberikan.
Express the number in index notation with the base given.

HP5.1(iii)

CONTOH

32 (asas/*base* 2)
$= 2\times2\times2\times2\times2$
$= 2^5$

2	32
2	16
2	8
2	4
2	2
	1

1. 343 (asas/*base* 7)
$= 7\times7\times7$
$= 7^3$

7	343
7	49
7	7
	1

2. 625 (asas/*base* 5)
$= 5\times5\times5\times5$
$= 5^4$

5	625
5	125
5	25
5	5
	1

3. 729 (asas/*base* 3)
$= 3\times3\times3\times3\times3\times3$
$= 3^6$

3	729
3	243
3	81
3	27
3	9
3	3
	1

Hari: ..... Tarikh: .....

5.2 Pendaraban Nombor dalam Tatatanda Indeks

A. Permudahkan.
Simplify.

HP5.2(ii) BAND 3

CONTOH

$p^2 \times 6p^6 \times 3p^8 = (6 \times 3)\, p^{2+6+8}$
$= 18p^{16}$

1. $9^3 \times 9^2 = 9^{3+2}$
$= 9^5$

2. $(-7)^4 \times (-7) \times (-7)^5 = (-7)^{4+1+5}$
$= (-7)^{10}$

3. $\left(\frac{3}{4}\right)^2 \times \left(\frac{3}{4}\right)^4 \times \frac{3}{4} = \left(\frac{3}{4}\right)^{2+4+1}$
$= \left(\frac{3}{4}\right)^7$

4. $h \times h^5 \times h^3 = h^{1+5+3}$
$= h^9$

5. $10n^4 \times \frac{4}{15} n^7 \times 3n = \left(10 \times \frac{4}{15} \times 3\right) n^{4+7+1}$
$= 8n^{12}$

B. Permudahkan.
Simplify.

HP5.2(iii) BAND 3

CONTOH

$9m^7 \times n \times n^3 \times (-2m)$
$= [9 \times (-2)] m^{7+1} n^{1+3}$
$= -18m^8 n^4$

1. $2^6 \times 6^3 \times 15^4 \times 2 \times 6^2$
$= 2^{6+1} \times 6^{3+2} \times 15^4$
$= 2^7 \times 6^5 \times 15^4$

2. $3h^2 \times k^3 \times 4h \times \frac{5}{12} k^4$
$= \left(3 \times 4 \times \frac{5}{12}\right) h^{2+1} k^{3+4}$
$= 5h^3 k^7$

5.3 Pembahagian Nombor dalam Tatatanda Indeks

Permudahkan.
Simplify.

HP5.3(ii) BAND 3

CONTOH

$27y^9 \div 9y^8$
$= \left(\frac{27}{9}\right) y^{9-8}$
$= 3y$

1. $4^8 \div 4^3$
$= 4^{8-3}$
$= 4^5$

2. $\frac{7^{10}}{7}$
$= 7^{10-1}$
$= 7^9$

3. $k^6 \div k^6$
$= k^{6-6}$
$= k^0$
$= 1$

4. $32r^9 s^5 \div 4r^4 s^5$
$= \left(\frac{32}{4}\right) r^{9-4} s^{5-5}$
$= 8r^5 s^0$
$= 8r^5$

5. $\frac{56h^7}{8h^2}$
$= \left(\frac{56}{8}\right) h^{7-2}$
$= 7h^5$

Hari: ..... Tarikh: .....

5.4 Nombor dan Sebutan Algebra dalam Tatatanda Indeks yang Dikuasakan

A. Bulatkan jawapan yang betul.
Circle the correct answers.

HP5.4(ii) BAND 3

1. $(5^2)^4 =$ 5^6, 5^8, 5^{-2}
2. $(13^5)^3 =$ 13^8, 13^2, 13^{15}
3. $(x^4)^7 =$ x^{28}, x^{-3}, x^{11}

B. Permudahkan.
Simplify.

HP5.4(ii) BAND 3

CONTOH

$(r^3)^6 = r^{3 \times 6}$
$= r^{18}$

1. $(8^6)^2 = 8^{6 \times 2}$
$= 8^{12}$

2. $(p^7)^3 = p^{7 \times 3}$
$= p^{21}$

C. Permudahkan.
Simplify.

HP5.4(iii) BAND 3

CONTOH

$(3^4 \times 7 \times 12^5)^2$
$= 3^{4 \times 2} \times 7^{1 \times 2} \times 12^{5 \times 2}$
$= 3^8 \times 7^2 \times 12^{10}$

1. $(4^2 \times 9^4)^3$
$= 4^{2 \times 3} \times 9^{4 \times 3}$
$= 4^6 \times 9^{12}$

2. $(-3a^7 bc^3)^3$
$= (-3)^{1 \times 3} a^{7 \times 3} b^{1 \times 3} c^{3 \times 3}$
$= -27a^{21} b^3 c^9$

D. Permudahkan.
Simplify.

HP5.4(iii) BAND 3

CONTOH

$\left(\frac{3d^5}{4e}\right)^3 = \frac{3^{1 \times 3} d^{5 \times 3}}{4^{1 \times 3} e^{1 \times 3}}$
$= \frac{27d^{15}}{64e^3}$

1. $\left(\frac{7}{9^2}\right)^5 = \frac{7^{1 \times 5}}{9^{2 \times 5}}$
$= \frac{7^5}{9^{10}}$

2. $\left(\frac{7w^2 x}{8y^3}\right)^2 = \frac{7^{1 \times 2} w^{2 \times 2} x^{1 \times 2}}{8^{1 \times 2} y^{3 \times 2}}$
$= \frac{49w^4 x^2}{64y^6}$

E. Permudahkan.
Simplify.

HP5.4(iv) BAND 3

1. $\frac{(2m^3 n^2)^3}{4m^2 n}$
$= \frac{8m^9 n^6}{4m^2 n}$
$= 2m^{9-2} n^{6-1}$
$= 2m^7 n^5$

2. $(3x^2 y)^3 \div 9xy^3$
$= \frac{(3x^2 y)^3}{9xy^3}$
$= \frac{27x^6 y^3}{9xy^3}$
$= 3x^{6-1} y^{3-3}$
$= 3x^5 y^0$
$= 3x^5$

3. $\left(\frac{5k^2}{k^4}\right)^2 \div k^3$
$= \frac{25k^4}{k^8} \times \frac{1}{k^3}$
$= \frac{25}{k^7}$

Hari: ..... Tarikh: .....

5.5 Pengiraan yang Melibatkan Indeks Negatif

A. Tulis setiap yang berikut dalam bentuk $\frac{1}{a^n}$.

Write each of the following in the form of $\frac{1}{a^n}$.

HP5.5(ii)

1. $7^{-1} = \frac{1}{7}$

2. $h^{-9} = \frac{1}{h^9}$

3. $\frac{1}{3^{-6}} = \frac{1}{\left(\frac{1}{3^6}\right)}$
$= 3^6$

4. $\frac{1}{r^{-8}} = \frac{1}{\left(\frac{1}{r^8}\right)}$
$= r^8$

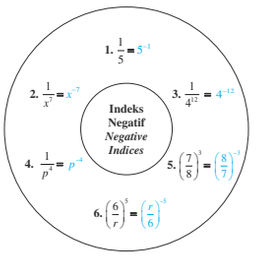
5. $\left(\frac{1}{15}\right)^{-3} = \frac{1}{\left(\frac{1}{15}\right)^3}$
$= 15^3$

6. $\left(\frac{m}{4}\right)^{-5} = \frac{1}{\left(\frac{m}{4}\right)^5}$
$= \left(\frac{4}{m}\right)^5$

B. Nyatakan setiap berikut dalam bentuk a^{-n}.
State each of the following in the form of a^{-n}.

HP5.5(ii)

i-THINK Peta Bulatan



C. Permudahkan.
Simplify.

HP5.5(iii)

1. $(3^2)^{-3} \times 9^3 \div (3^{-1})^2 = 3^{-6} \times (3^2)^3 \div 3^{-2}$
$= 3^{-6+6-(-2)}$
$= 3^2$
$= 9$

2. $\frac{(2^4)^{-2}}{(16)^{-1} \times 4^{-4}} = \frac{2^{-8}}{(2^4)^{-1} \times (2^2)^{-4}}$
$= \frac{2^{-8}}{2^{-4} \times 2^{-8}}$
$= 2^{-8-(-4)-(-8)}$
$= 2^4$
$= 16$

3. $\frac{\left(5x^{-2}\right)^3 \times y^{-5}}{25x^{-8} y^{-8}} = \frac{125x^{-6} y^{-5}}{25x^{-6} y^{-8}}$
$= 5x^{-6-(-6)} y^{-5-(-8)}$
$= 5x^0 y^3$
$= 5y^3$

4. $\frac{\left(m^3 k^{-2}\right)^{-2}}{m^{-7} \times \left(k^{-4}\right)^2} = \frac{m^{-6} k^4}{m^{-7} k^{-8}}$
$= m^{-6-(-7)} k^{4-(-8)}$
$= mk^{12}$

Hari: ..... Tarikh: .....

5.6 Pengiraan yang Melibatkan Indeks Pecahan

A. Lengkapkan peta titi berikut.
Complete the bridge map.

HP5.6(ii)

Sama dengan *Same as*

$5^{\frac{1}{2}}$ as $7^{\frac{1}{2}}$ as $13^{\frac{1}{3}}$ as 3. $8^{\frac{1}{3}}$ 4. $s^{\frac{1}{6}}$ as $p^{\frac{1}{8}}$

Faktor penghubung *Relating factor*

$\sqrt{5}$ 1. $\sqrt{7}$ 2. $\sqrt[3]{13}$ $\sqrt[3]{8}$ $\sqrt[6]{s}$ 5. $\sqrt[8]{p}$

i-THINK Peta Titi

B. Cari nilai berikut.
Find the value.

HP5.6(iii)

1. $64^{\frac{1}{3}} = \sqrt[3]{64}$
$= 4$

2. $(0.0081)^{\frac{1}{4}} = \sqrt[4]{0.0081}$
$= 0.3$

3. $\left(\frac{25}{81}\right)^{\frac{1}{2}} = \frac{\sqrt{25}}{\sqrt{81}}$
$= \frac{5}{9}$

C. Lengkapkan jadual berikut.
Complete the following table.

HP5.6(iv)

$a^{\frac{m}{n}}$	$\left(a^m\right)^{\frac{1}{n}}$	$\left(a^{\frac{1}{n}}\right)^m$	$\sqrt[n]{a^m}$	$\left(\sqrt[n]{a}\right)^m$
1. $13^{\frac{2}{3}}$	$\left(13^2\right)^{\frac{1}{3}}$	$\left(13^{\frac{1}{3}}\right)^2$	$\sqrt[3]{13^2}$	$\left(\sqrt[3]{13}\right)^2$
2. $7^{\frac{4}{3}}$	$\left(7^4\right)^{\frac{1}{3}}$	$\left(7^{\frac{1}{3}}\right)^4$	$\sqrt[3]{7^4}$	$\left(\sqrt[3]{7}\right)^4$
3. $24^{\frac{7}{8}}$	$\left(24^7\right)^{\frac{1}{8}}$	$\left(24^{\frac{1}{8}}\right)^7$	$\sqrt[8]{24^7}$	$\left(\sqrt[8]{24}\right)^7$

D. Permudahkan.
Simplify.

HP5.6(v)

1. $25^{\frac{7}{2}} \times \left(3^{\frac{2}{3}}\right)^5 \div 5^{\frac{3}{2}}$
$= \left(5^2\right)^{\frac{7}{2}} \times 3^{\frac{2}{3} \times 5} \div 5^{\frac{3}{2}}$
$= 5^{\frac{7}{2} - \frac{3}{2}} \times 3^2$
$= 5 \times 9$
$= 45$

2. $\frac{\left(2^{\frac{2}{3}} \times 3^{\frac{1}{2}}\right)^3}{2^{\frac{1}{2}}}$
$= 2^{\frac{5}{2} - \frac{1}{2}} \times 3$
$= 2^2 \times 3$
$= 4 \times 3$
$= 12$

3. $\frac{\left(m^{\frac{2}{3}} k^{\frac{1}{2}}\right)^6 \times \left(16m^6 k^2\right)^{\frac{3}{2}}}{\left(2m^{\frac{5}{3}}\right)^3}$
$= \frac{m^4 k^3 \times 4^3 m^9 k^3}{8m^5}$
$= \frac{64}{8} m^{4+9-5} k^{3+3}$
$= 8m^8 k^6$

Hari: ..... Tarikh: .....

