Examiner only

1. (a)   2   3   8   16   20   24   29

From the numbers in the list above, write down

(i)   a square number,   [1]

16

(ii)   the smallest prime number.   [1]

2

(b)   (i)   Work out 420 + 85.   [1]

$$\begin{array}{r} 420 \\ + 85 \\ \hline 505 \end{array}$$

(ii)   Work out 0·045 × 100.   [1]

4·5

(c)   Write 17% as a fraction.   [1]

$\frac{17}{100}$

(d)   Write the following values in order.
Start with the largest.   [1]

−2   0   −5   0·03

0·03   0   −2   −5

Largest

(e)   Work out $\frac{6 \times 40}{12}$.   [2]

$= \frac{240}{12} = 20$

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2. Samad asks a group of 120 football fans the following question.

"What type of football matches do you enjoy watching most?"

The pictogram shows his results.
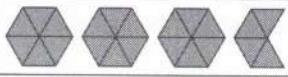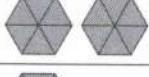
League	⬡⬡⬡◮	44
FA Cup	⬡⬡	24
European Championships	⬡	12
World Cup	⬡⬡⬡◿	40

| Key | ⬡ | represents 12 fans |

*(a)* How many more football fans answered League than answered FA Cup? [1]

44 − 24 = 20

(b) A football fan is chosen at random from Samad's group of 120.

(i) On the probability scale below, mark with an arrow the probability that this football fan answered European Championships. [2]

$\dfrac{12}{120} = \dfrac{1}{10}$

(C300U10-1)
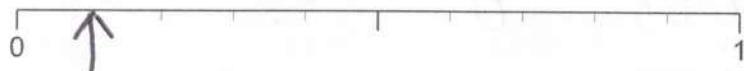
(ii) Work out the probability that the football fan answered World Cup.
Give your answer as a fraction in its simplest form. [2]

$$\frac{40}{120} = \frac{4}{12} = \frac{1}{3}$$

3. (a) Circle the equation. [1]

$2x > 3$ $\boxed{3x = 6}$ $x \leqslant 5$ $x \neq 2$ $5x + 7$

(b) Circle the expression that means '4 lots of n'. [1]

$4 + n$ $n \times n \times n \times n$ $n = 4$ $n \div 4$ $\boxed{4n}$

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4. Joni is buying a Silver Twist carpet.
She needs to buy <u>30 m²</u> and have it <u>delivered</u>.

Joni wants to pay the lowest total price possible.
She chooses from these two local shops.

Supadeal Carpets

50% off marked price
Local delivery £25

£12

Silver Twist
£24 per m²

Rugs to Go

Always low prices
Free local delivery

Silver Twist
£13 per m²

From which shop should she buy her carpet and how much will she save by choosing this shop?
You must show all your working. [5]

$$30 \times 12 = 360$$

$$360 + 25$$

$$= £385$$

$$30 \times 13$$

$$= £390$$

She should buy from ....Supadeal.......... and will

save £ ......5......

5. The diagram shows an (equilateral) triangle, *PQR*, inside a rectangle, *PSTU*.
*Q* is on side *PS* of the rectangle.
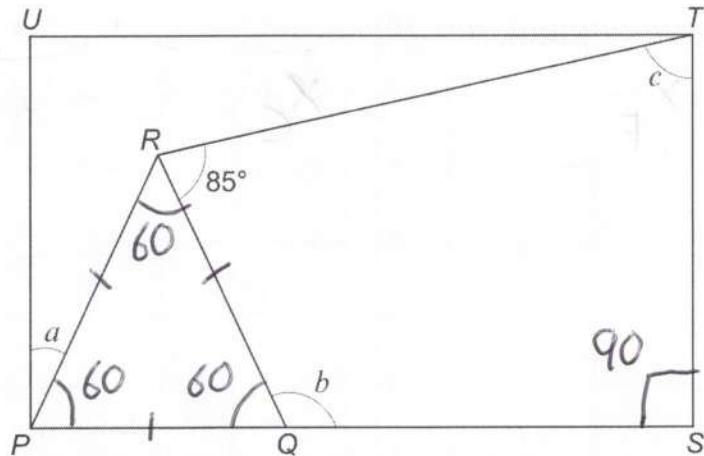
Diagram not drawn to scale

Calculate the size of each of the angles, a, b and c. [4]

