FOR THE EXAMINER

**EXAM. NUMBER:**

Total Marks:

# Coimisiún na Scrúduithe Stáit
# State Examinations Commission

## JUNIOR CERTIFICATE EXAMINATION, 2010

## MATHEMATICS - ORDINARY LEVEL - PAPER 2 (300 marks)

**MONDAY, 14 JUNE - MORNING, 9:30 to 11:30**

Time: 2 hours

Attempt **ALL** questions. Each question carries 50 marks.

**Answers and supporting work should be written into the boxes provided.**

**Extra paper and graph paper can be obtained from the Superintendent, if needed.**

**The symbol ✍ indicates that supporting work must be shown to obtain full marks.**

**Make and model of calculator used:**

**For Superintendent/Examiner use only:**

**Centre Stamp**

| Question | Mark |
|---|---|
| **1** | |
| **2** | |
| **3** | |
| **4** | |
| **5** | |
| **6** | |
| Total | |
| Grade | |

**1.** **(a)** Find 20% of 4·6 kg.
Give your answer in grammes.

**(b)** **(i)** Dara left Lucan by car at 09:25 and arrived in Sligo at 11:55.

How long did it take Dara to travel from Lucan to Sligo?
Give your answer in hours and minutes.

**(ii)** The distance from Lucan to Sligo is 195 km.

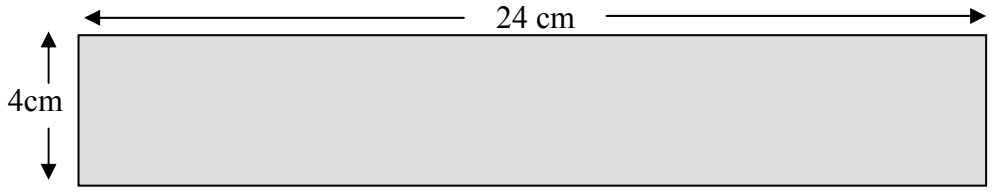
Calculate Dara's average speed, in km/h.

**(iii)** On the return journey from Sligo to Lucan, Dara's average speed was 60 km/h.

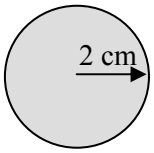
How long, in hours and minutes, did the return journey take?

**(c)** **(i)** A rectangular piece of silver measures 4 cm by 24 cm.

Find, in $cm^2$, the area of the piece of silver.




**(ii)** Brian wants to cut circular discs of radius 2 cm from the piece of silver.

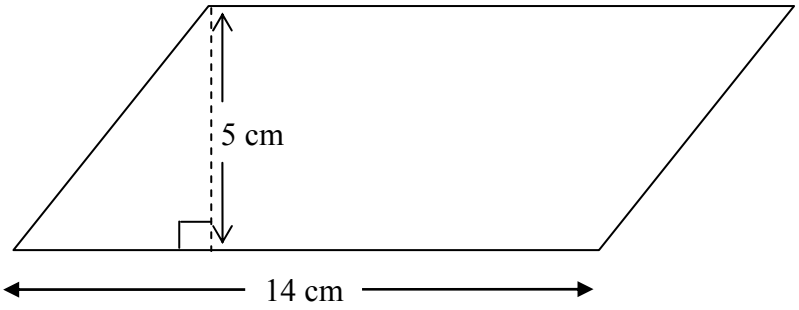



What is the greatest number of discs that he can cut from the piece?

**(iii)** Taking $\pi$ as 3·142, find in $cm^2$, the area of the silver remaining after the discs have been cut out.

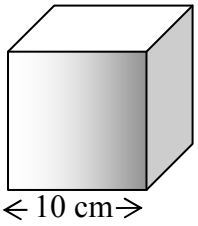
Give your answer correct to one decimal place.

**2.** **(a)** A parallelogram has dimensions as shown in the diagram.

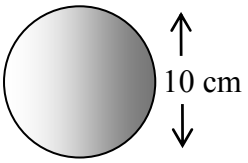



Find, in $cm^2$, the area of the parallelogram.

**(b)** **(i)** A cube with side length 10 cm is shown.
Find, in $cm^3$, the volume of the cube.




**(ii)** A sphere with diameter 10 cm is shown.
Taking $\pi$ as 3·142 find, in $cm^3$, the volume of the sphere.
Give your answer to the nearest whole number.

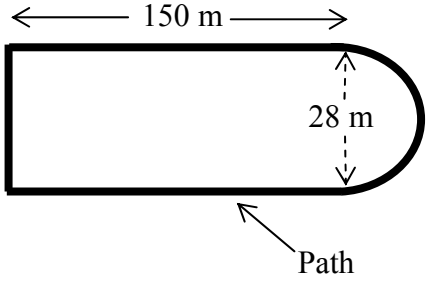



**(iii)** Express the volume of the sphere in **(ii),** as a percentage of the volume of the cube in **(i).**

**(c)** A park is in the shape of a rectangle with a semicircular end.

The rectangle is 150 m long and 28 m wide.
The diameter of the semicircular end is also 28 m.