5.7 Pengiraan yang Melibatkan Hukum Indeks

A. Isi petak kosong.
Fill in the blanks.

HP5.7(i), (ii) **BAND 4**

1. $16^{\frac{5}{4}} \times 8^{-\frac{2}{3}} \times 27^{\frac{1}{3}} = \left(2^{\boxed{4}}\right)^{\frac{5}{4}} \times \left(2^3\right)^{-\frac{2}{3}} \times \left(3^3\right)^{\frac{1}{3}}$

$= \boxed{32} \times \frac{1}{2^2} \times 3$

$= \boxed{8} \times 3$

$= \boxed{24}$

2. $\frac{8^{\frac{2}{3}} \times 16^{\frac{1}{4}}}{32^{\frac{3}{5}}} = \frac{\left(2^3\right)^{\frac{2}{3}} \times \left(2^4\right)^{\frac{1}{4}}}{\left(2^{\boxed{5}}\right)^{\frac{3}{5}}}$

$= \frac{2^2 \times 2}{\boxed{2^3}}$

$= 2^{\boxed{0}}$

$= \boxed{1}$

B. Permudahkan.
Simplify.

HP5.7(i), (ii) **BAND 4**

1. $3^{-5} \times \left(3^3 \times 4\right)^{\frac{5}{3}} \div 4^{-\frac{1}{3}} = 3^{-5} \times 3^5 \times 4^{\frac{5}{3}} \div 4^{-\frac{1}{3}}$

$= 3^{-5+5} \times 4^{\frac{5}{3}+\frac{1}{3}}$

$= 3^0 \times 4^{\frac{5}{3}+\frac{1}{3}}$

$= 1 \times 4^2$

$= 16$

2. $\frac{\left(2^4 \times 3^6\right)^{\frac{1}{2}}}{9^{\frac{3}{2}}} = \frac{2^{2\times 3} \times 3^3}{(3^2)^{\frac{3}{2}}}$

$= 2^2 \times 3^{3-3}$

$= 4 \times 3^0$

$= 4 \times 1$

$= 4$

3. $\left(pr^2\right)^4 \div p^3r^3 \times \left(-5p^3r\right)^2$

$= p^4r^8 \div p^3r^5 \times (-5)^2p^6r^2$

$= 25p^{4-3+6}r^{8-5+2}$

$= 25p^7r^5$

4. $\frac{\sqrt{64m^2nk} \times 2m^3k^2}{(16nk)^{\frac{1}{2}}}$

$= \frac{(64m^2nk)^{\frac{1}{2}} \times 2m^3k^2}{(4^2)^{\frac{1}{2}}n^{\frac{1}{2}}k^{\frac{1}{2}}}$

$= \frac{\sqrt{64}m^{\frac{1}{2}}k^{\frac{1}{2}} \times 2m^3k^2}{4n^{\frac{1}{2}}k^{\frac{1}{2}}}$

$= \frac{8\times 2}{4}m^{1+3}n^{\frac{1}{2}-\frac{1}{2}}k^{\frac{1}{2}+2-\frac{1}{2}}$

$= 4m^4n^0k^2$

$= 4m^4k^2$

Hari: ..... Tarikh: .....

PRAKTIS PT3

Soalan 1

(a) Tentukan nilai bagi x, y dan z dalam persamaan yang berikut.
Determine the values of x, y and z in the following equations.
[3 markah/3 *marks*]

(i) $a^4 \times a^5 = a^x$ $x =$ ..... 9 .....

(ii) $a^7 \div a^3 = a^y$ $y =$ ..... 4 .....

(iii) $(a^2)^6 = a^z$ $z =$ ..... 12 .....

(b) (i) Permudahkan: *Simplify:* $m^5 \div m^{-3}$
[1 markah/1 *mark*]
HEBAT LEMBARAN GANGSA

$m^5 \div m^{-3} = m^{5-(-3)}$
$= m^8$

(ii) Nilaikan: *Evaluate:* $\frac{5^{-2} \times 2^6}{5^{-4} \times 32}$
[3 markah/3 *marks*]

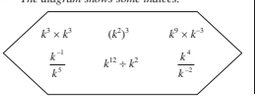
$\frac{5^{-2}\times 2^6}{5^{-4}\times 32} = \frac{5^{-2}\times 2^6}{5^{-4}\times 2^5}$
$= 5^{-2-(-4)} \times 2^{6-5}$
$= 5^2 \times 2$
$= 25 \times 2$
$= 50$

(c) Cari nilai bagi: *Find the value of:* $16^{\frac{1}{4}} \div 2^{-3} \times 8^{-\frac{4}{3}}$
[3 markah/3 *marks*]
HEBAT LEMBARAN PERAK

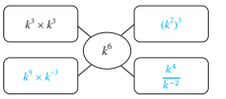
$16^{\frac{1}{4}} \div 2^{-3} \times 8^{-\frac{4}{3}} = (2^4)^{\frac{1}{4}} \div 2^{-3} \times (2^3)^{-\frac{4}{3}}$
$= 2 \div 2^{-3} \times 2^{-4}$
$= 2^{1-(-3)+(-4)}$
$= 2^0$
$= 1$

Soalan 2

(a) Rajah di bawah menunjukkan beberapa indeks.
The diagram shows some indices.



Dengan menggunakan indeks yang diberikan, isi petak kosong berikut.
Using the indices given, fill in the blanks.
[3 markah/3 *marks*]



(b) (i) Permudahkan: *Simplify:* $k^3 \times k^{-2}$
[1 markah/1 *mark*]
HEBAT LEMBARAN GANGSA

$k^3 \times k^{-2} = k^{3+(-2)}$
$= k$

(ii) Cari nilai bagi: *Find the value of:* $\frac{18^2}{2^{-2} \times 3^3}$
[3 markah/3 *marks*]

$\frac{18^2}{2^{-2}\times 3^3} = \frac{(2\times 3^2)^2}{2^{-2}\times 3^3}$
$= \frac{2^2\times 3^4}{2^{-2}\times 3^3}$
$= 2^{2-(-2)} \times 3^{4-3}$
$= 2^4 \times 3$
$= 16 \times 3$
$= 48$

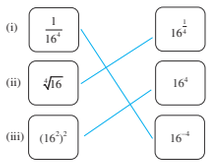
(c) Diberi $3^{4y-3} = (3^y)(3^6)$, cari nilai y.
Given $3^{4y-3} = (3^y)(3^6)$, *find the value of y.*
[3 markah/3 *marks*]

$3^{4y-3} = (3^y)(3^6)$
$3^{4y-3} = 3^{y+6}$
$4y - 3 = y + 6$
$4y - y = 6 + 3$
$3y = 9$
$y = 3$

Hari: ..... Tarikh: .....

Soalan 3

(a) Padankan setiap yang berikut dengan jawapan yang betul.
Match each of the following with the correct answer.
[3 markah/3 *marks*]



(b) (i) Permudahkan: *Simplify:* $36y^8 \div y^3 \div 4y^5$
[2 markah/2 *marks*]
HEBAT LEMBARAN PERAK

$36y^8 \div y^3 \div 4y^5$
$= \frac{36}{4}y^{8-3-5}$
$= 9y^0$
$= 9$

(ii) Cari nilai bagi: *Find the value of:* $32^{\frac{2}{5}} \times 27^{\frac{2}{3}}$
[2 markah/2 *marks*]

$32^{\frac{2}{5}} \times 27^{\frac{2}{3}} = (2^5)^{\frac{2}{5}} \times (3^3)^{\frac{2}{3}}$
$= 2^2 \times 3^2$
$= 4 \times 9$
$= 36$

(c) Cari nilai bagi: *Find the value of:* $20^{\frac{1}{2}} \times 8^{\frac{2}{3}} \times 5^{\frac{3}{2}}$
[3 markah/3 *marks*]
HEBAT LEMBARAN PERAK

$20^{\frac{1}{2}} \times 8^{\frac{2}{3}} \times 5^{\frac{3}{2}} = (2^2 \times 5)^{\frac{1}{2}} \times (2^3)^{\frac{2}{3}} \times 5^{\frac{3}{2}}$
$= 2 \times 5^{\frac{1}{2}} \times 2^2 \times 5^{\frac{3}{2}}$
$= 2^{1+2} \times 5^{\frac{1}{2}+\frac{3}{2}}$
$= 2^3 \times 5^2$
$= 8 \times 25$
$= 200$

Fokus KBAT

Video Tutorial

FOKUS KBAT

1. **Kemahiran Kognitif:** Mengaplikasi
Konteks: Indeks Negatif

Jika $10^{x-2} = \frac{1}{1000}$, cari nilai 10^x.

If $10^{x-2} = \frac{1}{1000}$, *find the value of* 10^x.
[3 markah/3 *marks*]

$10^{x-2} = \frac{1}{1000}$
$10^{x-2} = 10^{-3}$
$x - 2 = -3$
$x = -3 + 2$
$x = -1$
$10^x = 10^{-1}$
$= \frac{1}{10}$

2. **Kemahiran Kognitif:** Mengaplikasi
Konteks: Indeks Pecahan

Diberi $\left(\sqrt{m}\right)^6 \times n^2 = 256$ dan $\sqrt{m} \times n = 4$.
Hitung nilai m dan n.
Given $\left(\sqrt{m}\right)^6 \times n^2 = 256$ *and* $\sqrt{m} \times n = 4$.
Calculate the values of m and n.
[2 markah/2 *marks*]

Kaedah cuba jaya:

Guna $m = 4$, $n = 2$

$\sqrt{4} \times 2 = 4$

$\left(\sqrt{4}\right)^6 \times 2^2 = 256$

Maka, $m = 4$, $n = 2$

Hari: ..... Tarikh: .....

BAB 6

UNGKAPAN ALGEBRA III

ALGEBRAIC EXPRESSIONS III

HEBAT MATEMATIK MODUL 17

Pautan Pantas

6.1 Kembangan

A. Isikan ☐ atau ☐ dalam petak di bawah.
Fill in ☐ or ☐ in the boxes below.

HP5.1(i)

1. $3m(2k \square 1) \boxed{=} 6mk \square 3m$	**2.** $5(r+3s) \boxed{\neq} 5r+3s$	**3.** $-x(4-y) \boxed{=} -4x+xy$

B. Kembangkan.
Expand.

HP6.1(ii)

CONTOH

$(m+3)(m+5)$
$= m^2 + 5m + 3m + 15$
$= m^2 + 8m + 15$

1. $(x-4)(x-7)$
$= x^2 - 7x - 4x + 28$
$= x^2 - 11x + 28$

2. $(y+6)(2y-3)$
$= 2y^2 - 3y + 12y - 18$
$= 2y^2 + 9y - 18$

3. $(5u-3w)(u+4w)$
$= 5u^2 + 20uw - 3uw - 12w^2$
$= 5u^2 + 17uw - 12w^2$

4. $(e-g)(e+g)$
$= e^2 + eg - eg - g^2$
$= e^2 - g^2$

5. $(4d+5)(4d-5)$
$= 16d^2 - 20d + 20d - 25$
$= 16d^2 - 25$

6. $(f+9)^2$
$= f^2 + 2(f)(9) + 9^2$
$= f^2 + 18f + 81$

7. $(u-w)^2$
$= u^2 - 2(u)(w) + w^2$
$= u^2 - 2uw + w^2$

8. $(2h+4k)(3h-k) - 5hk$
$= 6h^2 - 2hk + 12hk - 4k^2 - 5hk$
$= 6h^2 - 2hk + 12hk - 5hk - 4k^2$
$= 6h^2 + 5hk - 4k^2$

9. $3p^2 - 5pr + (p-3r)(4p+r)$
$= 3p^2 - 5pr + 4p^2 + pr - 12pr - 3r^2$
$= 3p^2 + 4p^2 - 5pr + pr - 12pr - 3r^2$
$= 7p^2 - 16pr - 3r^2$

Hari: ..... Tarikh: .....

