

Young Lives 2016-17 School Surveys

Item level analysis

India

Wave 1

Subject: Mathematics

This booklet contains Maths items administered to students in Grade 9 at Wave 1 of Young Lives' school survey in India. This survey took place in 2016-17.

The item-level analyses in this booklet were undertaken by Educational Initiatives, Ahmedabad, India.

Items were selected following extensive piloting. For more details on item sources and the test development process, see Moore et al, 2017. Young Lives School Survey, 2016–17: Evidence from India.

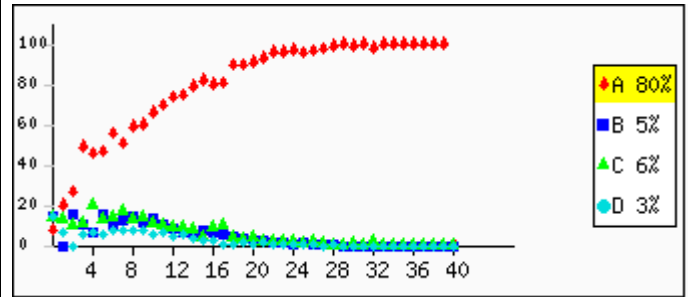
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Question no: 1

Skill: Number sense, related concepts and basic number competency **Paper Set: A, Medium: English**

Which of the following is a prime number?

- A: 5
- B: 15
- C: 25
- D: 35



Overall	A: 80.6%	B: 6.0%	C: 6.8%	D: 3.1%	Invalid Answer: 1.1%	Not Attempted: 2.5%
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Question no: 2

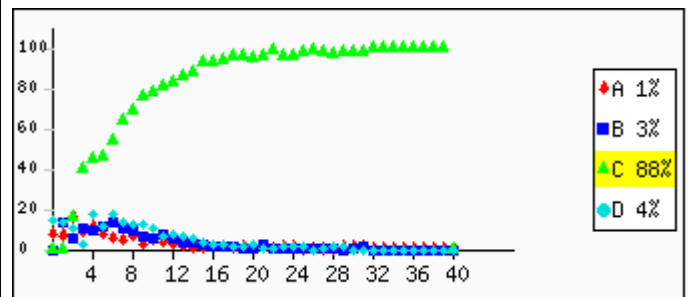
Skill: Number sense, related concepts and basic number competency **Paper Set: A, Medium: English**

A number when added to 35 gives 56.

$$\begin{array}{r} 35 \\ + \boxed{?} \\ \hline 56 \end{array}$$

What is the number?

- A: 12
- B: 20
- C: 21
- D: 91



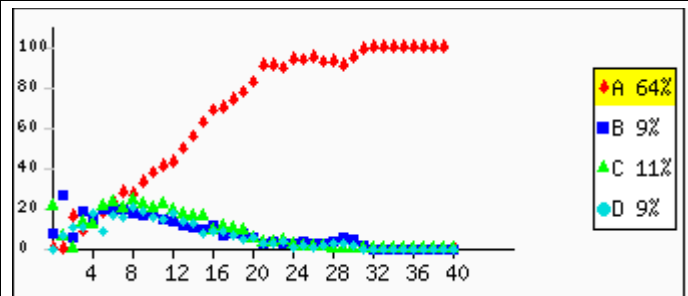
Overall	A: 1.7%	B: 3.3%	C: 88.1%	D: 4.8%	Invalid Answer: 0.9%	Not Attempted: 1.2%
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Question no: 3

Skill: Number sense, related concepts and basic number competency **Paper Set: A, Medium: English**

7341 is completely divisible by _____.

- A: 3
- B: 5
- C: 7
- D: 9



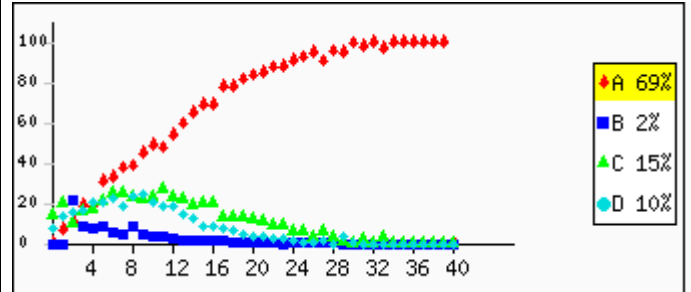
Overall	A: 64.0%	B: 9.3%	C: 11.8%	D: 9.1%	Invalid Answer: 1.0%	Not Attempted: 4.8%
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Question no: 4

Skill: Number sense, related concepts and basic number competency **Paper Set: A, Medium: English**

3 ones + 7 tens = _____.

- A: 73
- B: 40
- C: 37
- D: 10



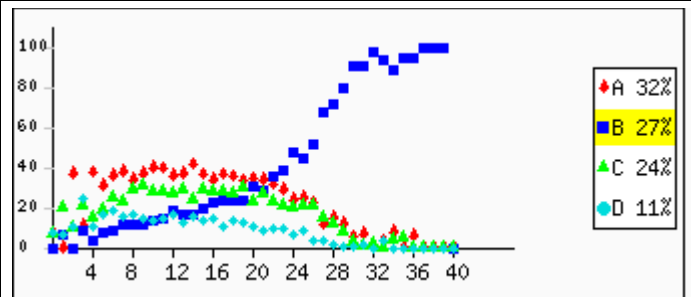
Overall	A: 69.0%	B: 2.0%	C: 16.0%	D: 10.0%	Invalid Answer: 1.0%	Not Attempted: 2.0%
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Question no: 5

Skill: Integers and Rational numbers, Powers and Bases **Paper Set: A, Medium: English**

$-4 - (-5) =$ _____.

- A: -1
- B: 1
- C: -9
- D: 9



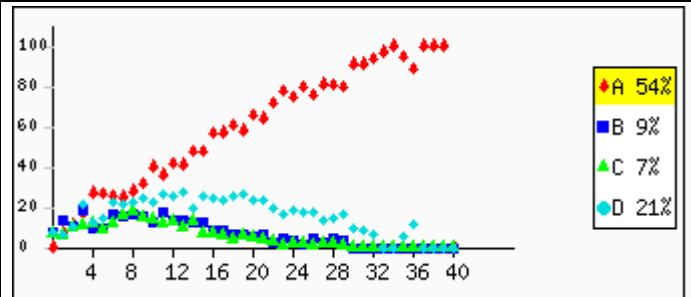
Overall	A: 32.2%	B: 27.9%	C: 24.6%	D: 11.6%	Invalid Answer: 1.1%	Not Attempted: 2.6%
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Question no: 6

Skill: Integers and Rational numbers, Powers and Bases **Paper Set: A, Medium: English**

Which of these is the cube root of 729?

