Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22	
TOTAL	

AQA

General Certificate of Secondary Education
Higher Tier
November 2013

Mathematics (Linear) 4365/1H

Paper 1

H

Friday 8 November 2013 9.00 am to 10.30 am

For this paper you must have:
- mathematical instruments.

You must **not** use a calculator.

Time allowed
- 1 hour 30 minutes

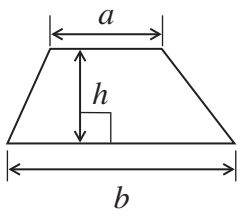
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided.
  Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 70.
- The quality of your written communication is specifically assessed in Questions 4, 7 and 12. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, tracing paper and graph paper.
  These must be tagged securely to this answer book.

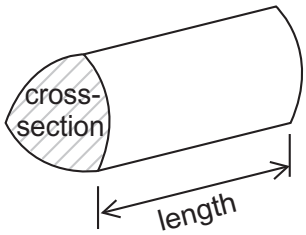
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

Area of trapezium = $\frac{1}{2}(a+b)h$

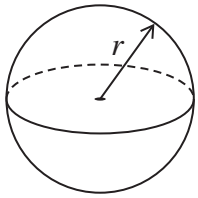


Volume of prism = area of cross-section × length



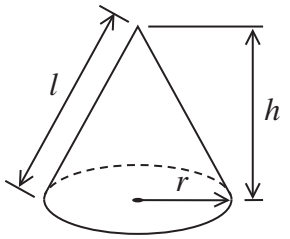
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

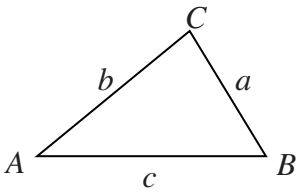
Curved surface area of cone = $\pi r l$



In any triangle ABC

Area of triangle = $\frac{1}{2}ab\sin C$

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$



Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

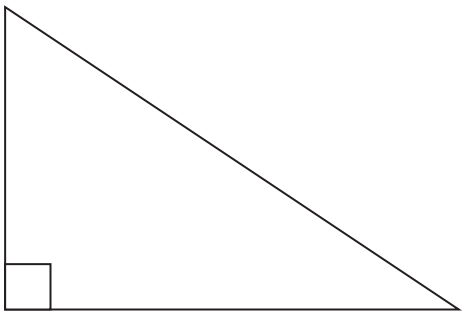
The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Answer **all** questions in the spaces provided.

1 This triangle is **drawn accurately.**



Drawn accurately

Work out the area of the triangle.

.....

.....

Answer ..... cm^2 *(3 marks)*

2 Theatre tickets cost £T each.

Cinema tickets cost £C each.

Write down an expression for the total cost of 20 theatre tickets and 16 cinema tickets.

.....

.....

Answer £ ..... *(2 marks)*

5

3 (a) Multiply out $3(2c - 1)$

Answer ..... *(1 mark)*

3 (b) Solve $\frac{x}{20} = 10$

x = ... *(1 mark)*

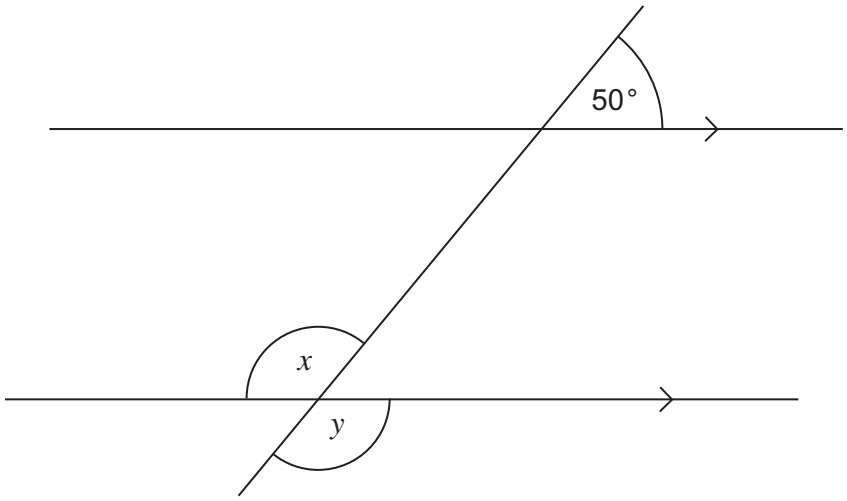
3 (c) Solve $3y + 6 = 30 - 7y$

.....

.....

y = ... *(3 marks)*

4



Not drawn accurately

4 (a) Work out the size of angle x.

