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

The table below shows all the factors of each of the given numbers.

(a) Complete the table to show **all** the factors of 10, 11, and 12.

Number	Factors
9	1, 3, 9
10	
11	
12	

(b) Which one of the numbers 9, 10, 11, or 12 is **prime**? Give a reason for your answer.

Number that is prime: 9 10 11 12

(Tick (✓) **one** box only) ❑ ❑ ❑ ❑

Reason:

(c) Write down three **other prime** numbers between 0 and 20.

Answer = ____ , ____ , and ____ .

(d) Find the **smallest** number that is a **multiple** of each of the three numbers you chose in part **(c)** above (i.e. their Lowest Common Multiple).

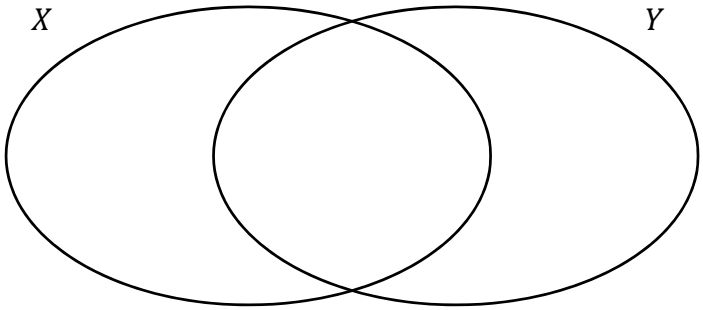
page

Question 2 **(Suggested maximum time: 10 minutes)**

(a) Fill in the Venn diagram below, given that:

$X = \{ \text{N, I, C, O, L, A} \}$

$Y = \{ \text{S, O, P, H, I, A} \}$.



(b) Write down a **subset** of X that has 2 elements, and that is also a subset of Y.

Answer $=$ $\{\quad , \quad\}$

(c) Write down a **subset** of X that has 2 elements, and that is **not** a subset of Y.

Answer $=$ $\{\quad , \quad\}$

The table below shows three statements. Each statement is written in English and in set notation.

(d) Complete the table.

	English	**Set Notation**
Statement 1	Letters in both X **and** Y.	$X \cap Y$
Statement 2		$X \backslash Y$
Statement 3	Letters in X **or** Y **or both**.	

Question 3 **(Suggested maximum time: 10 minutes)**

Kyle has a job in Cashel Cineplex.
He works every Friday and Saturday, from 6 p.m. to 11 p.m.

(a) **(i)** How many hours does Kyle work every week?

(ii) Kyle earns €95 in **total** every week. Work out how much he earns **per hour**.

(iii) Kyle saves 70% of the €95 he earns each week.
He spends the remainder of this money each Sunday.
Work out how much money he **spends** each Sunday.

(b) Kyle's mum has 20 beehives. She has $60\,000$ bees in each beehive.
Each bee makes an average of $0{\cdot}7$ grams of honey in its lifetime.

Find how many grams of honey are made in total by the bees in these 20 beehives.
Give your answer in the form $a \times 10^n$, where $1 \leq a < 10$, $n \in \mathbb{N}$.

Question 4 **(Suggested maximum time: 10 minutes)**

In a raffle, there is a choice of three different prizes, **A**, **B**, or **C**.
The winner of the raffle chooses **one** prize.

(a) Prize **A**: The winner gets some money each day for six days.
She gets €10 on Day 1, €15 on Day 2, and so on until Day 6.
Each day after Day 1, she gets €**5 more** than she got the day before.

(i) Complete the table below to show how much money she gets each day for Prize **A**.

	Day **1**	Day **2**	Day **3**	Day **4**	Day **5**	Day **6**
Prize **A**	€10	€15				

(ii) What kind of sequence is made by the daily amounts that the winner gets for Prize **A**?
Give a reason for your answer.