- A: 9
- B: 13
- C: 19
- D: 27



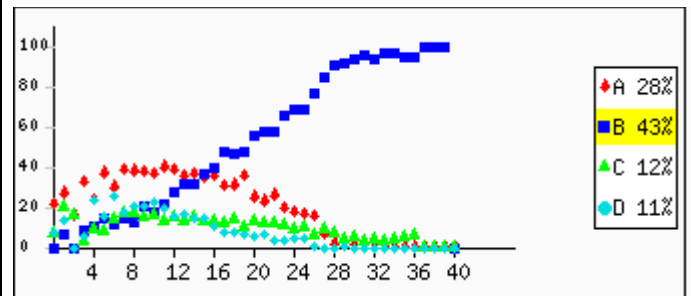
Overall	A: 54.0%	B: 9.2%	C: 7.9%	D: 21.9%	Invalid Answer: 1.3%	Not Attempted: 5.6%
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Question no: 7

Skill: Integers and Rational numbers, Powers and Bases **Paper Set: A, Medium: English**

$(-35) + 27 = \underline{\hspace{2cm}}$.

- A: -62
- B: -8
- C: 8
- D: 62



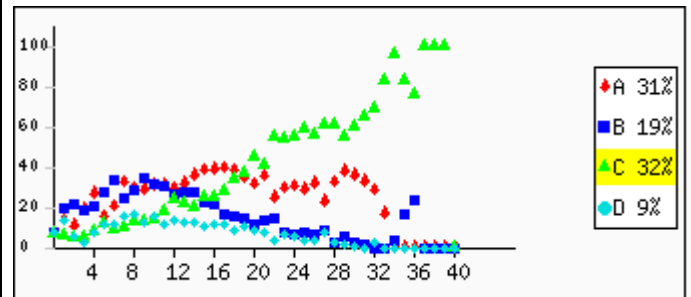
Overall	A: 28.9%	B: 43.6%	C: 12.6%	D: 11.0%	Invalid Answer: 1.2%	Not Attempted: 2.7%
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Question no: 8

Skill: Integers and Rational numbers, Powers and Bases **Paper Set: A, Medium: English**

In which number line does the pointer show a number between -2 and -3?

- A:
- B:
- C:
- D:

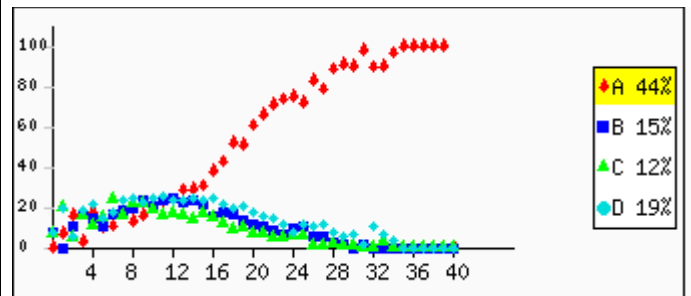


Overall	A: 32.0%	B: 19.4%	C: 32.8%	D: 9.8%	Invalid Answer: 1.2%	Not Attempted: 4.9%
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Question no: 9

Skill: Integers and Rational numbers, Powers and Bases **Paper Set: A, Medium: English**

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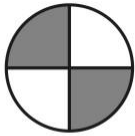


Overall	A: 44.3%	B: 15.7%	C: 12.1%	D: 19.2%	Invalid Answer: 0.8%	Not Attempted: 7.9%
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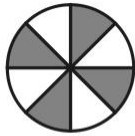
Question no: 10

Skill: Fractions, Decimals, Ratios and Percentages **Paper Set: A, Medium: English**

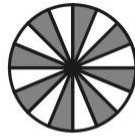
Which of the following fractions is the greatest?



$$\frac{2}{4}$$

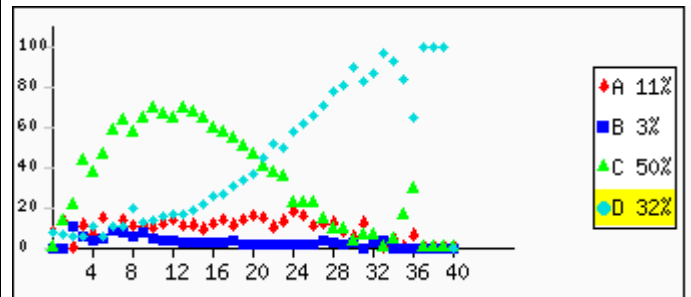


$$\frac{4}{8}$$



$$\frac{8}{16}$$

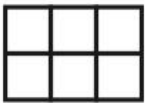
- A: 24
- B: 48
- C: 816
- D: (all are equal)

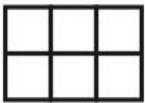


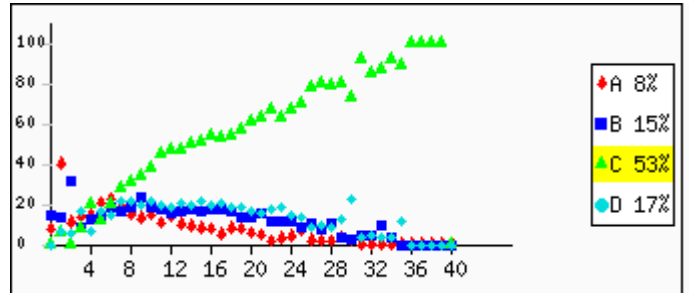
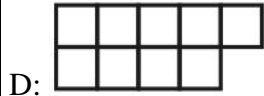
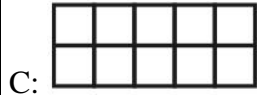
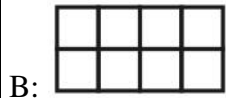
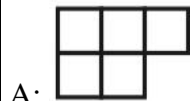
Overall	A: 11.4%	B: 3.0%	C: 50.1%	D: 32.4%	Invalid Answer: 1.0%	Not Attempted: 2.1%
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Question no: 11

Skill: Fractions, Decimals, Ratios and Percentages **Paper Set: A, Medium: English**



If  represents 75%, which of the following represents 125%?

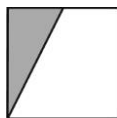


Overall	A: 8.1%	B: 15.1%	C: 53.4%	D: 17.8%	Invalid Answer: 1.0%	Not Attempted: 4.6%
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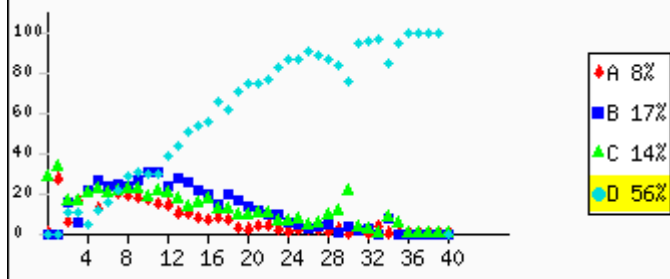
Question no: 12

Skill: Fractions, Decimals, Ratios and Percentages **Paper Set: A, Medium: English**

What fraction of the shape below is shaded?