There is a path around the park which is used for walking and jogging.




**(i)** Taking $\pi$ as 3·142, calculate the length of the semicircular end.
Give your answer to the nearest metre.

**(ii)** Calculate the total length of the path around the park.

**(iii)** Barbara wishes to jog 2·5 km.

How many laps of the path must she complete to ensure that she jogs this distance?

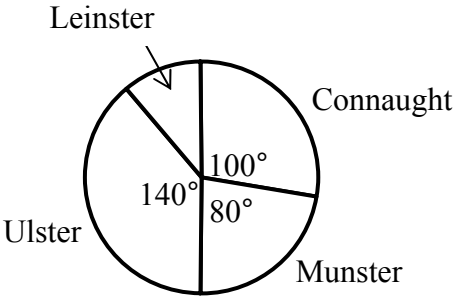
**3.** **(a)** Find the mode of the numbers:

5·1, 5·6, 5·8, 5·3, 5·6, 5·2

Mode =

**(b)** A group of people was surveyed to find out which Irish province, Ulster, Munster, Connaught or Leinster, each came from.

The pie chart represents the result of that survey.




**(i)** What is the measure of the angle for Leinster?

**(ii)** 35 people said they came from Connaught.

How many people were in the group that was surveyed?

**(iii)** How many people gave Ulster as their reply?

**(c)** Each day, during a particular week, Deirdre noted the number of minutes that she spent listening to music.

Her results from Monday to Saturday are in the table below.

| **Day** | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| **Time in minutes** | 75 | 65 | 60 | 50 | 80 | 90 |

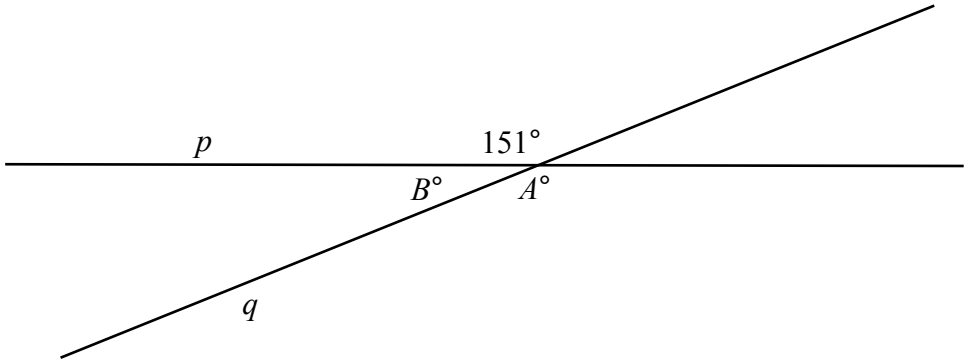
**(i)** Draw a trend graph of these results, putting days on the horizontal axis.

**(ii)** Calculate the mean number of minutes per day, that Deirdre spent listening to music.

**(iii)** When Sunday was included Deirdre's mean was 80 minutes.

How long did Deirdre listen to music on Sunday?

**4.** **(a)** Two lines $p$ and $q$ intersect as shown in the diagram.
Find the values of angles $A$ and $B$.



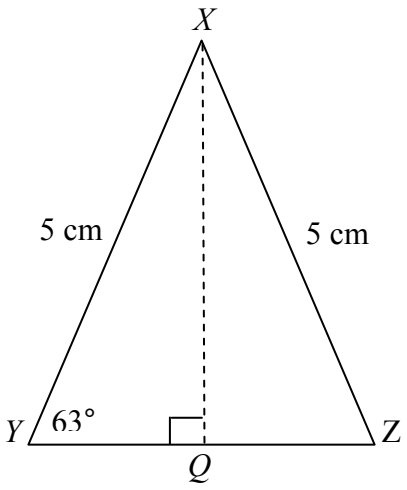

$A =$ $B =$

**(b)** $XYZ$ is an isosceles triangle.

$|XY| = |XZ| = 5$ cm.

$|\angle XYZ| = 63°$.

$Q$ is the midpoint of $[YZ]$ and $XQ \perp YZ$.




**(i)** Write down $|\angle XZY|$.

$|\angle XZY| =$

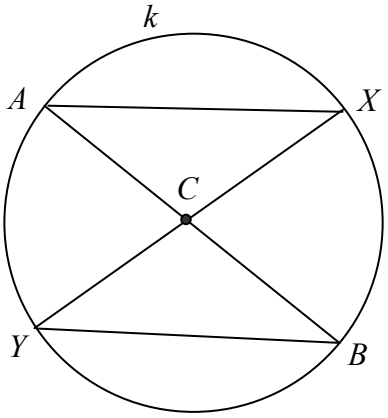
**(ii)** Given that $|XQ| = 4$ cm, use the theorem of Pythagoras to find $|YQ|$.