6.2 Pemfaktoran Ungkapan Algebra

A. Faktorkan.
Factorise.

HP6.2(iii)

CONTOH

$2x^2 - 18$
$= 2(x^2 - 9)$
$= 2(x^2 - 3^2)$
$= 2(x + 3)(x - 3)$

$a^2 - b^2 = (a + b)(a - b)$

1. $3e + 12$
$= 3(e + 4)$

2. $xy - 9y$
$= y(x - 9)$

3. $12m^2 - 8mn + 16m^2k$
$= 4m(3m - 2n + 4mk)$

4. $4p^2 - 49$
$= (2p)^2 - 7^2$
$= (2p + 7)(2p - 7)$

5. $9 - 36w^2$
$= 9(1 - 4w^2)$
$= 9[1^2 - (2w)^2]$
$= 9(1 + 2w)(1 - 2w)$

6. $t^2 - 6t + 9$
$= (t - 3)(t - 3)$
$= (t - 3)^2$

7. $k^2 + 12k + 36$
$= (k + 6)(k + 6)$
$= (k + 6)^2$

8. $r^2 - 10rs + 25s^2$
$= (r - 5s)(r - 5s)$
$= (r - 5s)^2$

9. $e^2 + 5e - ef - 5f$
$= e(e + 5) - f(e + 5)$
$= (e + 5)(e - f)$

10. $7x - xy - 7y + y^2$
$= x(7 - y) - y(7 - y)$
$= (7 - y)(x - y)$

11. $4h^2 - 2h + 2hk - k$
$= 2h(2h - 1) + k(2h - 1)$
$= (2h + k)(2h - 1)$

B. Permudahkan.
Simplify.

HP6.2(iv)

1. $\dfrac{9rs^3}{12(rs^2)^2} = \dfrac{9rs^3}{12r^2s^4}$
$= \dfrac{3rs^3(3)}{3rs^3(4rs)}$
$= \dfrac{3}{4rs}$

2. $\dfrac{4x^2 - 12xy}{16x} = \dfrac{4x(x - 3y)}{4x(4)}$
$= \dfrac{x - 3y}{4}$

3. $\dfrac{10m + 5}{4m^2 - 1} = \dfrac{5(2m + 1)}{(2m)^2 - 1^2}$
$= \dfrac{5(2m + 1)}{(2m + 1)(2m - 1)}$
$= \dfrac{5}{2m - 1}$

Hari: ..... Tarikh: .....

6.3 Penambahan dan Penolakan Pecahan Algebra

A. Permudahkan.
Simplify.

HP6.3(i)

1. $\dfrac{2k}{15} + \dfrac{k}{15}$
$= \dfrac{2k + k}{15}$
$= \dfrac{3k}{15}$
$= \dfrac{k}{5}$

2. $\dfrac{x}{4y} - \dfrac{x - 4}{4y}$
$= \dfrac{x - x + 4}{4y}$
$= \dfrac{4}{4y}$
$= \dfrac{1}{y}$

3. $\dfrac{5p + 3r}{2s} - \dfrac{3p - r}{2s}$
$= \dfrac{5p + 3r - 3p + r}{2s}$
$= \dfrac{2p + 4r}{2s}$
$= \dfrac{2(p + 2r)}{2s}$
$= \dfrac{p + 2r}{s}$

B. Permudahkan.
Simplify.

HP6.3(ii) BAND 4

CONTOH

$\dfrac{3d - 2}{5} + \dfrac{d - 7}{10} = \dfrac{(3d - 2)(2)}{5(2)} + \dfrac{d - 7}{10}$
$= \dfrac{6d - 4 + d - 7}{10}$
$= \dfrac{7d - 11}{10}$

1. $\dfrac{t}{3} + \dfrac{2t}{15} = \dfrac{t(5)}{3(5)} + \dfrac{2t}{15}$
$= \dfrac{5t + 2t}{15}$
$= \dfrac{7t}{15}$

2. $\dfrac{7h}{24} - \dfrac{k}{8} = \dfrac{7h}{24} - \dfrac{k(3)}{8(3)}$
$= \dfrac{7h - 3k}{24}$

3. $\dfrac{5}{16pq} + \dfrac{3}{4q} = \dfrac{5}{16pq} + \dfrac{3(4p)}{4q(4p)}$
$= \dfrac{5 + 12p}{16pq}$

4. $\dfrac{2r}{9} - \dfrac{3r - s}{18} = \dfrac{2r(2)}{9(2)} - \dfrac{3r - s}{18}$
$= \dfrac{4r - 3r + s}{18}$
$= \dfrac{r + s}{18}$

5. $\dfrac{m + 4}{3m^2} - \dfrac{5}{m} = \dfrac{m + 4}{3m^2} - \dfrac{5(3m)}{m(3m)}$
$= \dfrac{m + 4 - 15m}{3m^2}$
$= \dfrac{4 - 14m}{3m^2}$

6. $\dfrac{t}{t^2 - 25} + \dfrac{1}{t + 5} = \dfrac{t}{(t + 5)(t - 5)} + \dfrac{t - 5}{(t + 5)(t - 5)}$
$= \dfrac{t + t - 5}{(t + 5)(t - 5)}$
$= \dfrac{2t - 5}{(t + 5)(t - 5)}$

7. $\dfrac{3}{u - v} - \dfrac{u - 4v}{u^2 - v^2} = \dfrac{3(u + v)}{(u - v)(u + v)} - \dfrac{u - 4v}{(u - v)(u + v)}$
$= \dfrac{3u + 3v - u + 4v}{(u - v)(u + v)}$
$= \dfrac{2u + 7v}{(u - v)(u + v)}$

Hari: ..... Tarikh: .....

C. Permudahkan.
Simplify.

HP6.3(iii) BAND 4

CONTOH

$\dfrac{r + s}{4s} - \dfrac{s - t}{3t} = \dfrac{(r + s)(3t)}{4s(3t)} - \dfrac{(s - t)(4s)}{3t(4s)}$
$= \dfrac{3t(r + s)}{12st} - \dfrac{4s(s - t)}{12st}$
$= \dfrac{3rt + 3st - 4s^2 + 4st}{12st}$
$= \dfrac{3rt + 7st - 4s^2}{12st}$

1. $\dfrac{3m}{5} + \dfrac{n}{2}$
$= \dfrac{3m(2)}{5(2)} + \dfrac{n(5)}{2(5)}$
$= \dfrac{6m + 5n}{10}$

2. $\dfrac{5d}{7e} - \dfrac{2e}{3d}$
$= \dfrac{5d(3d)}{7e(3d)} - \dfrac{2e(7e)}{3d(7e)}$
$= \dfrac{15d^2 - 14e^2}{21de}$

3. $\dfrac{2 - h}{hk} + \dfrac{3}{5h}$
$= \dfrac{(2 - h)(5)}{hk(5)} + \dfrac{3(k)}{5h(k)}$
$= \dfrac{5(2 - h) + 3k}{5hk}$
$= \dfrac{10 - 5h + 3k}{5hk}$

4. $\dfrac{5}{6t^2} - \dfrac{4 - t}{9wt}$
$= \dfrac{5(3w)}{6t^2(3w)} - \dfrac{(4 - t)(2t)}{9wt(2t)}$
$= \dfrac{15w - 2t(4 - t)}{18wt^2}$
$= \dfrac{15w - 8t + 2t^2}{18wt^2}$

5. $\dfrac{a - b}{a + b} + \dfrac{2a}{a - b}$
$= \dfrac{(a - b)(a - b)}{(a + b)(a - b)} + \dfrac{2a(a + b)}{(a - b)(a + b)}$
$= \dfrac{a^2 - ab - ab + b^2}{(a + b)(a - b)} + \dfrac{2a^2 + 2ab}{(a + b)(a - b)}$
$= \dfrac{a^2 - 2ab + b^2 + 2a^2 + 2ab}{(a + b)(a - b)}$
$= \dfrac{3a^2 + b^2}{a^2 - b^2}$

6. $\dfrac{2}{3xy} - \dfrac{3 - y}{xy^2}$
$= \dfrac{2(y)}{3xy(y)} - \dfrac{(3 - y)(3)}{xy^2(3)}$
$= \dfrac{2y - 3(3 - y)}{3xy^2}$
$= \dfrac{2y - 9 + 3y}{3xy^2}$
$= \dfrac{5y - 9}{3xy^2}$

7. $\dfrac{m + n}{2nk} + \dfrac{k - 3m}{6mk}$
$= \dfrac{(m + n)(3m)}{2nk(3m)} + \dfrac{(k - 3m)(n)}{6mk(n)}$
$= \dfrac{3m(m + n) + n(k - 3m)}{6mnk}$
$= \dfrac{3m^2 + 3mn + nk - 3mn}{6mnk}$
$= \dfrac{3m^2 + nk}{6mnk}$

Hari: ..... Tarikh: .....

6.4 Pendaraban dan Pembahagian Pecahan Algebra

A. Cari hasil darab.
Find the product.

HP6.4(i) BAND 4

CONTOH

$\dfrac{2u - 6t}{t + 2u} \times \dfrac{9t^2 + 18ut}{3u - 9t}$
$= \dfrac{2(u - 3t)}{t + 2u} \times \dfrac{9t(t + 2u)}{3(u - 3t)}$
$= 6t$

1. $\dfrac{m}{n} \times \dfrac{3m}{5}$
$= \dfrac{3m^2}{5n}$

2. $\dfrac{4p}{10} \times \dfrac{15r}{12p^2}$
$= \dfrac{r}{2p}$

3. $\dfrac{6x^2}{5w} \times \dfrac{w^2}{9x^3}$
$= \dfrac{2w}{15x}$

4. $\dfrac{3d}{4c - 4d} \times \dfrac{2cd}{c + d}$
$= \dfrac{3d}{4(c - d)} \times \dfrac{2cd}{c + d}$
$= \dfrac{3cd^2}{2(c^2 - d^2)}$

5. $\dfrac{a - b}{k^2 - 2hk} \times \dfrac{2h^2 - hk}{b - a}$
$= \dfrac{a - b}{-k(2h - k)} \times \dfrac{h(2h - k)}{-(a - b)}$
$= \dfrac{h}{k}$

B. Cari hasil bahagi.
Find the quotient.

HP6.4(ii) BAND 4

CONTOH

$\dfrac{4xy}{x - y} \div \dfrac{12y^2}{x^2 - xy}$
$= \dfrac{4xy}{x - y} \times \dfrac{12y^2}{x(x - y)}$
$= \dfrac{4xy}{x - y} \times \dfrac{x(x - y)}{12y^2}$
$= \dfrac{x^2}{3y}$

1. $\dfrac{2}{7s} \div \dfrac{3r}{5}$
$= \dfrac{2}{7s} \times \dfrac{5}{3r}$
$= \dfrac{10}{21rs}$

2. $\dfrac{4d^2}{ef} \div \dfrac{2d}{ef^2}$
$= \dfrac{4d^2}{ef} \times \dfrac{ef^2}{2d}$
$= 2df$

3. $\dfrac{h^3}{9gk^2} \div \dfrac{2h^2}{3k^3}$
$= \dfrac{h^3}{9gk^2} \times \dfrac{3k^3}{2h^2}$
$= \dfrac{hk}{6g}$

4. $\dfrac{1}{(m - n)} \div \dfrac{3}{(5 + n)}$
$= \dfrac{1}{(m - n)} \times \dfrac{(5 + n)}{3}$
$= \dfrac{5 + n}{3(m - n)}$

5. $\dfrac{6r - 2q}{p + 2r} \div \dfrac{3r^2 - qr}{3p + 6r}$
$= \dfrac{2(3r - q)}{p + 2r} \div \dfrac{r(3r - q)}{3(p + 2r)}$
$= \dfrac{2(3r - q)}{p + 2r} \times \dfrac{3(p + 2r)}{r(3r - q)}$
$= \dfrac{6}{r}$

Hari: ..... Tarikh: .....

C. Selesaikan.
Solve.

HP6.4(iii) **BAND 5**

CONTOH

(a) $\frac{3x^2y}{2x^2+6x} \times \frac{x^2+6x+9}{6xy}$

$= \frac{3x^2y}{2x(x+3)} \times \frac{(x+3)(x+3)}{6xy}$

$= \frac{x+3}{4}$

(b) $\frac{a^2+4a+4}{2a-4b} \div \frac{5a+10}{6a-12b}$

$= \frac{(a+2)(a+2)}{2(a-2b)} \div \frac{5(a+2)}{6(a-2b)}$

$= \frac{(a+2)(a+2)}{2(a-2b)} \times \frac{6(a-2b)}{5(a+2)}$

$= \frac{3(a+2)}{5}$

1. $\frac{3m-6}{4+2n} \times \frac{8+4n}{(m-2)^2}$

$= \frac{3(m-2)}{2(2+n)} \times \frac{4(2+n)}{(m-2)(m-2)}$

$= \frac{6}{m-2}$

2. $\frac{h^2-1}{4h^2-k^2} \times \frac{6h+3k}{(h+1)^2}$

$= \frac{(h+1)(h-1)}{(2h+k)(2h-k)} \times \frac{3(2h+k)}{(h+1)(h+1)}$

$= \frac{3(h-1)}{(2h-k)(h+1)}$

3. $\frac{6+8r}{s^2-25} \times \frac{4s+20}{9-16r^2}$

$= \frac{2(3+4r)}{(s+5)(s-5)} \times \frac{4(s+5)}{(3+4r)(3-4r)}$

$= \frac{8}{(s-5)(3-4r)}$

4. $\frac{9e+3f}{e^2-f^2} \div \frac{3e+f}{e+f}$

$= \frac{3(3e+f)}{(e+f)(e-f)} \div \frac{3e+f}{e+f}$

$= \frac{3(3e+f)}{(e+f)(e-f)} \times \frac{e+f}{3e+f}$

$= \frac{3}{e-f}$

5. $\frac{2t^2-18}{12ut-6t^2} \div \frac{(t+3)^2}{2ut-t^2}$

$= \frac{2(t^2-9)}{6t(2u-t)} \div \frac{(t+3)(t+3)}{t(2u-t)}$

$= \frac{2(t+3)(t-3)}{6t(2u-t)} \div \frac{(t+3)(t+3)}{t(2u-t)}$

$= \frac{2(t+3)(t-3)}{6t(2u-t)} \times \frac{t(2u-t)}{(t+3)(t+3)}$

$= \frac{t-3}{3(t+3)}$

6. $\frac{3q-3}{2p^2-8} \div \frac{q^3-q}{4pq+8q}$

$= \frac{3(q-1)}{2(p^2-4)} \div \frac{q(q^2-1)}{4q(p+2)}$

$= \frac{3(q-1)}{2(p+2)(p-2)} \div \frac{q(q+1)(q-1)}{4q(p+2)}$

$= \frac{3(q-1)}{2(p+2)(p-2)} \times \frac{4q(p+2)}{q(q+1)(q-1)}$

$= \frac{6}{(p-2)(q+1)}$

Hari: ..... Tarikh: .....

