GET SMART AT EXAMS / SIAP PERIKSA 2009
Yayasan MENDAKI - BH Publication
GCE 'N' LEVEL MATHEMATICS

EXAMINATION FORMAT

Duration of Paper
The time allocation for the 2 papers is 3 hours.

Format of Paper
The examination consists of one written paper comprising two booklets.

i) Booklet A contains multiple-choice questions
ii) Booklet B contains short-answer questions and structured or long-answer questions.

Component	Time Allocation	Type	Maximum Mark	Weighting
Paper 1	1.5 hours	Short answer questions testing more on the fundamental skills and concepts from the core topics only (see Note 4 below)	60	60%
Paper 2 (scientific calculator allowed)	1.5 hours	Questions testing more on the higher order thinking skills	40	40%

NOTES

1. Paper 1 will consist of about 18 short answer questions. Candidates are required to answer all the questions. Paper 2 will consist of 2 sections. Section A will contain 5 to 7 questions with no choice. Section B will contain 2 questions of which candidates will be required to answer only one. Each choice carries the same number of marks, that is, between 6 to 8 marks.

2. Omission of essential working will result in loss of marks.

3. Spaces will be provided on the question paper of Paper 1 for working and answers.

4. Certain parts of the syllabus have been underlined. The topics concerned need only be taught to the more able pupils and will not be tested in Paper 1. There will be no restriction on the topics tested in Paper 2.

5. Scientific calculators are allowed in Paper 2 but not in Paper 1.

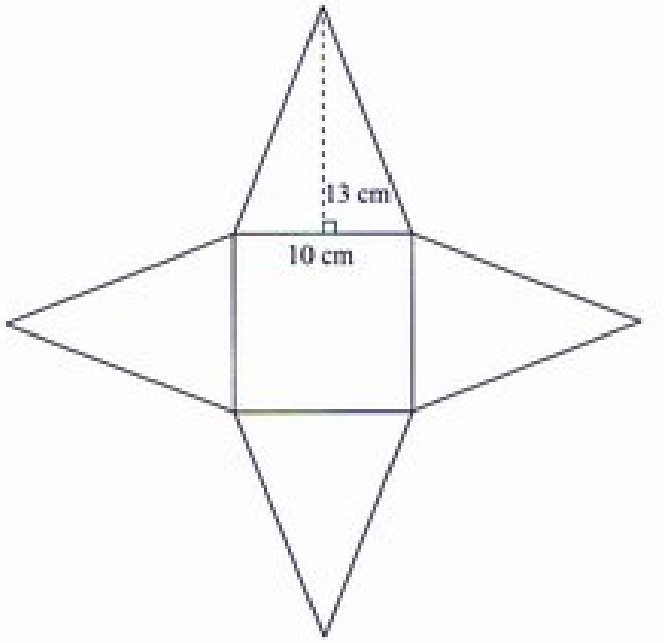
6. Candidates should also have geometrical instruments with them for Paper 1 and Paper 2.

7. Unless stated otherwise within an individual question, three-figure accuracy will be required for answers in Paper 2. This means that four-figure accuracy should be shown throughout the working, including cases where answers are used in subsequent parts of the question. Premature approximation may be penalised.

8. Unless the question requires the answer in terms of ´ , use ´ = 3.14 for Paper 1, and use either your calculator value for ´ or ´ =3.142 for Paper 2.

SAMPLE QUESTIONS

1. The diagram below shows the net diagram of a regular square pyramid.



Determine
(a) the surface area of the pyramid,
(b) the volume of the pyramid.

