Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination 2016

Mathematics

Foundation Level

Friday 10 June – Afternoon 2:00 to 4:00

300 marks

Examination number

Centre stamp

Running total	

For examiner			
Question	Mark	Question	Mark
1		11	
2		12	
3		13	
4		14	
5		15	
6			
7			
8			
9			
10		Total	

Grade

Instructions

There are 15 questions on this examination paper. Answer **all** questions.

Questions do not necessarily carry equal marks. To help you manage your time during this examination, a maximum time for each question is suggested. If you remain within these times you should have about 10 minutes left to review your work.

Write your answers in the spaces provided in this booklet. You may lose marks if you do not do so. You may ask the superintendent for more paper. Label any extra work clearly with the question number and part.

The superintendent will give you a copy of the *Formulae and Tables* booklet. You must return it at the end of the examination. You are not allowed to bring your own copy into the examination.

You will lose marks if you do not show all necessary work.

You may lose marks if you do not include the appropriate units of measurement, where relevant.

You may lose marks if you do not give your answers in simplest form, where relevant.

Write the make and model of your calculator(s) here:

Question 1 **(Suggested maximum time: 5 minutes)**

(a) Write down the value of each of the following.

(i) $7 + 11 =$ ☐

(ii) $85 - 61 =$ ☐

(iii) $6{\cdot}4 \times 5 =$ ☐

(b) **(i)** Write down the nearest **whole number** to $6{\cdot}1$. Answer = ☐

(ii) Round each number to the nearest **whole number** to estimate the value of $3{\cdot}8 \times 8{\cdot}2$.

$3{\cdot}8 \times 8{\cdot}2 =$ ☐ $\times$ ☐ $=$ ☐

(c) Write down the **reciprocal** of 20. Answer = $\frac{\square}{\square}$

Question 2 **(Suggested maximum time: 5 minutes)**

(a) List the elements of each of the following sets.

(i) The natural numbers from 1 to 6, inclusive:

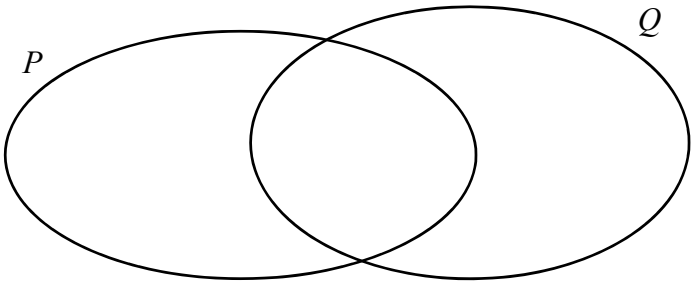
$\{\quad,\quad,\quad,\quad,\quad,\quad\}$

(ii) The prime numbers between 1 and 10:

$\{\quad,\quad,\quad,\quad\}$

(b) P is the set $\{a, c, e\}$.
Q is the set $\{b, c, d\}$.

(i) Fill in the Venn diagram below, showing the elements of P and Q.



(ii) List the elements of each of these two sets:

$P \cap Q =$

$P \setminus Q =$

Question 3 **(Suggested maximum time: 5 minutes)**

Bertie is saving money to buy a phone.

He has €25 in his money box now (Week 0 in the table below). He is going to put another €10 in his money box at the end of each week until he has enough money to buy the phone.

(a) Fill in the table below, showing the total amount of money Bertie will have in his money box at the end of each week for the first 5 weeks.

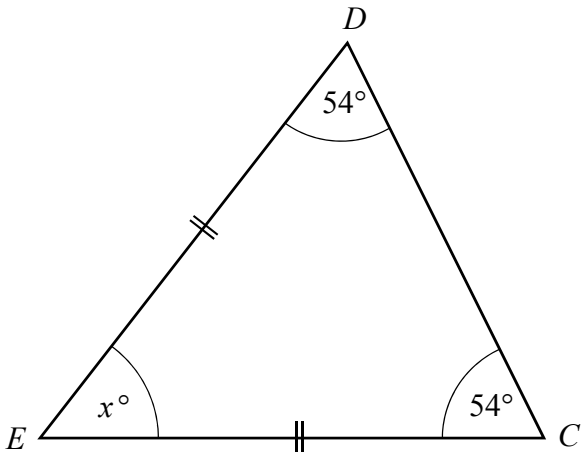
Week	Total amount of money in Bertie's money box (€)
0	**25**
1	**35**
2	
3	
4	
5	

The phone costs **€99**.