PRAKTIS PT3

Soalan 1

(a) Tentukan sama ada berikut ialah faktor bagi $3k^2 - 3$ atau bukan. Bulatkan jawapan anda.
Determine whether the following are factors of $3k^2 - 3$. Circle your answer.

[2 markah/2 *marks*]

(i) 3 — (Ya/*Yes*) / Bukan/*No*

(ii) $k + 3$ — Ya/*Yes* / (Bukan/*No*)

(b) (i) Kembangkan: $r(8 + s)$
Expand:

[1 markah/1 *mark*]

$r(8 + s) = 8r + rs$

(ii) Ungkapkan $\frac{1}{4x} - \frac{2x-5}{12x}$ sebagai satu pecahan tunggal dalam bentuk termudah.
Express $\frac{1}{4x} - \frac{2x-5}{12x}$ as a single fraction in its simplest form.

[4 markah/4 *marks*]

$\frac{1}{4x} - \frac{2x-5}{12x} = \frac{3-2x+5}{12x}$

$= \frac{8-2x}{12x}$

$= \frac{2(4-x)}{12x}$

$= \frac{4-x}{6x}$

(c) Permudahkan: $4x^2 - (2x - a)(2x + a)$
Simplify:

[3 markah/3 *marks*]

HEBAT LEMBARAN GANGSA

$4x^2 - (2x - a)(2x + a)$
$= 4x^2 - (4x^2 + 2ax - 2ax - a^2)$
$= 4x^2 - (4x^2 - a^2)$
$= 4x^2 - 4x^2 + a^2$
$= a^2$

Soalan 2

(a) Permudahkan: $\frac{2h}{k^2-1} \times \frac{k^2+2k+1}{6}$
Simplify:

[3 markah/3 *marks*]

HEBAT LEMBARAN PERAK

$\frac{2h}{k^2-1} \times \frac{k^2+2k+1}{6}$

$= \frac{2h}{(k+1)(k-1)} \times \frac{(k+1)(k+1)}{6}$

$= \frac{h(k+1)}{3(k-1)}$

(b) Faktorkan selengkapnya: $7 - 28y^2$
Factorise completely:

[3 markah/3 *marks*]

$7 - 28y^2 = 7(1 - 4y^2)$
$= 7[1^2 - (2y)^2]$
$= 7(1 + 2y)(1 - 2y)$

(c) Ungkapkan $\frac{3}{4n} - \frac{1-\frac{1}{4}x}{nx}$ sebagai satu pecahan tunggal dalam bentuk termudah.

Express $\frac{3}{4n} - \frac{1-\frac{1}{4}x}{nx}$ as a single fraction in its simplest form.

[4 markah/4 *marks*]

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

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

$= \frac{3x-4+x}{4nx}$

$= \frac{4x-4}{4nx}$

$= \frac{4(x-1)}{4nx}$

$= \frac{x-1}{nx}$

Hari: ..... Tarikh: .....

Soalan 3

(a) Padankan setiap yang berikut.
Match each of the following.

[3 markah/3 *marks*]

(i)	$3x - 3y + x^2 - xy$	$(3 + y)(x - y)$
(ii)	$3y - 3x + xy - x^2$	$(3 + x)(x - y)$
(iii)	$3x + xy - 3y - y^2$	$(3 + x)(y - x)$

(b) Faktorkan selengkapnya: $5k^4 - 5$
Factorise completely:

[3 markah/3 *marks*]

$5k^4 - 5$
$= 5(k^4 - 1)$
$= 5(k^2 + 1)(k^2 - 1)$
$= 5(k^2 + 1)(k + 1)(k - 1)$

(c) Ungkapkan $\frac{5}{y} + \frac{3}{y^2-2y}$ sebagai satu pecahan tunggal dalam bentuk termudah.

Express $\frac{5}{y} + \frac{3}{y^2-2y}$ as a single fraction in its simplest form.

[4 markah/4 *marks*]

$\frac{5}{y} + \frac{3}{y^2-2y} = \frac{5}{y} + \frac{3}{y(y-2)}$

$= \frac{5(y-2)+3}{y(y-2)}$

$= \frac{5y-10+3}{y(y-2)}$

$= \frac{5y-7}{y(y-2)}$

Elemen PAK-21 — Fokus KBAT

Elemen PAK-21 — Video Tutorial

FOKUS KBAT

1. **Kemahiran Kognitif:** Mengaplikasi
Konteks: Pemfaktoran Ungkapan Algebra

Diberi $x^2 - y^2 = 45$ dan $x - y = 3$, cari nilai bagi $(x + y)^2$.
Given $x^2 - y^2 = 45$ and $x - y = 3$, find the value of $(x + y)^2$.

[3 markah/ 3 *marks*]

$x^2 - y^2 = 45$
$(x + y)(x - y) = 45$
$(x + y)(3) = 45$
$x + y = 15$
$(x + y)^2 = 15^2$
$= 225$

2. **Kemahiran Kognitif:** Mengaplikasi
Konteks: Pemfaktoran Ungkapan Algebra

Faktorkan selengkapnya:
Factorise completely:

$x^2 - 2xy + y^2 - z^2$

[3 markah/*marks*]

$x^2 - 2xy + y^2 - z^2$
$= (x^2 - 2xy + y^2) - z^2$
$= (x - y)^2 - z^2$
$= [(x - y) + z][(x - y) - z]$
$= (x - y + z)(x - y - z)$

Hari: ..... Tarikh: .....

Elemen PAK-21 — Aktiviti PAK-21

AKTIVITI PAK-21

Aktiviti/*Activity* : *TARSIA Puzzles*

Konteks/*Context* : Ungkapan Algebra III (Pemfaktoran)/ *Algebraic Expressions III (Factorization)*

Objektif/*Objective* : Memfaktorkan ungkapan algebra dan melengkapkan *puzzle*
Factorize algebraic expressions and complete the puzzle

Bahan/*Materials* : Kertas kosong, kertas mahjung, gunting, gam
Blank paper, mahjong paper, scissors, glue

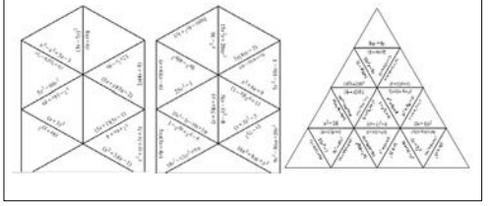
Arahan/*Instruction* : Lakukan secara berkumpulan.
Work in groups.

Prosedur/*Procedure* :
1. Setiap kumpulan diberi cetakan yang mengandungi bentuk segi tiga.
   Each group is given print-out consisting of triangle shapes.
2. Potong semua segi tiga itu.
   Cut out all the triangles.
3. Padankan semua jawapan dengan soalan untuk melengkapkan *puzzle*.
   Match all the answers to the questions to complete the puzzle.
4. Lekatkan *puzzle* yang telah dilengkapkan pada kertas mahjung.
   Paste the completed puzzle on the mahjong paper.

Langkah-langkah menggunakan *Formulator Tarsia*/*Steps to use Formulator Tarsia*

1. Muat turun *Formulator Tarsia*.
   Download Formulator Tarsia.
2. Mulakan applikasi.
   Start the application.
3. Pilih ***Standard Jigsaw → Standard Triangular Jigsaw Puzzle (16 pieces)***
   *Choose **Standard Jigsaw → Standard Triangular Jigsaw Puzzle (16 pieces)***
4. Pilih ***Style → Math***
   *Choose **Style → Math***
5. Pilih **Input**, taipkan soalan1 pada bahagian atas dan jawapannya pada bahagian bawah.
   *Choose **Input**, type the first question on the upper part and its answer on the lower part.*
6. Ulangi langkah 5 untuk soalan 2 hingga 18.
   Repeat step 5 for questions 2 to 18.
7. Untuk mencetak, pilih ***Output*** dan kemudian pilih ***Print***.
   *To print, choose the **Output** and then choose **Print**.*
8. Untuk melihat hasil, pilih ***Solution***.
   *To view the outcome, choose the **Solution**.*

Output **Solution**



Hari: ..... Tarikh: .....

BAB **7**

RUMUS ALGEBRA
ALGEBRAIC FORMULAE

7.1 Pemboleh Ubah dan Pemalar

Tentukan sama ada setiap yang berikut ialah pemboleh ubah atau pemalar. Bulatkan jawapan anda.
Determine whether each of the following is a variable or a constant. Circle your answer. HP7.1(i)

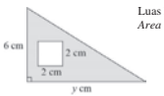
		Pemboleh ubah *Variable*	Pemalar *Constant*
1.	Bilangan bucu sebuah heptagon *The number of vertices of a heptagon*		(Pemalar *Constant*)
2.	Luas permukaan bumi *The surface area of earth*		(Pemalar *Constant*)
3.	Isi padu air yang diminum oleh Nazri dalam sehari *The volume of water consumed by Nazri in a day*	(Pemboleh ubah *Variable*)	

7.2 Rumus

A. Tulis rumus bagi pernyataan berikut.
Write a formula for the statement. HP7.2(i)

1.	Perimeter sebuah segi empat sama dengan sisi $(x + 2)$ cm ialah P cm. *The perimeter of a square with sides $(x + 2)$ cm is P cm.*	$P = 4(x + 2)$
2.	N ialah tiga kali suatu nombor yang kurang 10 daripada y. *N is three times a number which is 10 less than y.*	$N = 3(y - 10)$
3.	Isi padu sebuah kuboid dengan panjang $(t + 2)$ cm, lebar 5 cm dan tinggi t cm ialah I cm^3. *The volume of a cuboid with length $(t + 2)$ cm, width 5 cm and height t cm is I cm^3.*	$I = (t + 2) \times 5 \times t$ $= 5t(t + 2)$

B. Tulis rumus bagi situasi berikut.
Write a formula for the situation. HP7.2(ii)

1.	Jisim Halim ialah n kg. Jisim adiknya 12 kg kurang daripadanya. Jumlah jisim mereka ialah J kg. *Halim's mass is n kg. His brother's mass is 12 kg less than him. Their total mass is J kg.*	$J = n + n - 12$ $= 2n - 12$
2.	 Luas kawasan berlorek ialah L cm^2. *Area of the shaded region is L cm^2.*	$L = (\frac{1}{2} \times y \times 6) - (2 \times 2)$ $= 3y - 4$
3.	Fatimah mempunyai RMh. Dia berbelanja sebanyak RM$(k + 2)$ setiap hari selama seminggu. Baki wangnya ialah RM18. *Fatimah has RMh. She spends RM$(k + 2)$ each day for a week. The balance is RM18.*	$h = 7(k + 2) + 18$ $= 7k + 14 + 18$ $= 7k + 32$

Hari: ..... Tarikh: .....

C. Tandakan (✓) pada perkara rumus yang betul.
Mark (✓) for the correct subject of the formula. HP7.2(ii) **BAND 1**

1.	$s = 9h - k$	h ( )	k ( )	s (✓)
2.	$L = \frac{1}{2}t(a + b)$	t ( )	L (✓)	a ( )
3.	$p = \frac{(m-n)^2}{5}$	p (✓)	m ( )	n ( )

D. Nyatakan sama ada pemboleh ubah berikut ialah perkara rumus atau bukan.
State whether the variable is the subject of the formula. HP7.2(ii) **BAND 1**

	Rumus *Formula*	**Pemboleh ubah** *Variable*	**Ya atau Bukan** *Yes or No*
1.	$Ft = m(v - u)$	F	Bukan
2.	$A = \pi r^2 + \pi rl$	A	Ya
3.	$a^2 = b^2 + 3c^2$	a	Bukan
4.	$k = \sqrt{\frac{h-g}{3}}$	k	Ya
5.	$\sqrt{y} = x^2 + 3z - 2$	y	Bukan
6.	$4R = \sqrt[3]{y + 7}$	R	Bukan
7.	$s = ut + \frac{1}{2}at^2$	s	Ya
8.	$\frac{1}{u} = \frac{1}{w} - \frac{1}{v}$	u	Bukan

Hari: ..... Tarikh: .....