$$b = 180 - 60 = 120$$

$$a = 90 - 60 = 30$$

$$85 + 90 + 120 = 295$$

$$c = 360 - 295$$

$$120$$

$a =$ __30__ °, $b =$ __120__ °, $c =$ __65__ °

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6. The points *A*, *B*, *D* and *E* have been marked on the 1 cm grid below.
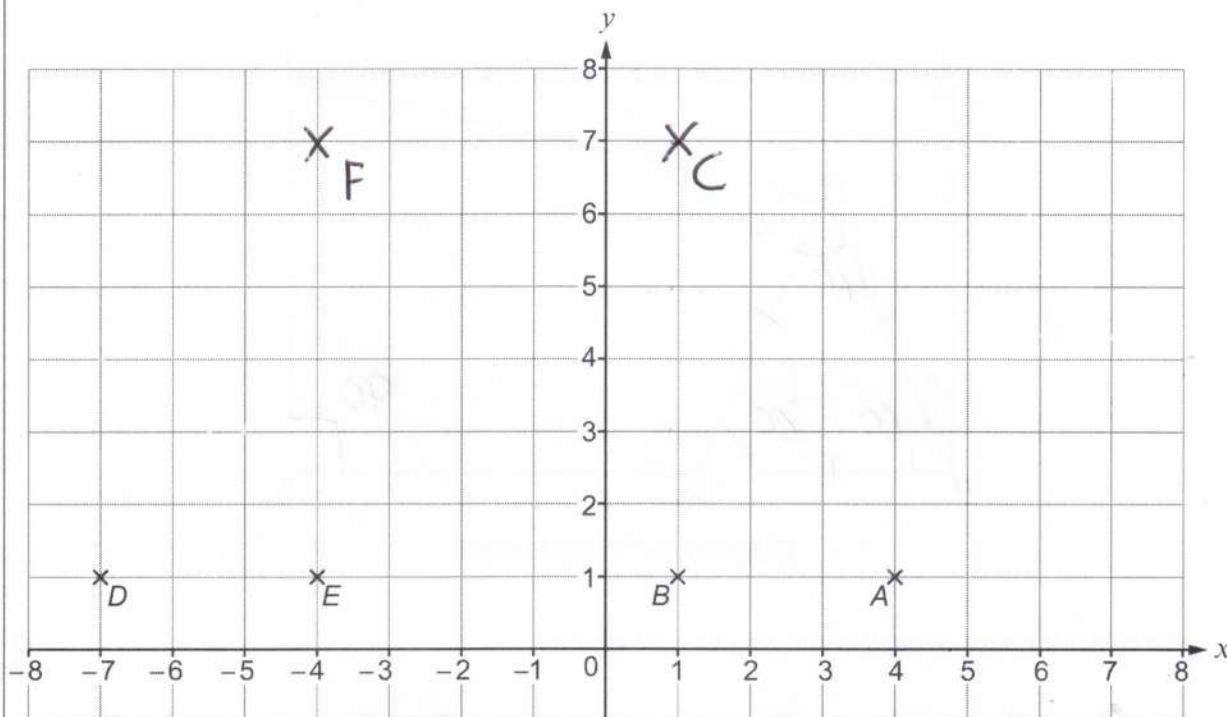
(a) Write down the coordinates of *E*. [1]

E (─4 , 1)

(b) (i) *ABC* is a triangle with the following properties.

- Angle *ABC* is a right angle.
- The length of *BC* is twice the length of *AB*. → 3 → 6

Mark and label the position of *C* on the grid. [2]

(ii) *D* and *E* are two vertices of a triangle *DEF*.
Triangle *DEF* is congruent to triangle *ABC*.

Mark and label the position of *F* on the grid. [1]

(C300U10-1)

7. Maria is playing a game with two fair spinners.
She spins each spinner once.
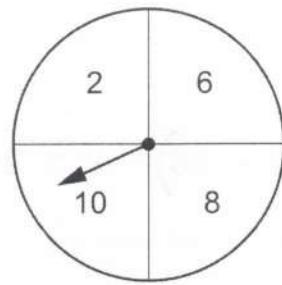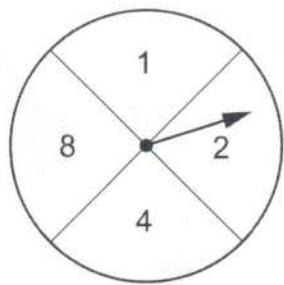
She adds the two scores together.

(a) Complete the diagram to show all the possible totals. [1]

		Spinner 2		
+	2	6	8	10
1	3	7	9	11
2	4	8	10	12
4	6	10	12	14
8	10	14	16	18

Not win

(b) Maria wins the game when the total is 10 or less.

What is the probability that Maria does **not** win the game? [2]

$\frac{7}{16}$

Turn over.

8. *(a)* Put one pair of brackets in each calculation to make it correct.

(i) $3 \times (4 + 1) \times 2 = 30$ [1]

(ii) $(50 - 36) \div 2 \times 3 = 21$ [1]

(b) Callum is working out $(41 - 29 \cdot 5)^2$.

He **estimates** the answer to be 700.

Is Callum's answer a good estimate?

Yes ☐ No ☑

Show how you decide. [2]

$(41 - 30)^2 = 11^2 = 121$

(C300U10-1)

9. *(a)* Here is a number machine.

| INPUT | → | Multiply by 7 | → | Add 3 | → | OUTPUT |
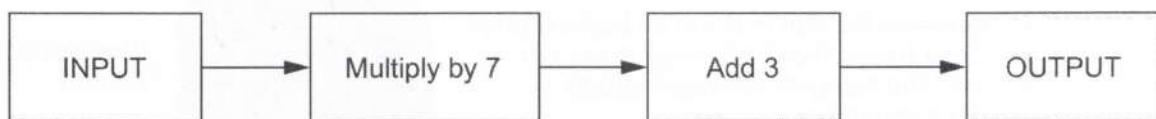
(i) The input is 6.
What is the output? [1]

$$6 \times 7 = 42$$

$$42 + 3 = 45$$

(ii) The input is $2x$.
Write an expression for the output.
Simplify your answer. [2]

$$2x \times 7 = 14x \qquad 14x + 3$$

(b) Here is a different number machine.

| INPUT | → | Subtract 8 | → | $\div 10$ | → | OUTPUT |

4
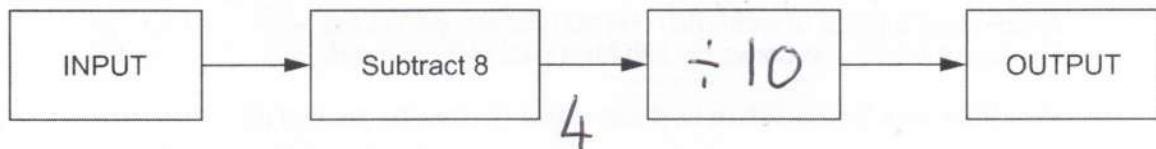
When the input is 12 the output is 0·4.