2. (a) *P*, *Q*, *R* and *S* are four points on the circumference of the circle. Given that $\angle RSQ = 20^\circ$, $\angle RTS = 125^\circ$ and *SQ* bisects $\angle RQP$,

(i) find $\angle RPQ$

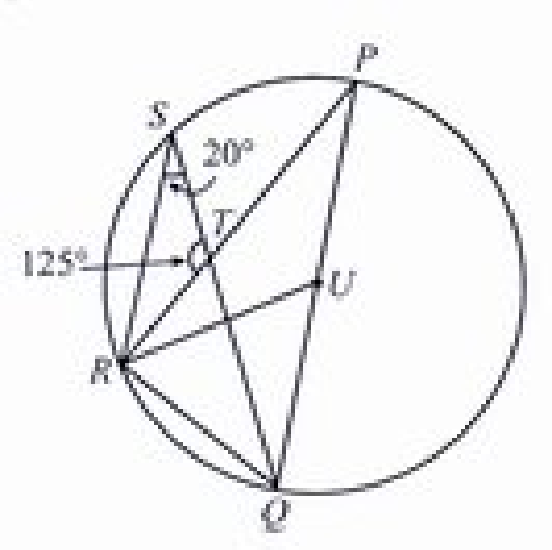
(ii) find $\angle RQP$

(iii) explain why *PQ* is the diameter of the circle.

(b) *U* is the midpoint of the chord *PQ*.

(i) Explain why *U* is the center of the circle.

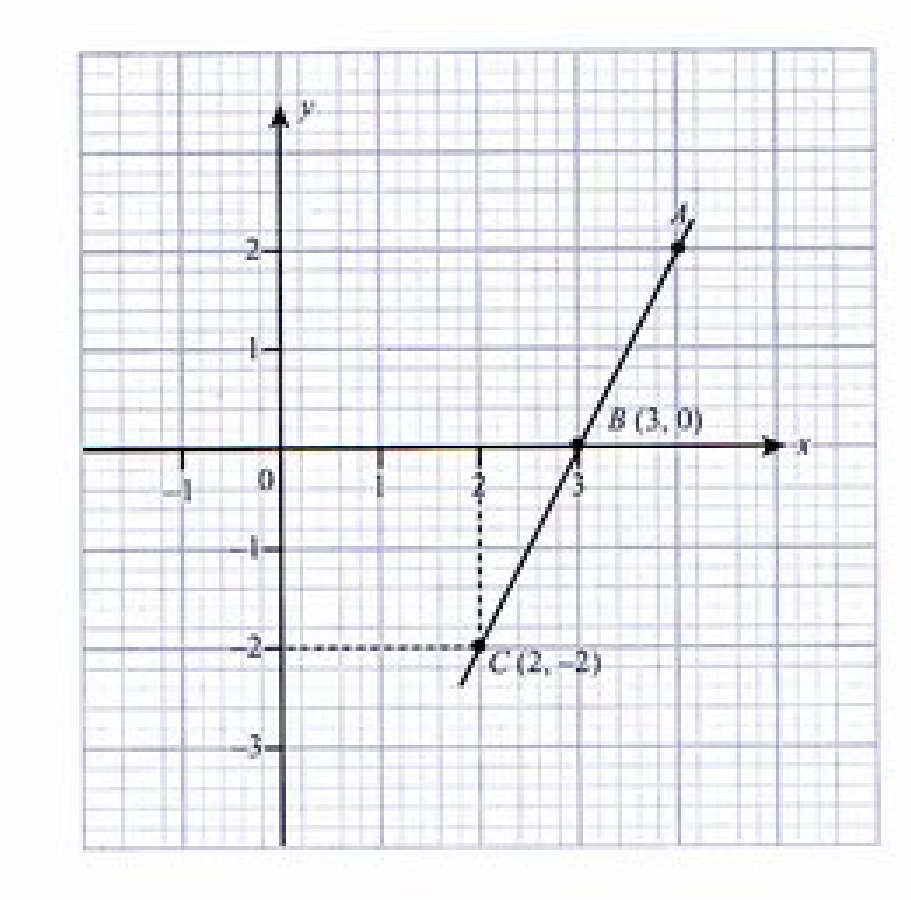
(ii) Find $\angle QRU$



3. There are 30 boxes of breakfast cereals on the supermarket shelf. Out of the 30 boxes, 18 are chocolate-coated cereals and the remaining boxes are original flavour. Linda picks any two boxes at random. With the aid of a probability tree diagram, determine the probability that Linda picks.

