



UNICUS  
OLYMPIADS

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## Sample Paper



**Class 6**

## Unicus Global Mathematics Olympiad (UGMO)

Time: 60 minutes

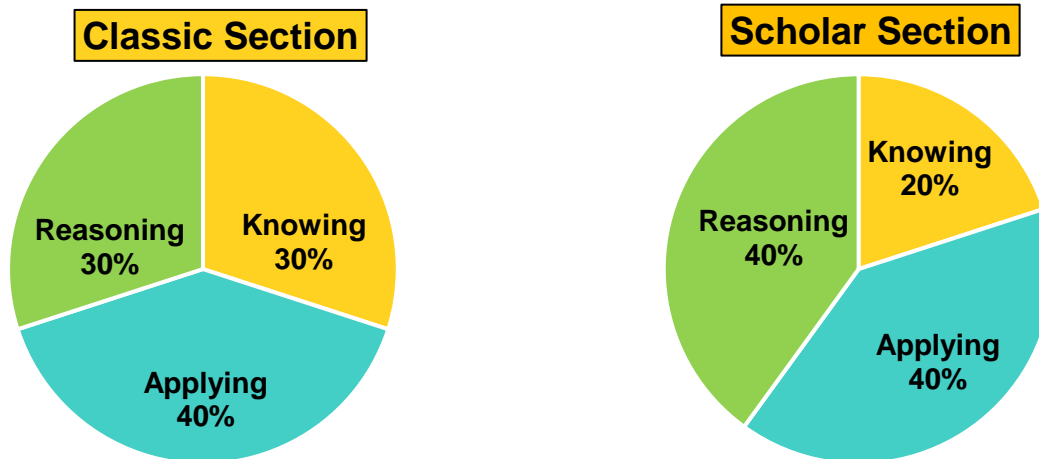
Pattern and Marking Scheme			
Section	Total Questions	Marks per Question	Total Marks
Classic Section	30	1	30
Scholar Section	15	2	30
Grand Total	45		60

## Unicus Global Mathematics Olympiad (UGMO)

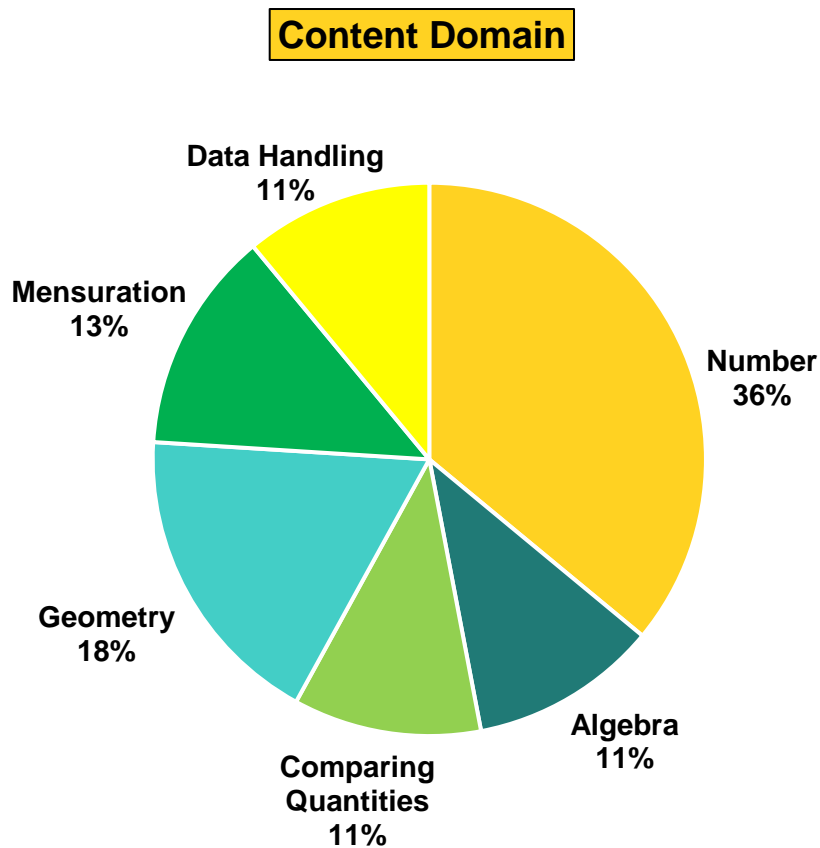
The **Unicus Global Olympiad** is organised around two dimensions:

1. Content dimension, specifying the subject matter domains to be assessed
2. Cognitive dimension, specifying the thinking processes to be assessed

### Target percentages of the question paper devoted to cognitive domains



### Target percentages of the question paper devoted to content domains



For more details, visit <https://www.unicusolympiads.com/>.