Complete the number machine.
You must use multiplication or division. [1]

$$\left(\text{or} \times \tfrac{1}{10} \text{ etc} \right)$$

(C300U10-1)

Turn over.

10. *(a)* Katy uses the following rule for cooking frozen fish.

- Measure the fish in cm at its thickest point.
- Cook frozen fish for 8 minutes per cm.
- Turn the fish over halfway through the cooking time.

Thickest point (in cm)
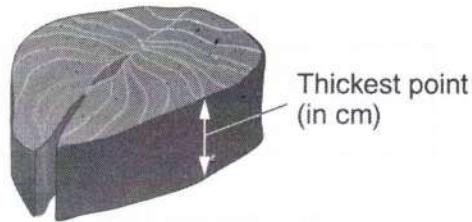
Katy cooks a piece of frozen fish that measures 3 cm at its thickest point.

After how many minutes should Katy turn her piece of fish over? [2]

$3 \times 8 = 24$ $24 \div 2 = 12$

(b) Sajid uses the following rule for cooking fresh fish.

- Measure the fish in cm at its thickest point.
- Cook fresh fish for 4 minutes per cm.
- Add an extra 5 minutes to the cooking time for fish wrapped in foil.

Sajid cooks a piece of **fresh** fish that he has wrapped in foil.
He uses the rule and cooks his fish for a total of 31 minutes.

How thick was Sajid's fish at its thickest point before he cooked it? [2]

$31 - 5 = 26$

$$4 \overline{) 26 \cdot 0} \quad 6 \cdot 5 \text{ cm}$$

11. *(a)* £125 is invested at a fixed percentage rate of simple interest.
In 3 years it earns £9 simple interest.

How many years in total will it take to earn £36 simple interest? [1]

$$\frac{9}{3} = £3 \text{ per yr} \qquad 36 \div 3$$

12 years

(b) Jim invested £20 000 in Lulu's business.
Lulu agreed to pay Jim a fixed percentage rate of simple interest each year on his investment.
At the end of 5 years, Lulu had paid Jim a total of £4000 in interest payments.

What yearly rate of simple interest did Lulu agree to pay? [3]

$$\frac{800}{5 \overline{)4000}}$$

$$\frac{800}{20000} \times 100 = \frac{8}{2}$$

4 %

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C300U101
13

12. *(a)* The table shows the standard prices per night at the *Cliff Hotel* for 2022.

Dates	Double Plus Room (1 or 2 adults plus no more than one child)	Family Room (4 or 5 people)	
		Each adult	Each child
01 Mar – 31 May	£117	£63	£8
01 Jun – 31 Aug	£160	£80	£12
01 Sep – 30 Nov	£105	£57	£7

The hotel website states:
- a child must be 17 years old or less,
- a person aged 18 or more must pay the adult rate,
- a **single adult** in a double plus room pays $\frac{3}{4}$ of the standard price per night.

Mr and Mrs King are making a booking for one night in August 2022.
They will be taking their two sons, William aged 11 and Henry aged 20.

Mr and Mrs King are going to book either
- one double plus room for themselves and William and one double plus room for Henry, or
- one family room for all 4 of them.

How much **more** will it cost the King family to stay for the night in two double plus rooms than it will if they stay in a family room?
You must show all your working. [5]

$$\text{Option 1} = 160 + \frac{3}{4} \times 160$$

$$= 160 + 120 \qquad = £280$$

$$\text{Option 2} = 3 \times 80 \quad + 12$$

$$= 240 + 12 \quad = £252$$

$$\begin{array}{r} 2\overset{7}{\cancel{8}}0 \\ -252 \\ \hline 28 \end{array}$$

£ ___28___ more

(b)   In March 2020, the King family went on holiday to New Delhi, India.

(i)   When their flight took off from London, it was 14:55 in New Delhi.
The duration of the flight was 8 hours 10 minutes.

What was the time in New Delhi when their flight arrived?   [2]

$+ 8hrs = 22:55$

$+ 10mins = 23:05$

(ii)   Flights from New Delhi back to London take a different route.

The King family's flight was due to take off from New Delhi at 11:05, New Delhi time,
on 21st March.
It was due to arrive in London at 15:20, London time, on 21st March.
New Delhi time is 5 hours 30 minutes ahead of London time.

What was the duration of their flight?
You may assume the flight took off and landed on time.   [3]

ND   L
11:05 $5:35 \longrightarrow 15:20$
$-5hr\ 30$
                    $= 10hrs - 15mins$
$= 5:35$

Duration of flight $9hr\ 45min$

(iii)   The assumption in part (ii) was incorrect.
The flight took off 10 minutes late and landed in London before 15:20.

How does this affect your answer to part (ii)?   [1]

The flight took less than 9h45

(C300U10-1)   **Turn over.**

13. *(a)* The scale drawing shows the positions of a beach café (*B*), a church (*C*) and a farmhouse (*F*) on an island.

