
UNIVERSITI SAINS MALAYSIA

First Semester Examination
2012/2013 Academic Session

January 2013

MGM 531 – Euclidean Geometry
[Geometri Euklidan]

Duration : 3 hours
[Masa : 3 jam]

Please check that this examination paper consists of SEVEN pages of printed material before you begin the examination.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi TUJUH muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]

Instructions: Answer **all ten** [10] questions.

[Arahan: Jawab **semua sepuluh** [10] soalan.]

In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah diguna pakai].

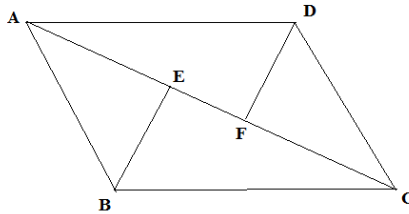
1. Given $\triangle ABC$ such that $\angle ABC = \angle ACB$ and $\angle CAB = 28^\circ$. If R is on the line segment AC such that BR bisects $\angle ABC$, then find $\angle BRC$.

[3 marks]

1. Diberi $\triangle ABC$ sedemikian hingga $\angle ABC = \angle ACB$ dan $\angle CAB = 28^\circ$. Jika R terletak pada garis cebisan AC sedemikian hingga BR membahagi dua sama $\angle ABC$, maka cari $\angle BRC$.

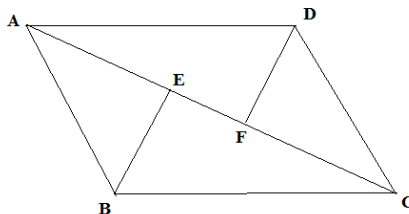
[3 markah]

2. Let $ABCD$ be a parallelogram. BE and DF are perpendiculars to AC . Show that $|BE| = |DF|$.



[4 marks]

2. Andaikan $ABCD$ sebagai suatu segiempat selari, BE dan DF berserenjang dengan AC . Tunjukkan bahawa $|BE| = |DF|$.

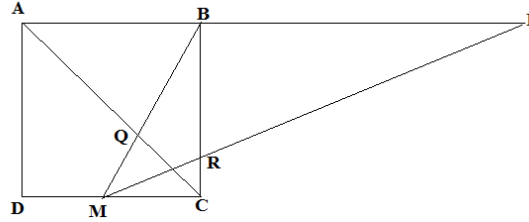


[4 markah]

3. The side AB of a square $ABCD$ is extended to a point P such that $BP = 2(AB)$. Let M be the midpoint of DC . The line segment BM intersects AC at Q and the line segment PM meets the line segment BC at R .

(a) Find the ratio $\frac{CQ}{QA}$.

(b) Using Menelaus' theorem determine the ratio $\frac{CR}{RB}$.

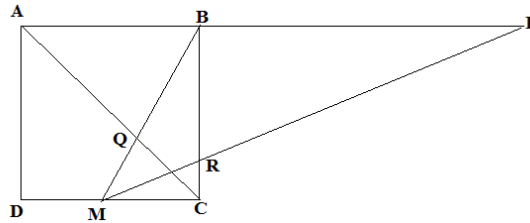


[7 marks]

3. Sisi AB suatu segiempat serbasama $ABCD$ diperpanjangkan ke P supaya $BP = 2(AB)$. Biar M sebagai titik tengah DC . Garis cebisan BM dilukis dan bersilang AC pada Q dan garis cebisan PM bertemu garis cebisan BC di R .

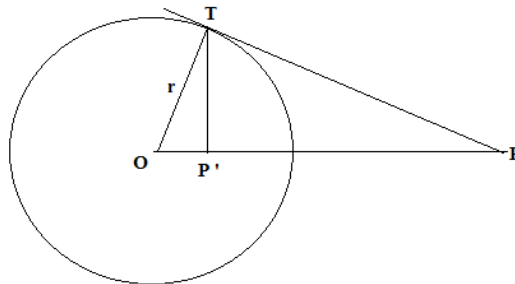
(a) Cari nisbah $\frac{CQ}{QA}$.