Answer ..... degrees *(1 mark)*

***4 (b)** Which **one** of these describes angles x and y?
Circle your answer.

alternate angles | corresponding angles

interior angles | vertically opposite angles

(1 mark)

7

5 (a) $E = mv^2$

Work out the value of E when $m = 3$ and $v = 10$

.....

.....

Answer ..... *(2 marks)*

5 (b) Julie and Phil rearrange $E = mv^2$ to make v the subject.
Here are their answers.

Julie

$E = mv^2$

$\frac{E}{m} = v^2$

$\sqrt{\frac{E}{m}} = v$

$v = \sqrt{\frac{E}{m}}$

Phil

$E = mv^2$

$\sqrt{E} = mv$

$\frac{\sqrt{E}}{m} = v$

$v = \frac{\sqrt{E}}{m}$

Which student has rearranged the formula correctly?
Tick a box.

☐ Julie ☐ Phil

What mistake has the other student made?

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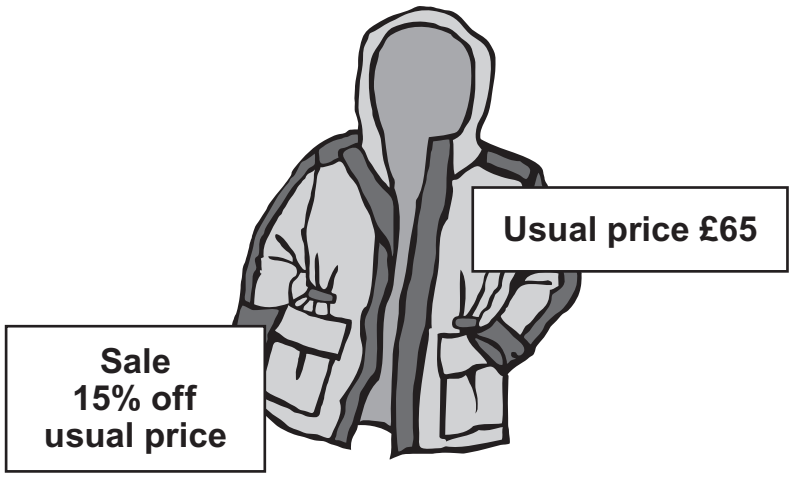
(2 marks)

6



Work out the sale price.

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Answer £ ..... *(3 marks)*

Turn over for the next question

7

***7** There are 24 counters in a bag.

One-third of the counters are blue.

5 red, 5 white and 5 blue counters are added to the bag.

Tom says,

"The probability of taking a blue counter from the bag is still $\frac{1}{3}$"

Is he correct?
Tick a box.

☐ Yes ☐ No ☐ Cannot tell

Give a reason for your answer.

.....

.....

.....

(3 marks)

8 Which of these fractions is closest to $\frac{3}{4}$?

$\frac{2}{3}$ $\frac{3}{5}$ $\frac{7}{10}$ $\frac{13}{20}$

You **must** show your working.

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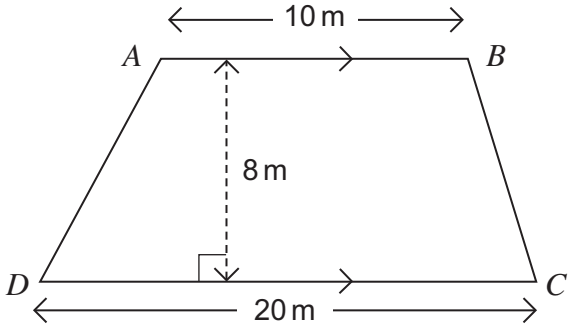
Answer ..... *(3 marks)*

Turn over for the next question

6

9 (a) $ABCD$ is a trapezium.



Not drawn accurately

Calculate the area of $ABCD$.
State the units of your answer.

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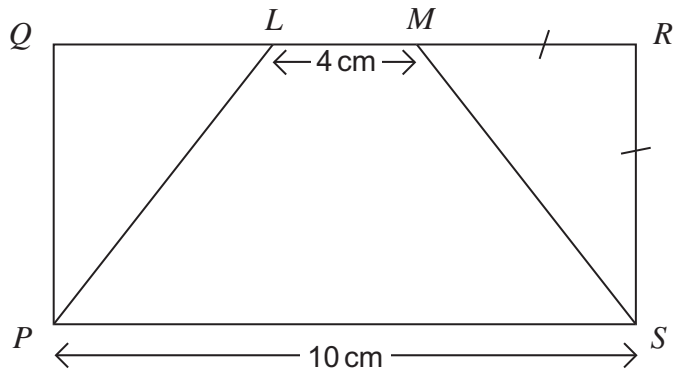
Answer ..... *(3 marks)*

9 (b) $PQRS$ is a rectangle.