E. Ungkapkan x sebagai perkara rumus.
Express x as the subject of the formula. HP7.2(iii) **BAND 4**

1.	2.	3.	4.
$y = x - 4$ $y + 4 = x$ $x = y + 4$	$3m = x + 7$ $3m - 7 = x$ $x = 3m - 7$	$5r = \frac{x}{s}$ $5r \times s = x$ $x = 5rs$	$w^2 = 8xy$ $\frac{w^2}{8y} = x$ $x = \frac{w^2}{8y}$

F. Ungkapkan y sebagai perkara rumus.
Express y as the subject of the formula. HP7.2(iii) **BAND 4**

1.	2.	3.	4.
$5p = \sqrt{y}$ $(5p)^2 = (\sqrt{y})^2$ $25p^2 = y$ $y = 25p^2$	$\sqrt[3]{y} = 4x$ $(\sqrt[3]{y})^3 = (4x)^3$ $y = 64x^3$	$16w = y^2$ $\sqrt{16w} = \sqrt{y^2}$ $4\sqrt{w} = y$ $y = 4\sqrt{w}$	$\frac{1}{27}t = y^3$ $\sqrt[3]{\frac{1}{27}t} = \sqrt[3]{y^3}$ $\frac{1}{3}(\sqrt{t}) = y$ $y = \frac{\sqrt{t}}{3}$

G. Ungkapkan pemboleh ubah dalam kurungan sebagai perkara rumus.
Express the variable in brackets as the subject of the formula. HP7.2(iii) **BAND 4**

1. $x = 5y - 3z$ [y] $x = 5y - 3z$ $5y - 3z = x$ $5y = x + 3z$ $y = \frac{x+3z}{5}$	2. $p = \frac{5}{3q-7}$ [q] $p = \frac{5}{3q-7}$ $p(3q - 7) = 5$ $3pq - 7p = 5$ $3pq = 5 + 7p$ $q = \frac{5+7p}{3p}$
3. $w = \frac{1}{3}\sqrt{ut}$ [u] $w = \frac{1}{3}\sqrt{ut}$ $\sqrt{ut} = 3w$ $ut = (3w)^2$ $u = \frac{9w^2}{t}$	4. $\frac{h}{k} + \frac{2}{h} = \frac{2}{k}$ [k] $\frac{2}{k} - \frac{h}{k} = \frac{2}{h}$ $\frac{2-h}{k} = \frac{2}{h}$ $2k = h(2 - h)$ $k = \frac{h(2-h)}{2}$

Hari: ..... Tarikh: .....

H. Hitung setiap berikut.
Calculate each of the following. HP7.2(iv)

CONTOH

Diberi $p = 3rs - 8$, cari nilai p apabila $r = \frac{5}{6}$ dan $s = 16$.
Given $p = 3rs - 8$, find the value of p when $r = \frac{5}{6}$ and $s = 16$.

$p = 3\left(\frac{5}{6}\right)(16) - 8$
$= 40 - 8$
$= 32$

1. Diberi $w = \frac{v^2-u}{t}$, cari nilai u apabila $w = 7$, $v = 6$ dan $t = 4$.
Given $w = \frac{v^2-u}{t}$, find the value of u when $w = 7$, $v = 6$ and $t = 4$.

$7 = \frac{(6)^2-u}{4}$
$28 = 36 - u$
$u = 36 - 28$
$= 8$

2. Diberi $x^2 = y^2 - z^2$, cari nilai z apabila $x = -8$ dan $y = 10$.
Given $x^2 = y^2 - z^2$, find the value of z when $x = -8$ and $y = 10$.

$(-8)^2 = 10^2 - z^2$
$64 = 100 - z^2$
$z^2 = 100 - 64$
$z^2 = 36$
$z = \sqrt{36}$
$= 6$

3. Diberi $k = \frac{3(m-2n)^2}{m+2n} + 5n$, cari nilai k apabila $m = 2$ dan $n = 3$.
Given $k = \frac{3(m-2n)^2}{m+2n} + 5n$, find the value of k when $m = 2$ and $n = 3$.

$k = \frac{3[2-2(3)]^2}{2+2(3)} + 5(3)$
$= \frac{3(16)}{8} + 15$
$= 6 + 15$
$= 21$

4. Diberi $a = \sqrt{3b^2 + 2c}$, cari nilai a apabila $b = -5$ dan $c = 3$.
Given $a = \sqrt{3b^2 + 2c}$, find the value of a when $b = -5$ and $c = 3$.

$a = \sqrt{3(-5)^2 + 2(3)}$
$= \sqrt{3(25) + 6}$
$= \sqrt{75 + 6}$
$= \sqrt{81}$
$= 9$

5. Diberi $T = 2g\sqrt[3]{3+h}$, cari nilai h apabila $T = 24$ dan $g = 6$.
Given $T = 2g\sqrt[3]{3+h}$, find the value of h when $T = 24$ and $g = 6$.

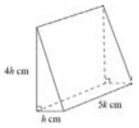
$24 = 2(6)\sqrt[3]{3+h}$
$24 = 12\sqrt[3]{3+h}$
$\sqrt[3]{3+h} = \frac{24}{12}$
$(\sqrt[3]{3+h})^3 = 2^3$
$3 + h = 8$
$h = 8 - 3$
$= 5$

Hari: ..... Tarikh: .....

I. Selesaikan masalah berikut.
Solve the problem.

HP7.2(v) **BAND 5**

1.



Rajah di sebelah menunjukkan sebuah prisma. Diberi isi padu prisma itu ialah I cm^3.
The diagram shows a prism. It is given the volume of the prism is I cm^3.

(a) Ungkapkan I dalam sebutan h dan k.
Express I in the terms of h and k.

(b) Jika $h = 3$ dan $k = 7$, cari nilai I.
If $h = 3$ and $k = 7$, find the value of I.

(a) $I = \frac{1}{2} \times h \times 4h \times 5k$
$= 10h^2k$

(b) $I = 10(3)^2(7)$
$= 10 \times 9 \times 7$
$= 630$

2. Puan Zarina membeli emas yang berharga RMx. Lima tahun kemudian, dia menjual emas itu dengan keuntungan h%.
Puan Zarina bought gold for RMx. Five years later, she sold the gold at a profit of h%.

(a) Jika keuntungannya ialah RM5 400, bina satu rumus bagi h.
If the profit was RM5 400, construct a formula for h.

(b) Jika $h = 30$, cari harga jualan emas itu.
If $h = 30$, find the selling price of the gold.

(a) $\frac{h}{100} \times x = 5\,400$
$h = \frac{540\,000}{x}$

(b) $30 = \frac{540\,000}{x}$
$x = \frac{540\,000}{30}$
$= 18\,000$

Harga jualan emas = RM18 000 + RM5 400
= RM23 400

3. Luas permukaan, L cm^2, sebuah kon yang mempunyai jejari j cm dan tinggi sendeng t cm diberi oleh rumus $L = \pi j(t + j)$.
The surface area, L cm^2, of a cone with a radius of j cm and a slant height of t cm is given by the formula $L = \pi j(t + j)$.

(a) Ungkapkan t dalam sebutan L, π dan j.
Express t in the terms of L, π and j.

(b) Cari nilai t jika $L = 924$, $\pi = \frac{22}{7}$ dan $j = 14$.
Find the value of t if $L = 924$, $\pi = \frac{22}{7}$ and $j = 14$.

(a) $L = \pi j(t + j)$
$\pi j(t + j) = L$
$t + j = \frac{L}{\pi j}$
$t = \frac{L}{\pi j} - j$

(b) $t = \frac{924}{\frac{22}{7} \times 14} - 14$
$= 21 - 14$
$= 7$

Hari: ..... Tarikh: .....

PRAKTIS PT3

Soalan 1

(a) Tulis Betul atau Salah bagi pernyataan yang berikut.
Write True or False for the following statements.

[3 markah/3 *marks*]

(i) Ketinggian Gunung Kinabalu ialah satu pemalar.
The height of Mount Kinabalu is a constant.

Betul

(ii) Hasil tambah sudut peluaran bagi sebuah poligon ialah satu pemboleh ubah.
The sum of exterior angles of a polygon is a variable.

Salah

(iii) Kelajuan sebuah kereta yang bergerak ialah satu pemboleh ubah.
The speed of a moving car is a variable.

Betul

(b) (i) Liza ada RMk. Dia membeli 5 buah buku yang berharga RMx sebuah dan 20 batang pen yang berharga y sen sebatang. Bina satu rumus bagi wang, RMr, yang tinggal pada Liza.
Liza had RMk. She bought 5 books at RMx each and 20 pens at y sen each. Construct a formula for the amount of money, RMr, that Liza still has.

[2 markah/2 *marks*]

$r = k - \left(5x + 20 \times \frac{y}{100}\right)$
$r = k - 5x - 0.2y$

(ii) Diberi $6p - 2(q - p) = 5r + q$, ungkapkan p sebagai perkara rumus.
Given $6p - 2(q - p) = 5r + q$, express p as the subject of the formula.

[2 markah/2 *marks*]

$6p - 2(q - p) = 5r + q$
$6p - 2q + 2p = 5r + q$
$8p = 5r + q + 2q$
$p = \frac{5r + 3q}{8}$

(c) Diberi: $\frac{1}{6}z + y = x$
Given:

(i) Ungkapkan y dalam sebutan x dan z.
Express y in terms of x and z.

[1 markah/1 *mark*]

$\frac{z}{6} + y = x$
$y = x - \frac{z}{6}$

(ii) Hitung nilai y apabila $x = -4$ dan $z = 18$.
Calculate the value of y when $x = -4$ and $z = 18$.

[2 markah/2 *marks*]

$y = -4 - \frac{18}{6}$
$= -4 - 3$
$= -7$

Soalan 2

(a) Tentukan sama ada pemboleh ubah dalam kurungan ialah perkara rumus atau bukan. Bulatkan jawapan anda.
Determine whether the variable in the brackets is the subject of the formula. Circle your answer.

[3 markah/3 *marks*]

(i) $m = \frac{1}{2}x(h + k)$ $[m]$ — Ya/*Yes* / Bukan/*No*

(ii) $5p = a^2 - b^2$ $[p]$ — Ya/*Yes* / Bukan/*No*

(iii) $\sqrt{s} = u^3 - 4t$ $[s]$ — Ya/*Yes* / Bukan/*No*

(b) Diberi: $2m = \frac{5k - kh}{3}$
Given:

(i) Ungkapkan k dalam sebutan h dan m.
Express k in terms of h and m.

[2 markah/2 *marks*]

$2m = \frac{5k - kh}{3}$
$5k - kh = 6m$
$k(5 - h) = 6m$
$k = \frac{6m}{5 - h}$

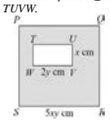
Hari: ..... Tarikh: .....

(ii) Cari nilai k apabila $h = -4$ dan $m = 12$.
Find the value of k when $h = -4$ and $m = 12$.

[2 markah/2 *marks*]

$k = \frac{6m}{5 - h}$
$= \frac{6(12)}{5 - (-4)}$
$= \frac{72}{9}$
$= 8$

(c) Rajah di bawah menunjukkan sebuah segi empat sama $PQRS$ dan sebuah segi empat tepat $TUVW$.
The diagram shows a square $PQRS$ and a rectangle $TUVW$.



(i) Bina satu rumus bagi luas kawasan yang berlorek, G cm^2.
Construct a formula for the area of the shaded region, G cm^2.

[1 markah/1 *mark*]

$G = (5xy)^2 - (2y \times x)$
$= 25x^2y^2 - 2xy$

(ii) Cari nilai G apabila $x = -1$ dan $y = 4$.
Find the value of G when $x = -1$ and $y = 4$.

