



**GRADE 10 EXEMPLAR EXAMINATION
NOVEMBER 2006**

MATHEMATICS PAPER II

LO 3 & 4

Time: 2 Hours

120 marks

Paper 2 will contain 75-80% from LO3 and 20- 25% from LO4

Levels of difficulty of questions within the 100 marks are categorised as for Paper 1

K	Knowledge :	15 – 25%
RP	Routine Procedure :	25 – 35%
CP	Complex Procedure:	25 – 35%
PS	Problem Solving:	15 – 20%

QUESTION ONE

- (a) The co-ordinates of the vertices of a triangle are $P(-2;6)$, $Q(6;2)$ and $R(-8;a)$.
- (i) Calculate the distance PQ. (2) K
 - (ii) Calculate the co-ordinates of the midpoint of PQ. (2) K
 - (iii) Calculate the gradient of the line PQ. (2) K
 - (iv) If $\hat{RPQ} = 90^\circ$, write down the gradient of line PR. (1) RP
 - (v) Hence, or otherwise, find the value of a . (2) RP

(b) The marks scored by eleven students in a mathematics test are as follows:

10 20 30 45 50 60 65 65 65 70 70

Find:

- (i) the mean. (2) K
- (ii) the mode. (1) K
- (iii) the median. (1) K

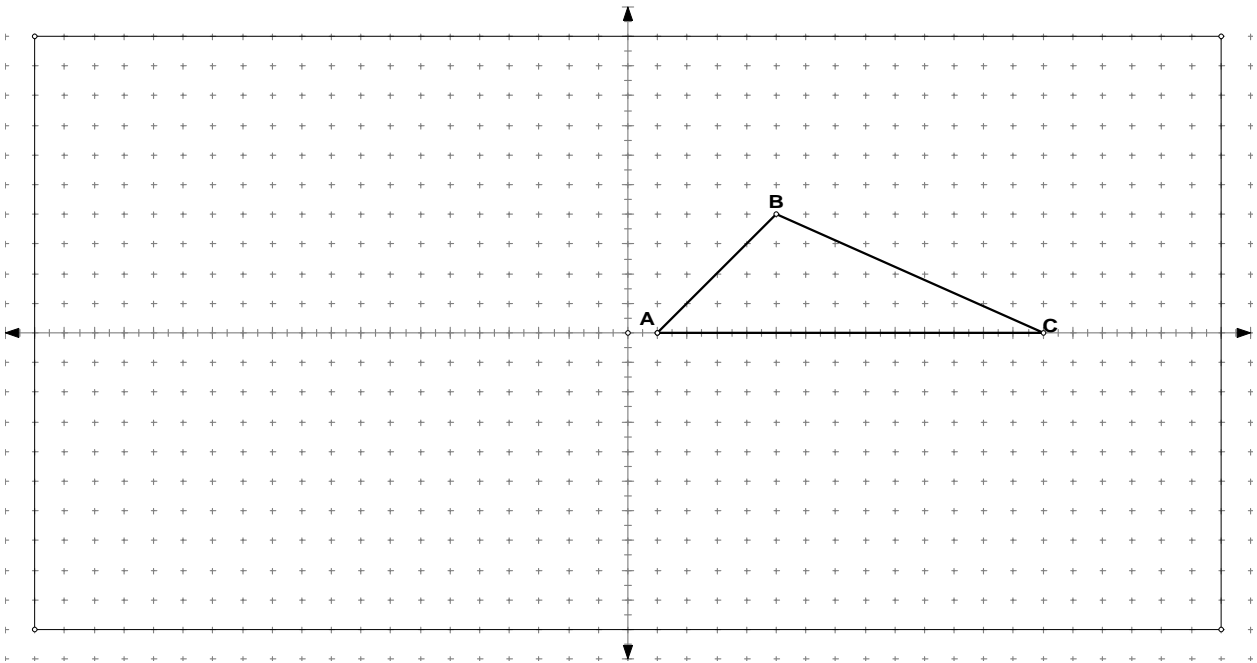
(c) In the following ordered data, the lower quartile is 2, the range is 10.

1, a, 2, 3, 4, 6, 9, 10, b.

Find:

- (i) the value of a . (1) RP
- (ii) the value of b . (1) K
- (iii) the interquartile range. (2) RP

(d) $A(1; 0)$, $B(5; 4)$ and $C(10; 0)$ are shown forming $\triangle ABC$.