(b) After how many weeks (in total) will Bertie have enough money in his money box to buy the phone?

Question 4 **(Suggested maximum time: 5 minutes)**

The diagram below shows the triangle CDE.
The size of the angles are $54°$, $54°$, and $x°$.
$|CE| = |DE|$, as shown.



(a) Work out the value of x.

(b) Put a tick (✓) in the correct box to show what type of triangle CDE is.
Give a reason for your answer.

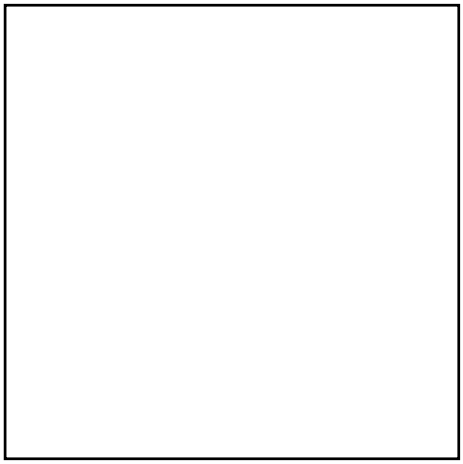
Type of triangle: (Tick **one** box only.)	Right-angled	Equilateral	Isosceles
	❑	❑	❑

Reason:

Question 5 **(Suggested maximum time: 15 minutes)**

(a) The square shown below has a number of axes of symmetry.

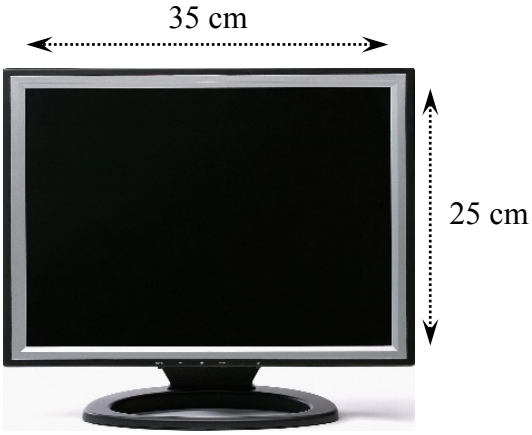
(i) Draw **one** axis of symmetry of the square.



(ii) Put a tick (✓) in the correct box in the table below to show how many axes of symmetry a square has.

Number of axes of symmetry of a square	Tick **one** box
2	
4	
8	
12	

(b) A rectangular computer screen has sides of length 35 cm and 25 cm.

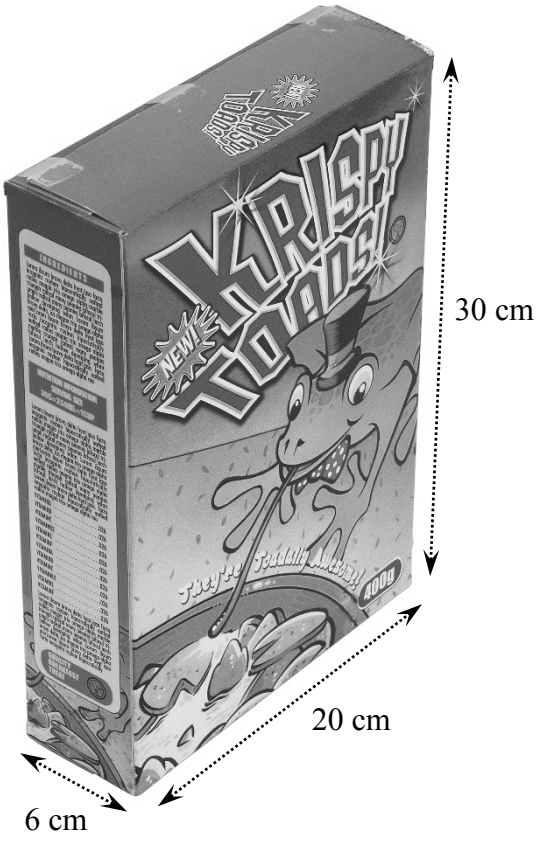


(i) Work out the **area** of the computer screen, in cm^2.