(a) 2 boxes of chocolate-coated cereals,
(b) 2 boxes of the original flavour cereals,
(c) 2 different types of cereals,
(d) at least one chocolate-coated cereals.

4. In the diagram, *B* is the midpoint of *A* and *C*. Coordinates of *A*, *B* and *C* are (x,y), (3,0) and (2, -2) respectively.

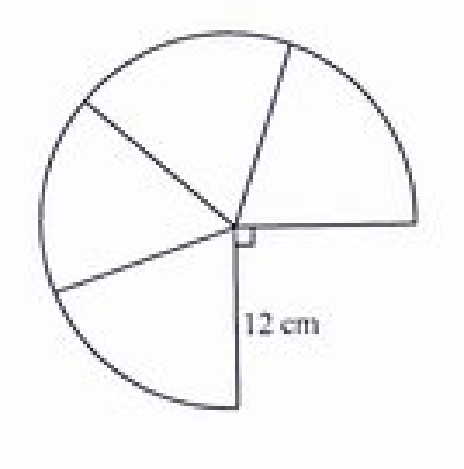


(a) Find
- (i) the coordinates of *A*,
- (ii) the equation of the line *AC.*

(b) Given that the line *AC* cuts the y-axis at *D,* find the coordinates of *D.*

(c) Another line y=2 cuts the y-axis at *E*, find the area of ΔAED.

5. A three-quarter circle is cut into four equal sectors. Find the area of one of the sectors given that the radius of the circle is 12 cm. (Take $\pi = 3.142$.)



6. Simplify $\left(\frac{1}{x^2} - \frac{1}{y^2}\right) \div \left(\frac{1}{x} - \frac{1}{y}\right)$ into a single fraction in its simplest form.

7. 100 boys had their height measured. The data is tabulated in the table as shown.

Height, *h* (in cm)	$155 < h \leq 160$	$160 < h \leq 165$	$165 < h \leq 170$	$170 < h \leq 175$	$175 < h \leq 180$	$180 < h \leq 185$
No. of boys	5	11	29	34	12	9

Find

(a) the modal height,
(b) the median,
(c) the mean height and the standard deviation of the distribution.

ANSWERS & TIPS

1. (a) surface area = 4 (½ X 10 X 13) + (10 X 10)
= 360 cm^2

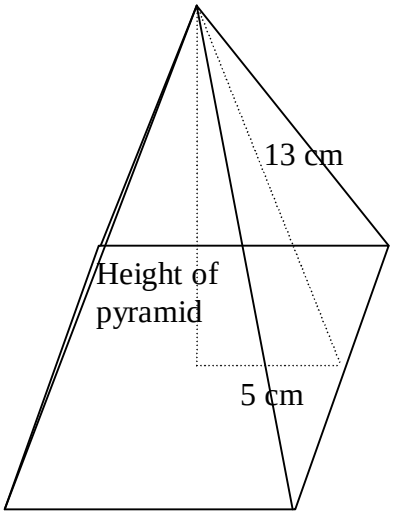
Note: Surface area of the pyramid = total area of all the shapes
= area of 1 square + area of 4 triangles

(b) height of pyramid = $\sqrt{13^2 - 5^2}$
= 12 cm

Volume = 1/3 X base area X height
= 1/3 X 10 X 10 X 12
= 400 cm^3

Note: 13 cm is not the height of the pyramid. To calculate the height of the pyramid, use Pythagoras theorem.

$$a^2 = b^2 + c^2$$



2. (a) (i) $\angle RPQ = 20^\circ$ ($\angle$s in the same segment)

(ii) $\angle SRT = 180^\circ - 125^\circ - 20^\circ$
$= 35^\circ$ (sum of a triangle = 180°)

$\angle RQS = \angle SQP$
$= 35^\circ$

$\angle RQP = 35^\circ$ X 2
$= 70^\circ$ (since *SQ* bisects $\angle RQP$)

(iii) $\angle PRQ = 180^\circ - 70^\circ - 20^\circ$
$= 90^\circ$
Therefore PQ is diameter of the circle.