**(iii)** Hence find the area of the triangle $\Delta\, XYZ$.

**(iv)** Find the perimeter of triangle $\Delta\, XYZ$.

**Part (c) on next page**

**(c)**




$C$ is the centre of the circle $k$.
$[AB]$ and $[XY]$ are diameters of $k$.

**(i)** Name another line segment equal in length to $[AC]$.
Give a reason for your answer.

Answer: is the same length as $[AC]$

Reason:

**(ii)** Name the image of $\Delta\, AXC$ by central symmetry in $C$.

**(iii)** Complete the following reasons for the fact that the triangles $\Delta\, AXC$ and $\Delta\, BYC$ are congruent.

Reasons:

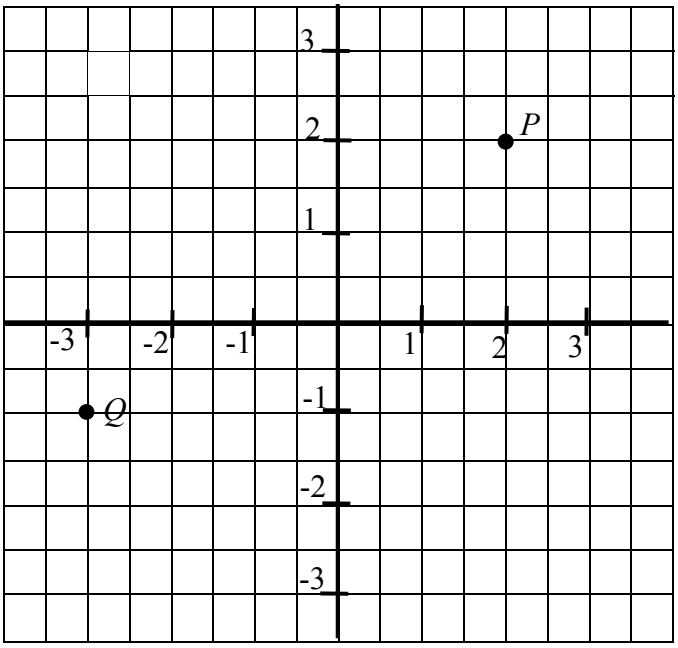
| In $\Delta\, AXC$ | | In $\Delta\, BYC$ |
|---|---|---|
| | = | |
| | = | |
| | = | |

**5.** *Note: Coordinate Geometry Formulae are given on Page 13.*

**(a)** Write down the co-ordinates of the points $P$ and $Q$

$P$ =

$Q$ =




**(b)** $C$ is the point (5, - 4) and $D$ is the point (3, 8).

Find each of the following:

