

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE MATHEMATICS

F

Foundation Tier Paper 3 Calculator

Tuesday 13 June 2017

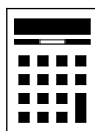
Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- 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. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
TOTAL	

Advice

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



Answer **all** questions in the spaces provided

- 1 Circle the lowest of these temperatures.

[1 mark]

-4.9°C

0°C

-7°C

0.1°C

- 2 Circle the expression that is four times bigger than n . — $4 \times n$

[1 mark]

$n + 4$

$4n$

$\frac{n}{4}$

n^4

- 3 Circle the fraction **greater** than $\frac{3}{10} = 0.3$

[1 mark]

$\frac{1}{3}$
 $= 0.333\dots$

$\frac{3}{11}$
 $0.2727\dots$

$\frac{4}{15}$
 $0.266\dots$

$\frac{29}{100}$
 0.29



4

Circle the value of 2^5

$$2 \times 2 \times 2 \times 2 \times 2 = 32$$

[1 mark]

10

25

32

64

5 (a)

Simplify

$$\begin{array}{c} a^3 \quad + \quad 2b \\ \hline \underline{a \times a \times a} + \underline{b + b} \end{array}$$

[2 marks]

Answer $a^3 + 2b$

5 (b)

Simplify

$$\overbrace{5(x+3)} - x + 2$$

[3 marks]

$$= \underline{5x} + \underline{15} - \underline{x} + \underline{2}$$

$$= 4x + 17$$

Answer _____

Turn over for the next question

Turn over ►



- 6 Twelve cards numbered 1 to 12 are put into six pairs.
Each pair has a total.

Complete the table to show the pairs and their totals.

[4 marks]

Each
number
can only
be used
once

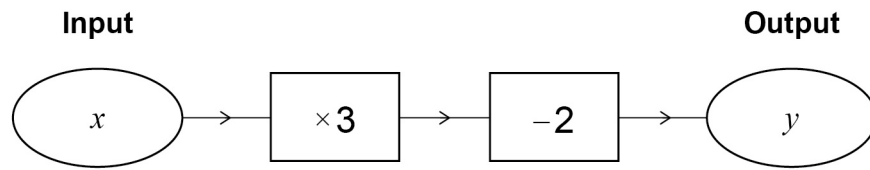
Cards	Total
1 and 2	3
<u>6</u> and <u>3</u>	9
<u>4</u> and <u>7</u>	11
<u>5</u> and <u>9</u>	14
<u>8</u> and <u>11</u>	19
<u>10</u> and <u>12</u>	22

now only way
is 8 and 11 (2)

only way is
10 and 12 (1)



7 Here is a number machine.



7 (a) Work out the output when the input is 4

[1 mark]

$$4 \times 3 = 12$$

$$12 - 2 = 10$$

Answer 10

7 (b) Work out the output when the input is -4

[1 mark]