[2 markah/2 *marks*]

$G = 25(-1)^2(4)^2 - 2(-1)(4)$
$= 25(1)(16) - (-8)$
$= 400 + 8$
$= 408$

Fokus KBAT

Video Tutorial

FOKUS KBAT

Kemahiran Kognitif: Mengaplikasi, Menganalisis
Konteks: Rumus

Di planet P, letupan solar telah mencairkan penutup ais. Lapan tahun selepas ais cair, tumbuhan Y mula tumbuh di atas batu. Tumbuhan itu berbentuk bulatan dan hubungan antara diameter bulatan dan umur tumbuhan diberikan oleh formula: $d = 4 \times \sqrt{(t - 8)}$ bagi $t \geq 8$ dengan keadaan d mewakili diameter dalam mm dan t mewakili bilangan tahun sejak letupan solar.
On planet P, a solar blast has melted the ice caps. Eight years after the ice has melted, plant Y started growing on the rocks. The plant is in the form of a circle and the relationship between the diameter of this circle and the age of the plant is given by the formula: $d = 4 \times \sqrt{(t - 8)}$ for $t \geq 8$ where d represents the diameter in mm and t represents the number of years since the solar blast.

(a) Dengan menggunakan formula yang diberi, hitung diameter tumbuhan Y, 17 tahun selepas letupan solar.
Using the given formula, calculate the diameter of plant Y, 17 years after the solar blast.

(b) Jika radius tumbuhan Y ialah 8 mm, berapa tahunkah letupan solar telah berlaku?
If the radius of plant Y was 8 mm, how many years back did the solar blast occur?

[4 markah/ 4 *marks*]

PISA

(a) $d = 4 \times \sqrt{(t - 8)}$
$= 4 \times \sqrt{17 - 8}$
$= 4 \times \sqrt{9}$
$= 12$ mm

(b) $d = 4 \times \sqrt{(t - 8)}$
$8 \times 2 = 4 \times \sqrt{(t - 8)}$
$4 = \sqrt{(t - 8)}$
$4^2 = \left(\sqrt{(t - 8)}\right)^2$
$16 = t - 8$
$t = 16 + 8$
$t = 24$ tahun

Hari: ..... Tarikh: .....

BAB 8

PEPEJAL GEOMETRI III
SOLID GEOMETRY III
HEBAT MATEMATIK MODUL 2T

Pautan Pantas

8.1 Prisma Tegak dan Silinder Membulat Tegak

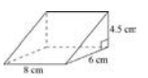
FAKTA UTAMA

Isi padu prisma tegak = Luas tapak × Tinggi
Volume of a right prism = Base area × Height

A. Hitung isi padu prisma berikut.
Calculate the volume of the prism.

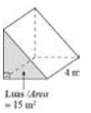
HP8.1(i), (ii) **BAND 3**

CONTOH



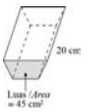
Isi padu $= \left(\frac{1}{2} \times 4.5 \times 6\right) \times 8$
$= 13.5 \times 8$
$= 108$ cm^3

1.



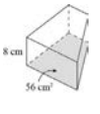
Isi padu $= 15 \times 4$
$= 60$ m^3

2.



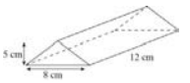
Isi padu $= 45 \times 20$
$= 900$ cm^3

3.



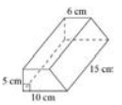
Isi padu $= 56 \times 8$
$= 448$ cm^3

4.



Isi padu $= \left(\frac{1}{2} \times 8 \times 5\right) \times 12$
$= 240$ cm^3

5.



Isi padu $= \left[\frac{1}{2} \times (6 + 10) \times 5\right] \times 15$
$= 40 \times 15$
$= 600$ cm^3

Hari: ..... Tarikh: .....

B. Hitung tinggi prisma berdasarkan isi padu dan luas tapak yang diberikan.
Calculate the height of the prism based on the given volume and base area. **HP**8.1(iii)

CONTOH

Isi padu/*Volume* = 1 800 cm^3
Luas tapak/*Base area* = 225 cm^2

$\text{Tinggi} = \dfrac{\text{Isi padu}}{\text{Luas tapak}}$
$= \dfrac{1\,800}{225}$
$= 8 \text{ cm}$

1. Isi padu/*Volume* = 1 000 cm^3
Luas tapak/*Base area* = 80 cm^2

$\text{Tinggi} = \dfrac{\text{Isi padu}}{\text{Luas tapak}}$
$= \dfrac{1\,000}{80}$
$= 12.5 \text{ cm}$

2. Isi padu/*Volume* = 2.05 m^3
Luas tapak/*Base area* = 1.25 m^2

$\text{Tinggi} = \dfrac{\text{Isi padu}}{\text{Luas tapak}}$
$= \dfrac{2.05}{1.25}$
$= 1.64 \text{ m}$

3. Isi padu/*Volume* = 2 700 cm^3
Luas tapak/*Base area* = 250 cm^2

$\text{Tinggi} = \dfrac{\text{Isi padu}}{\text{Luas tapak}}$
$= \dfrac{2\,700}{250}$
$= 10.8 \text{ cm}$

C. Hitung luas tapak prisma berdasarkan isi padu dan tinggi yang diberikan.
Calculate the base area of the prism based on the given volume and height. **HP**8.1(iv)

CONTOH

Isi padu/*Volume* = 3 360 cm^3
Tinggi/*Height* = 12.8 cm

$\text{Luas tapak} = \dfrac{\text{Isi padu}}{\text{Tinggi}}$
$= \dfrac{3\,360}{12.8}$
$= 262.5 \text{ cm}^2$

1. Isi padu/*Volume* = 8.1 m^3
Tinggi/*Height* = 0.9 m

$\text{Luas tapak} = \dfrac{8.1}{0.9}$
$= 9 \text{ m}^2$

2. Isi padu/*Volume* = 864 cm^3
Tinggi/*Height* = 16 cm

$\text{Luas tapak} = \dfrac{864}{16}$
$= 54 \text{ cm}^2$

3. Isi padu/*Volume* = 6.54 m^3
Tinggi/*Height* = 0.5 m

$\text{Luas tapak} = \dfrac{6.54}{0.5}$
$= 13.08 \text{ m}^2$

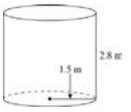
Hari: ..... Tarikh: .....

FAKTA UTAMA

Isi padu silinder membulat tegak = Luas tapak × Tinggi $I = \pi j^2 t$
Volume of a right circular cylinder = Base area × Height $V = \pi r^2 h$

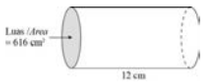
D. Hitung isi padu silinder berikut.
Calculate the volume of the cylinder. [Guna / *Use* $\pi = \frac{22}{7}$] **HP**8.1(v) **BAND 3**

CONTOH



Isi padu $= \left(\frac{22}{7} \times 1.5 \times 1.5\right) \times 2.8$
$= 19.8 \text{ m}^3$

1.



Isi padu $= 616 \times 12$
$= 7\,392 \text{ cm}^3$

2.

Isi padu $= 264 \times 8.5$
$= 2\,244 \text{ cm}^3$

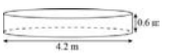
3.

Isi padu $= \left(\frac{22}{7} \times 14 \times 14\right) \times 80$
$= 49\,280 \text{ mm}^3$

4.

Isi padu $= \left(\frac{22}{7} \times 2.8 \times 2.8\right) \times 12$
$= 295.68 \text{ cm}^3$

5.



Isi padu $= \left(\frac{22}{7} \times 2.1 \times 2.1\right) \times 0.6$
$= 8.316 \text{ m}^3$

Hari: ..... Tarikh: .....

E. Cari tinggi silinder berdasarkan isi padu dan jejari yang diberikan.
Find the height of the cylinder based on the given volume and radius. [Guna / *Use* $\pi = \frac{22}{7}$] **HP**8.1(vi)

1. Isi padu/*Volume* = 770 cm^3
Jejari/*Radius* = 5 cm

$\frac{22}{7} \times 5^2 \times t = 770$
$\frac{550t}{7} = 770$
$t = \frac{770 \times 7}{550}$
$= 9.8 \text{ cm}$

2. Isi padu/*Volume* = 1 078 cm^3
Jejari/*Radius* = 7 cm

$\frac{22}{7} \times 7^2 \times t = 1\,078$
$154t = 1\,078$
$t = \frac{1\,078}{154}$
$= 7 \text{ cm}$

3. Isi padu/*Volume* = 847 cm^3
Jejari/*Radius* = 3.5 cm

$\frac{22}{7} \times 3.5^2 \times t = 847$
$38.5t = 847$
$t = \frac{847}{38.5}$
$= 22 \text{ cm}$

F. Cari jejari silinder berdasarkan isi padu dan tinggi yang diberikan.
Find the radius of the cylinder based on the given volume and height. [Guna / *Use* $\pi = \frac{22}{7}$] **HP**8.1(vii)

1. Isi padu/*Volume* = 2 310 cm^3
Tinggi/*Height* = 15 cm

$\frac{22}{7} \times j^2 \times 15 = 2\,310$
$\frac{330}{7} j^2 = 2\,310$
$j^2 = \frac{2\,310 \times 7}{330}$
$j = \sqrt{49}$
$= 7 \text{ cm}$

2. Isi padu/*Volume* = 6 600 mm^3
Tinggi/*Height* = 21 mm

$\frac{22}{7} \times j^2 \times 21 = 6\,600$
$66 j^2 = 6\,600$
$j^2 = 100$
$j = \sqrt{100}$
$= 10 \text{ mm}$

3. Isi padu/*Volume* = 237.6 cm^3
Tinggi/*Height* = 8.4 cm

$\frac{22}{7} \times j^2 \times 8.4 = 237.6$
$26.4 j^2 = 237.6$
$j^2 = 9$
$j = \sqrt{9}$
$= 3 \text{ cm}$

FAKTA UTAMA

① 1 cm^3 = 1 000 mm^3 ② 1 m^3 = 1 000 000 cm^3 ③ 1 ℓ = 1 000 mℓ = 1 000 cm^3

G. Tukarkan isi padu berikut kepada unit yang diberikan dalam kurungan.
Convert the volume to the given units in the brackets. **HP**8.1(viii)

1. 8.3 cm^3 [mm^3]

1 cm^3 = 1 000 mm^3
8.3 cm^3 = (8.3 × 1 000) mm^3
$= 8\,300 \text{ mm}^3$

2. 3 650 000 cm^3 [m^3]

1 000 000 cm^3 = 1 m^3
3 650 000 cm^3
= (3 650 000 ÷ 1 000 000) m^3
$= 3.65 \text{ m}^3$

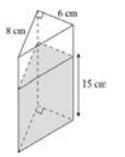
3. 47 800 mℓ [ℓ]

1 000 mℓ = 1 ℓ
47 800 mℓ
= (47 800 ÷ 1 000) ℓ
$= 47.8 \ell$

Hari: ..... Tarikh: .....

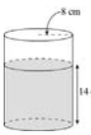
H. Hitung isi padu cecair.
Calculate the volume of the liquid. [Guna / *Use* $\pi = \frac{22}{7}$] **HP**8.1(ix)

CONTOH



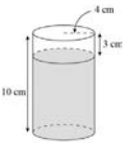
Isi padu cecair $= \frac{1}{2} \times 8 \times 6 \times 15$
$= 360 \text{ cm}^3$

1.



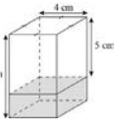
Isi padu cecair $= \frac{22}{7} \times 8^2 \times 14$
$= 2\,816 \text{ cm}^3$

2.



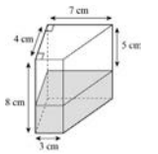
Isi padu cecair $= \frac{22}{7} \times 4^2 \times 7$
$= 352 \text{ cm}^3$

3.



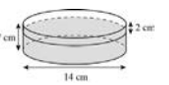
Isi padu cecair $= 4 \times 4 \times 2$
$= 32 \text{ cm}^3$

4.



Isi padu cecair $= \frac{1}{2} \times (7 + 3) \times 4 \times 3$
$= 60 \text{ cm}^3$

5.



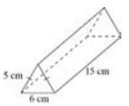
Isi padu cecair $= \frac{22}{7} \times 7^2 \times 5$
$= 770 \text{ cm}^3$

Hari: ..... Tarikh: .....

I. Selesaikan masalah berikut.
Solve the problem.

HP8.1(x)

1.

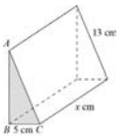


Rajah di sebelah menunjukkan sebuah prisma tepat yang mempunyai segi tiga sama kaki sebagai keratan rentas seragamnya. Cari isi padu, dalam cm^3, prisma itu.
The diagram shows a right prism with an isosceles triangle as its uniform cross section. Find the volume, in cm^3, of the prism.

Tinggi segi tiga $= \sqrt{5^2 - 3^2}$
$= \sqrt{25 - 9}$
$= \sqrt{16}$
$= 4$ cm

Isi padu $= \left(\frac{1}{2} \times 6 \times 4\right) \times 15$
$= 180\ cm^3$

2.