(ii) Work out the length of the **perimeter** of the computer screen, in cm.

(c) A rectangular box is 20 cm long, 6 cm wide, and 30 cm high.

Work out the **volume** of this box, in cm^3.



Question 6 **(Suggested maximum time: 5 minutes)**

Ms O'Sullivan buys costumes for her drama class.
Each costume costs €5·30. She must buy 28 costumes.

(a) Find the **total cost** of the 28 costumes.

Ms O'Sullivan gets a discount of 15% on the costumes.

(b) Work out the amount of the **discount**.

(c) Find the amount that Ms O'Sullivan must pay, **after** the discount has been **taken away**.

	Amount (€)
Total cost (part **(a)**)	
Discount (part **(b)**)	
Amount to pay **after** the discount	

Question 7 **(Suggested maximum time: 15 minutes)**

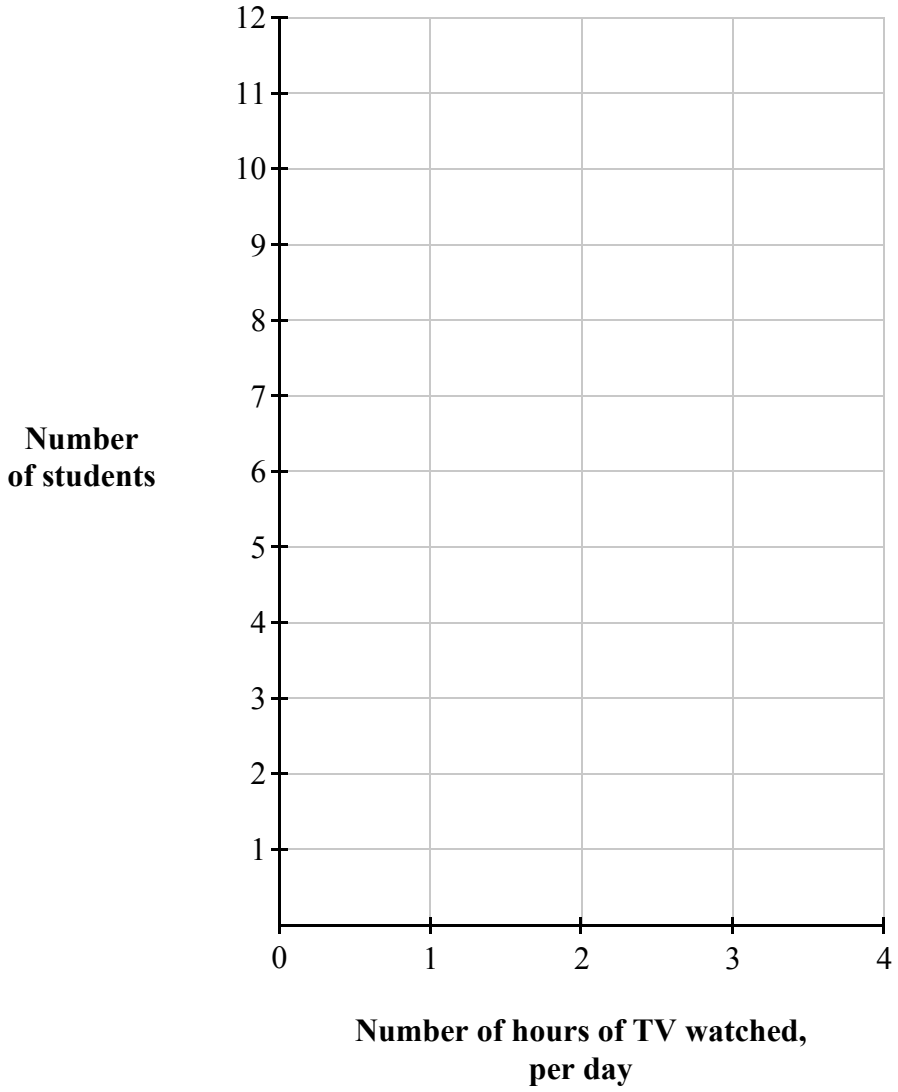
Shauna and Eoin are carrying out surveys on the students in First Class in their school.