$$-4 \times 3 = -12$$

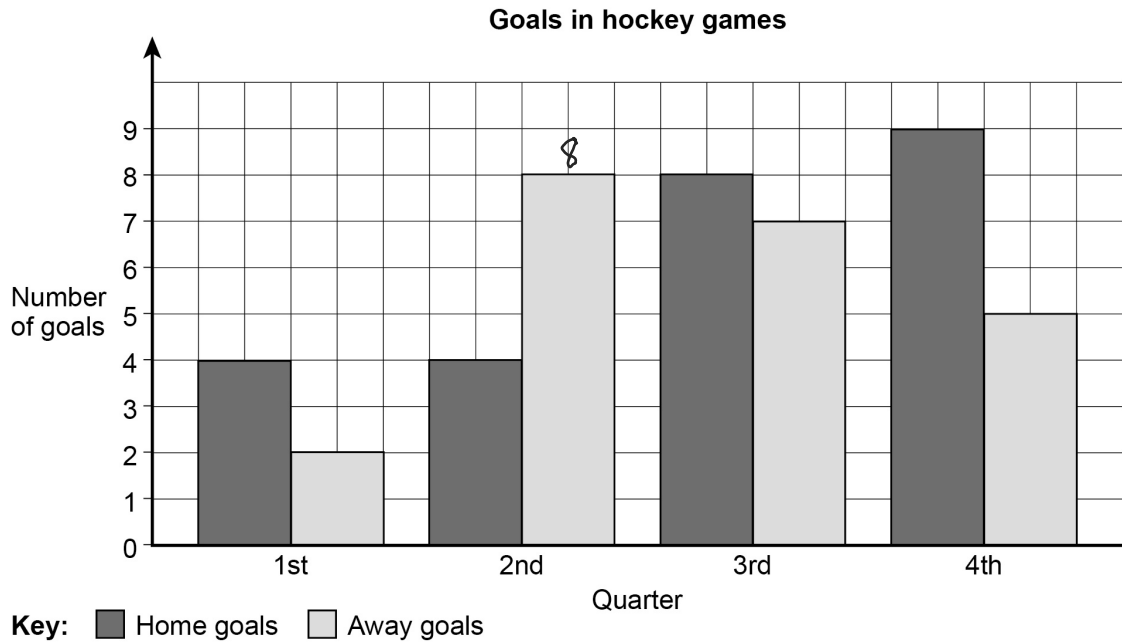
$$-12 - 2 = -14$$

Answer -14

Turn over for the next question



- 8 Here is information about the goals scored in some hockey games.
Each game has four quarters.



- 8 (a) Which quarter was the ^{most} mode for ^{lighter} away goals?
Circle your answer.

[1 mark]

1st

2nd

3rd

4th

- 8 (b) There were 10 games.

Work out the mean number of goals per game.

[2 marks]

$$\frac{\text{Total goals}}{\text{games}} = \frac{4 + 2 + 4 + 8 + 8 + 7 + 9 + 5}{10} = \frac{47}{10}$$

Answer 4.7



8 (c) In total, how many **more** home goals were scored than away goals?

[2 marks]

$$\text{Number of home goals: } 4 + 4 + 8 + 9 = 25$$

$$\text{No of away goals: } 2 + 8 + 7 + 5 = 22$$

$$25 - 22 = 3$$

Answer 3

8 (d) Rob says,

“More home teams **must** have won because there were more home goals.”

Is he correct?

Give a reason for your answer.

[1 mark]

No, because the home team could score alot more goals in one game but draw/lose other games



9 (a)

List all the factors of 30

Numbers that are divisible by 30

[2 marks]

 $1 \times 30, 2 \times 15, 3 \times 10, 4 \times$, 5×6

Not
a factor

Answer $1, 2, 3, 5, 6, 10, 15, 30$

9 (b)

A factor of 30 is chosen at random.

What is the probability that it is a 2-digit number?

[1 mark]

Total 2 digit factors = 3

Total factors = 8

$P(2 \text{ digit}) =$

Answer $\frac{3}{8}$



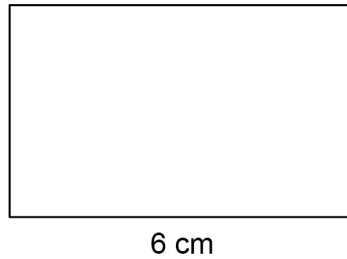
10 Each shape below has an area of 24 cm^2

Complete the missing lengths.

[3 marks]

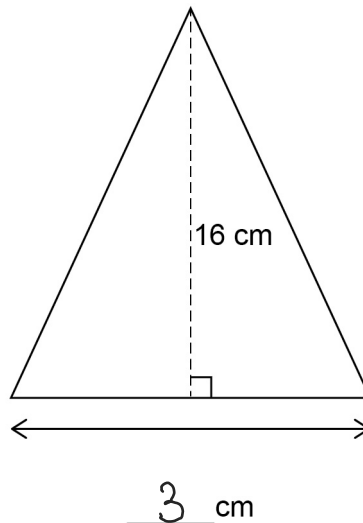
$$\begin{aligned} L \times W &= 24 \\ 6 \times W &= 24 \\ W &= 4 \end{aligned}$$

Rectangle



Not drawn
accurately

Triangle



$$\frac{1}{2} \times b \times h = 24$$

$$\frac{16 \times b}{2} = 24$$

$$16 \times b = 48$$

$$b = 3$$

Turn over for the next question

Turn over ►



11 A television channel shows 12 minutes of adverts in each half hour.

How many **minutes** of adverts does it show from 5 am to 11 pm?