Scale: 1 cm represents 1000 m

D

North

8cm

C

North

B

F
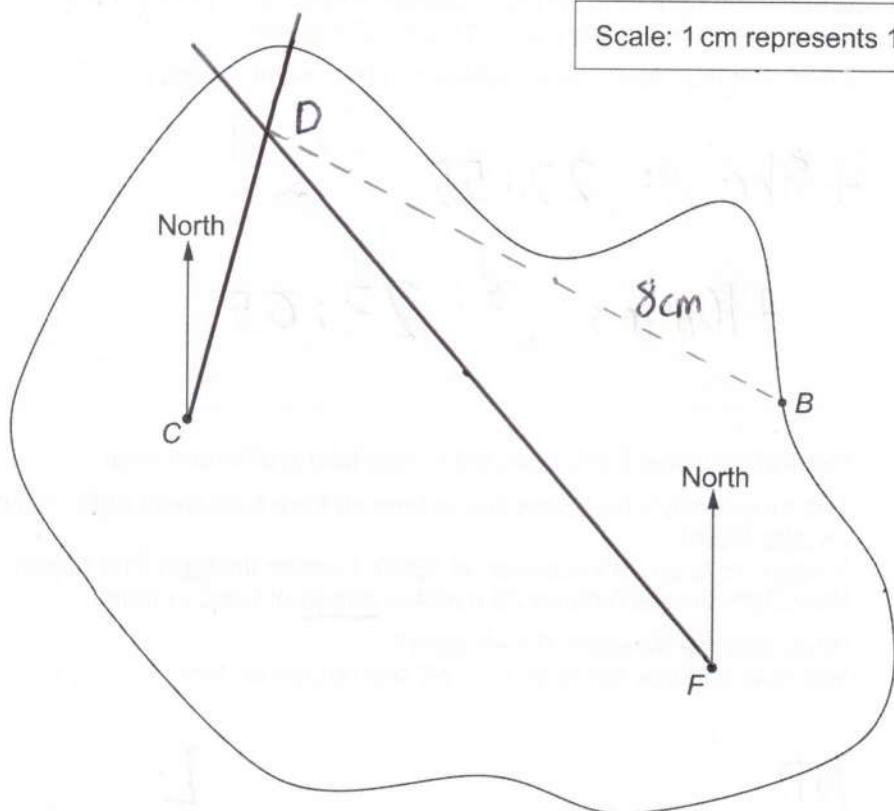
Don's house is on a bearing of 015° from the church (*C*) and on a bearing of 320° from the farmhouse (*F*).

(i) Mark the position of Don's house (*D*) on the diagram. [3]

(ii) Work out the shortest distance in metres from Don's house (*D*) to the beach café (*B*). [2]

"8" x 1000

8000

.... metres

(b) During the holiday season, a boat brings people to a point on the island.

Don drives a minibus taking people from the boat to the beach café.

Don's minibus has seats for 16 passengers.
He makes 3 trips every 2 hours from the boat to the beach café.

He starts work at the boat at 10 a.m. and finishes at 5 p.m.
His lunchtime lasts for 1 hour.
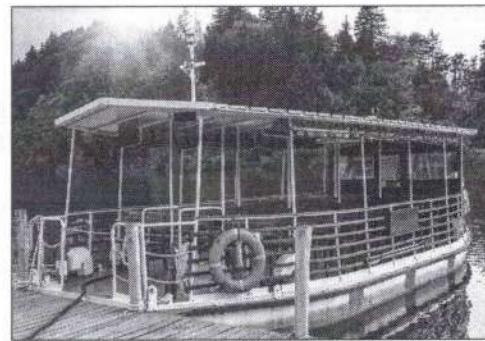
What is the (greatest) number of people Don can take from the boat to the beach café each day?
You must show all your working. [4]

$$10am \rightarrow 5pm = 7hr$$

$$- lunch = 6 hrs$$

$$16 \times 3 = 48 \text{ every } 2 hr$$

$$\begin{array}{r} 48 \\ \times\,3 \\ \hline 144 \end{array}$$

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14. Three workmates, Alf, Nicky and Harriet, took part in a first aid training course at the local medical centre.
The course ended at 15:30.

After the course, they all travelled home to the same village.
The distance-time graph shows Alf's journey and Nicky's journey.