Note: $\angle PRQ = 180^\circ - \angle RQP - \angle RPQ$
If the angle at the circumference is a right angle triangle and the triangle is made within the segment of the circle, hence the *PQ* will be the diameter of the circle.

(b) (i) Since PQ is the diameter of the circle and U is the midpoint of the diameter, U must be the center of the circle.

(ii) $\angle RPQ = \angle RSQ$ ($\angle$ in the same segment)
$= 20^\circ$

$\angle RUQ = 2(\angle RPQ)$($\angle$ at center = 2 $\angle$s at center of circle)
$= 40^\circ$

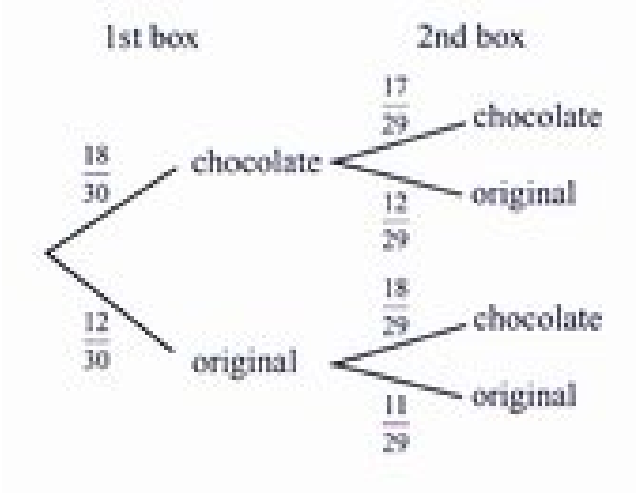
Since *RU* and *UQ* are radii of the circle, *RU* = *UQ*.
$\angle QRU = (180^\circ - 40^\circ) \div 2$ (base $\angle$ of isosceles triangle)
$= 70^\circ$

Alternatively,

$\angle RQU = 70°$ (from part a(ii))

Thus, $\angle QRU = 70°$ (isosceles triangle, since U is the centre of the circle)

3.



(a) P(both chocolate)

= P(obtaining chocolate from 1st box) X P(obtaining chocolate from 2nd box)

$= \frac{18}{30} \times \frac{17}{29}$

$= \frac{51}{145}$

(b) P(both original)

= P(obtaining original from 1st box) X P(obtaining original from 2nd box)

$= \frac{12}{30} \times \frac{11}{29}$

$= \frac{22}{145}$

(c) P(different types)

= P(obtaining original from 1st box) X P(obtaining chocolate from 2nd box) + P(obtaining chocolate from 1st box) X P(obtaining original from 2nd box)

$= \frac{12}{30} \times \frac{18}{29} + \frac{18}{30} \times \frac{12}{29}$

$= \frac{72}{145}$

(d) P(at least 1 chocolate) = 1 ï P(no chocolate)

$= 1 - \frac{22}{145}$

$= \frac{123}{145}$

Note: P(at least 1 chocolate) can be P(obtaining chocolate from either 1st box or 2nd box) and also P(both chocolate).

4. (a)(i) *B* is the midpoint of *AC*.

Midpoint of *AC* = $\left(\frac{x+2}{2}, \frac{y+(-2)}{2}\right)$

(3, 0) = $\left(\frac{x+2}{2}, \frac{y-2}{2}\right)$

$\left(\frac{x+2}{2}\right) = 3$ $\qquad$ $\left(\frac{y+(-2)}{2}\right) = 0$

$x + 2 = 3 \times 2$ $\qquad$ $y - 2 = 0$

$y = 2$

$x = 6 - 2$

$x = 4$

coordinates of *A* are (4, 2).