Kind of sequence: (Tick (✓) **one** box only) Linear ❑ Quadratic ❑ Exponential ❑

Reason:

(iii) Find the **total** amount of money the winner will get if she chooses Prize **A**.

(b) Prize **B**: The winner gets €2 on Day 1, €4 on Day 2, and so on until Day 6.
Each day after Day 1, she gets **twice as much** as she got the day before.

(i) Complete the table below to show how much money she gets each day for Prize **B**.

	Day **1**	Day **2**	Day **3**	Day **4**	Day **5**	Day **6**
Prize **B**	€2			€16		

(ii) What kind of sequence is made by the daily amounts that the winner gets for Prize **B**?
Give a reason for your answer.

Kind of sequence: (Tick (✓) **one** box only) Linear ❑ Quadratic ❑ Exponential ❑

Reason:

For Prize **C**, the winner gets a single prize of €100 on Day 1.
Alexa wins the raffle.

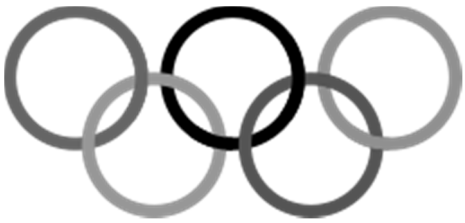
(c) Which prize do you think Alexa should choose, Prize **A**, Prize **B**, or Prize **C**?
Give a reason for your answer.

Alexa should choose: (Tick (✓) **one** box only) Prize **A** ❑ Prize **B** ❑ Prize **C** ❑

Reason:

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

Tom and Mary travelled to Rio with their two children to watch the Olympic Games. They flew from London to Rio.



The time in Rio was 4 hours behind the time in London, so when it was $6{:}00$ p.m. in London, it was $2{:}00$ p.m. in Rio.

Their flight left London at $9{:}00$ a.m.

(a) **(i)** What was the time in Rio when their flight left London?

Their flight took 11 hours and 40 minutes.

(ii) What was the time in Rio when their flight landed?

The currency in Rio is the Real (R$).
The exchange rate was €$1 =$ R$3{\cdot}60$.

(b) The total cost of their tickets for the Athletics was R$756.
Work out the cost of these tickets in euro (€).

Tom and Mary got 2 adult tickets and 2 children's tickets for their R$756.
The cost of an adult ticket was **twice** the cost of a child's ticket.

(c) Work out the cost of a child's ticket. Give your answer in Real (R$).

Cost of a child's ticket $=$ R$

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

Emma was 4 years old when her dog Spot was born.
The table below shows Emma's age and Spot's age at different times.

Emma's age, in years	**4**	**5**	**6**	**7**	**10**	**16**
(a)(i) Spot's age, in years	0	1				
(a)(ii) Spot's age, in dog years		7			42	

(a) **(i)** Fill in the row in the table showing Spot's age in years, given Emma's age.

Emma says that 1 year is the same as **7 dog years**.

(ii) Fill in the row in the table showing Spot's age in dog years, given Emma's age.

(b) At the moment, Spot's age is **105 dog years**.
Work out Emma's age, in years.

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

The function h takes a **shape** as an input. The output is the **number of sides** of that shape.

(a) Complete the table below, showing the number of sides of four different shapes.

Shape: x	Number of sides: $h(x)$
Pentagon	5
Square	
Hexagon	
	3

(b) Write down the **range** of the function h, as shown in the table above.