- A: 1
- B: 12
- C: more than 12
- D: less than 12



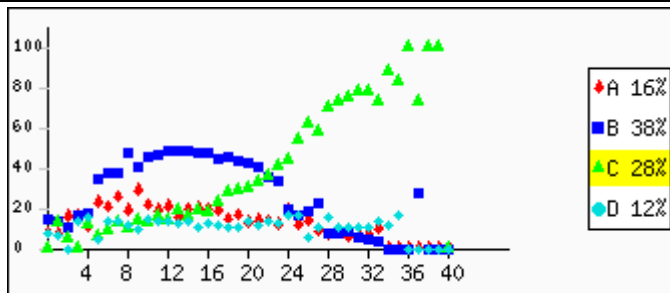
Overall	A: 8.1%	B: 18.0%	C: 14.0%	D: 56.5%	Invalid Answer: 0.9%	Not Attempted: 2.5%
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Question no: 13

Skill: Fractions, Decimals, Ratios and Percentages **Paper Set: A, Medium: English**

In which of the following are the decimal fractions arranged from the smallest to the largest?

- A: 2.5, 2.03, 2.07
- B: 2.03, 2.5, 2.07
- C: 2.03, 2.07, 2.5
- D: 2.07, 2.03, 2.5



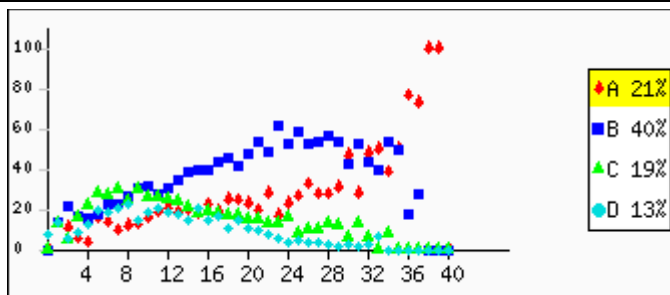
Overall	A: 16.7%	B: 38.7%	C: 28.1%	D: 12.2%	Invalid Answer: 1.1%	Not Attempted: 3.3%
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Question no: 14

Skill: Fractions, Decimals, Ratios and Percentages **Paper Set: A, Medium: English**

If the ratio of Ravi's age to John's age is 2:3, which of the following is definitely true about their actual ages?

- A: John's age is 112 times Ravi's age
- B: Ravi is a year younger than John
- C: John is 3 times as old as Ravi
- D: Ravi's age is half of John's age



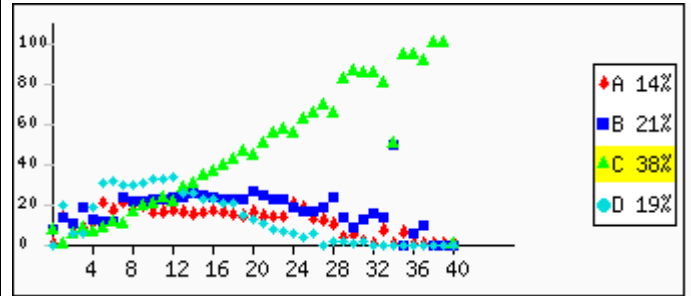
Overall	A: 21.0%	B: 40.3%	C: 19.1%	D: 13.3%	Invalid Answer: 0.8%	Not Attempted: 5.6%
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Question no: 15

Skill: Fractions, Decimals, Ratios and Percentages **Paper Set: A, Medium: English**

$0.99 + \text{-----} = 1$

- A: 1
- B: 0.1
- C: 0.01
- D: 0.001

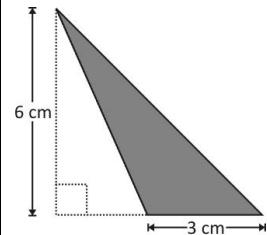


Overall	A: 14.7%	B: 21.8%	C: 38.6%	D: 19.3%	Invalid Answer: 0.9%	Not Attempted: 4.6%
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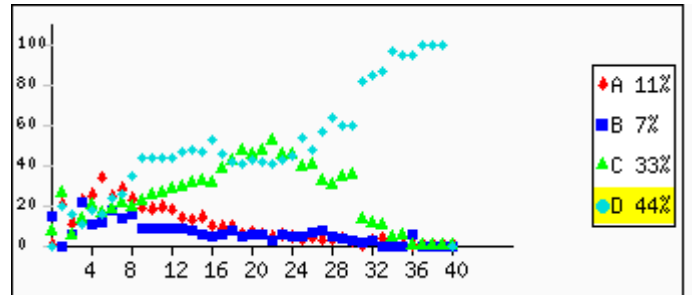
Question no: 16

Skill: Mensuration - Area and Perimeter, Volume and Surface Area **Paper Set: A, Medium: English**

What is the area of the shaded region in the figure below?



- A: 36 cm^2
- B: 24 cm^2
- C: 18 cm^2
- D: 9 cm^2

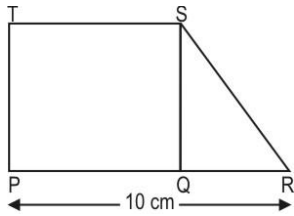


Overall	A: 11.1%	B: 7.0%	C: 33.5%	D: 45.0%	Invalid Answer: 1.2%	Not Attempted: 2.2%
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Question no: 17

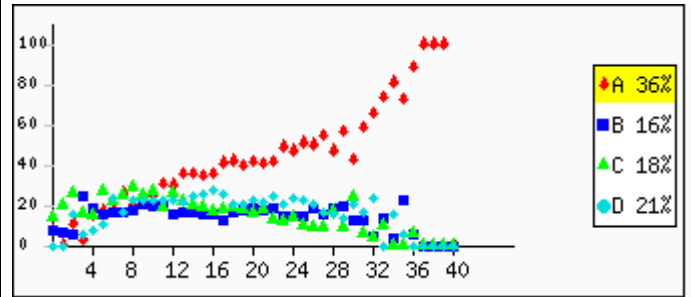
Skill: Mensuration - Area and Perimeter, Volume and Surface Area **Paper Set: A, Medium: English**

A trapezium is divided into a square and a triangle as shown below.



Which of the following lengths, if known, would NOT be sufficient to find out the area of trapezium?

- A: RS
- B: PT
- C: PQ
- D: QR

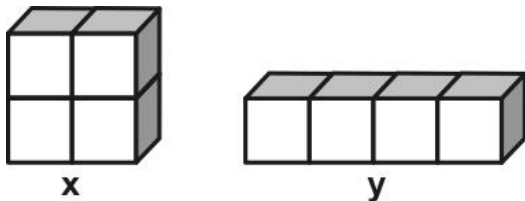


Overall A: 36.8% B: 16.6% C: 19.0% D: 21.8% Invalid Answer: 0.8% Not Attempted: 5.2%

Question no: 18

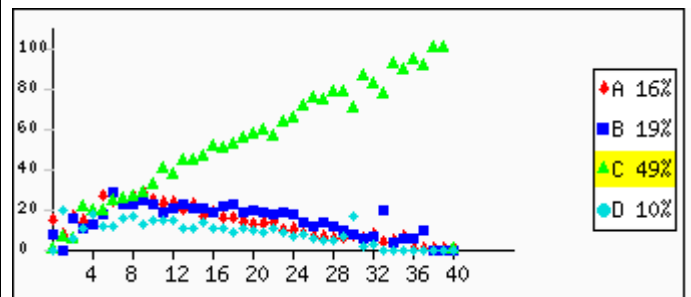
Skill: Mensuration - Area and Perimeter, Volume and Surface Area Paper Set: A, Medium: English

Cuboid x and Cuboid y below are both made of 4 identical unit cubes each.