- (i) $\triangle ABC$ is reflected about the x -axis forming $\triangle ADC$.
Give the coordinates of D. (1) K
- (ii) ABCD is reflected about the y -axis. Draw $A'B'C'D'$. (3) RP
- (iii) $A'B'C'D'$ is then translated using the rule $T(x + 3; y - 9)$.
Give the coordinates of each of the vertices of $A''B''C''D''$. (4) CP

(iv) ΔABC is reflected about the line $y = x$. Give the coordinates of the vertices of A', B' and C' . (3) CP

(e) If $A = 48,3^\circ$ and $B = 22,2^\circ$, calculate correct to three decimal digits:

(i) $\sin(A + B)$
(1)K

(ii) $\cos \frac{A}{2}$
(1)K

(iii) $\tan 2B$
(1)K

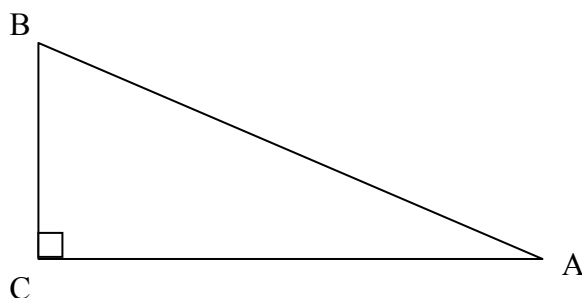
(f) Determine θ , $\theta \in [0^\circ ; 90^\circ]$ (correct to 2 decimal digits) for :

$\cos \theta = 0,5$ (1) K

(g) In the diagram below, ΔABC is right angled at C.

$\tan A = \frac{3}{2}$ and $A \in (0^\circ; 90^\circ)$

$AC = 4$ units



Find the following:

- (i) Length of BC. (2) CP
- (ii) Length of AB, correct to two decimal digits. (2) K
- (iii) The size of angle \hat{B} . (2) RP

(h) On separate systems of axes, $x \in [0^\circ ; 360^\circ]$ sketch the graphs of:

- (i) $y = \sin x$ (3) K
- (ii) $y = \cos x + 1$ (4) RP
- (iii) $y = 2 \tan x$ (4) RP

(i) Which has the greater volume:

- (i) a cube with sides 20cm or
- (ii) a rectangular prism with sides 10cm by 20cm by 50cm? (3) K

49 MARKS

QUESTION TWO

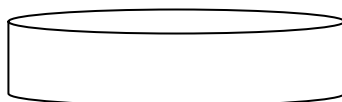
(a) Complete the following table

TRANSFORMATION	POINT BEFORE TRANSFORMATION	POINT AFTER TRANSFORMATION
$(x; y) \rightarrow (-x; y)$	$(-2; 5)$	(1)
$(x; y) \rightarrow (x - 1; y + 3)$	(2)	$(-2; 5)$
(3)	$(-2; 5)$	$(5; -2)$
(4)	$(-2; 5)$	$(1; 1)$
$(x; y) \rightarrow (-y + 2; 5 - x)$	$(-2; 5)$	(5)

7 MARKS

RP/CP

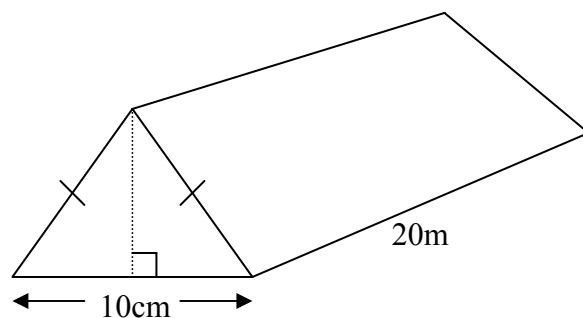
(b) A cake is baked in a round tin with a radius of 9 cm and a height of 12 cm.



- (i) What is the volume of the cake if it fills the tin? (2) K
- (ii) If the radius of another round tin was 12 cm, what would the height of the tin need to be to cook a cake with the same volume? (3) RP
- (iii) If you doubled each of the radius and the height, by what scale factor would you increase the volume? (2) RP

(c) The volume of the shape below is 490 m^3 .