(b) Dengan mengguna teorem Menelaus' cari nisbah $\frac{CR}{RB}$.



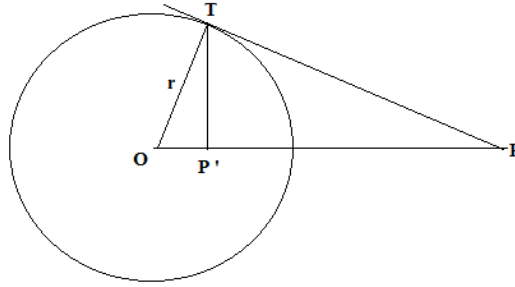
[7 markah]

4. Let P be a point outside of the circle with centre O . Let PT be a tangent to the circle at T . If TP' is perpendicular to OP , show that $(OP)(OP') = r^2$.



[7 marks]

4. Andaikan P sebagai suatu titik diluar bulatan yang berpusat pada O . Andaikan PT sebagai suatu tangen pada T . Jika TP' adalah berserenjang dengan OP , tunjukkan $(OP)(OP') = r^2$.



[7 markah]

5. Let $|BC| = a, |CA| = b, |AB| = c$ be the lengths of sides of ΔABC .

(a) If the radius of the incircle to ΔABC is r and ΔABC is right-angled at C , show that area of $\Delta ABC = sr$.

(b) If $|BC| = 14, |CA| = 10, |AB| = 8$, find the value of r .

[7 marks]

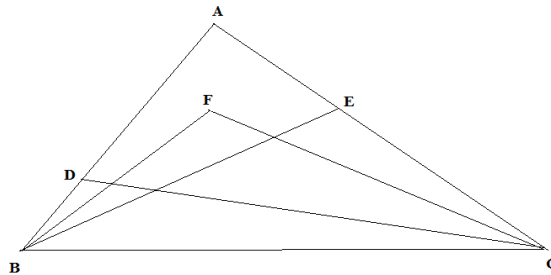
5. Andaikan $|BC| = a, |CA| = b, |AB| = c$ sebagai panjang sisi sisi ΔABC .

(i) Jika jejari bulatan yang terterap dalam segitiga ialah r dan ΔABC adalah segitiga siku-siku, tunjukkan bahawa luas $\Delta ABC = sr$.

(ii) Jika $|BC| = 14, |CA| = 10, |AB| = 8$, cari nilai r .

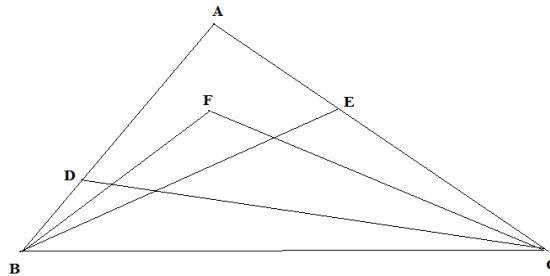
[7 markah]

6. Given ΔABC with two points D and E are on AB and AC respectively. The angle bisectors of $\angle ABE$ and $\angle ACD$ intersect at the point F . Show that $\angle BDC + \angle BEC = 2(\angle BFC)$.



[7 marks]

6. Diberi $\triangle ABC$ dengan dua titik D dan E masing-masingnya terletak pada AB dan AC dan BE dan CD berpotongan pada F . Tunjukkan $\angle BDC + \angle BEC = 2(\angle BFC)$.



[7 markah]

7. (a) Give the definition of a radical axis of two circles.
(b) Find the equation of a radical axis of two circles that intersect at two points with coordinates $(1, 2)$ and $(3, 4)$.
(c) If the two circles do not intersect, then describe with a diagram how to construct the radical axis.

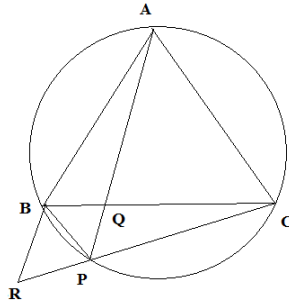
[7 marks]

7. (a) Beri penakrifan paksi genting dua bulatan.
(b) Cari persamaan paksi genting jika dua bulatan bersilang pada dua titik dengan koordinat $(1, 2)$ dan $(3, 4)$.
(c) Jika dua bulatan tidak bersilang, huraikan dengan suatu lakaran untuk membina paksi genting.