Range $=$ $\{\quad,\quad,\quad,\quad\}$

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

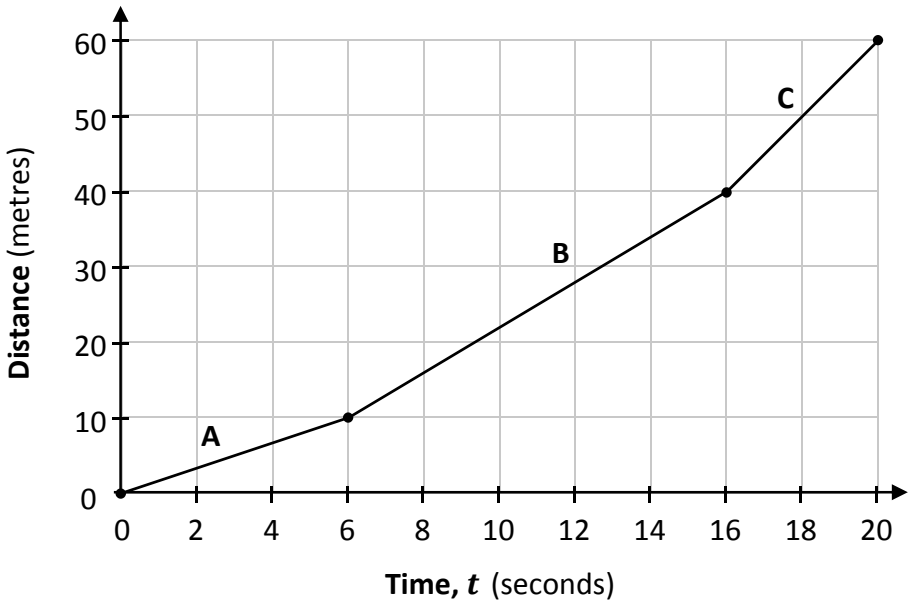
(a) Find the value of $\frac{2n+1}{3n-2}$, when $n = 4$.

(b) Multiply out and simplify $(w + 4)(3w - 2)$.

Question 9 **(Suggested maximum time: 15 minutes)**

Martin took part in a 60 metre race.

The graph below shows the distance in metres travelled by Martin after t seconds during the race. The graph is in three sections, labelled **A**, **B**, and **C**.



(a) **(i)** How many seconds did it take Martin to finish the race? Answer = ☐

(ii) What distance had Martin travelled after 16 seconds? Answer = ☐ m

(b) **(i)** Which was Martin's **slowest** section of the race?

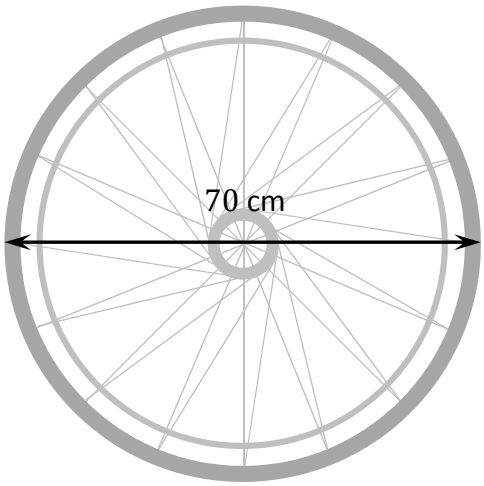
Martin's slowest section: (Tick (✓) **one** box only)	**A**	**B**	**C**
	❑	❑	❑

(ii) Find Martin's **speed** during his slowest section of the race, in metres per second.

This question continues on the next page.

Martin was racing in a wheelchair.

The **diameter** of the large circular wheel on Martin's wheelchair was 70 cm.



(c) **(i)** Write down the **radius** of this wheel.

Radius $=$ ☐ cm

(ii) Show that the length of the **perimeter** of this wheel was 220 cm, correct to the nearest centimetre.

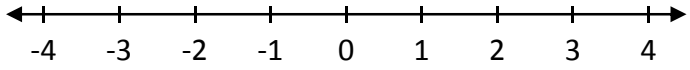
Every time this wheel turned fully, the wheelchair travelled a distance equal to the length of the wheel's perimeter.

(d) Find how many times this wheel turned **fully** during the 60 metre race.
Remember that there are 100 cm in one metre.