Rajah di sebelah menunjukkan sebuah prisma tegak dengan segi tiga bersudut tegak *ABC* sebagai keratan rentas seragamnya. Jika isi padunya ialah 540 cm^3, cari nilai *x*.
The diagram shows a right prism with right-angled triangle ABC as its uniform cross section. If the volume is 540 cm^3, find the value of x.

$AB^2 = 13^2 - 5^2$
$= 144$
$AB = 12$ cm

$\left(\frac{1}{2} \times 5 \times 12\right) \times x = 540$
$30x = 540$
$x = 18$

3. Kapasiti sebuah bekas yang berbentuk silinder ialah 1 760 cm^3. Jika tingginya ialah 35 cm, cari jejari tapaknya.
The capacity of a cylindrical container is 1 760 cm^3. If its height is 35 cm, find the radius of its base.

$\left[\text{Guna / } Use\ \pi = \frac{22}{7}\right]$

$\frac{22}{7} \times j^2 \times 35 = 1\,760$
$110\,j^2 = 1\,760$
$j^2 = 16$
$j = 4$ cm

Hari: ..... Tarikh: .....

FAKTA UTAMA

Isi padu piramid tegak $= \frac{1}{3} \times$ Luas tapak $\times$ Tinggi

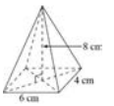
Volume of a right pyramid $= \frac{1}{3} \times$ *Base area* $\times$ *Height*

8.2 Piramid Tegak dan Kon Membulat Tegak

A. Hitung isi padu piramid yang berikut.
Calculate the volume of the pyramid.

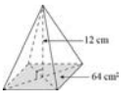
HP8.2(i), (ii) **BAND 3**

CONTOH



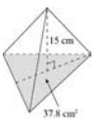
Isi padu $= \frac{1}{3} \times (6 \times 4) \times 8$
$= 64\ cm^3$

1.



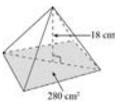
Isi padu $= \frac{1}{3} \times 64 \times 12$
$= 256\ cm^3$

2.



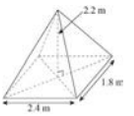
Isi padu $= \frac{1}{3} \times 37.8 \times 15$
$= 189\ cm^3$

3.



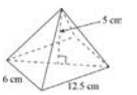
Isi padu $= \frac{1}{3} \times 280 \times 18$
$= 1\,680\ cm^3$

4.



Isi padu $= \frac{1}{3} \times 1.8 \times 2.4 \times 2.2$
$= 3.168\ m^3$

5.



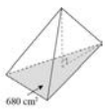
Isi padu $= \frac{1}{3} \times 6 \times 12.5 \times 5$
$= 125\ cm^3$

Hari: ..... Tarikh: .....

B. Cari tinggi bagi pyramid berikut.
Find the height of the pyramid.

HP8.2(iii)

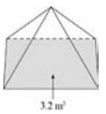
1.



Isi padu/*Volume*
$= 2\,040\ cm^3$

$\frac{1}{3} \times 680 \times t = 2\,040$
$t = 2\,040 \times \frac{3}{680}$
$= 9$ cm

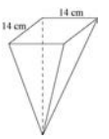
2.



Isi padu/*Volume*
$= 2.56\ m^3$

$\frac{1}{3} \times 3.2 \times t = 2.56$
$t = 2.56 \times \frac{3}{3.2}$
$= 2.4$ m

3.



Isi padu/*Volume*
$= 980\ cm^3$

$\frac{1}{3} \times 14 \times 14 \times t = 980$
$\frac{1}{3} \times 196 \times t = 980$
$t = 980 \times \frac{3}{196}$
$= 15$ cm

C. Cari luas tapak, *L*, piramid berdasarkan isi padu dan tinggi yang diberikan.
Find the base area, L, of the pyramid based on the given volume and height.

HP8.2(iv)

CONTOH

Isi padu/*Volume* $= 480\ cm^3$
Tinggi/*Height* $= 3.6$ cm

$\frac{1}{3} \times L \times 3.6 = 480$
$1.2L = 480$
$L = 400\ cm^2$

1. Isi padu/*Volume* $= 2\,400\ cm^3$
Tinggi/*Height* $= 18$ cm

$\frac{1}{3} \times L \times 18 = 2\,400$
$6L = 2\,400$
$L = 400\ cm^2$

2. Isi padu/*Volume* $= 5.12\ m^3$
Tinggi/*Height* $= 1.2$ m

$\frac{1}{3} \times L \times 1.2 = 5.12$
$0.4L = 5.12$
$L = 12.8\ m^2$

3. Isi padu/*Volume* $= 2\,800\ cm^3$
Tinggi/*Height* $= 24$ cm

$\frac{1}{3} \times L \times 24 = 2\,800$
$8L = 2\,800$
$L = 350\ cm^2$

Hari: ..... Tarikh: .....

FAKTA UTAMA

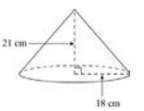
Isi padu kon membulat tegak $= \frac{1}{3} \times$ Luas tapak $\times$ Tinggi $\quad I = \frac{1}{3}\pi j^2 t$

Volume of a right circular cone $= \frac{1}{3} \times$ *Base area* $\times$ *Height* $\quad V = \frac{1}{3}\pi r^2 h$

D. Hitung isi padu kon berikut.
Calculate the volume of the cone. $\left[\text{Guna / } Use\ \pi = \frac{22}{7}\right]$

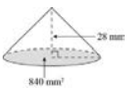
HP8.2(v) **BAND 3**

CONTOH



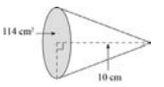
Isi padu $= \frac{1}{3} \times \frac{22}{7} \times 18 \times 18 \times 21$
$= 7\,128\ cm^3$

1.



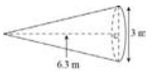
Isi padu $= \frac{1}{3} \times 840 \times 28$
$= 7\,840\ mm^3$

2.



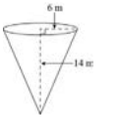
Isi padu $= \frac{1}{3} \times 114 \times 10$
$= 380\ cm^3$

3.



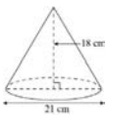
Isi padu $= \frac{1}{3} \times \frac{22}{7} \times \frac{3}{2} \times \frac{3}{2} \times 6.3$
$= 14.85\ m^3$

4.



Isi padu $= \frac{1}{3} \times \frac{22}{7} \times 6 \times 6 \times 14$
$= 528\ m^3$

5.

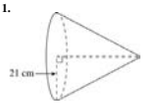


Isi padu $= \frac{1}{3} \times \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times 18$
$= 2\,079\ cm^3$

Hari: ..... Tarikh: .....

E. Cari tinggi kon berikut.
Find the height of the cone. [Guna / *Use* $\pi = \frac{22}{7}$] HP8.2(vii)

1.



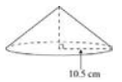
Isi padu/*Volume* = 1 848 cm^3

$1\,848 = \frac{1}{3} \times \frac{22}{7} \times 21 \times 21 \times t$

$t = \frac{1\,848 \times 3 \times 7}{22 \times 21 \times 21}$

$= 4$ cm

2.



Isi padu/*Volume* = 924 cm^3

$924 = \frac{1}{3} \times \frac{22}{7} \times 10.5 \times 10.5 \times t$

$t = \frac{924 \times 3 \times 7}{22 \times 10.5 \times 10.5}$

$= 8$ cm

3.

Isi padu/*Volume* = 77 cm^3

$77 = \frac{1}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times t$

$t = \frac{77 \times 3 \times 7 \times 2 \times 2}{22 \times 7 \times 7}$

$= 6$ cm

F. Cari jejari kon berdasarkan isi padu dan tinggi yang diberikan.
Find the radius of the cone based on the given volume and height. [Guna / *Use* $\pi = \frac{22}{7}$] HP8.2(vii)

CONTOH

Isi padu/*Volume* = 346.5 cm^3
Tinggi/*Height* = 27 cm

$346.5 = \frac{1}{3} \times \frac{22}{7} \times j^2 \times 27$

$j^2 = \frac{346.5 \times 3 \times 7}{22 \times 27}$

$= 12.25$

$j = \sqrt{12.25}$

$= 3.5$ cm

1. Isi padu/*Volume* = 924 cm^3
Tinggi/*Height* = 18 cm

$924 = \frac{1}{3} \times \frac{22}{7} \times j^2 \times 18$

$j^2 = \frac{924 \times 3 \times 7}{22 \times 18}$

$= 49$

$j = \sqrt{49}$

$= 7$ cm

2. Isi padu/*Volume* = 115.5 cm^3
Tinggi/*Height* = 9 cm

$115.5 = \frac{1}{3} \times \frac{22}{7} \times j^2 \times 9$

$j^2 = \frac{115.5 \times 3 \times 7}{22 \times 9}$

$= 12.25$

$j = \sqrt{12.25}$

$= 3.5$ cm

3. Isi padu/*Volume* = 528 cm^3
Tinggi/*Height* = 14 cm

$528 = \frac{1}{3} \times \frac{22}{7} \times j^2 \times 14$

$j^2 = \frac{528 \times 3 \times 7}{22 \times 14}$

$= 36$

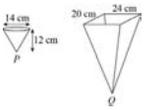
$j = \sqrt{36}$

$= 6$ cm

Hari: ..... Tarikh: .....

G. Selesaikan masalah berikut.
Solve the problem. HP8.2(viii)

1.



Rajah di sebelah menunjukkan dua buah bekas. Isi padu bekas *Q* ialah 16 kali isi padu bekas *P*. Cari tinggi bekas *Q*.
The diagram shows two containers. The volume of container Q is 16 times the volume of container P. Find the height of container Q.
[Guna / *Use* $\pi = \frac{22}{7}$]

Andaikan tinggi bekas *Q* ialah *t*.

Isi padu bekas $P = \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 12$

$= 616$ cm^3

Isi padu bekas $Q = \frac{1}{3} \times 24 \times 20 \times t$

$= 160t$ cm^3

$160t = 16 \times 616$

$t = 61.6$ cm

2. Sebuah kon membulat tegak mempunyai isi padu 1 875π cm^3 dan tingginya ialah 25 cm. Hitung jejarinya.
A right circular cone has a volume of 1 875π cm^3 and a height of 25 cm. Calculate its radius.

$\frac{1}{3} \times \pi \times j^2 \times 25 = 1\,875\pi$

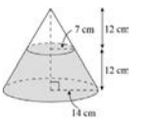
$j^2 = \frac{1\,875\pi \times 3}{\pi \times 25}$

$= 225$

$j = \sqrt{225}$

$= 15$ cm

3.



Rajah di sebelah menunjukkan sebuah pepejal berbentuk kon. Bahagian atas dengan tinggi 12 cm dikeluarkan. Cari isi padu pepejal yang tinggal.
The diagram shows a solid in the shape of a cone. The top section with a height of 12 cm is removed. Find the volume of the remaining solid.
[Guna / *Use* $\pi = \frac{22}{7}$]

Isi padu pepejal yang tinggal

$= \left(\frac{1}{3} \times \frac{22}{7} \times 14 \times 14 \times 24\right) - \left(\frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 12\right)$

$= 4\,928 - 616$

$= 4\,312$ cm^3

Hari: ..... Tarikh: .....

8.3 Sfera

FAKTA UTAMA

Isi padu sfera = $\frac{4}{3} \times \pi \times$ jejari^3 $\quad I = \frac{4}{3}\pi j^2$

Volume of a sphere = $\frac{4}{3} \times \pi \times radius^3$ $\quad V = \frac{4}{3}\pi r^2$

A. Hitung isi padu bagi sfera atau hemisfera berikut.
Calculate the volume of the sphere or the hemisphere. [Guna / *Use* $\pi = \frac{22}{7}$] HP8.3(i) **BAND 3**

CONTOH

Isi padu

$= \frac{4}{3} \times \frac{22}{7} \times 10.5 \times 10.5 \times 10.5$

$= 4\,851$ cm^3

1.

Isi padu $= \frac{4}{3} \times \frac{22}{7} \times 4.2 \times 4.2 \times 4.2$

$= 310.464$ cm^3

2.

Isi padu $= \frac{2}{3} \times \frac{22}{7} \times 2.1 \times 2.1 \times 2.1$

$= 19.404$ cm^3

3.