What can be said about volume of x and y?

- A: Volume of x is greater than volume of y.
- B: Volume of x is less than volume of y.
- C: Volume of x is same as volume of y.
- D: Volume of x and volume of y can't be determined.



Overall A: 16.5% B: 19.1% C: 49.5% D: 10.7% Invalid Answer: 0.8% Not Attempted: 3.4%

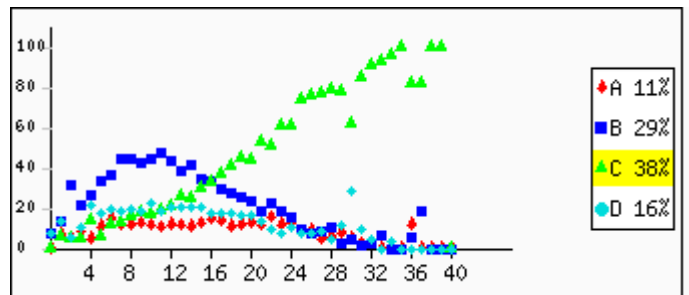
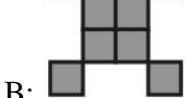
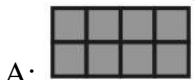
Question no: 19

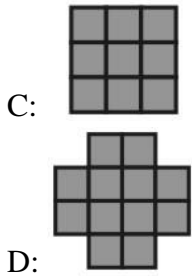
Skill: Mensuration - Area and Perimeter, Volume and Surface Area **Paper Set: A, Medium: English**

4 identical tiles are used to form the shape shown below. The area of the shape is 16 sq cm.



Some more identical tiles were added to the above shape to form another shape with area 36 sq cm. Which of the following could be the new shape formed?



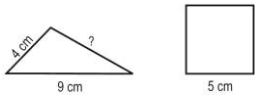


Overall	A: 11.1%	B: 29.9%	C: 38.4%	D: 16.4%	Invalid Answer: 0.7%	Not Attempted: 3.5%
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Question no: 20

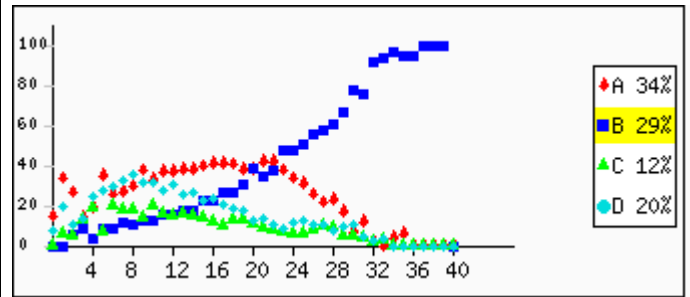
Skill: Mensuration - Area and Perimeter, Volume and Surface Area **Paper Set: A, Medium: English**

Shown here is a triangle with two of its sides as 9 cm and 4 cm and a square of side 5 cm.



Both the figures have the same perimeter. What would be the length of the third side of the triangle?

- A: 5 cm
- B: 7 cm
- C: 8 cm
- D: 13 cm

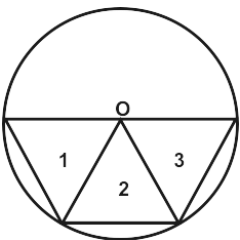


Overall	A: 34.5%	B: 29.0%	C: 12.5%	D: 20.8%	Invalid Answer: 0.8%	Not Attempted: 2.5%
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Question no: 21

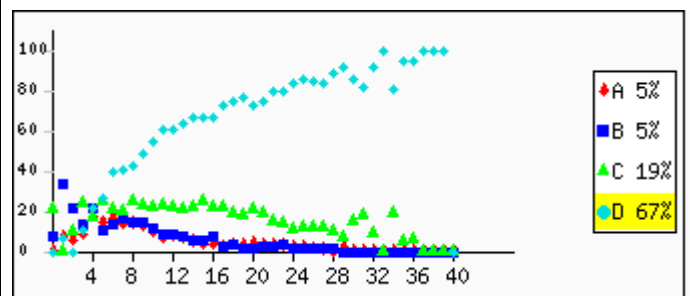
Skill: Basic Shapes, Geometry and Visual estimation **Paper Set: A, Medium: English**

Three equilateral triangles are inscribed in a circle with center O as shown below.



Which of the three triangles are congruent?

- A: triangles 1 and 2 only
- B: triangles 2 and 3 only
- C: triangles 1 and 3 only



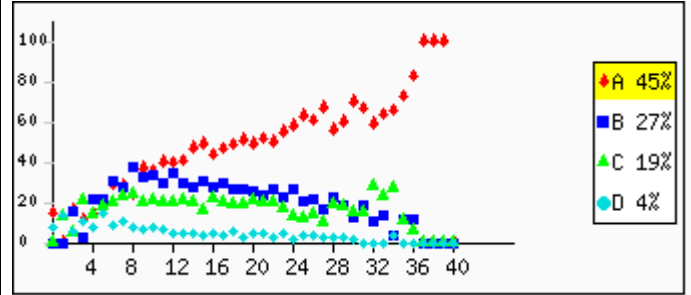
D: all the three triangles

Overall A: 5.1% B: 5.9% C: 19.5% D: 67.4% Invalid Answer: 0.9% Not Attempted: 1.3%

Question no: 22

Skill: Basic Shapes, Geometry and Visual estimation Paper Set: A, Medium: English

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Overall A: 45.9% B: 27.1% C: 19.2% D: 4.7% Invalid Answer: 1.0% Not Attempted: 2.2%

Question no: 23

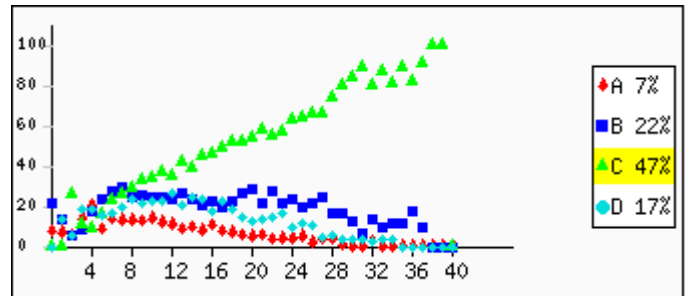
Skill: Basic Shapes, Geometry and Visual estimation Paper Set: A, Medium: English

Look at the map below.



Which of these streets are perpendicular to each other?