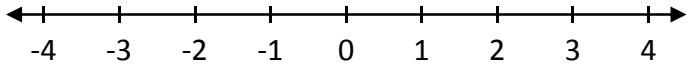
Question 10 **(Suggested maximum time: 5 minutes)**

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.

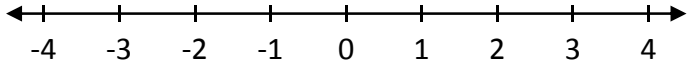
(a) $x \geq -2$, where $x \in \mathbb{Z}$.



(b) $x \geq -2$, where $x \in \mathbb{N}$.



(c) $x \geq -2$, where $x \in \mathbb{R}$.



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

(a) Factorise $x^2 + 4x - 5$. One of the factors is $(x + 5)$.

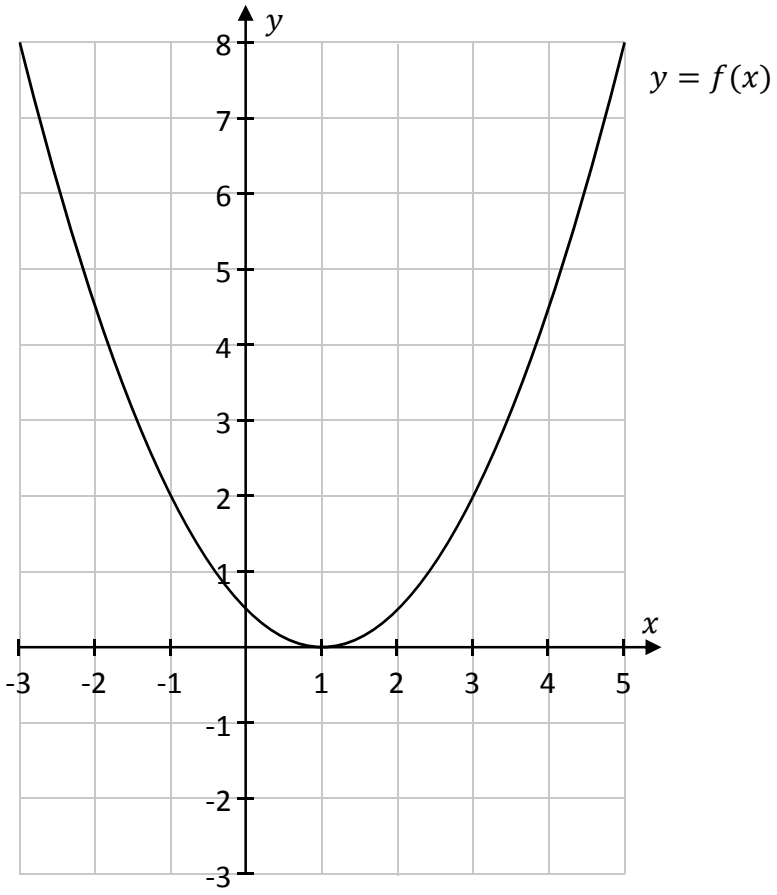
$x^2 + 4x - 5 = (\ x\ +\ 5\ )\ (\qquad\qquad)$

(b) Using your factors from part **(a)**, or otherwise, solve the equation:

$$x^2 + 4x - 5 = 0.$$

Question 12 **(Suggested maximum time: 15 minutes)**

(a) The co-ordinate diagram below shows the graph of the function $y = f(x)$.



(i) On the same axes, draw the graph of the **line** $g(x) = x + 3$, for $-3 \leq x \leq 5,\ x \in \mathbb{R}$.

(ii) Use the graphs to write down the points of intersection of $f(x)$ and $g(x)$.

Answer = (,) and (,)

(b) Another function is $k(x) = x^2 - 2x - 1$.

(i) Work out the value of $k(3)$.

(ii) Draw the graph of the function $k(x) = x^2 - 2x - 1$ on the axes below, for $-2 \leq x \leq 4,\ x \in \mathbb{R}$.