Isi padu $= \frac{2}{3} \times \frac{22}{7} \times 7 \times 7 \times 7$

$= 718.67$ cm^3

B. Cari jejari sfera atau hemisfera berdasarkan isi padu yang diberikan.
Find the radius of a sphere or hemisphere based on the given volume. [Guna / *Use* $\pi = \frac{22}{7}$]

HP8.3(ii) **BAND 3**

1. Isi padu sfera
Volume of a sphere
$= 268\frac{4}{21}$ cm^3

$\frac{4}{3} \times \frac{22}{7} \times j^3 = 268\frac{4}{21}$

$\frac{88}{21} j^3 = \frac{5\,632}{21}$

$j^3 = \frac{5\,632}{88}$

$= 64$

$j = \sqrt{64}$

$= 4$ cm

2. Isi padu sfera
Volume of a sphere
$= 33\frac{11}{21}$ cm^3

$\frac{4}{3} \times \frac{22}{7} \times j^3 = 33\frac{11}{21}$

$\frac{88}{21} j^3 = \frac{704}{21}$

$j^3 = \frac{704}{88}$

$= 8$

$j = \sqrt[3]{8}$

$= 2$ cm

3. Isi padu hemisfera
Volume of a hemisphere
$= 56\frac{4}{7}$ cm^3

$\frac{2}{3} \times \frac{22}{7} \times j^3 = 56\frac{4}{7}$

$\frac{44}{21} j^3 = \frac{396}{7}$

$j^3 = 27$

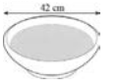
$j = \sqrt{27}$

$= 3$ cm

Hari: ..... Tarikh: .....

C. Selesaikan masalah berikut.
Solve the problem. HP8.3(iii)

1. Rajah di bawah menunjukkan sebiji mangkuk berbentuk hemisfera yang dipenuhi air.
The diagram shows a hemispherical bowl filled with water.



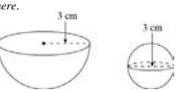
Air di dalam mangkuk itu dituang secara sama banyak ke dalam 100 biji botol. Cari isi padu air di dalam setiap botol.
The water in the bowl is poured equally into 100 bottles. Find the volume of water in each bottle.
[Guna / *Use* $\pi = \frac{22}{7}$]

Isi padu air di dalam setiap botol

$= \left(\frac{2}{3} \times \frac{22}{7} \times 21 \times 21 \times 21\right) \div 100$

$= 194.04$ cm^3

2. Rajah di bawah menunjukkan sebuah hemisfera dan sebuah sfera.
The diagram shows a hemisphere and a sphere.



Hitung jumlah isi padu bagi dua buah pepejal itu dalam sebutan π.
Calculate the total volume of the two solids in terms of π.

Jumlah isi padu

$= \left(\frac{2}{3} \times \pi \times 3 \times 3 \times 3\right) + \left(\frac{4}{3} \times \pi \times \frac{3}{2} \times \frac{3}{2} \times \frac{3}{2}\right)$

$= 18\pi + 4\frac{1}{2}\pi$

$= 22\frac{1}{2}\pi$ cm^3

3. Jejari sebiji mangkuk yang berbentuk hemisfera ialah 3.5 cm. Cari isi padu sup di dalam mangkuk itu jika tiga per empat daripada mangkuk itu dipenuhi sup.
The radius of a bowl in the shape of a hemisphere is 3.5 cm. Find the volume of the soup in it if it is three quarters full.
[Guna / *Use* $\pi = \frac{22}{7}$]

Isi padu sup $= \frac{3}{4} \times \frac{2}{3} \times \frac{22}{7} \times 3.5^3$

$= 67.375$ cm^3

4. Sebiji bebola logam berjejari 6 cm dicairkan untuk membentuk beberapa bebola kecil yang berjejari 1.5 cm. Cari bilangan bebola kecil yang dapat dibentuk.
A metal ball with a radius of 6 cm is melted to form some small balls each with a radius of 1.5 cm. Find the number of small balls that can be formed.

Bilangan bebola kecil yang dapat dibentuk

$= \frac{\text{Isi padu bebola besar}}{\text{Isi padu bebola kecil}}$

$= \frac{\frac{4}{3} \times \pi \times 6 \times 6 \times 6}{\frac{4}{3} \times \pi \times 1.5 \times 1.5 \times 1.5}$

$= 64$

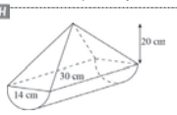
Hari: ..... Tarikh: .....

8.4 Pepejal Gubahan

A. Hitung isi padu pepejal gubahan berikut.
Calculate the volume of the composite solid. [Guna / *Use* $\pi = \frac{22}{7}$]

HP8.4(i) **BAND 4**

CONTOH



Isi padu piramid = $\frac{1}{3} \times 30 \times 14 \times 20$
= 2 800 cm^3

Isi padu separuh silinder
= $\frac{1}{2} \times \frac{22}{7} \times 7 \times 7 \times 30$
= 2 310 cm^3

Isi padu pepejal gubahan
= 2 800 + 2 310
= 5 110 cm^3

1.

Isi padu hemisfera = $\frac{2}{3}\pi j^3$
= $\frac{2}{3} \times \frac{22}{7} \times (10.5)^3$
= 2 425.5 cm^3

Isi padu silinder = $\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 15$
= 577.5 cm^3

Isi padu pepejal gubahan
= 2 425.5 + 577.5
= 3 003 cm^3

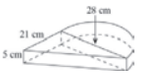
2.

Isi padu separuh silinder
= $\frac{1}{2} \times \frac{22}{7} \times 7 \times 7 \times 20$
= 1 540 cm^3

Isi padu kuboid
= 5 × 14 × 20
= 1 400 cm^3

Isi padu pepejal gubahan
= 1 540 + 1 400
= 2 940 cm^3

3.



Isi padu separuh silinder
= $\frac{1}{2} \times \frac{22}{7} \times 14 \times 14 \times 5$
= 1 540 cm^3

Isi padu prisma
= $\frac{1}{2} \times 21 \times 28 \times 5$
= 1 470 cm^3

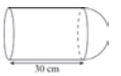
Isi padu pepejal gubahan
= 1 540 + 1 470
= 3 010 cm^3

Hari: ..... Tarikh: .....

B. Selesaikan masalah berikut.
Solve the problem.

HP8.4(ii)

1.



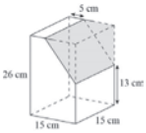
Rajah di sebelah menunjukkan sebuah pepejal gubahan yang terdiri daripada sebuah silinder dan sebuah hemisfera. Diberi isi padu silinder ialah 10 395 cm^3.
The diagram shows a composite solid consists of a cylinder and a hemisphere. Given the volume of the cylinder is 10 395 cm^3.
(a) Cari jejari, dalam cm, silinder itu.
Find the radius, in cm, of the cylinder.
(b) Hitung jumlah isi padu, dalam cm^3, pepejal itu.
Calculate the total volume, in cm^3, of the solid.
[Guna / *Use* $\pi = \frac{22}{7}$]

(a) Isi padu silinder = 10 395 cm^3
$\frac{22}{7} \times j^2 \times 30 = 10\,395$
$j^2 = 110.25$
$j = 10.5$ cm

(b) Isi padu hemisfera = $\frac{2}{3} \times \frac{22}{7} \times 10.5 \times 10.5 \times 10.5$
= 2 425.5 cm^3

Jumlah isi padu pepejal = 10 395 + 2 425.5
= 12 820.5 cm^3

2.



Sebuah prisma yang mempunyai tapak berbentuk segi tiga telah dikeluarkan daripada sebuah bongkah kayu seperti yang ditunjukkan dalam rajah di sebelah. Cari isi padu, dalam cm^3, bongkah kayu yang tinggal.
A triangular prism is removed from a rectangular wooden block as shown in the diagram. Find the volume, in cm^3, of the remaining wooden block.

Isi padu kuboid = 15 × 15 × 26
= 5 850 cm^3

Isi padu prisma segi tiga = $\left(\frac{1}{2} \times 10 \times 13\right) \times 15$
= 65 × 15
= 975 cm^3

Isi padu bongkah kayu yang tinggal
= 5 850 − 975
= 4 875 cm^3

Hari: ..... Tarikh: .....

PRAKTIS PT3

Soalan 1

(a) Rajah di bawah menunjukkan sebuah kon membulat tegak. Isi padu kon itu ialah 1 500π cm^3.
The diagram shows a right circular cone. The volume of the cone is 1 500π cm^3.

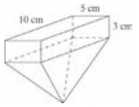
Cari jejari, dalam cm, kon itu.
Find the radius, in cm, of the cone.
[3 markah/3 *marks*]
HEBAT LEMBARAN GANGSA

$\frac{1}{3} \times \pi \times j^2 \times 5 = 1\,500\pi$
$\frac{5}{3} \times j^2 = 1\,500$
$j^2 = 1\,500 \times \frac{3}{5}$
$= 900$
$j = 30$ cm

(b) Isi padu sebiji bola ialah $113\frac{1}{7}$ cm^3. Cari jejari, dalam cm, bola itu.
The volume of a ball is $113\frac{1}{7}$ cm^3. Find the radius, in cm, of the ball.
[Guna / *Use* $\pi = \frac{22}{7}$]
[3 markah/3 *marks*]

$\frac{4}{3} \times \frac{22}{7} \times j^3 = 113\frac{1}{7}$
$\frac{88}{21} \times j^3 = \frac{792}{7}$
$j^3 = \frac{792}{7} \times \frac{21}{88}$
$= 27$
$j = 3$ cm

(c) Rajah di bawah menunjukkan sebuah pepejal gubahan yang terdiri daripada sebuah kuboid dan sebuah piramid. Tinggi piramid itu ialah 15 cm.
The diagram shows a composite solid consisting of a cuboid and a pyramid. The height of the pyramid is 15 cm.



Hitung isi padu, dalam cm^3, pepejal gubahan itu.
Calculate the volume, in cm^3, of the composite solid.
[4 markah/4 *marks*]

$10 \times 5 \times 3 + \frac{1}{3} \times 10 \times 5 \times 15$
$= 150 + 250$
$= 400$ cm^3

Soalan 2

(a) Namakan pepejal *P*, *Q* dan *R* dengan ciri-ciri berikut.
Name the solids P, Q and R with the following characteristics.

P	Mempunyai 2 muka dan 1 tepi. *Has 2 faces and 1 edge.*
Q	Mempunyai 3 muka dan 2 tepi. *Has 3 faces and 2 edges.*
R	Mempunyai 5 muka dan 8 tepi. *Has 5 faces and 8 edges.*

[3 markah/3 *marks*]

(i) *P* : Kon/*Cone*
(ii) *Q* : Silinder/*Cylinder*
(iii) *R* : Piramid/*Pyramid*

Hari: ..... Tarikh: .....

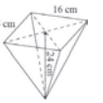
Fokus KBAT (Bentuk 1/Form 1)
Video Tutorial (Bentuk 1/Form 1)

(b) Rajah di bawah menunjukkan sebuah kon membulat tegak. Isi padu kon itu ialah 77 cm^3.
The diagram shows a right circular cone. The volume of the cone is 77 cm^3.

Cari tinggi, dalam cm, kon itu.
Find the height, in cm, of the cone.
[Guna / *Use* $\pi = \frac{22}{7}$]
[3 markah/3 *marks*]
HEBAT LEMBARAN GANGSA

$\frac{1}{3} \times \frac{22}{7} \times 3.5^2 \times t = 77$
$\frac{269.5}{21} \times t = 77$
$t = 77 \times \frac{21}{269.5}$
$= 6$ cm

(c) Rajah di bawah menunjukkan sebuah bekas berbentuk piramid tegak. Bekas itu digunakan untuk mengisi air ke dalam sebuah baldi yang berisi padu 8 500 cm^3.
The diagram shows a container in the shape of a right pyramid. The container is used to fill up a pail of the volume of 8 500 cm^3 with water.



Cari bilangan kali yang minimum bekas itu perlu digunakan untuk mengisi baldi itu sehingga penuh dengan air.
Find the minimum number of times the container has to be used in order to fill the pail fully with water.
[4 markah/4 *marks*]

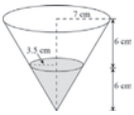
Isi padu bekas = $\frac{1}{3} \times 16 \times 15 \times 24 = 1\,920$

Bilangan kali bekas digunakan
= 8 500 ÷ 1 920 = 4.427

Maka, bilangan kali yang minimum bekas itu digunakan = 5

FOKUS KBAT

Kemahiran Kognitif: Mengaplikasi, Menganalisis
Konteks: Isi padu kon



Rajah di sebelah menunjukkan sebuah bekas dalam bentuk kon dengan air di dalamnya. Hitung isi padu, dalam cm^3, air yang perlu ditambahkan untuk memenuhi bekas itu.
The diagram shows a container in the shape of a cone with water in it. Calculate the volume, in cm^3, of water needed to fill up the container completely.
[4 markah/4 *marks*]
HEBAT LEMBARAN EMAS

Isi padu kon = $\frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 12 = 616$ cm^3
Isi padu air = $\frac{1}{3} \times \frac{22}{7} \times 3.5 \times 3.5 \times 6 = 77$ cm^3
Isi padu air yang perlu ditambahkan = 616 − 77 = 539 cm^3