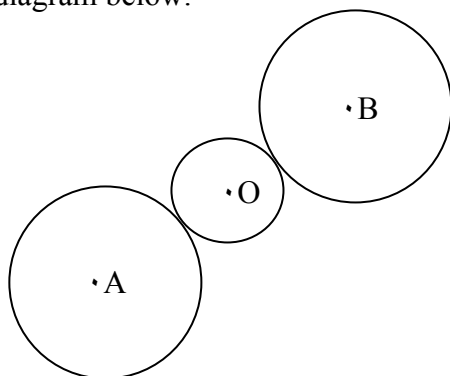
- (i) Find the perpendicular height of the triangle. (4) CP
- (ii) What effect would there be on the surface area of this shape if each of the dimensions was halved? (2) RP



13 MARKS

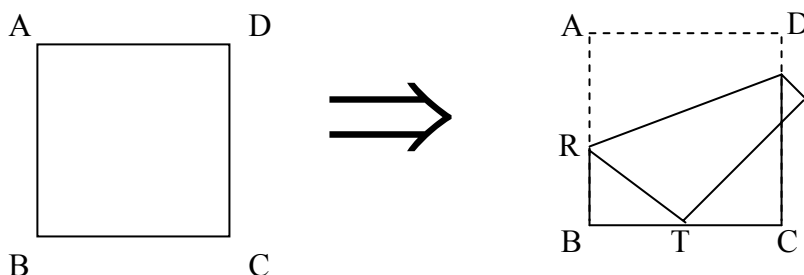
QUESTION THREE

- (a) Two EQUAL circles with centres $A(1;1)$ and $B(4;5)$ touch a third circle with centre O as shown in the diagram below.



If A , O and B lie on a straight line, find:

- (i) the co-ordinates of O . (2) CP
 - (ii) the length of the diameter of the third circle if the equal circles have a radius of 2 units each. (3) CP
- (b) A square piece of paper $ABCD$ with side length 4 cm is folded so that vertex A coincides with the midpoint of side BC . Let the new position of A be T and let the folding point on side AB be R .



Given $A(-2;4)$ and the length of $RB = x$.

- (i) Write down the coordinates of B , C and D . (3) CP
- (ii) Write down the coordinates of T . (1) CP
- (iii) State true or false in each case.
 - (1) $RT = 4 - x$
 - (2) $RT^2 = x^2 + 2^2$
 - (3) $R(-2; x)$ (3) CP
- (iv) Show that $x = \frac{4}{3}$ satisfies the equation $x^2 + 4 = (4 - x)^2$. (4) CP
- (v) Write down the gradient of RT . (2) CP

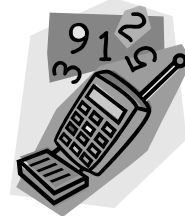
18 MARKS

QUESTION FOUR

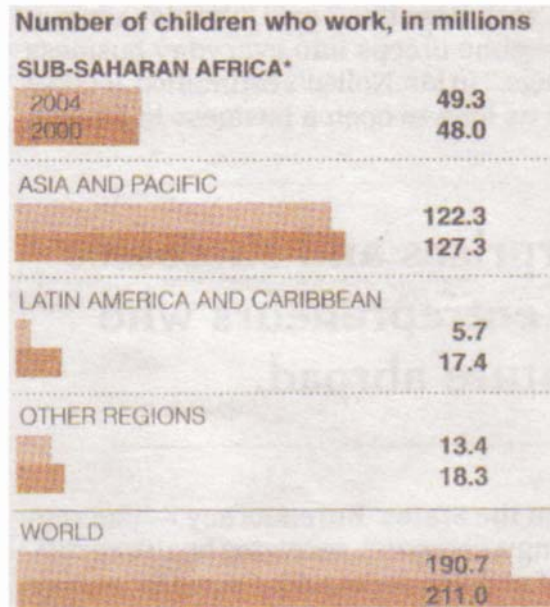
- (a) The following table gives a summary of the number of cellphones advertised in the classified section of a newspaper.



Interval (in Rands)	Number of phones
R 0 - R 199,99	1
R 200 - R 399,99	0
R 400 - R 599,99	5
R 600 - R 799,99	3
R 800 - R 999,99	15
R1000 - R1199,99	3
R1200 - R1399,99	2
R1400 - R1599,99	1



- (i) How many phones were advertised? (1) K
- (ii) Determine an estimated mean price of the cellphones. (5)RP/CP
- (b) From the beginning of 1997 to the end of 2001 the mean number of AIDS-related deaths in South Africa of children younger than 9 years old, was 41 225 per year. From the beginning of 2002 to the end of 2004, the mean was 56 515 deaths per year. What was the mean number of deaths per year from the beginning of 1997 to the end of 2004? (4) CP
- (c) In the dual bar graph below, the number of children below age 14 who work in different regions around the world is illustrated.



