

**Question 1** (Suggested maximum time: 10 minutes)

**Question 1** (Suggested maximum time: 10 minutes)

- (a) (i)** Write down the **biggest** possible six-digit number.

[illegible]

- (ii) Write down the **smallest** possible six-digit number that does **not** start with 0.

- (b)** Write in the missing number in each of the following sequences.

- |     |             |  |
|-----|-------------|--|
| (i) | 3, 5, 7, 9, |  |
|-----|-------------|--|

- |      |              |  |
|------|--------------|--|
| (ii) | 1, 4, 9, 16, |  |
|------|--------------|--|

- (iii) 2, 4, 8, 16, .

- (iv) , 10, 13, 16, 19.

[illegible][illegible]

## Question 2

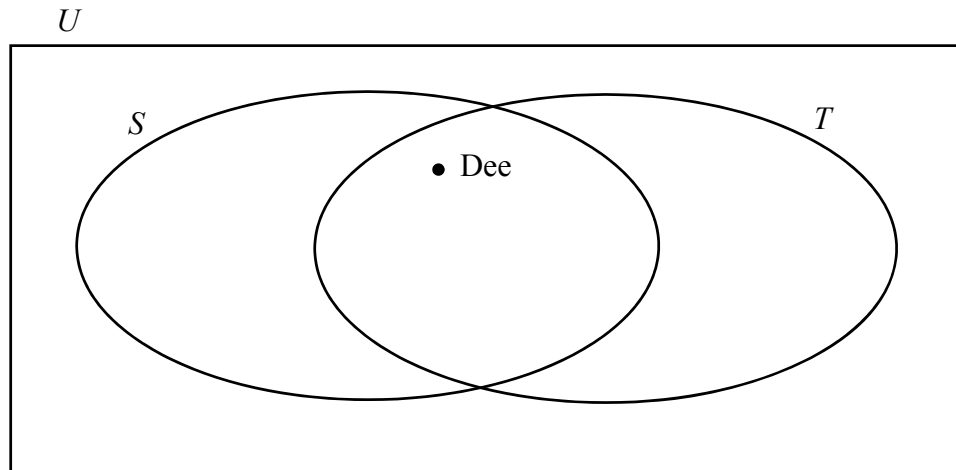
(Suggested maximum time: 10 minutes)

Dee, Máire, Ray, Evan, and Fiona all use Snapchat ( $S$ ).

Dee, Máire, and Ray use Twitter ( $T$ ).

Zach doesn't use Snapchat or Twitter.

- (a) Use this information to complete the Venn diagram below, where  $U$  is the universal set.



- (b) List the elements of each of the following two sets, where  $S'$  is the complement of the set  $S$ .

(i)  $S \cap T =$

(ii)  $S' =$

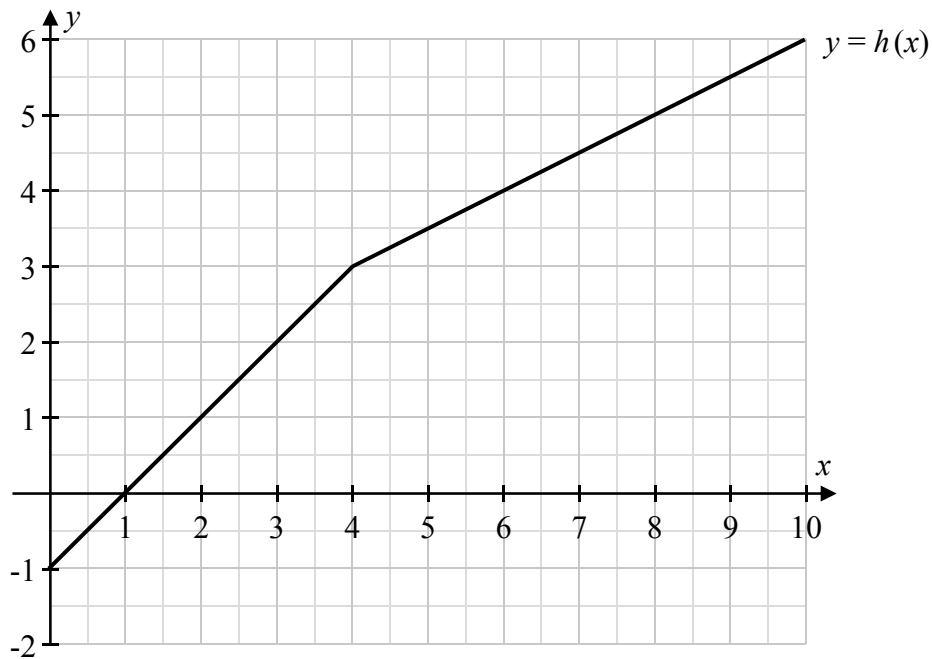
- (c) Put a tick (✓) in the correct box in each row of the table below, to show whether each statement is true or false.