LM = 4 cm, PS = 10 cm

$MR = RS$



Not drawn accurately

The area of $PLMS$ is 21 cm^2

Show that $QL = MR$

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(3 marks)

Turn over for the next question

6

10 A fruit drink is made by mixing juice and lemonade in the ratio

juice : lemonade = 1 : 4

Juice costs £6.00 per litre.

Lemonade costs 50p per litre.

10 (a) Show that 1 litre of the fruit drink costs £1.60 to make.

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(3 marks)

10 (b) The fruit drink is sold for £2 a litre.

Work out the percentage profit.

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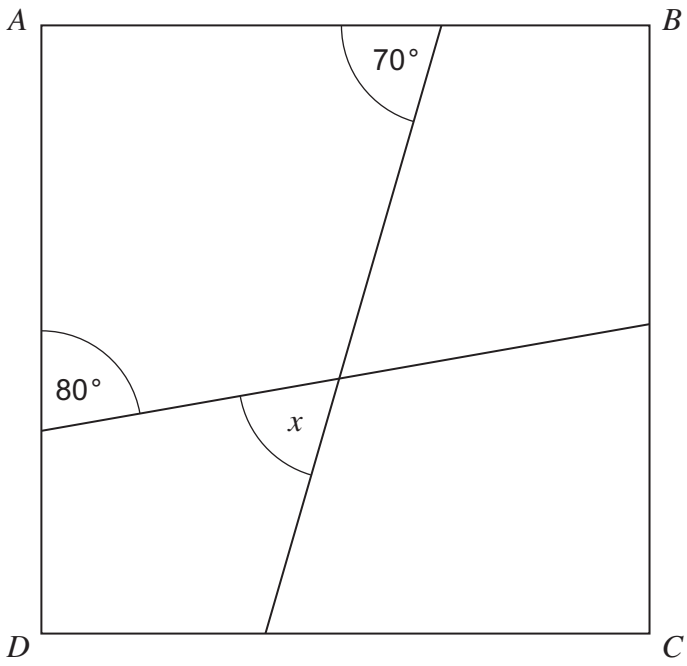
Answer ..... % *(2 marks)*

11 $ABCD$ is a square.



Not drawn accurately

Work out the size of angle x.
You **must** show your working, which may be on the diagram.

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Answer ..... degrees *(4 marks)*

Turn over for the next question

9

***12** Jo teaches the violin.

Half of her students take violins home to practise.

She wants to investigate the following hypothesis.

"Students who take violins home to practise score higher marks in violin exams."

Use the data handling cycle to describe how Jo could carry out this investigation and test her hypothesis.

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(4 marks)

13 Solve the simultaneous equations

$$2x - 3y = 7$$

$$3x + 4y = 2$$

You **must** show your working.

Do **not** use trial and improvement.

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Answer ..... *(4 marks)*

Turn over for the next question

8

14 A holiday park has three different areas to stay in.
Each area has three different types of home.

The table shows the number of families staying in the holiday park during the summer of 2013.

		Area		
		Forest	Fields	Beach
Type of home	Economy	55	50	60
	Super	35	20	15
	Luxury	10	30	25
	Total	100	100	100

The manager sends a questionnaire to 60 families to ask them about their holiday.

The sample of size 60 is stratified by **type of home** and **area**.

14 (a) How many families who stayed in a **Luxury** home in the **Forest** are sent a questionnaire?

.....

Answer ..... *(2 marks)*

14 (b) How many families who stayed in a **Super** home are sent a questionnaire?

.....

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Answer ..... *(2 marks)*

15 (a) Expand and simplify $(2x + 1)(3x – 4)$

.....

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Answer ..... *(2 marks)*

15 (b) Factorise $6x^2 – 23x – 4$

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.....

Answer ..... *(2 marks)*

Turn over for the next question

8

16 A bag contains triangles and quadrilaterals in the ratio of the number of sides of each shape.

16 (a) Explain why the least number of shapes that could be in the bag is 7.

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(1 mark)

16 (b) A shape is taken at random from the bag and **replaced**.
Another shape is then taken from the bag.

Work out the probability that the two shapes taken from the bag are of the same type.