- A: MG Road and LBS Marg
- B: Market Road and MG Road
- C: LBS Marg and Nehru Road
- D: (None of the streets shown in the map are perpendicular to each other)



Overall	A: 7.7%	B: 22.9%	C: 47.7%	D: 17.7%	Invalid Answer: 1.0%	Not Attempted: 3.0%
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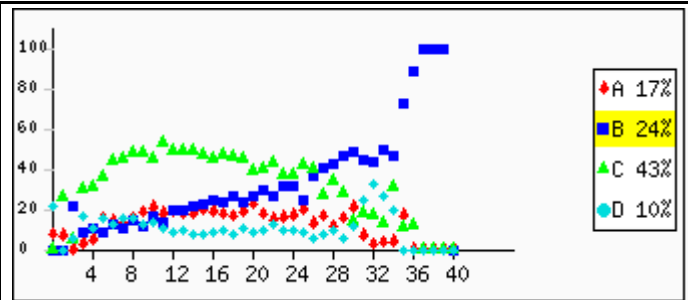
Question no: 24

Skill: Basic Shapes, Geometry and Visual estimation Paper Set: A, Medium: English

Rashi measured two of the sides of a triangle and found them to be 4 cm and 9 cm.

Which of the following could be the length of the third side?

- A: 3 cm
- B: 8 cm
- C: 13 cm
- D: 14 cm



Overall	A: 17.1%	B: 24.0%	C: 43.3%	D: 10.1%	Invalid Answer: 0.7%	Not Attempted: 4.9%
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Question no: 25

Skill: Basic Shapes, Geometry and Visual estimation Paper Set: A, Medium: English

Sheetal has made a pattern with pieces of chart paper.



What will come next in the pattern?

A:



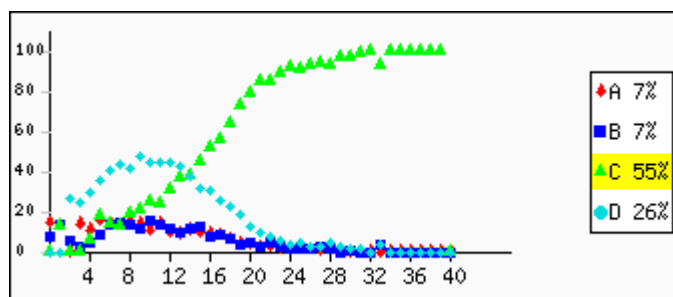
B:



C:



D:

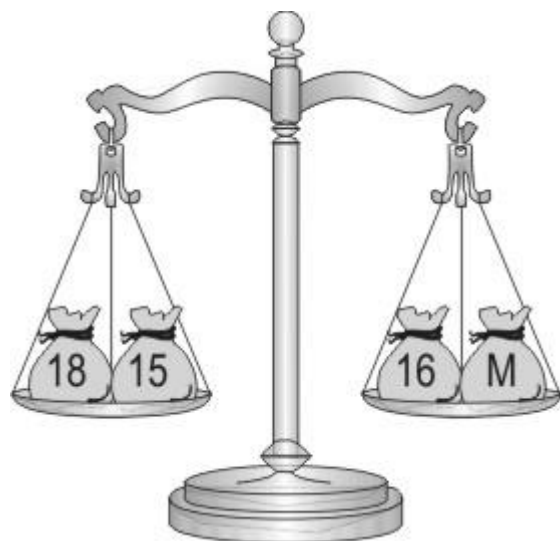


Overall	A: 7.4%	B: 7.8%	C: 55.3%	D: 26.0%	Invalid Answer: 1.0%	Not Attempted: 2.6%
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Question no: 26

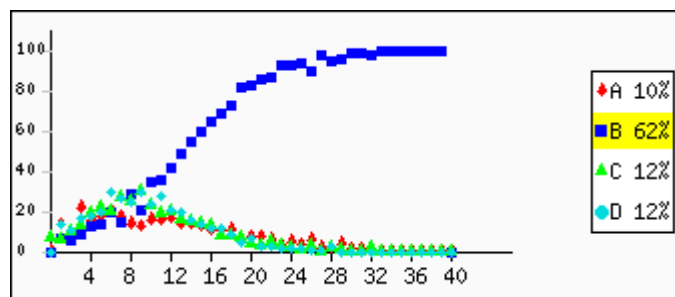
Skill: Algebra: concepts and applications **Paper Set: A, Medium: English**

Jim has balanced some bags of marbles. All the marbles are of the same weight. The number of marbles in each bag is written on it.



How many marbles are there in the bag marked M?

- A: 13
- B: 17
- C: 33
- D: 49

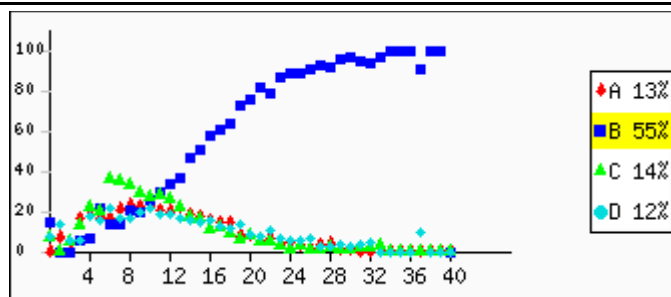


Overall A: 10.2% B: 62.3% C: 12.1% D: 12.6% Invalid Answer: 1.0% Not Attempted: 1.9%

Question no: 27

Skill: Algebra: concepts and applications **Paper Set: A, Medium: English**

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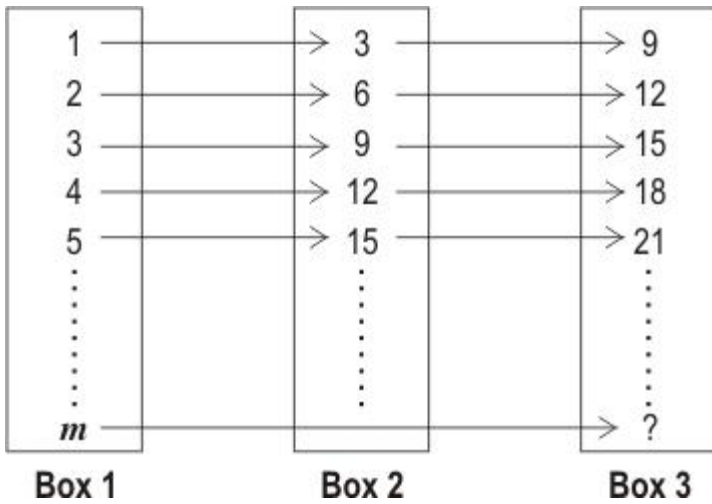


Overall A: 13.3% B: 55.8% C: 14.7% D: 12.9% Invalid Answer: 1.0% Not Attempted: 2.4%

Question no: 28

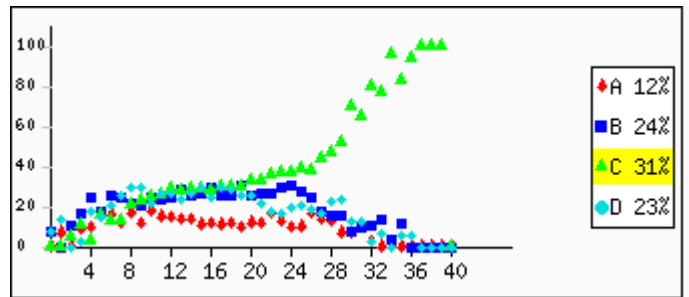
Skill: Algebra: concepts and applications **Paper Set: A, Medium: English**