Shauna asks all the students how many hours of TV they watch, per day.
Her results are shown in the table below.

Number of hours of TV watched, per day	0 – 1 hours	1 – 2 hours	2 – 3 hours	3 – 4 hours
Number of students	7	3	10	5

Note: "1 – 2" means at least 1 but less than 2, etc.

(a) Draw a **histogram** to show these results.



(b) Work out the number of students in the class who watch **2 or more hours** of TV per day.

Eoin wants to find out how the students travel to school. He asks the following question.

> Eoin's Question:
>
> How do you travel to school?
> Circle one of the following.
>
> **Walk** **Cycle** **Bus**

(c) Put a tick (✓) in the correct box below to show what type of data Eoin will get.
Give a reason for your answer.

Type of data: (Tick **one** box only.)	Categorical	Numerical
	❑	❑

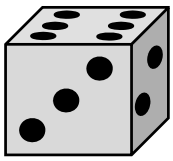
Reason:

(d) Give one way that Eoin's question could be improved.

Question 8 **(Suggested maximum time: 15 minutes)**

In a game, Mia flips a coin and rolls a 6-sided die.

Coin



Die

(a) List all of the possible outcomes in the table below. Three are already filled in for you.

For example, **H 2** means she got **Heads** on the coin and a **2** on the die.

		Die					
		1	2	3	4	5	6
Coin	Heads (**H**)	**H 1**	**H 2**				
	Tails (**T**)				**T 4**		

(b) Write down the **total** number of different possible outcomes.

Each outcome is equally likely.

(c) Find the **probability** that Mia gets **H 3**, i.e. Heads (**H**) on the coin and a **3** on the die.

Answer = $\frac{\quad}{\quad}$

(d) Find the **probability** that Mia gets Tails (**T**) on the coin and an **even number** on the die.

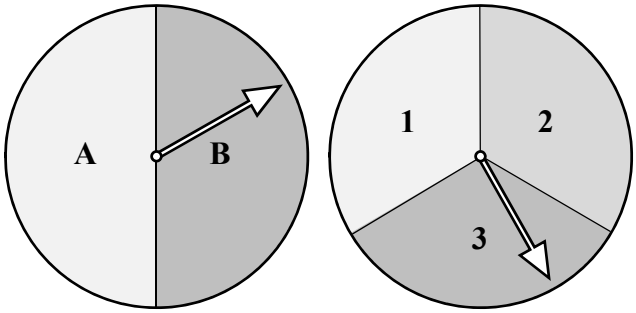
Answer = $\frac{\quad}{\quad}$

In a different game, Mia spins two spinners.

One spinner has 2 sections, labelled A and B.

The other spinner has 3 sections, numbered 1, 2, and 3.

One possible outcome is **A 2**.



(e) Find the **total** number of different possible outcomes for these two spinners.

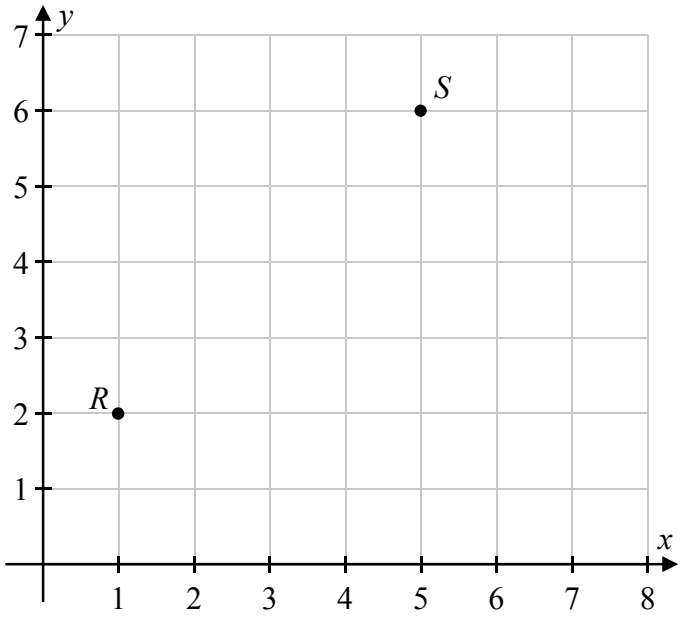
Question 9 **(Suggested maximum time: 5 minutes)**