Statement	Tick <b>one</b> only for each statement	
	True	False
$\# S = 3$		
$\text{Dee} \in T$		
$S \cup T = T \cup S$		
$T \subset S$		
$S \setminus T = \{ \}$		

### Question 3

(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 to answer the following questions.

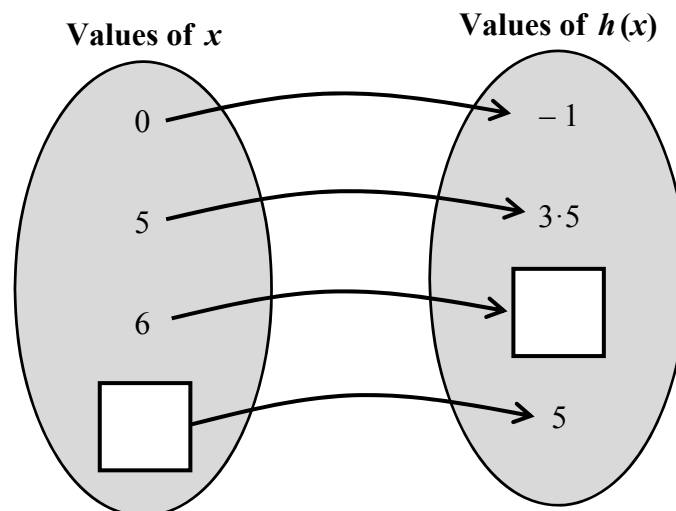
(i) Find the value of  $h(4)$ .

$$h(4) = \boxed{\phantom{00}}$$

(ii) What number must  $\odot$  represent, if  $h(\odot) = 1$ ?

$$\odot = \boxed{\phantom{00}}$$

(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  $x$ .



previous	page	running

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

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

Gary's gross income is €2450 per month (i.e. before tax is deducted).

He pays tax at a rate of 20% on his gross income.

- (a) Work out Gary's **gross tax** per month.

[illegible]

Gary has a tax credit of €275 per month.

- (b)** Work out Gary's **net income** per month (i.e. after tax is deducted).

[illegible]

### Question 5

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

Paula runs a plumbing business.

- (a)** She charges a basic call-out fee of €40.  
She also charges €30 for each hour, or part of an hour, that a job lasts.

Paula spent 2 hours and 45 minutes on a job.

Work out the total charge for this job.

[illegible]

- (b)** Paula is ordering parts from the UK.  
One part costs £24.83 sterling.  
The exchange rate is €1 = £0.71 sterling.

Work out the cost of this part, in euro. Give your answer correct to two decimal places.

- (c) The total charge for the parts, **before VAT**, is €330.  
€75.90 VAT is charged on the parts.

Find the **percentage rate of VAT** charged on the parts.

[illegible]

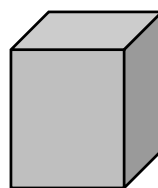
**Question 6** (Suggested maximum time: 10 minutes)

A shop sells two brands of orange juice, **Brand A** and **Brand B**, as shown.

- (a)** Find the price per litre of **Brand A**  
(i.e. the price of 1 litre of Brand A).

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

## Brand A



2 litres

€3.60

## Brand B



750 ml

€1.50

[illegible]

- (b)** Find which brand, **A** or **B**, is cheaper, per litre. Show all of your work.

Cheaper brand, per litre = \_\_\_\_\_

- (c) Samantha needs to buy **at least 5 litres** of orange juice.

Find the **lowest price** that she could pay to do this.

She can buy **Brand A**, **Brand B**, or a **combination** of both.

Justify your answer fully.

Lowest price =

**Question 7****(Suggested maximum time: 5 minutes)**

The attendance at the Ireland v Romania game in the 2015 Rugby World Cup was 89 267.