A certain common formula converts the numbers in Box 1 to the corresponding ones in Box 2. Another formula then converts the numbers in Box 2 to the corresponding ones in Box 3:



If we wanted to convert a number m in Box 1 directly to the corresponding number in Box 3, we could use the formula

- _____.
- A: $3m + 2$
 - B: $3m \times 3$
 - C: $3(m+2)$
 - D: $m + 2 \times 3$

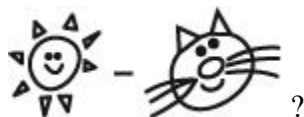
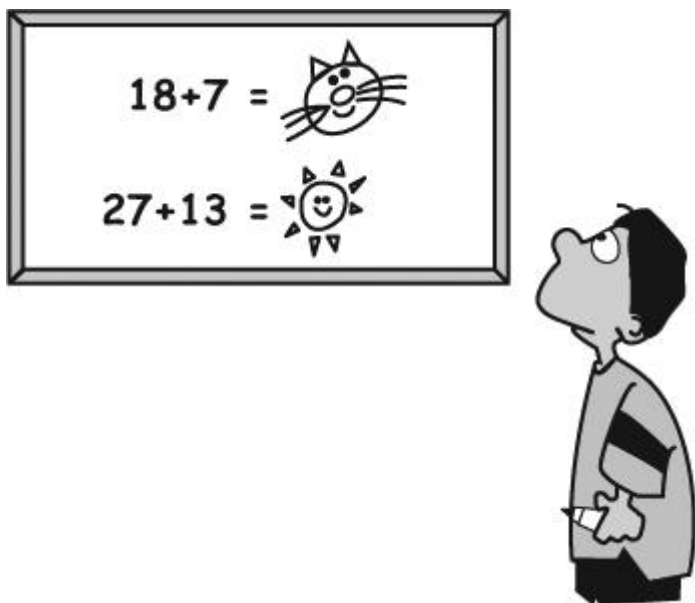


Overall	A: 12.3%	B: 24.7%	C: 31.5%	D: 23.6%	Invalid Answer: 1.1%	Not Attempted: 6.8%
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Question no: 29

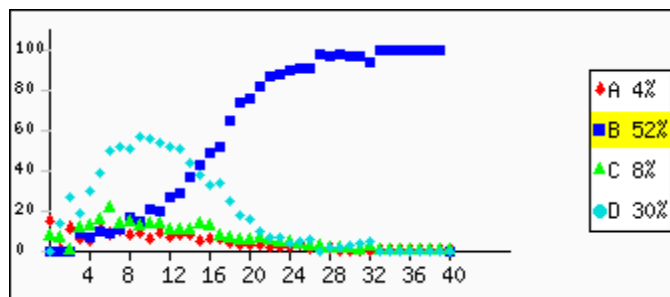
Skill: Algebra: concepts and applications Paper Set: A, Medium: English

Look at the picture below.



What is ?

- A: 6
- B: 15
- C: 20
- D: 40



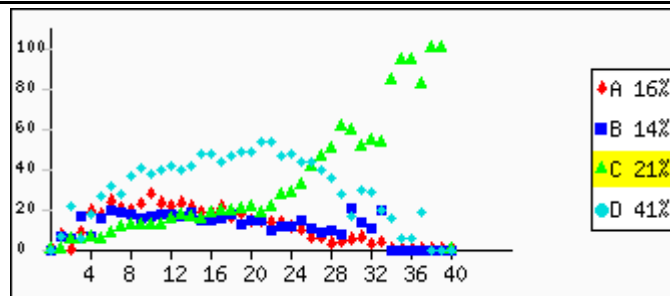
Overall A: 4.7% B: 52.3% C: 8.5% D: 30.4% Invalid Answer: 1.3% Not Attempted: 2.9%

Question no: 30

Skill: Algebra: concepts and applications Paper Set: A, Medium: English

For any numbers x and y such that $x = 70 + y$, what can be said about x and y ?

- A: $x = y$
- B: $x < y$
- C: $x > y$
- D: None of the above can be said as the exact values of x or y are NOT known.

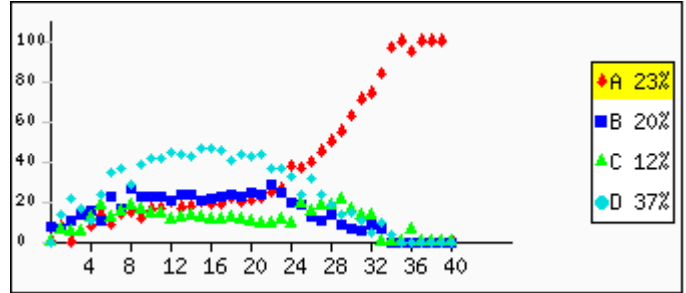


Overall A: 16.9% B: 14.8% C: 21.4% D: 41.7% Invalid Answer: 0.9% Not Attempted: 4.3%

Question no: 31

Skill: Algebra: concepts and applications Paper Set: A, Medium: English

$y + 10 < 10$. Which of these is DEFINITELY true?
A: y is any negative number.
B: y is a positive number less than 10.
C: y has to be a negative number less than -10.
D: $y + 10$ cannot be less than 10 for any value of y .



Overall	A: 23.4%	B: 20.8%	C: 12.7%	D: 37.6%	Invalid Answer: 1.1%	Not Attempted: 4.3%
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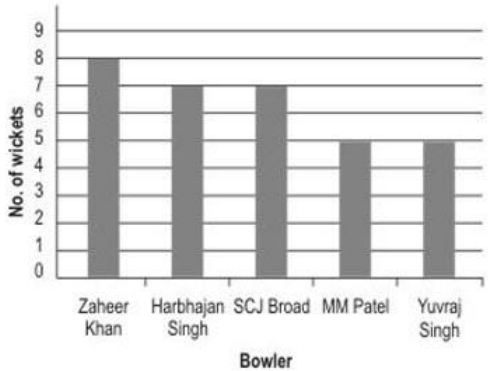
Question no: 32

Skill: Measurement, Data Interpretation, analysis and graphs **Paper Set: A, Medium: English**

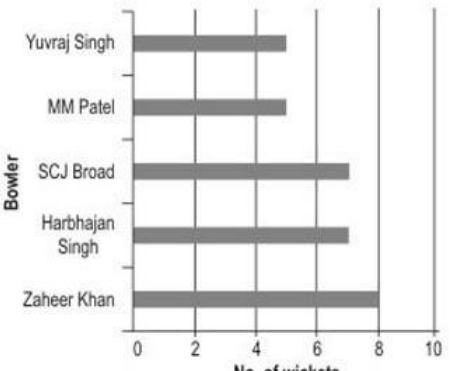
Bowler	No. of wickets
Zaheer Khan	8
Harbhajan Singh	7
SCJ Broad	7
MM Patel	5
Yuvraj Singh	5

A teacher gave the table shown above and asked to represent the data in some other way. Given below is the way Vandana, Asif, Devpal and Aasma represented it.