Distance travelled from medical centre (km)
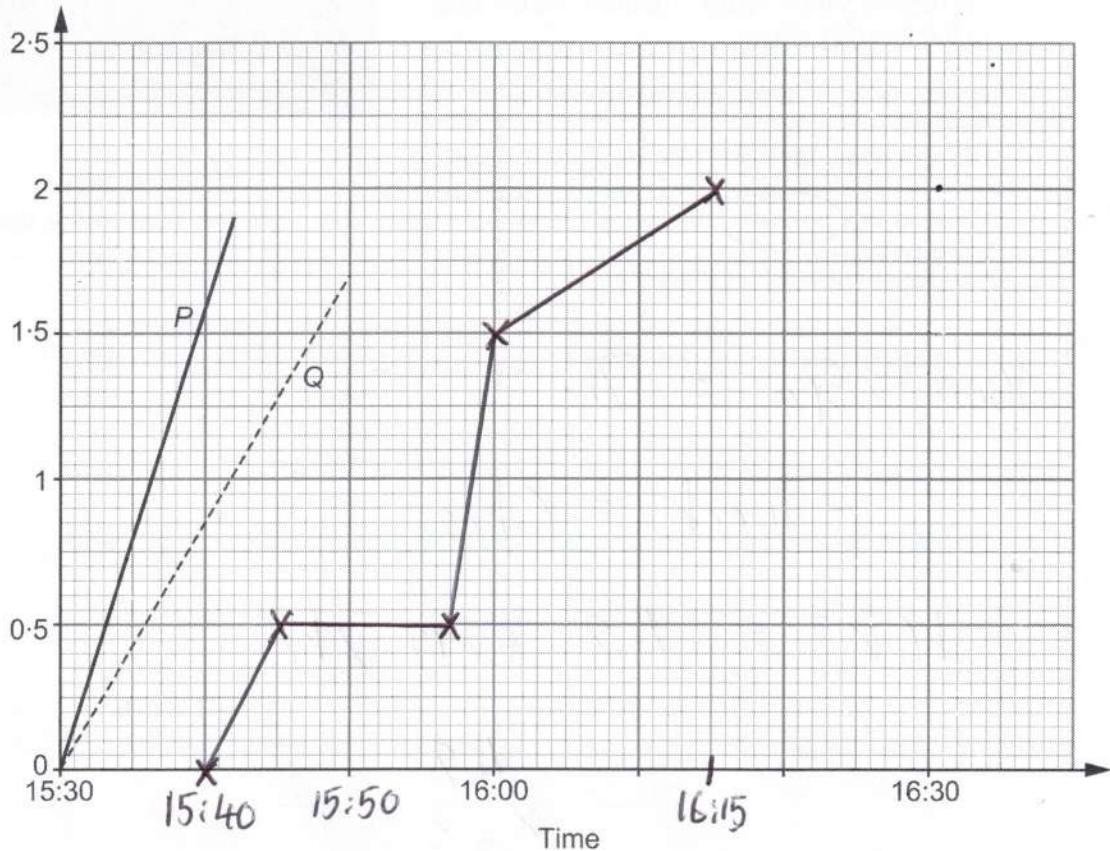
(a) Alf rode his bicycle and Nicky walked home.

Which of the two lines on the graph, *P* or *Q*, is more likely to represent Nicky's journey home?

P ☐   Q ☑

Explain how you decide. [1]

Riding a bike should be quicker (steeper line) than walking

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(b) Harriet waited 10 minutes at a bus stop outside the medical centre and then caught the bus home.

After 5 minutes, the bus stopped in a traffic jam 0·5 km from the medical centre for 12 minutes.
The bus then travelled directly to Harriet's village.
Harriet got off the bus at a stop in her village 1·5 km from the medical centre.
Harriet was on the bus for a total of 20 minutes.

(i) Draw Harriet's bus journey on the distance-time graph. ✓ [3]

....

....

(ii) Harriet got off the bus and then walked 0·5 km to her house.
She walked at a speed of 2 km per hour.

How many minutes did it take Harriet to walk home from the bus stop? [2]

÷4 $\left(\dfrac{2\,Km \rightarrow 60\,mins}{0.5\,Km \rightarrow} \right)$ ÷4

.... 15 .... minutes

(iii) Harriet lives further from the medical centre than Alf and Nicky.

Complete Harriet's journey home on the distance-time graph. ✓ [1]

....

....

(C300U10-1)

Turn over.

15. When they were students, Paige and Anja had part-time jobs.

(a) One week, Paige earned £51 at a rate of £8.50 per hour.

For how many hours did Paige work? [2]

$$8.5 \times 2 = 17$$
$$17 \times 3 = 51 \qquad \text{so} \qquad 6\,hrs$$

(b) Anja worked as a carer at weekends.
Her rate of pay for the daytime was £12 per hour.
Her rate of pay for the night-time was £9 per hour.

(i) How much did Anja earn for working 20 daytime hours and 10 night-time hours? [2]

$$12 \times 20 = 240$$
$$10 \times 9 = 90 \qquad +$$

$$= £330$$

(ii) Last weekend, her total daytime pay and her total night-time pay were in the ratio

total daytime pay : total night-time pay = 4 : 1.

She earned a total of £360.

How many night-time hours did she work last weekend? [3]

$$\tfrac{1}{5} \text{ of } 360 = 5\overline{)360}^{\,72}$$

$$72 \div 9 = 8\,hrs$$

(C300U10-1)

16. One evening all the members of a craft club either paint, sew or knit.
Each member takes part in only one activity.

- $\frac{1}{3}$ of the members paint.

- $\frac{2}{5}$ of the members sew.

- The remaining members all knit.

That evening, 33 of the members either **paint** or **sew**.

How many members does the craft club have in total? [4]

$$\frac{1}{3} + \frac{2}{5} = \frac{5}{15} + \frac{6}{15} = \frac{11}{15}$$

$$SO \quad \frac{11}{15} = 33$$

$\div 11$

$$\frac{1}{15} = 3$$

$\div 11$

$\times 15$

$$\frac{15}{15} = 45$$

$\times 15$

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17. Fifteen people aged between 40 and 60 take an eye test as part of an experiment.

The test involves reading letters from a chart.
Each line of letters is smaller than the line above.
Letter size is measured in points.
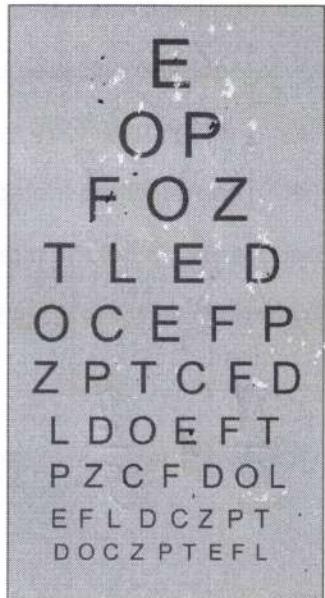
The scatter graph below shows the age of and the smallest letter size read by each person.