Alternatively, from the graph reads the coordinates of A.

(ii) Gradient of *AC* = $\frac{2-(-2)}{4-2}$

= $\frac{4}{2}$

= 2

$y = mx + c$

$y = 2x + c$

Substitute $x = 2, y = -2$ into $y = 2x + c$:

$-2 = 2(2) + c$

$-2 = 4 + c$

$c = -6$

$y = 2x - 6$

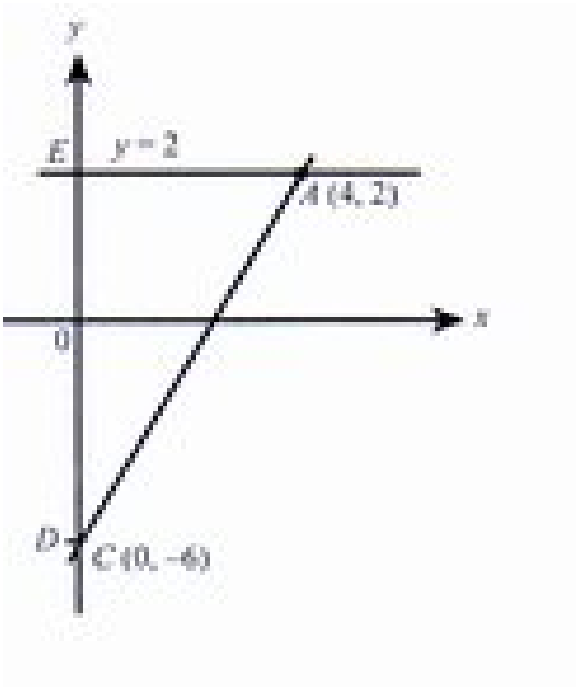
(b) On the $y - axis, x = 0$

$y = 2(0) - 6$

$y = -6$

Coordinates of *D* are (0, -6).

(c)



Area of $\Delta AED = \frac{1}{2} \times b \times h$

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

5. Angle of each sector = $\frac{360° - 90°}{4}$

$= 67.5°$

Area of 1 sector = $\frac{\cancel{9}}{360°} \times \pi r^2$

$= \frac{67.5°}{360°} \times 3.142 \times 12^2$

$= 84.834$

$= 84.8 \text{ cm}^2$ (3 sig. Fig.)

Note: The 4 sectors are equal in size.

6.

$$\left(\frac{1}{x^2} - \frac{1}{y^2}\right) \div \left(\frac{1}{x} - \frac{1}{y}\right) = \left(\frac{y^2}{x^2y^2} - \frac{x^2}{x^2y^2}\right) \div \left(\frac{y}{xy} - \frac{x}{xy}\right)$$

$$= \left(\frac{y^2 - x^2}{x^2y^2}\right) \div \left(\frac{y - x}{xy}\right)$$

$$= \left(\frac{y^2 - x^2}{x^2y^2}\right) \times \left(\frac{xy}{y - x}\right)$$

$$= \left(\frac{(y - x)(y + x)}{x^2y^2}\right) \times \left(\frac{xy}{y - x}\right)$$

$$= \frac{y + x}{xy}$$

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

7.

(a) Modal height is $170 < h \leq 175$

(b) Median = middle of the 50th and 51st boy

= $170 < h \leq 175$

(c) Mean height

$$= \frac{157.5 \times 5 + 162.5 \times 11 + 167.5 \times 29 + 172.5 \times 34 + 177.5 \times 12 + 182.5 \times 9}{100}$$

= 170.7 cm

Standard deviation

$$= \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

= 6.19 (3 sig. fig.)

Note: (a) Mode or Modal height referring to the height of most boys.
(c) Mean is the same as average.