

AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA

JUNIOR CERTIFICATE EXAMINATION, 2000

MATHEMATICS - HIGHER LEVEL

FRIDAY, 9 JUNE - MORNING, 9.30 to 12.00

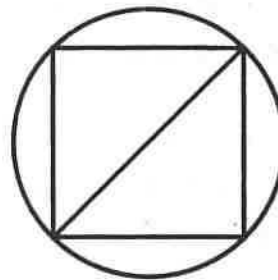
PAPER 2 (300 marks)

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) 1 euro (€1) is approximately equal to IR£0.79.
What is the euro equivalent of IR£39.50?
- (ii) A person has a salary of IR£36 000 per annum and has a tax free allowance of IR£6000. Tax is deducted at the rate of 35% of the taxable income.
What is the amount of this tax?

- (iii) A square is inscribed in a circle.
The diameter of the circle is 20 cm.



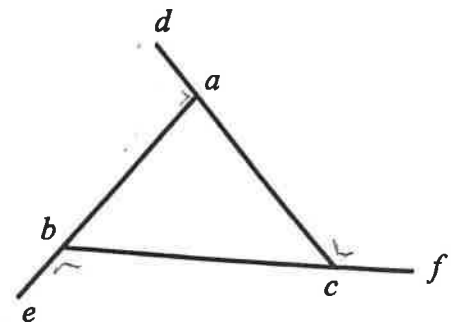
Find the area of the square.

- (iv) In the triangle abc , the sides ab , bc and ca are produced to e , f and d respectively, as shown.

Write down the value of $|\angle dab| + |\angle bac|$.

Hence, or otherwise, find the value of

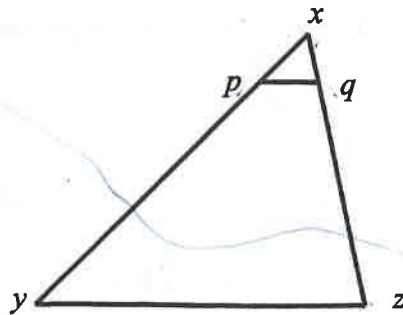
$$|\angle dab| + |\angle ebc| + |\angle fca|.$$



(v) In the triangle xyz , pq is parallel to yz .

$|xy| = 14$ cm, $|xz| = 10$ cm and $|xq| = 2$ cm.

Find $|py|$.



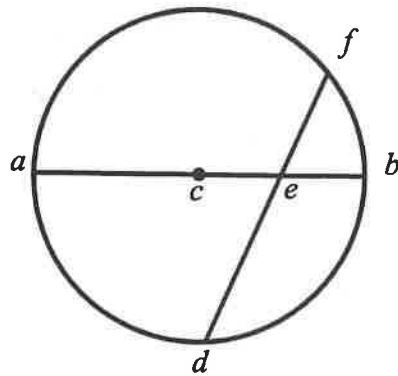
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(vi) A circle has centre c and radius length 14 cm.

The diameter $[ab]$ cuts the chord $[df]$ at the point e .

$|ce| = 6$ cm and $|ef| = 10$ cm.

Find $|df|$.

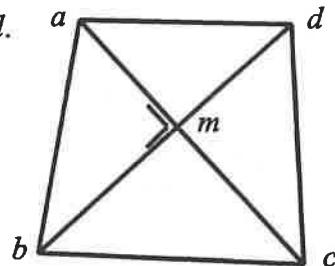


(vii) $abcd$ is a quadrilateral in which ac is perpendicular to bd .

Why is $|ab|^2 = |am|^2 + |bm|^2$?

Hence prove that

$$|ab|^2 + |cd|^2 = |ad|^2 + |bc|^2.$$



(viii) $p(3, 2)$, $q(-1, 1)$ and $r(-3, -5)$ are three vertices of the parallelogram $pqrs$.

Find the coordinates of the fourth vertex s .

(ix) Verify that the point $(1, 4)$ is on the line $2x - y + 2 = 0$.

Find the equation of the image of this line under the translation

$(1, 4) \rightarrow (-2, 3)$.

(x) If $\cos A = 0$, find the two values of $\sin A$, when $0^\circ \leq A \leq 360^\circ$.

2. (a) (i) If $q^2x = p + 2q^2$, express x in terms of p and q .

(ii) If $y = q(x - 4)$, show that $y = \frac{p - 2q^2}{q}$.

Hence, evaluate y when $p = 30$ and $q = 3$.