**(i)** the midpoint of $[CD]$

**(ii)** the slope of $CD$

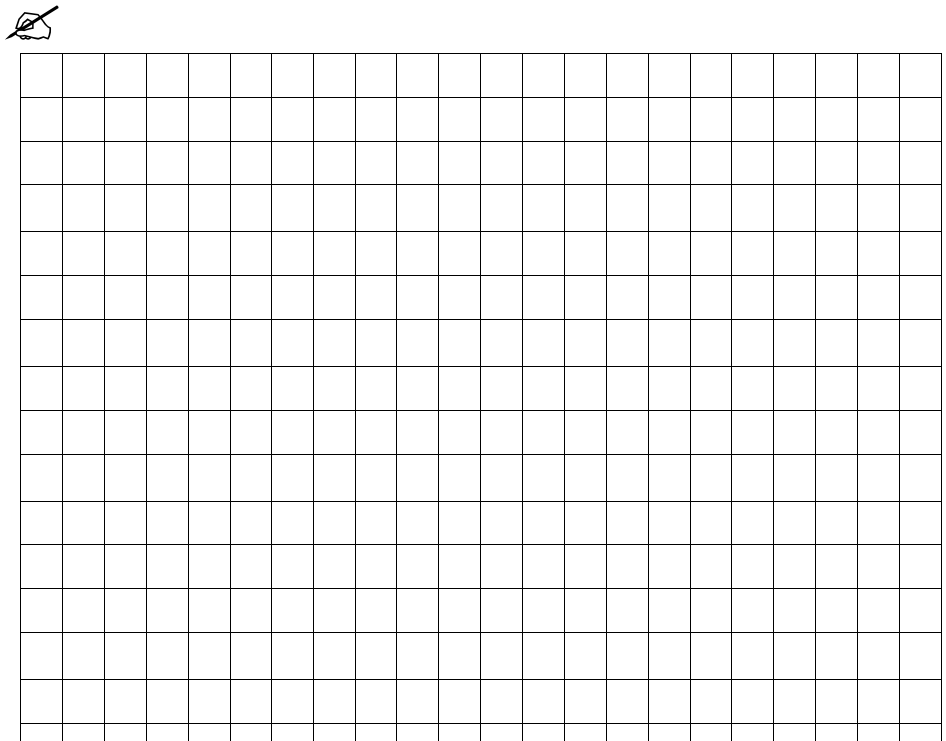
**(iii)** the length of $[CD]$

**If you wish to draw a diagram, use the next page.**

**(c)** **(i)** $y = 5x - 3$ is the equation of the line $l$.
Verify the point (1, 2) is on $l$.

**(ii)** By letting $x = 0$, find the co-ordinates of $A$, the point of intersection of $l$ and the $y$ -axis.

**(iii)** Hence draw the line $l$, on the grid below.



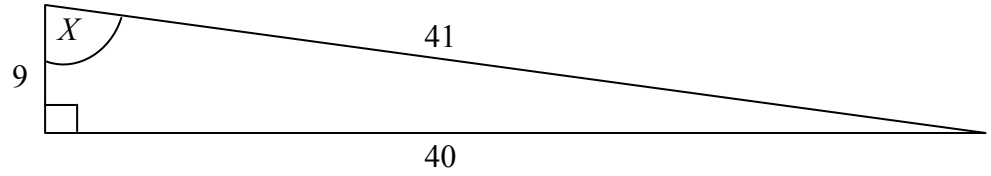
**Formulae**

Midpoint of a line segment : $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Slope of a line: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Length of a line segment: $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

**6.** **(a)** The diagram shows a right-angled triangle with measurements as shown.




**(i)** Write down the length of the hypotenuse of the triangle.

Length of the hypotenuse =

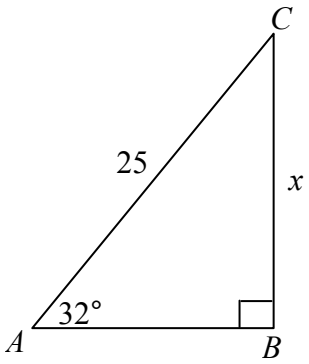
**(ii)** Write down the value of cos $X$ as a fraction.

cos $X$ =

**(b)** In the right-angled triangle $ABC$,

$|AC| = 25$, $|\angle BAC| = 32°$.

Let $|CB| = x$.




**(i)** Using your calculator find sin 32°.
Write your answer correct to two decimal places.

sin 32° =

**(ii)** Using the diagram of the triangle $ABC$ write sin 32° as a fraction.

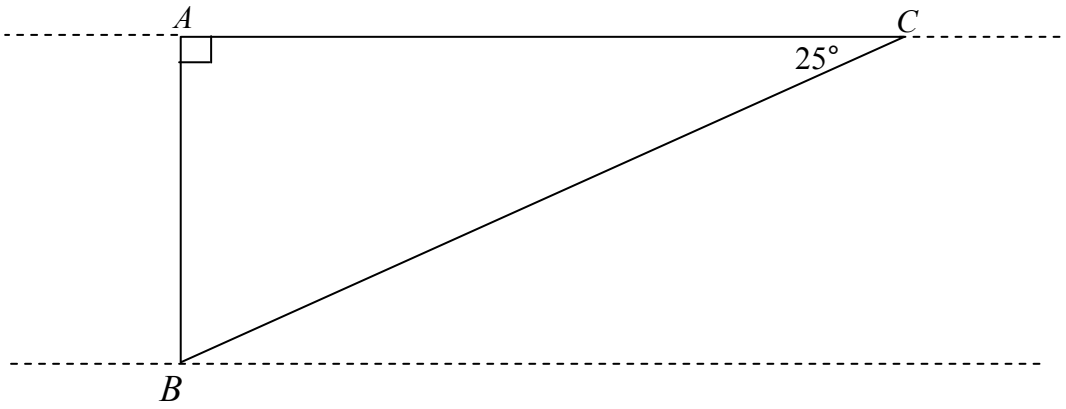
sin 32° =

**(ii)** Hence, or otherwise, find $x$, the value of $|CB|$.

**(c)** Seán wishes to measure the width of a canal.
He is at a point $A$ directly opposite a landmark $B$ on the opposite bank.

Seán walks 50 paces along the bank of the canal to point $C$.

He measures the angle $ACB$ and finds it is 25°.




**(i)** Each of Seán's paces is 0·7 m.
Calculate $|AC|$.

**(ii)** Hence calculate the width of the canal, $|AB|$.
Give your answer to the nearest metre.

Space for extra work