(C300U10-1)
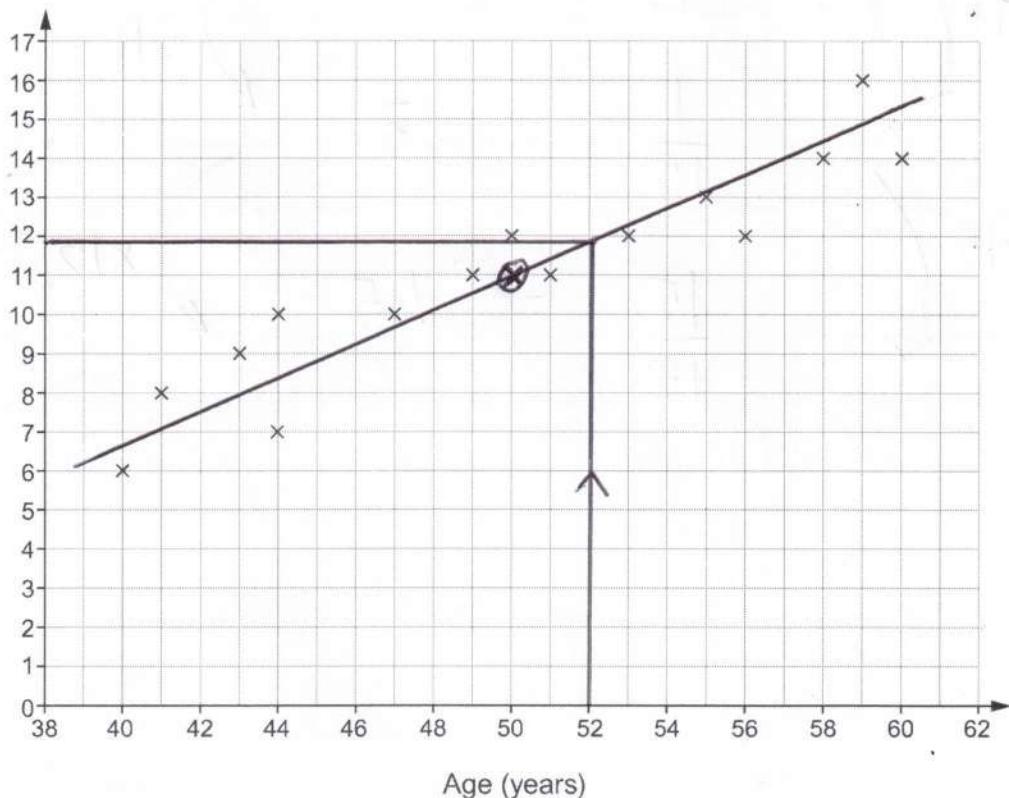
(a) The mean age is 50 years and the mean letter size is 11 points. ✓

Using this information, draw a line of best fit on the scatter graph. ✓ [2]

(b) Use the scatter graph to answer each of the following questions.

(i) Estimate the smallest letter size which can be read by a person aged 52. [1]

[ms 11 → 13]   12

(ii) Jared is 30 years old.

Should the scatter graph be used to estimate the smallest letter size that Jared can read?

Yes ☐   No ☑

Give a reason for your answer. [1]

There's no data for 30 year olds

Turn over.

18. Zena is carrying out a survey to find out how people learn about **recent national political events**.

Here is her question.

> Which method do you use to learn about politics?
> Tick (✓) one box.
>
> Social media ☐   Newspaper ☐   Radio ☐

Write a better version of Zena's question in the box below.
You must include response boxes.

[2]

Which method do you use to learn about politics most often?

Social Media ☐   News paper ☐   Radio ☐   Other ☐   None ☐

(C300U10-1)

19. *(a)* Simplify $5\sqrt{7} + 3\sqrt{7}$. [1]

$$8\sqrt{7}$$

(b) Work out the value of $6 + \sqrt[3]{8000}$. [1]

$$6 + 20 = 26$$

(c) Work out the value of $3^{20} \div 3^{18}$. [2]

$$= 3^{20-18}$$

$$= 3^{2} = 9$$

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20. A running club has 125 members. ✓
Each member is either a sprinter, a middle-distance runner or a long-distance runner.

82 members are seniors. ✓
45 members are long-distance runners and 5 of these are juniors. ✓
28 members are senior middle-distance runners. ✓
There are 3 more junior sprinters than senior sprinters.

A person is selected at random from the club.

Find the probability that this person is a junior middle-distance runner.
Use this table to help you.   [5]

	Sprinter	Middle-distance runner	Long-distance runner	Total
Senior	14	28	40	82
Junior	17	21	5	43
Total	31	49	45	125

Probability $\dfrac{21}{125}$

**21.** A company logo is printed on cards and letters.
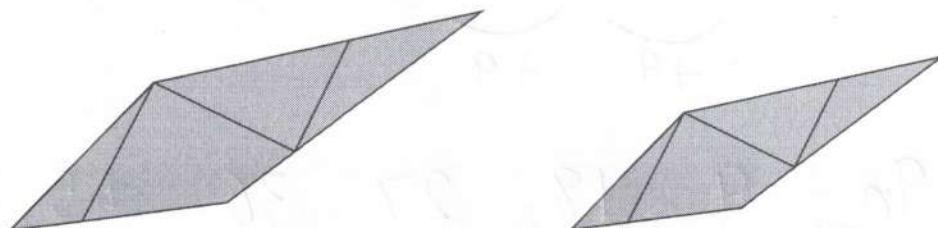
Diagram not drawn to scale

Each line in the larger logo has a corresponding line in the smaller one.
The lengths of the corresponding lines are all in the ratio 5 : 2.