(a) Find the value of $2x + 3y$, when $x = 4$ and $y = 7$.

(b) Solve the equation $6x - 4 = 26$.

Question 10 **(Suggested maximum time: 5 minutes)**

The points R and S are shown on the co-ordinate diagram below.



(a) Write down the co-ordinates of R and S.

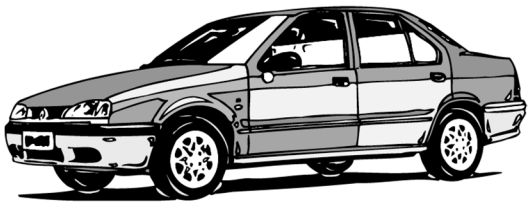
$R =$ (,) $S =$ (,)

(b) Work out $|RS|$, the **distance** from R to S.

(c) **Plot** the point $T(7,3)$ on the co-ordinate diagram above.
Label the point T.

Question 11 **(Suggested maximum time: 5 minutes)**

Joe bought a car for €4000. He sold the car for €4880.



(a) Work out Joe's **profit**.

(b) Find Joe's profit as a **percentage** of the cost price.

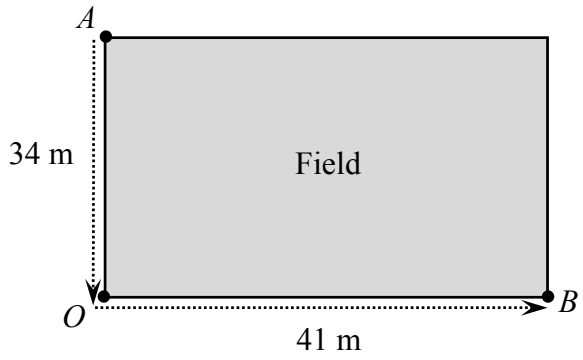
Question 12 **(Suggested maximum time: 5 minutes)**

The letter J stands for Jake's age now, in years.
Fill in the table by writing an algebraic term, in terms of J, to match each description.
Two have already been filled in for you.

Description	Algebraic term
Jake's age now.	J
Jake's age in 2 years' time.	$J + 2$
Jake's age in 5 years' time.	
Jake's age 4 years ago.	
Twice Jake's age.	
One third of Jake's age.	

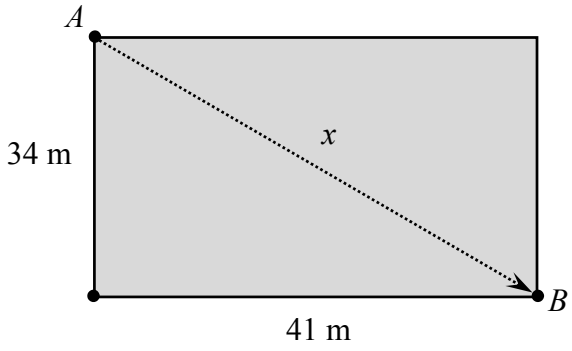
Question 13 **(Suggested maximum time: 10 minutes)**

The diagram shows a rectangular field near Aisling's school.
When it is wet, she walks from A to O to B **around** the field, as shown below.



(a) Find the distance that Aisling walks, going from A to O to B **around** the field.

When it is dry, Aisling walks from A to B straight **through** the field, as shown below.
This distance is x.



(b) Use the **Theorem of Pythagoras** to find the value of x.
Give your answer in metres, correct to one decimal place.

(c) Find how much **shorter** it is for Aisling to walk straight through the field instead of around it. Give your answer correct to the nearest metre.