VANDANA



ASIF

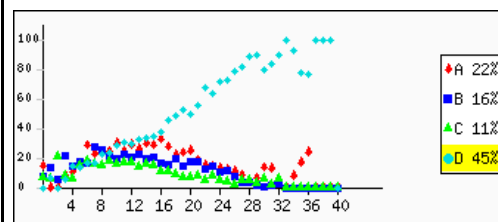


DEVPAL

Bowlers	No. of wickets
Zaheer Khan	
Harbhajan Singh	
SCJ Broad	
MM Patel	
Yuvraj Singh	

AASMA

Bowlers	No. of wickets (○ = 2 wickets)
Zaheer Khan	○○○○
Harbhajan Singh	○○○○
SCJ Broad	○○○○
MM Patel	○○○
Yuvraj Singh	○○○



Who has represented it correctly?

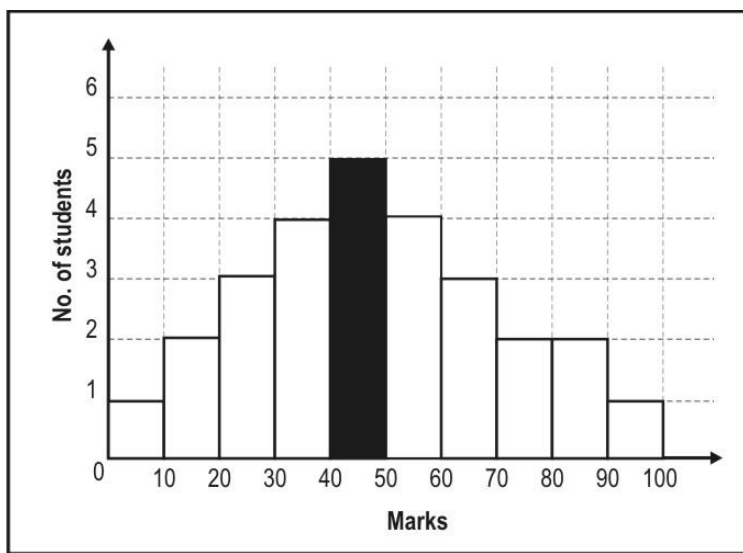
- A: only Vandana
- B: only Vandana and Asif
- C: only Vandana and Aasma
- D: all of them

Overall	A: 22.1%	B: 16.7%	C: 11.3%	D: 45.2%	Invalid Answer: 1.0%	Not Attempted: 3.7%
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Question no: 33

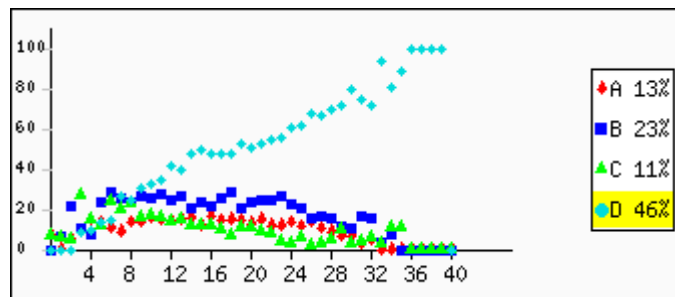
Skill: Measurement, Data Interpretation, analysis and graphs **Paper Set: A, Medium: English**

A histogram is a graphical representation of grouped data, with the bars showing the frequency of the class interval. The following is a histogram showing the distribution of marks of 27 students in a test. Study the histogram and answer the following question based on it.



What does the bar shaded black represent?

- A: The maximum marks scored by a student.
- B: The average marks scored by 5 students.
- C: The number of students who scored 45 marks.
- D: The number of students who scored marks between 40 and 50.

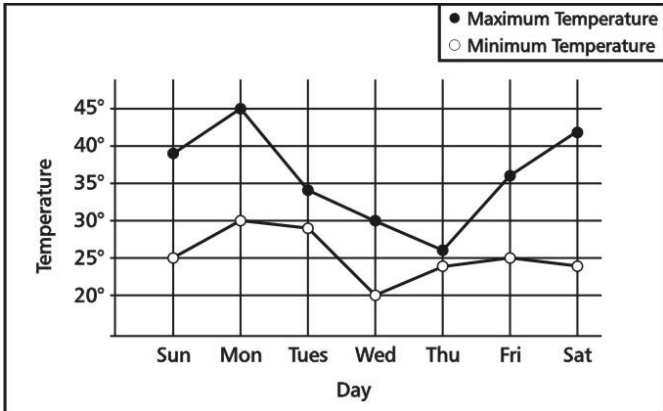


Overall	A: 13.1%	B: 23.1%	C: 11.5%	D: 46.8%	Invalid Answer: 1.3%	Not Attempted: 4.3%
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Question no: 34

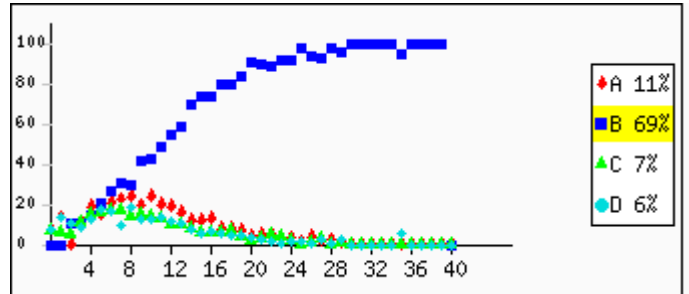
Skill: Measurement, Data Interpretation, analysis and graphs **Paper Set: A, Medium: English**

Shown below is the graph representing the highest and the lowest temperature recorded in a day for a week. Study it and answer the question.



On which day of the week was the HIGHEST temperature recorded?

- A: Sunday
- B: Monday
- C: Wednesday
- D: Saturday



Overall	A: 11.0%	B: 70.0%	C: 7.4%	D: 6.8%	Invalid Answer: 0.7%	Not Attempted: 4.0%
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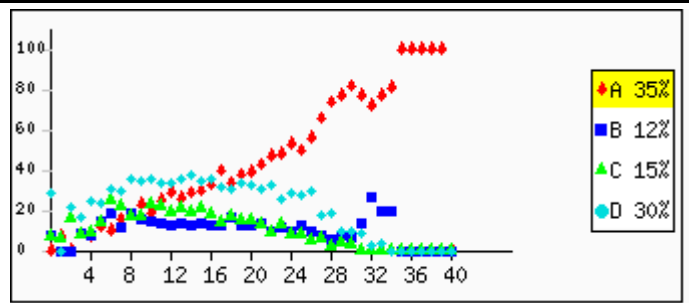
Question no: 35

Skill: Applications in daily life, commercial Maths, word and visual problems **Paper Set: A, Medium: English**

Rahul is older than Ramesh and Ramesh is older than Peter.

Which statement must be true?

- A: Rahul is older than Peter.
- B: Rahul is younger than Peter.
- C: Rahul is the same age as Peter.
- D: We cannot tell who is the oldest from the information.