- (a) Hugo rounded 89 267 to the **nearest 10**.  
Write down Hugo's estimate of the attendance.


- (b) Danny rounded 89 267 to **2 significant figures**.  
Write down Danny's estimate of the attendance.


- (c) Jenny rounded 89 267 to 89 300.  
Write down Jenny's estimate in the form  $a \times 10^n$ , where  $1 \leq a < 10$  and  $n \in \mathbb{N}$ .


**Question 8****(Suggested maximum time: 5 minutes)**

- (a) Multiply out and simplify  $(x + 9)(2x - 1)$ .

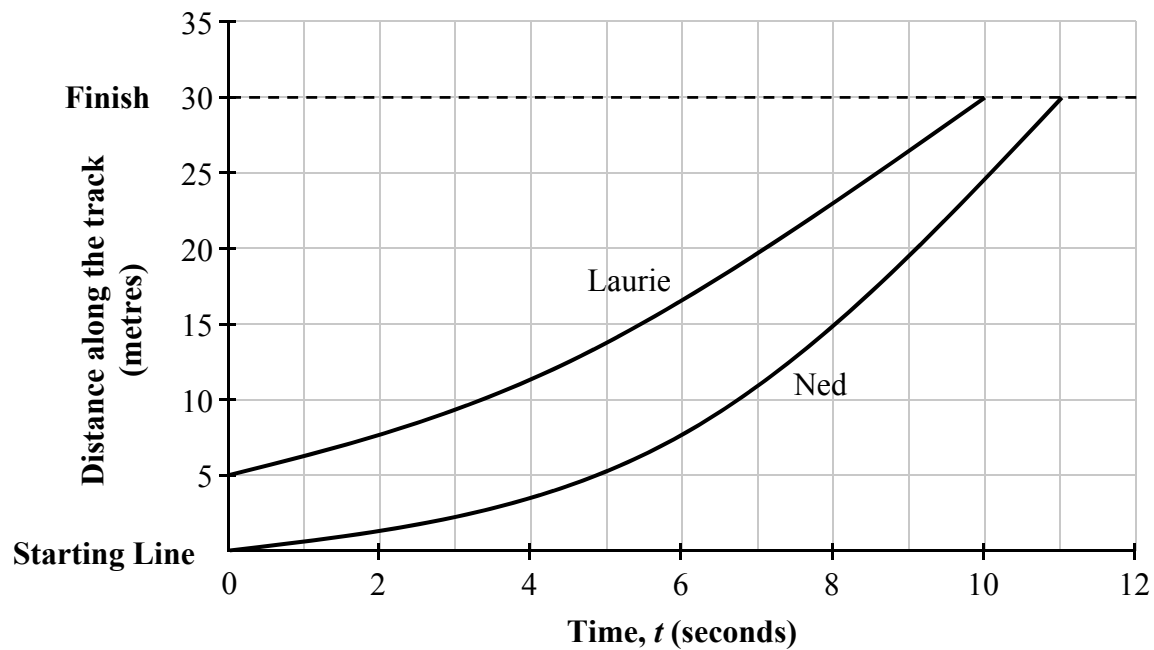

- (b) Factorise fully  $3ax + ay + 3cx + cy$ .


previous	page	running
----------	------	---------

**Question 9** (Suggested maximum time: 10 minutes)

**Question 9** (Suggested maximum time: 10 minutes)

Ned and Laurie had a race. Laurie was given a head start, so she ran a shorter distance than Ned. The graphs below show the distance along the track, in metres, that each of them was from the starting line after  $t$  seconds of the race.



- (a)** What **distance** did **Ned** run during the race?

Ned's distance =

m

- (b)** What **distance** did **Laurie** run during the race?

Laurie's distance =

m

[illegible]

- (c) How many **seconds** did it take **Laurie** to finish the race?

Answer =

□

seconds

- (d)** Work out **Laurie's** mean **speed** during the race, in metres per second.

[illegible]



- (e) Ned says: “I ran at the same speed for the whole race.” Is Ned correct? Give a reason for your answer.

Answer:	
Reason:	

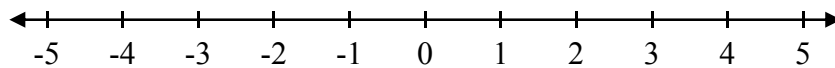
### Question 10

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

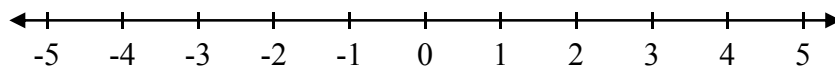
Graph each of the following inequalities on the number line given.