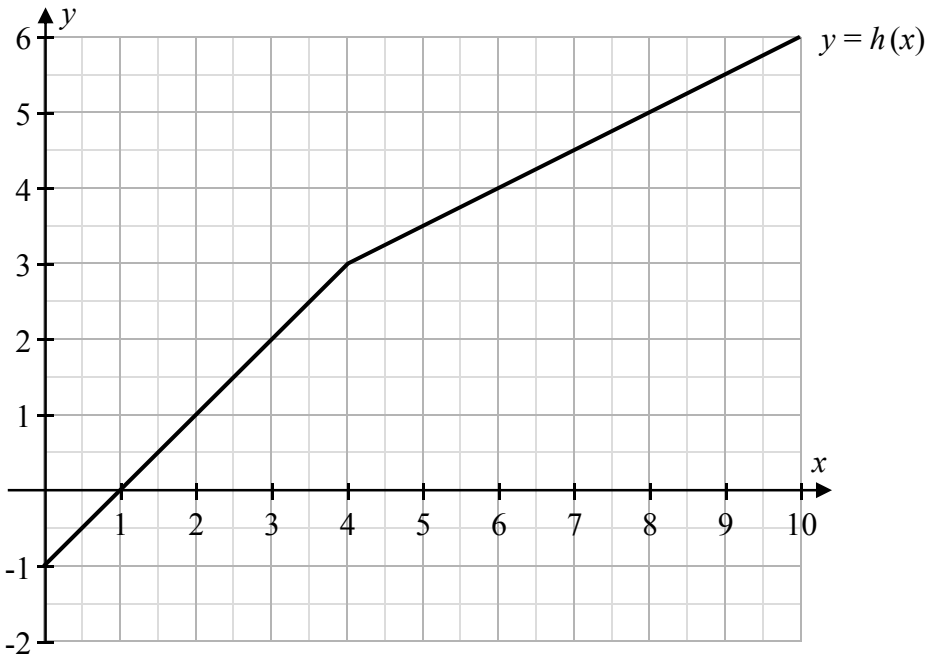
Question 14 **(Suggested maximum time: 5 minutes)**

(a) Multiply out $4(6x + 2y + 3)$.

(b) Factorise $3x - 12$.

Question 15 **(Suggested maximum time: 5 minutes)**

The graph of the function $y = h(x)$ is shown on the co-ordinate grid below.
The graph is made up of two line segments.

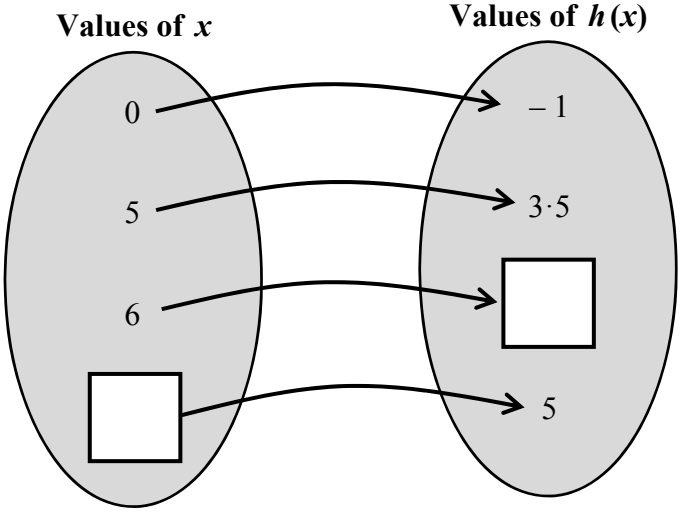


(a) Use the **graph above** to answer the following questions.

(i) Find the value of $h(4)$. $h(4) =$ ☐

(ii) What number must ☺ represent, if $h(☺) = 1$? ☺ = ☐

(b) Use the **graph above** to fill in the two missing values in the arrow diagram below, which shows the values of $h(x)$ for the given values of x.



You may use this page for extra work.

Junior Certificate 2016 – Foundation Level

Mathematics

Friday 10 June
Afternoon 2:00 to 4:00