(a) (i) Complete the following statement with a single mathematical word. [1]

'The two logos are ......**Similar**...... because corresponding lines are in the same proportion.'

(ii) Complete the following statement with a number. [1]

'The larger logo is an enlargement of the smaller logo using a scale factor

of ......**2·5**...... .' or $\frac{5}{2}$ or $2\frac{1}{2}$

(b) One of the lines on the larger logo is 7·5 cm long.

How long is the corresponding line on the smaller logo? [2]

$7·5 \div 2·5 = 3$

(C300U10-1) **Turn over.**

22. *(a)* Find an expression for the *n*th term of this sequence. [2]

1   10   19   28   37

+9   +9

$9n$ 9   18   27   36   45   }   -8

$9n - 8$

(b) (i) The *n*th term of a different sequence is $3(n^2 + 1)$.
Find the 10th term of this sequence. [1]

$$3(10^2 + 1) \quad = 3(100 + 1)$$
$$= 3 \times 101$$
$$= 303$$

(ii) Explain why 601 cannot be a term of this sequence.
Do not find any more terms. [1]

It isn't a multiple of 3

(C300U10-1)

23. A catering company made 40 trays of sandwiches for a party buffet.
Each tray contained the same number of sandwiches.

They made trays of egg, trays of cheese and trays of meat sandwiches in the ratio

egg : cheese : meat = 1 : 3 : 4.

At the end of the party, 20% of the egg sandwiches, 10% of the cheese sandwiches and 25% of the meat sandwiches were uneaten.

How many trays of sandwiches were uneaten?   [4]

$E = \frac{1}{8} \times 40 = 5$ $20\% = 1$

$C = \frac{3}{8} \times 40 = 15$ $10\% = 1.5$

$M = 20$ $25\% = 5$

7.5 .... trays of sandwiches

Turn over.

**24.** Novak's online chocolate company has a special offer.

Special Offer
Free sample box worth £3*

*requires a minimum spend of £25
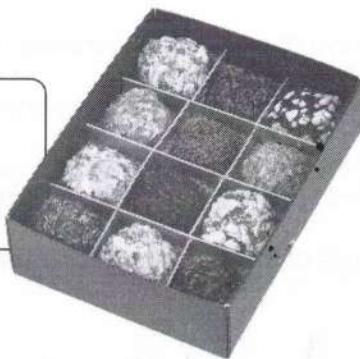
Novak records the number of free sample boxes he sends to his customers.

The graph shows the relative frequency that a customer has been sent a free sample box after 200, 400, 600, 800 and 1000 customer orders.

Relative frequency of
a customer being sent
a free sample box

Number of customers

© WJEC CBAC Ltd.   (C300U10-1)
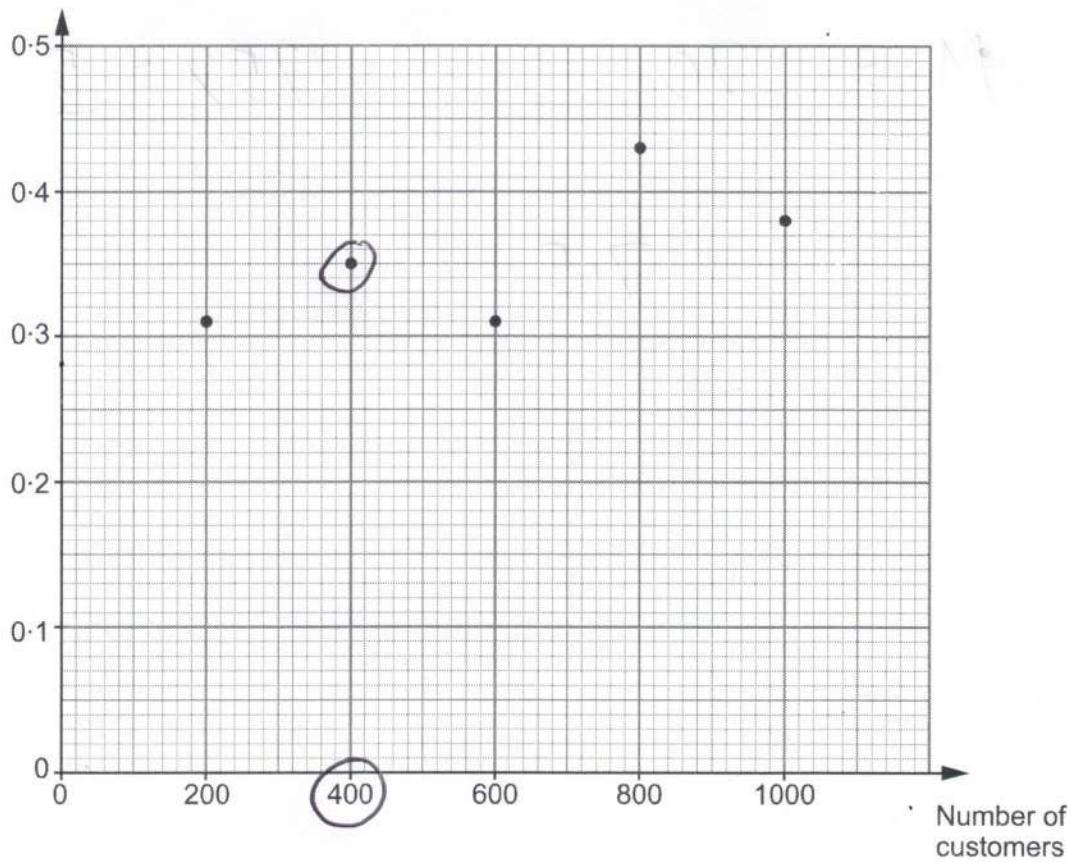
(a) What is the total value of the free sample boxes that Novak sent his first 400 customers? [4]