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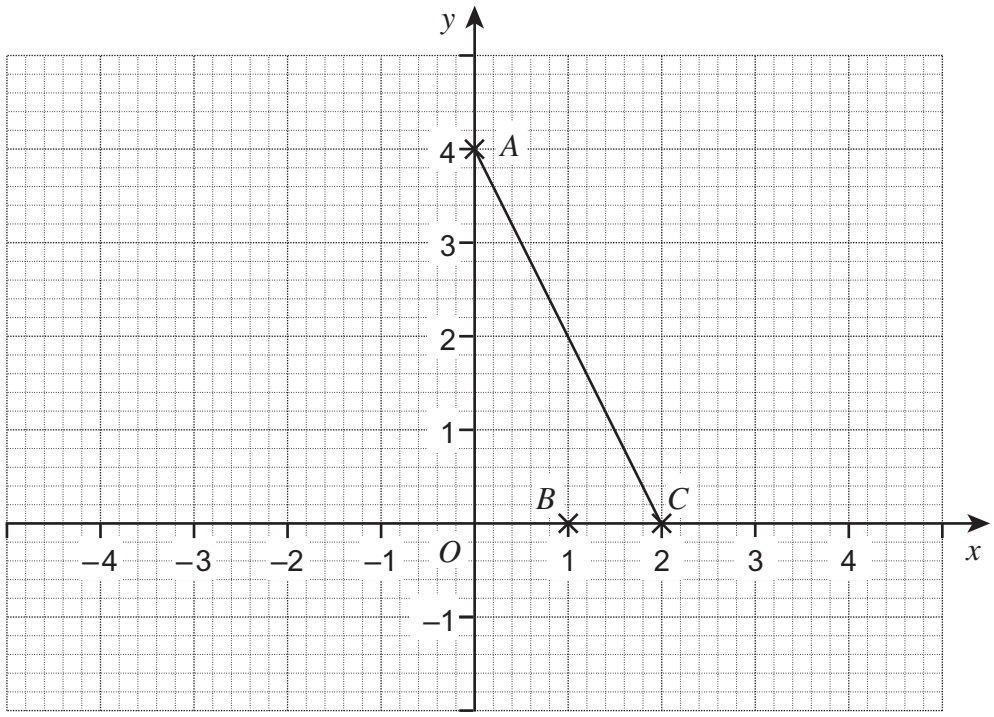
Answer ..... *(4 marks)*

17 Show clearly that the equation of the line through B parallel to AC is $2x + y = 2$



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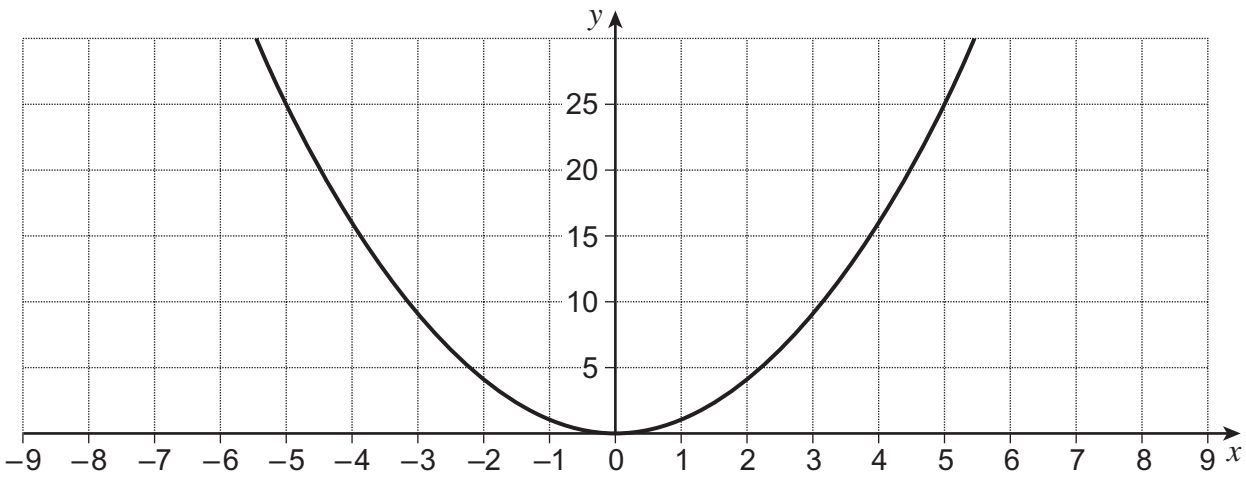
(3 marks)