[3 marks]

$$\begin{array}{l} 5:00 \quad 23:00 \\ 5 \text{ am} - 11 \text{ pm} = 18 \text{ hours} \\ 23 - 5 = 18 \end{array} \quad \begin{array}{l} = 36 \text{ half an hours} \end{array} \quad \begin{array}{l} \left. \begin{array}{l} \text{ } \\ \text{ } \end{array} \right\} \times 2 \end{array}$$

$$\text{Advert} = 36 \times 12 = 432$$

Answer 432 minutes

12 Put these probabilities in order, starting with the least likely.

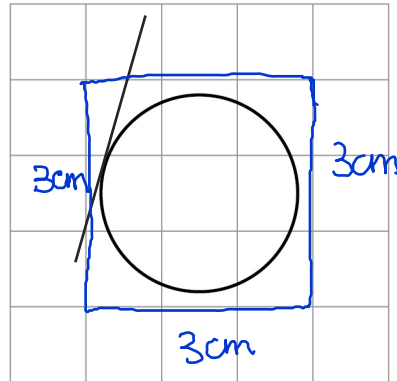
$$\begin{array}{cccc} \begin{array}{l} 0.44 \\ 44\% \\ \textcircled{4} \end{array} & \begin{array}{l} \frac{1}{4} \\ 0.25 \\ \textcircled{1} \end{array} & 0.404 & \begin{array}{l} \frac{4}{10} \\ 0.4 \\ \textcircled{2} \end{array} \end{array} \quad \begin{array}{l} \text{smallest - biggest} \end{array}$$

[2 marks]

Answer $\frac{1}{4}$, $\frac{4}{10}$, 0.404, 44%.



- 13 A circle is drawn on a centimetre grid.



- 13 (a) Draw a tangent to the circle.

[1 mark]

- 13 (b) Grace works out that the area of the circle is more than 9 cm^2

Why must this be wrong?

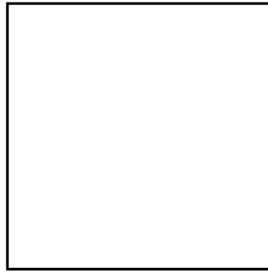
[1 mark]

Looking at the area of the square it is
 $3 \times 3 = 9 \text{ cm}^2$. The area of the square is
 more than the circle's area. So this
 statement must be wrong

Turn over for the next question



- 14 (a)** The front elevation, side elevation and plan of a solid are all the same, as shown.

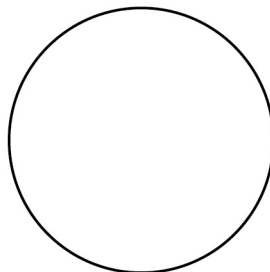


Write down the name of the solid.

[1 mark]

Answer Cube

- 14 (b)** The front elevation, side elevation and plan of a solid are all the same, as shown.



Write down the name of the solid.

[1 mark]