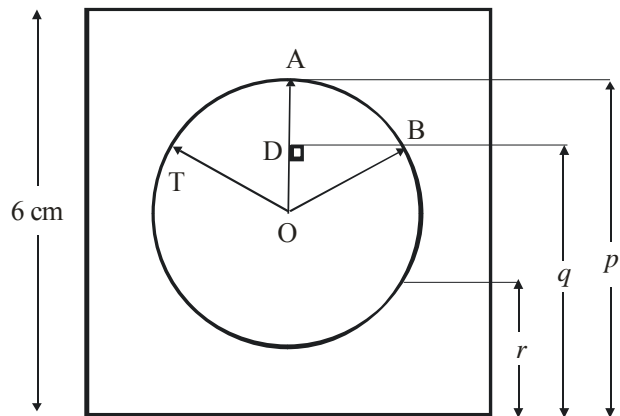
- (i) Calculate the number of degrees required to draw the “Asia and Pacific” sector of a pie chart representing the above information. (3) CP
- (ii) Which region recorded the greatest drop in numbers of children working? (1) K

- (iii) “In sub-Saharan Africa, more than one in four children below the age 14 works, often as prostitutes, haulers or miners.”
- (1) Approximate the number of children below the age of 14 living in Sub-Saharan Africa. (2) CP
- (2) Three possible factors contributing to child labour in this region are “Instability, conflict and war”, “Poverty” and “HIV and AIDS”. Choose one of the three latter factors and explain how child labour arises from it. (2) CP

18 MARKS

QUESTION FIVE

The diagram below represents a stopwatch. This is a circle; centre O, inside a square of 6 cm, also with centre O. The stopwatch has a minute hand and a seconds hand. The seconds hand, with end point T, is shown in the diagram, and has a radius of 2 cm.

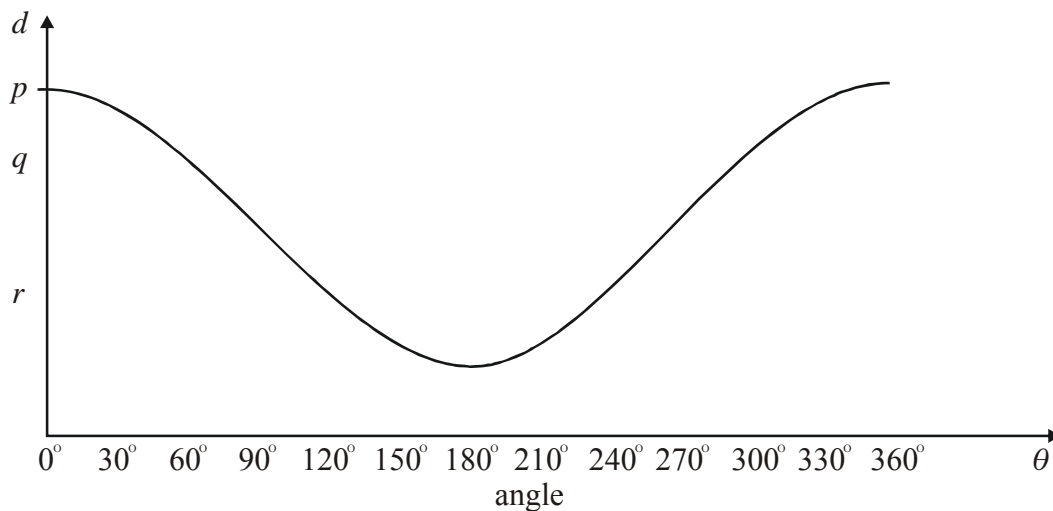


- (a) When T is at point A, the shortest distance from T to the base of the square at D, is p . Calculate the value of p . (2) PS
- (b) In 10 seconds, T moves from point A to point B. When T is at point B, the shortest distance from T to the base is q . Calculate:
- (i) the size of angle $A\hat{O}B$.
 - (ii) the distance OD.
 - (iii) the value of q . (5) PS
- (c) In another 10 seconds, T moves from point B to point C. When T is at the point C, the shortest distance from T to the base of the square is r . Calculate the value of r . (4) PS

Let d be the shortest distance from T to the base of the square, when the seconds hand has moved through an angle θ . The following table gives the values of d and θ .

Angle θ	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
Distance d	p	4,7	q	3	r	1,3	1	1,3	r	3	q	4,7	p

The graph representing this information is as follows:



The equation of this graph can be written in the form $d = c + k \cos \theta$.

(d) Find the values of c and k .

(4) PS

15 MARKS