Turn over for the next question

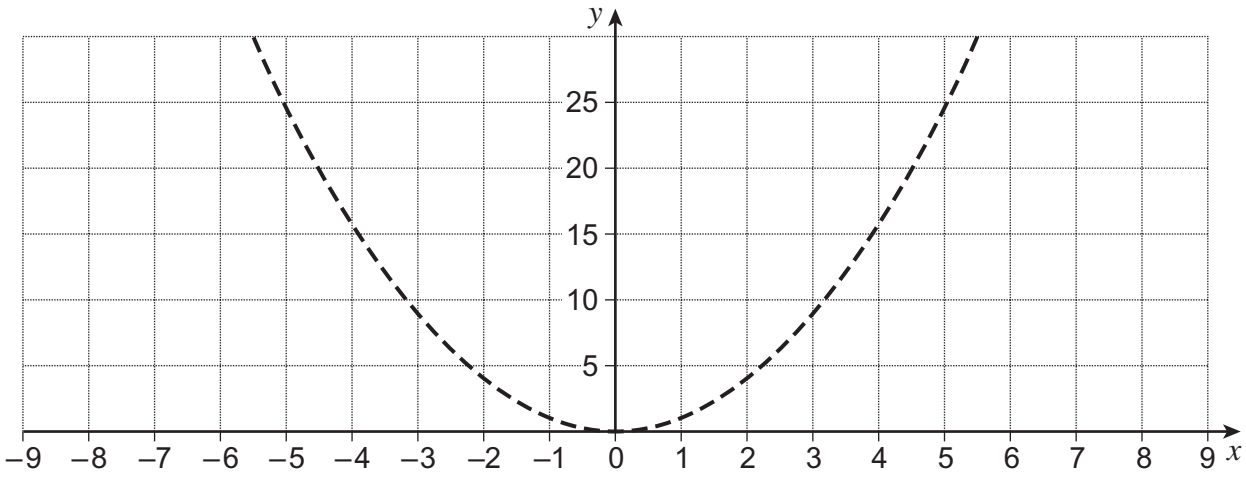
8

18 This graph is a sketch of $y = x^2$



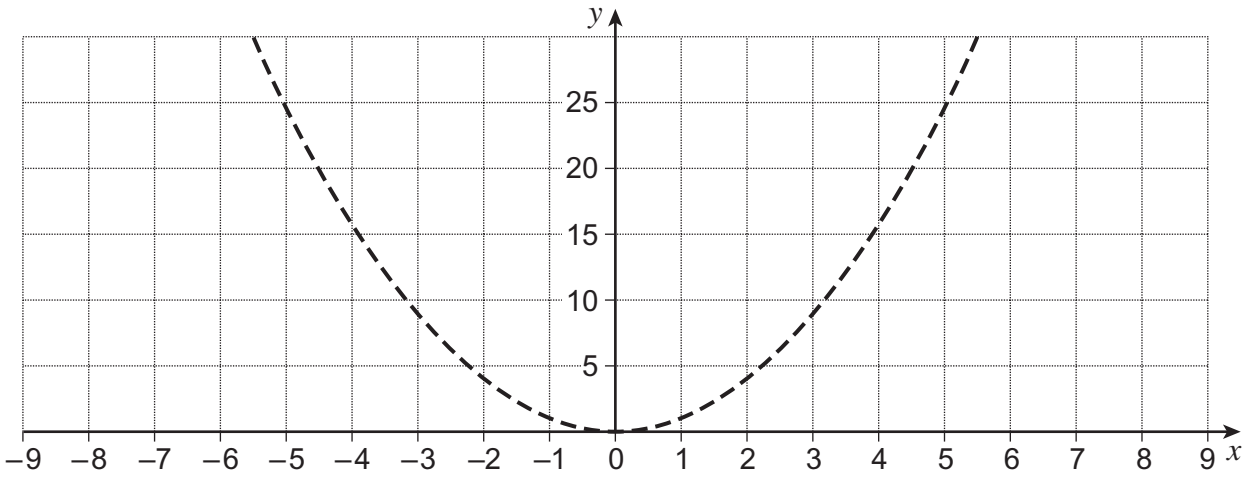
On each grid, the graph of $y = x^2$ is shown dashed to help you.

18 (a) Sketch the graph of $y = x^2 + 5$ on the grid.



(1 mark)

18 (b) Sketch the graph of $y = (x - 3)^2$ on the grid.



(1 mark)

Turn over for the next question

2

19 Solve $x^2 + 8x + 6 = 0$ by completing the square.

Give your answer in the form $a \pm \sqrt{b}$, where a and b are integers.

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Answer ..... *(4 marks)*

END OF QUESTIONS

4

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