Answer Sphere



15

Show that there are **exactly** five 3-digit cube numbers.**[3 marks]**

$$4^3 = 64 \quad \times$$

$$5^3 = 125 \quad \checkmark \quad 1$$

$$6^3 = 216 \quad \checkmark \quad 2$$

$$7^3 = 343 \quad \checkmark \quad 3$$

$$8^3 = 512 \quad \checkmark \quad 4$$

$$9^3 = 729 \quad \checkmark \quad 5$$

$$10^3 = 1000 \quad \times$$

There are 5 3digit cube numbers

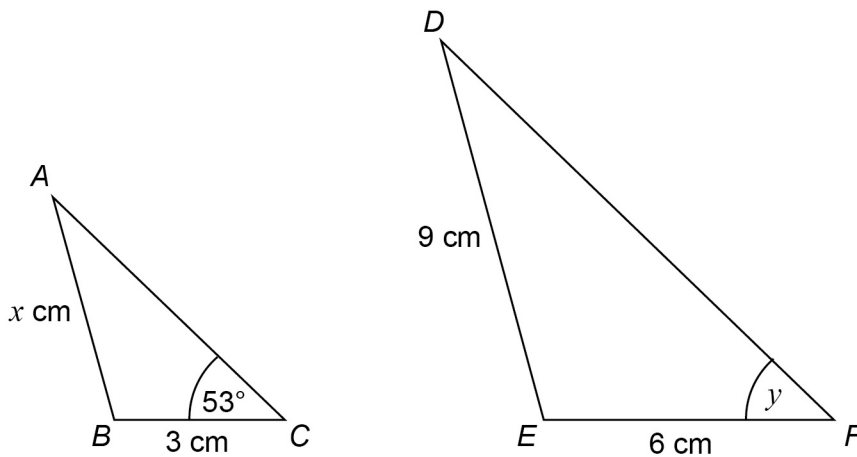
Turn over for the next question

Turn over ►



- 16 Triangles ABC and DEF are similar.

Not drawn
accurately



- 16 (a) Work out the value of x .

[2 marks]

$$\text{scale factor} = \frac{BC}{EF} = \frac{3}{6} = \frac{1}{2}$$

$$9 \times \frac{1}{2} = 4.5$$

Answer $x = 4.5\text{ cm}$

- 16 (b) Write down the size of angle y .

- Angles are same because
triangles are similar

[1 mark]

Answer 53 degrees

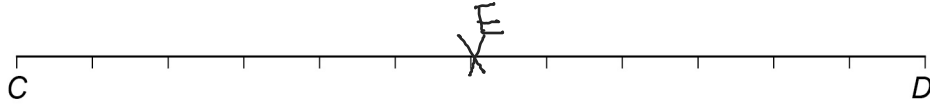


17 CD and PQ are lines of length 12 cm

17 (a) $CE : CD = 1 : 2$ CE is halfway as CD is double

Mark point E on the line with a cross.

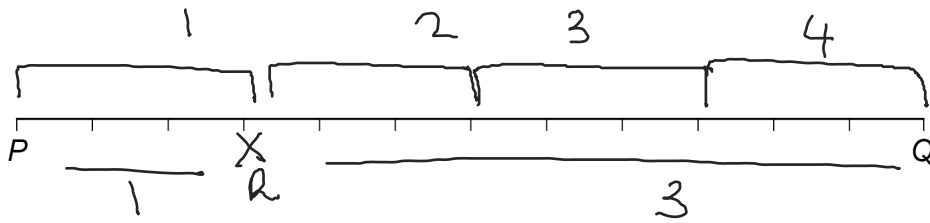
[1 mark]



17 (b) $PR : RQ = 1 : 3 = 4$ parts

Mark point R on the line with a cross.

[1 mark]

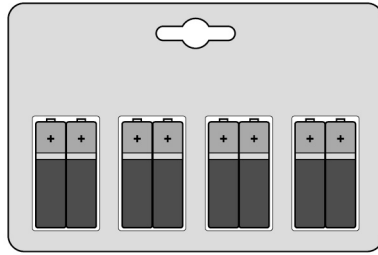


Turn over for the next question

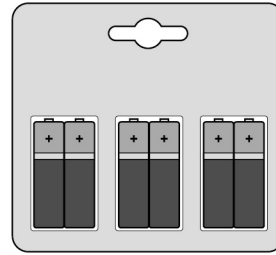
Turn over ►



- 18 A shop sells two brands of battery.



Brand A
Pack of 8
Price £3.60



Brand B
Pack of 6
Price £2.94

One brand A battery powers a toy for 5 hours.

One brand B battery powers the same toy for $5\frac{1}{2}$ hours.

Which brand is better value?

You **must** show your working.

[5 marks]

Brand A: Total hours = $5 \times 8 = 40$ hours
for £3.60

$\div 40$ $\left\{ \begin{array}{l} 40\text{h} : \pounds 3.60 \\ 1\text{hour is } \pounds 0.09 \end{array} \right. \div 40$

Brand B: Total hours = $5\frac{1}{2} \times 6 = 33$ hours
for £2.94

$\div 33$ $\left\{ \begin{array}{l} 33\text{h} : \pounds 2.94 \\ 1\text{hour} : \pounds 0.08909 \dots \end{array} \right. \div 33$

$0.089 < 0.09$ so B has better
value.