[7 markah]

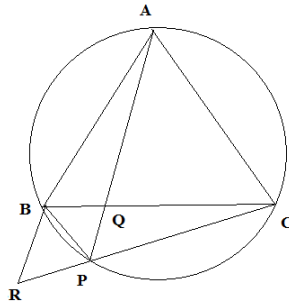
8. When the Ceva line AQ of an equilateral $\triangle ABC$ is extended, it intersects the circumcircle of $\triangle ABC$ at P . The line segment BQ is then extended to a point R so that $|PB| = |PR|$. Show that

- (i) The line segment AP bisects $\angle BPC$,
(ii) $\triangle BPR$ is an equilateral triangle,
(iii) — — —.



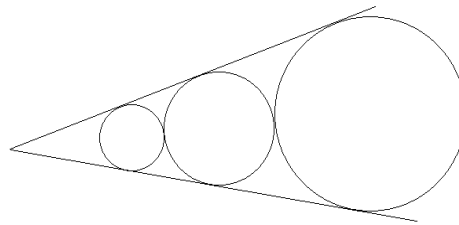
[7 marks]

8. Jika garis Ceva suatu $\triangle ABC$ serbasama diperpanjang, ia bersilang bulatan yang menerap $\triangle ABC$ pada P . Garis segmen kemudiannya diperpanjang ke titik sedemikian rupa $|PB|=|PR|$. Tunjukkan bahawa
- (i) Garis cebisan AP membahagi dua sama $\angle BPC$,
 - (ii) $\triangle BPR$ ialah segitiga serbasama,
 - (iii) — — —.



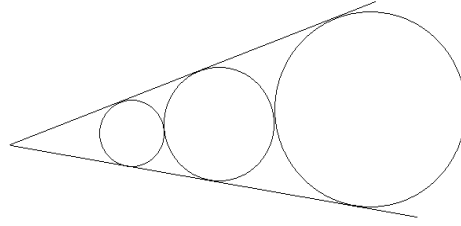
[7 markah]

9. Let two lines be tangents to three circles with the middle circle touches the other two. If the radius of the smallest circle is 1 and the radius of the largest circle is 2, then find the radius of the middle circle.



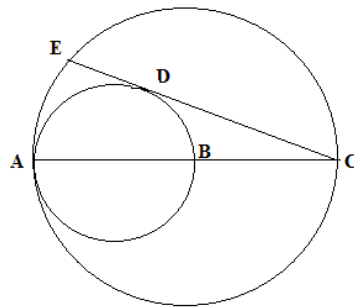
[7 marks]

9. Biar dua garis tangen kepada tiga bulatan dengan bulatan tengah bersentuhan dengan dua lagi bulatan. Jika jejari bulatan terkecil ialah 1 dan jejari bulatan terbesar ialah 2, cari jejari bulatan tengah.



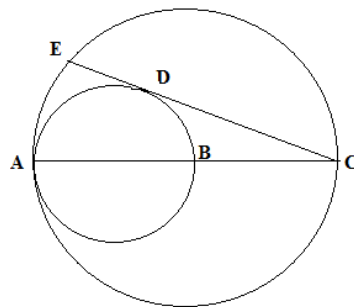
[7 markah]

10. A large circle has a centre B and a diameter AC , and a smaller circle of diameter AB is drawn. Let the line segment CE be tangent to the smaller circle at the point D as shown below. Show that $\angle EAD = \angle DAC$.



[7 marks]

10. Suatu bulatan besar pusatnya ialah B dan garis pusat AC , dan bulatan kecil dengan garis pusat AB dilukis. Andaikan CE adalah garis tangen bulatan kecil pada D seperti tertera dibawah. Tunjukkan $\angle EAD = \angle DAC$.



[7 markah]