*Note:*  $x$  is an element of a different set ( $\mathbb{N}$ ,  $\mathbb{Z}$ , or  $\mathbb{R}$ ) in each case.

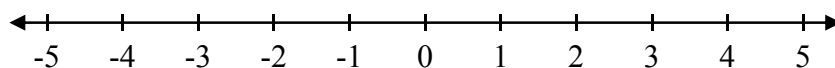
- (a)**  $x < 4$ , where  $x \in \mathbb{N}$ .



- (b)**  $x < 4$ , where  $x \in \mathbb{Z}$ .



- (c)  $x < 4$ , where  $x \in \mathbb{R}$ .



Question 11

(Suggested maximum time: 5 minutes)

Fill in the table by writing each expression in the form  $2^p$ , where  $p \in \mathbb{N}$ .  
One has already been filled in for you.

Expression	In the form $2^p$ , where $p \in \mathbb{N}$
$8 =$	<div><div></div><div><math>2^3</math></div><div></div></div>
$32 =$	<div><div></div><div></div><div></div></div>
$2 \times 2 \times 2 \times 2 \times 2 \times 2 =$	<div><div></div><div></div><div></div></div>
$2^7 \times 2^{10} =$	<div><div></div><div></div><div></div></div>
$(2^6)^4 =$	<div><div></div><div></div><div></div></div>

### Question 12

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

The letter  $J$  stands for Jake's age, in years.

- (a) 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.	

[illegible]

- (b)** Solve this equation:

$$5M + 2 = 2M + 35.$$

A blank sheet of graph paper with a grid of squares. The grid consists of 20 columns and 10 rows of small squares. There are no margins or additional markings on the page.

### Question 13

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

The graphs of the functions  $f(x)$  and  $h(x)$  are shown on the co-ordinate grid on the right.

The functions are:

$$f(x) = x + 1$$

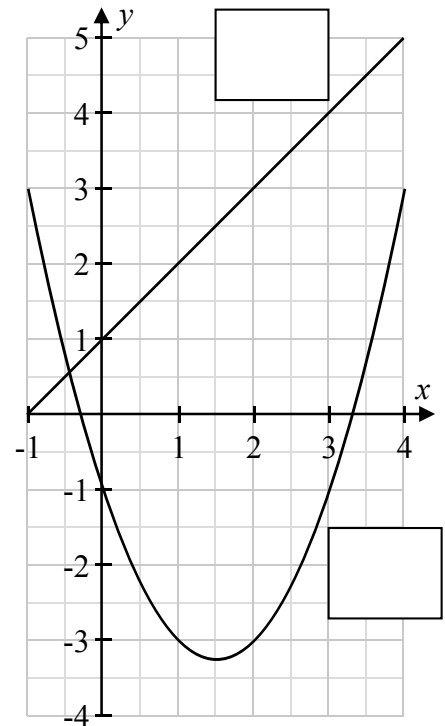
$$h(x) = x^2 - 3x - 1.$$

- (a)** Match the functions to the graphs by writing  $f(x)$  or  $h(x)$  in the box next to the corresponding graph.
- (b)** For one of the functions above, give a reason for your answer in part **(a)**.

Function:

--

Reason for your answer:



- (c) Use the graphs to estimate the solution of the equation  $x + 1 = x^2 - 3x - 1$ , between  $-1$  and  $4$ .

 $x =$ 

--

- (d)** Work out the value of  $h(8)$ .

Remember that  $h(x) = x^2 - 3x - 1$ .

[illegible]

### Question 14

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

- (a) (i)** Factorise  $x^2 + 6x - 7$ .

$$x^2 + 6x - 7 = (x + 7)(\quad)$$

- (ii)** Using the factors from part **(a) (i)**, or otherwise, solve the equation:

$$x^2 + 6x - 7 = 0.$$

A large grid of graph paper with 20 columns and 10 rows. The grid is composed of small squares, with a slightly larger margin on the left side for writing.

- (b)** Solve the following simultaneous equations.

$$3x + 2y = 39$$

$$x + 2y = 25$$

[illegible]