Answer Brand B



- 19 The value of x can be 2 or 5
The value of y can be 3 or 12

- 19 (a) List the possible values of xy

	①	②	③	④ [2 marks]
	$x=2 \ y=3$	$x=2 \ y=12$	$x=5 \ y=3$	$x=5 \ y=12$
$xy:$	6	24	15	60

Answer 6, 15, 24, 60

- 19 (b) Work out the **least** possible value of $\frac{x-y}{x}$

You **must** show your working.

[2 marks]

$$\text{Least} = \frac{\text{highest - lowest value}}{\text{highest}}$$

$$= \frac{2 - 12}{2} = -5$$

Answer -5

Turn over for the next question



20

An exam has two papers.

Anil scores

33 out of 60 on paper 1

and

75 out of 100 on paper 2

Work out his percentage score for the exam.

[3 marks]

$$\text{Total marks available} = 60 + 100 = 160$$

$$\text{Total marks scored} = 75 + 33 = 108$$

$$\text{Percentage} = \frac{108}{160} \times 100$$

$$\frac{27}{40} \times 100$$

$$= 67.5\%$$

Answer _____ %



21

Purple paint is made by mixing red paint and blue paint in the ratio 5 : 2

Yan has 30 litres of red paint and 9 litres of blue paint.

What is the **maximum** amount of purple paint he can make?

using all red using all blue [3 marks]

$$\begin{array}{r} \times 6 \quad \leftarrow \quad 5 : 2 \quad \rightarrow \quad \times 6 \\ \hline 30 : 12 \end{array}$$

$$\begin{array}{r} \times 4.5 \quad \leftarrow \quad 5 : 2 \quad \rightarrow \quad \times 4.5 \\ \hline 22.5 : 9 \end{array}$$

↑
Not
enough
blue

$$22.5 + 9 = 31.5$$

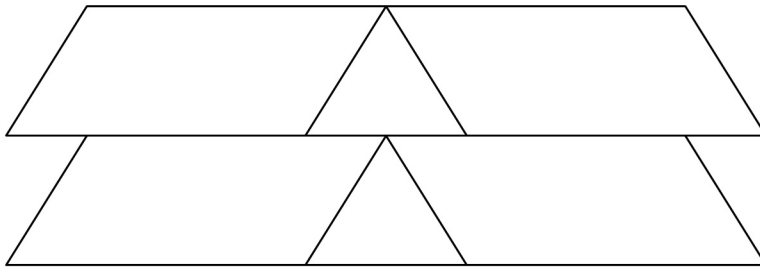
Answer 31.5 litres

Turn over for the next question

Turn over ►



- 22** This shape is made from two triangles and four congruent parallelograms.



Not drawn
accurately

For each statement, tick the correct box.

- 22 (a)** The triangles are equilateral.

[1 mark]

Must be true

Could be true

Must be false

could be isosceles

- 22 (b)** The triangles are congruent.

[1 mark]

Must be true

Could be true

Must be false

*parallelograms
are congruent*



23 (a) The length of a pipe is 6 metres to the nearest metre.

Complete the error interval for the length of the pipe.

[2 marks]

all values
that round to
6

Answer 5.5 m \leq length < 6.5 m

23 (b) The length of a different pipe is 4 metres to the nearest metre.

Olly says,

$$3.5 \leq m < 4.5$$

"The total length of the two pipes is 11 metres to the nearest metre."

Give an example to show that he ~~could be~~ correct.