$$400 \times 0.35$$
$$= 4 \times 35 \qquad = 140 \text{ samples}$$

$$\begin{array}{r} 140 \\ \times \ 3 \\ \hline 420 \end{array} \qquad = £420$$

Total value of free sample boxes is £ ......420......

(b) Novak says:

> The most accurate estimate of the probability that a customer will be sent a free sample box is 0·38.

Is he correct?

Yes ✓   No ☐

Explain how you decide. [1]

It's based on the largest sample

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25. *(a)* The diagram shows the graphs of $y = 3x - 1$ and $y = 4 - 3x$.
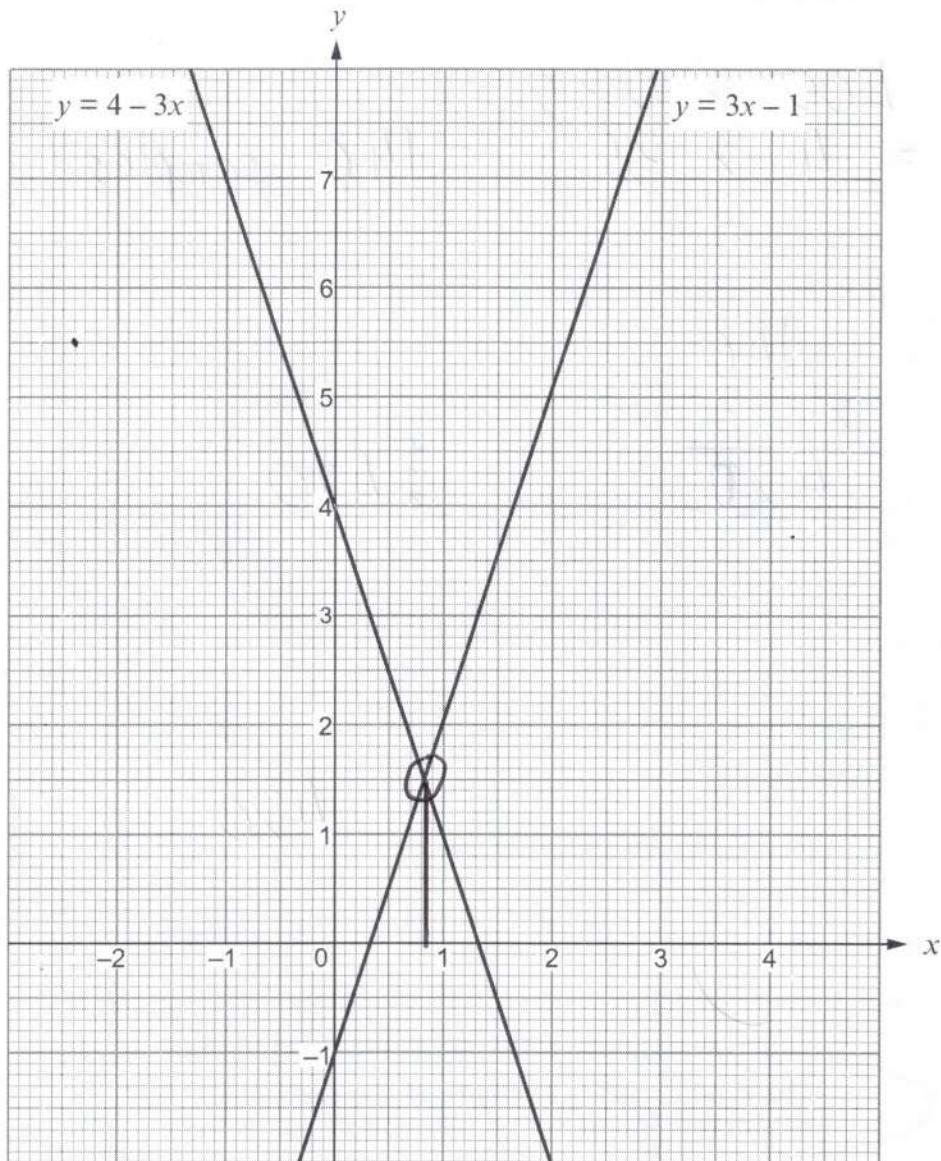
(i) Use the graphs to write down an **approximate** solution of the equation
$3x - 1 = 4 - 3x$. [1]

$x =$ ....0.83..............

$\left[ms \quad 0.8 \rightarrow 0.9 \right]$

(ii) Circle the equation that represents a line parallel to $y = 3x - 1$. [1]

$$y = 3 - x \qquad 3y = x - 1 \qquad \boxed{y = 3x + 2} \qquad \frac{3}{y} = x \qquad \frac{x}{3} = y$$

(b) Circle the equation where y is directly proportional to x. [1]

$$y = \frac{5}{x} \qquad x + y = 1 \qquad 7 = xy \qquad y = 3x^2 \qquad \boxed{y = 4x}$$

END OF PAPER

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