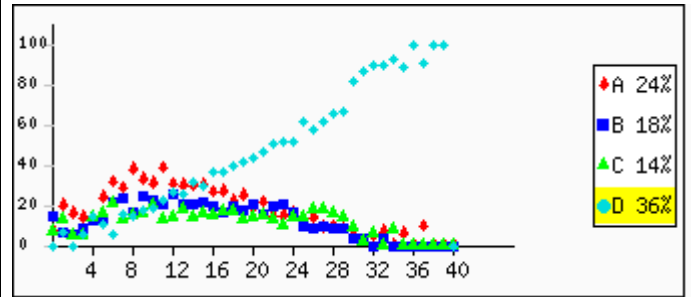
Overall	A: 35.9%	B: 12.7%	C: 15.5%	D: 30.7%	Invalid Answer: 0.9%	Not Attempted: 4.3%
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Question no: 36

Skill: Applications in daily life, commercial Maths, word and visual problems **Paper Set: A, Medium: English**

Rahul's father is 6 times as old as Rahul. Rahul's mother is 25 years old. The average age of this family of three is 20 years. How old is Rahul?

- A: 15 years
- B: 10 years
- C: 7 years
- D: 5 years



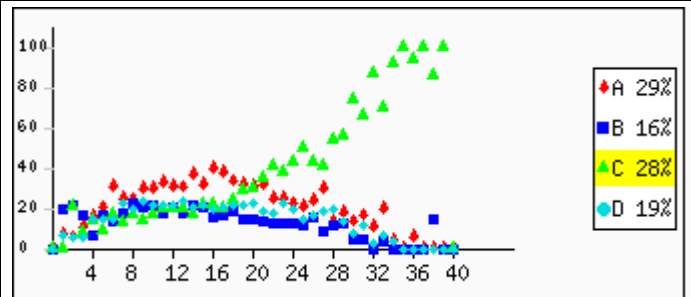
Overall	A: 24.2%	B: 18.1%	C: 15.0%	D: 37.0%	Invalid Answer: 1.1%	Not Attempted: 4.7%
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Question no: 37

Skill: Applications in daily life, commercial Maths, word and visual problems **Paper Set: A, Medium: English**

A sheet of paper is 0.012 cm thick. What would be the height of a stack of 400 sheets of this paper?

- A: 0.048 cm
- B: 0.48 cm
- C: 4.8 cm
- D: 48 cm



Overall	A: 29.1%	B: 16.2%	C: 28.4%	D: 19.7%	Invalid Answer: 0.7%	Not Attempted: 5.8%
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Question no: 38

Skill: Reasoning and Problem Solving (Advanced or challenging problems) Paper Set: A, Medium: English

Observe the number pattern in the number triangle below.

1 ←———— Row 1

2 3 4 ←———— Row 2

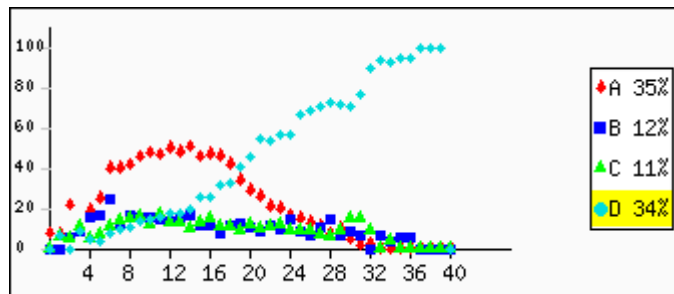
5 6 7 8 9 ←———— Row 3

10 11 12 13 14 15 16 ←———— Row 4

17 18 19 20 21 22 23 24 25 ←———— Row 5

If it is extended, what will be the last number (on the right) in the 9th row?

- A: 25
- B: 36
- C: 61
- D: 81

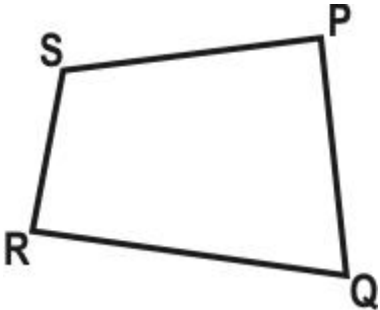


Overall	A: 35.3%	B: 12.2%	C: 11.9%	D: 34.0%	Invalid Answer: 1.3%	Not Attempted: 5.2%
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Question no: 39

Skill: Reasoning and Problem Solving (Advanced or challenging problems) Paper Set: A, Medium: English

A field PQRS is in the shape of a quadrilateral.

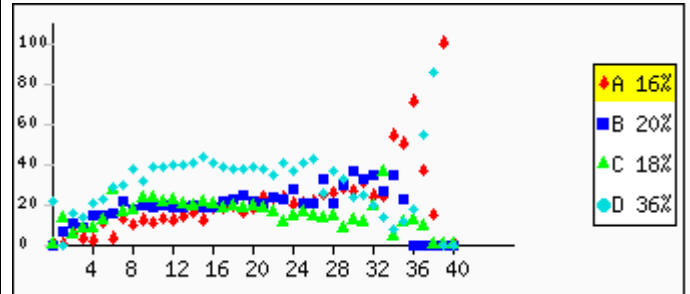


(Note: Figure not to scale.)

If you walked from Q to P to S to R along the boundary of the field, you would have covered 140 metres. If you walked from P to S to R to Q along the boundary of the field, you would have covered 135 metres.

Based on this, which of the following can you conclude?

- A: PQ is 5 m longer than QR
- B: QR is 5 m longer than SR
- C: PS is 5 m longer than PQ
- D: the perimeter of the field is 275 m



Overall	A: 16.6%	B: 21.0%	C: 18.4%	D: 36.8%	Invalid Answer: 1.0%	Not Attempted: 6.3%
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Question no: 40

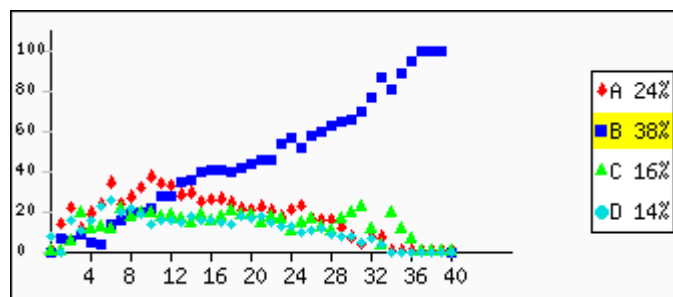
Skill: Reasoning and Problem Solving (Advanced or challenging problems) **Paper Set: A, Medium: English**

Here is a letter pattern.

a
aba
abcba
abcdcba
⋮

How many times would you have written the letter 'c' if you complete writing this pattern up to the end of the TENTH row?

- A: 10
- B: 15
- C: 19
- D: 45



Overall	A: 24.2%	B: 38.5%	C: 16.5%	D: 14.9%	Invalid Answer: 0.9%	Not Attempted: 5.0%
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Note: For each question, options marked with **RED** letters shows % of students who gave wrong answers, options marked with **GREEN** letters shows % of students who gave correct answers.