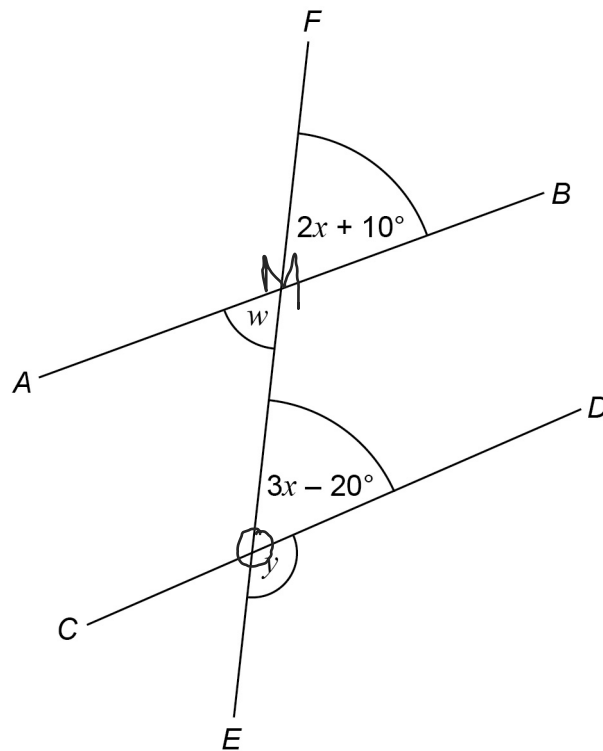
[2 marks]

Could be : $6.4 + 4.4 = 10.8$ 10.8 rounds to 11
BUT $3.5 + 5.5 = 9$, which rounds to 9

Turn over for the next question



24 AB , CD and EF are straight lines.



Not drawn
accurately

24 (a) Ava assumes that AB and CD are parallel.

What answer should she get for the size of angle y ?

[4 marks]

$$\angle BMF = \angle DOE \quad - \text{congruent angle}$$

$$3x - 20 = 2x + 10$$

$$x - 20 = 10$$

$$x = 30^\circ$$

← angles on straight line add to 180

$$y = 180 - (3 \times 30 - 20)$$

$$= 180 - 70$$

Answer 110 degrees



24 (b)

In fact,

 AB and CD are **not** parallelangle w is 60° What effect does this have on the size of angle y ?

Tick a box.

 y is bigger y is the same y is smaller

$$w = 60$$

$$2x + 10 = 60$$

$$2x = 50$$

$$x = 25^\circ$$

$$y = 180 - (3 \times 25 - 20)$$
$$= 180 - 55$$
$$= 125^\circ$$

so y is bigger- opposite
angles are
equal

Show working to support your answer.

[3 marks]

Turn over for the next question

Turn over ►



25 There are 720 boys and 700 girls in a school.

The probability that a boy chosen at random studies French is $\frac{2}{3}$

The probability that a girl chosen at random studies French is $\frac{3}{5}$

25 (a) Work out the number of students in the school who study French.

[3 marks]

$$\frac{2}{3} \text{ of } 720 = 480$$

$$\frac{3}{5} \text{ of } 700 = 420$$

$$480 + 420 = 900$$

Answer _____ 900 students

25 (b) Work out the probability that a student chosen at random from the whole school does **not** study French.

[2 marks]

$$\text{Total number of students} = 700 + 720 = 1420$$

$$\text{Not studying French} = 1420 - 900 = 520$$

$$\text{Probability} = \frac{520}{1420}$$

Answer _____ = $\frac{26}{71}$



26

Circle the expression equivalent to

$$x^2 \boxed{-4x - 12}$$

add to multiply to

[1 mark]

X $(x-4)(x-8)$	X $(x+3)(x-4)$	X $(x-12)(x+1)$	$(x+2)(x-6)$
$-4x-8 = 32$	$3-4 = -1$	$-12+1 = -11$	$2-6 = -4$
$-4-8 = -12$	$3x-4 = -12$	$-12 \times 1 = -12$	$2x-6 = -12$

27

How are the whole number solutions to A and B different?

A Solve $3 \leq 3x < 18$

B Solve $3 < 3x \leq 18$

[2 marks]

$$A: \quad 3 \leq 3x < 18 \quad \rightarrow \div 3$$

$$1 \leq x < 6$$

solutions : 1, 2, 3, 4, 5

$$B: \quad 3 < 3x \leq 18$$

$$1 < x \leq 6 \quad 2, 3, 4, 5, 6$$

A includes the lower bound as x is more or
END OF QUESTIONS equal to 1.

B includes the upper bound as x is less or
 equal to 6



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