AN ROINN OIDEACHAIS

JUNIOR CERTIFICATE EXAMINATION, 1995

MATHEMATICS - HIGHER LEVEL - PAPER 2 (300 marks)

FRIDAY, 9 JUNE – MORNING, 9.30 to 12.00

Attempt **QUESTION 1** (100 marks) and **FOUR** other questions (50 marks each)

Marks may be lost if necessary work is not clearly shown.
Mathematics Tables may be obtained from the Superintendent.

1. *(i)* Express 513 marks as a percentage of 600 marks.

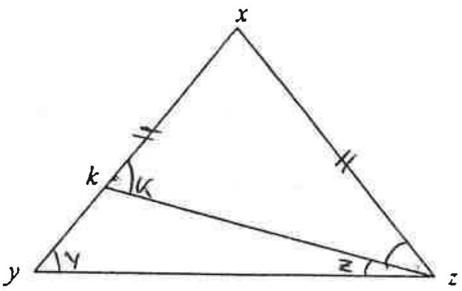
(ii) The area of a rectangle is 500 m^2.
If length : breadth = 5 : 1, find the length and the breadth of the rectangle.

(iii) Simplify $\left(\frac{8}{27}\right)^{2/3}$ and write your answer in the form $\frac{a}{b}$, $a, b \in N_0$.

(iv) xyz is an isosceles triangle with $|xy| = |xz|$.

Prove that

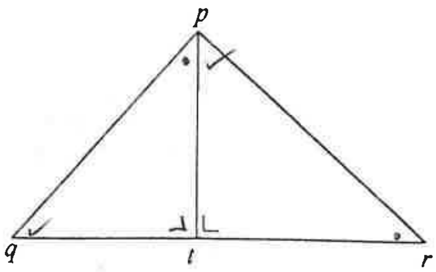
$$|\angle xkz| > |\angle xzk|.$$



(v) $pt \perp qr$ and $|\angle qpt| = |\angle trp|$.

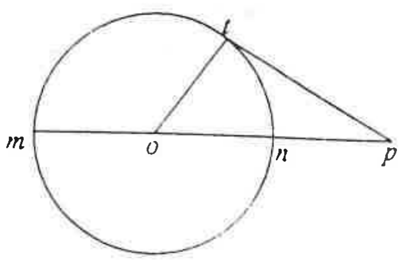
Prove that

$$\frac{\text{area } \Delta pqt}{\text{area } \Delta ptr} = \frac{|qt|^2}{|pt|^2}.$$



(vi) pt is a tangent to the circle at t.
The centre of the circle is o.
$|mo| = |np|$.

If $|pt| = 3$, find $|np|$.



(vii) N is the line $y = 2$ and M is the line $x = 3$.
Find the image of $p(2, 1)$ under $S_M \circ S_N$.

(viii) Calculate the area of the triangle having vertices (1, 1), (3, 4) and (–2, 3).

(ix) The line $2x + y = 6$ is perpendicular to the line $4y - kx = 14$.
Find the value of k.

(x) Find the values of A for which
$\sin A = 0, \quad 0° \leq A \leq 360°$.

2. *(a)* If $\frac{p}{2} = \sqrt{\frac{1}{x^2 - 4}}$, express x^2 in terms of p.

If $p = 5$ and $x = \sqrt{k}$, determine the value of k.

(b) A sum of money, IR£40 000, is invested for 3 years at compound interest. The rate for year 1 is 10% and for year 2 is also 10%. Calculate how much the invested money amounts to at the end of year 2.

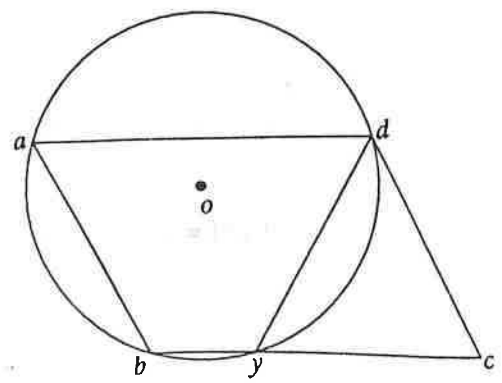
At the end of year 3, the invested money amounted to IR£51 667.
Calculate the rate of interest for year 3.

3. Prove that the measure of the angle at the centre of a circle is twice the measure of an angle at the circle standing on the same arc.

abcd is a parallelogram and *a*, *b*, *y*, *d* are points on the circle, centre *o*.

Prove
$|\angle aby| + |\angle ady| = 180°$.

Deduce
$|dy| = |dc|$.



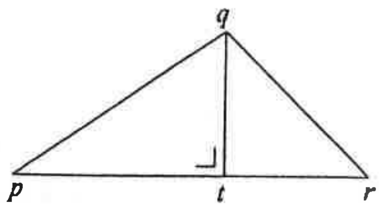
4. Prove that in a right angled triangle the area of the square on the hypotenuse is the sum of the areas of the squares on the other two sides.

In the triangle pqr,

$$|pq|^2 = |pt|^2 + |tr|^2$$

and $qt \perp pr$.

Find $|\angle trq|$.



5. $a(-1, 2)$ and $b(3, 4)$ are two points.

(i) Find the slope of ab.

(ii) Find the equation of ab.

(iii) The line L passes through the origin and is parallel to ab. Write down the equation of L.

(iv) The line K passes through the point b and $K \perp L$. Find the equation of K.

(v) If $K \cap L = \{c\}$ and o is the origin, find the area of $abco$.

6. *(a)* If $\sin A = \frac{1}{\sqrt{2}}$, for $0° \leq A \leq 90°$,

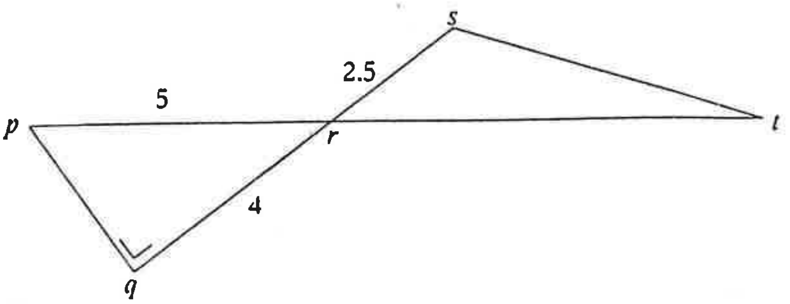
find

(i) $2 \sin A$
(ii) $\sin 2A$.

(b) *pt* and *qs* intersect at *r*.
$|\angle pqr| = 90°$, $|pr| = 5$,
$|qr| = 4$, $|rs| = 2.5$ and
area $\Delta\, pqr$ = area $\Delta\, rst$.

Calculate, as accurately as the Tables allow,

(i) $|\angle prq|$
(ii) $|rt|$.



(c) In the diagram
$|\angle krm| = 13°18'$, $|\angle rkm| = 30°$,
$|\angle kmp| = 68°26'$,
$kp \perp mp$ and $|rm| = 10$.

Calculate $|kp|$, correct to the nearest whole number.