(b) A person invested IR£20 000 in a building society. The rate of interest for the first year was $2\frac{1}{2}\%$.

At the end of the first year the person invested a further IR£2000. The rate of interest for the second year was 2%.

Calculate the value of the investment at the end of the second year.

At the end of the second year a further sum of IR£1050 was invested. At the end of the third year the total value of the investment was IR£24 720.

Calculate the rate of interest for the third year.

3. (a) 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.

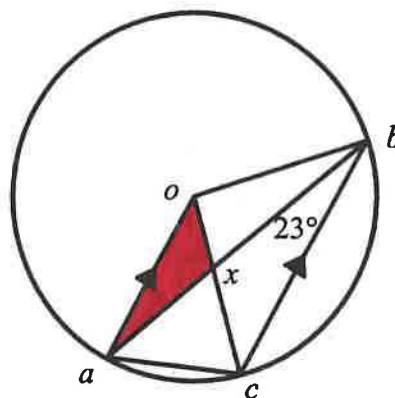
(b) In a circle, centre o , oa is parallel to bc .

If $|\angle abc| = 23^\circ$, find

(i) $|\angle aoc|$

(ii) $|\angle oxb|$

(iii) $|\angle oca|$.



4. (a) Prove that if the angles of two triangles are, respectively, equal in measure, then the lengths of the corresponding sides are proportional.

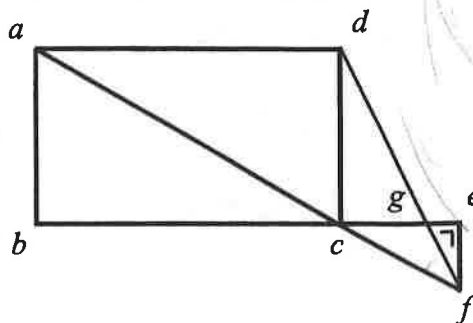
(b) $abcd$ is a rectangle. The lines bc and ac are produced to e and f respectively, where $|\angle cef| = 90^\circ$.

Prove that $|ab| : |ef| = |bc| : |ce|$.

df intersects ce at the point g .

$|dc| = 8$, $|cg| = 4$ and $|ge| = 1$.

Find $|ef|$ and hence, find $|bc|$.



Hi Emma!

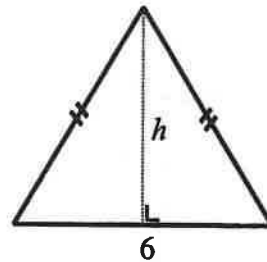
5. The equation of the line L is $3x + 4y = 24$.

L cuts the x -axis at a and the y -axis at b .

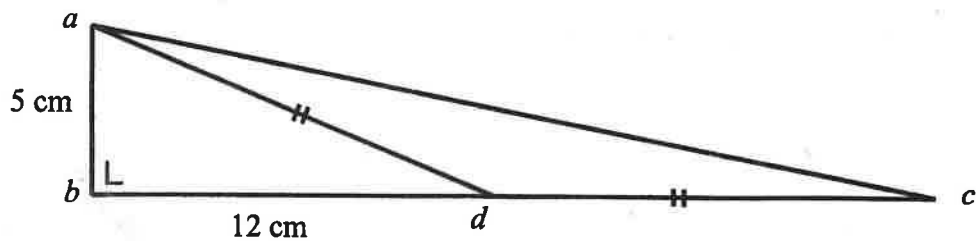
Find

- (i) the coordinates of a and the coordinates of b
- (ii) the slope of the line L
- (iii) the equation of the line K through $q(7, 7)$ which is perpendicular to L
- (iv) the coordinates of p , the point of intersection of L and K
- (v) $|pq|$
- (vi) the area of the triangle qab .

6. (a) The isosceles triangle in the diagram has base 6, perpendicular height h and perimeter 16.
Find the value of h .



- (b) In the triangle abc , $|ab| = 5$ cm and $|\angle abc| = 90^\circ$.
The point d is on $[bc]$.
 $|bd| = 12$ cm and $|ad| = |dc|$.



- (i) Find $|ad|$.
 - (ii) Find $|\angle acb|$, as accurately as the Tables allow.
- (c) The area of the triangle pqr is 9028 m^2 ,
 $|pq| = 200$ m and $|\angle pqr| = 47^\circ 44'$.

- (i) Find $|qr|$.

qt is perpendicular to pq , as shown, and
 $|\angle qtr| = 37^\circ 35'$.

- (ii) Find $|rt|$, correct to the nearest metre.