## Classic Section (Each Question is 1 Mark)

<b>Cognitive Domain: Knowing</b>	<b>Content Domain: Algebra</b>
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1. If  $x = 3$ ,  $y = 4$  and  $z = -8$ , then evaluate the following and match the correct answers.

<b>a</b>	$x^2 + y^2 + z^2$	<b>(i)</b>	<b>76</b>
<b>b</b>	$2x^3 - 3y - 8z$	<b>(ii)</b>	<b>169</b>
<b>c</b>	$3x + 4x^2y - 2z$	<b>(iii)</b>	<b>106</b>
<b>d</b>	$-2z + 5xy$	<b>(iv)</b>	<b>89</b>

a. a-iv, b-iii, c-ii, d-i

b. a-i, b-iii, c-ii, d-iv

c. a-iii, b-i, c-ii, d-iv

d. a-iii, b-i, c-iv, d-ii

<b>Cognitive Domain: Reasoning</b>	<b>Content Domain: Algebra</b>
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2. A and B each have a certain number of oranges. A says to B, "If you give me 10 of your oranges, I will have twice the number of oranges left with you." B replies, "If you give me 10 of your oranges, I will have the same number of oranges left with you." Find the number of oranges that A has.

a. 65

b. 50

c. 70

d. 55

<b>Cognitive Domain: Knowing</b>	<b>Content Domain: Algebra</b>
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3. If  $A = -5x + 3y$ ,  $B = 5x - 3y$ , find  $(3A + B) - (3A - B)$ .

a.  $5x - 6y$ b.  $10x - 6y$ c.  $10x - 7y$ d.  $8x - 6y$ 

<b>Cognitive Domain: Applying</b>	<b>Content Domain: Algebra</b>
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4. If  $a - \frac{24}{a} = 5$ , where  $a > 0$ , then find the value of  $a^2 + \frac{64}{a^2}$ .

a. 65

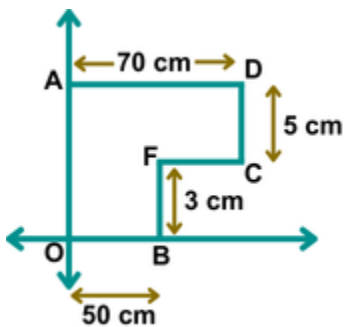
b. 60

c. 56

d. 45

<b>Cognitive Domain: Knowing</b>	<b>Content Domain: Mensuration</b>
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5. Find the area of figure AOBFCD from the given figure.



- |                       |                       |
|-----------------------|-----------------------|
| a. $500 \text{ cm}^2$ | b. $400 \text{ cm}^2$ |
| c. $300 \text{ cm}^2$ | d. $450 \text{ cm}^2$ |

<b>Cognitive Domain: Applying</b>	<b>Content Domain: Mensuration</b>
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6. The length of a rectangle is three times its width and the length of its diagonal is  $6\sqrt{10}$  cm. Find the perimeter of the rectangle.

- |          |          |
|----------|----------|
| a. 36 cm | b. 48 cm |
| c. 24 cm | d. 12 cm |

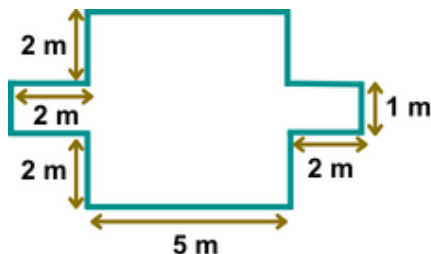
<b>Cognitive Domain: Applying</b>	<b>Content Domain: Mensuration</b>
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7. The diagonal of the square is  $16\sqrt{2}$  cm. Find the diagonal of another square whose area is triple that of the first square.

- |                    |                    |
|--------------------|--------------------|
| a. $12\sqrt{6}$ cm | b. $6\sqrt{6}$ cm  |
| c. $8\sqrt{6}$ cm  | d. $16\sqrt{6}$ cm |

<b>Cognitive Domain: Reasoning</b>	<b>Content Domain: Mensuration</b>
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8. The length of a rectangle is increased by 60%. By what percentage would the width have to be reduced to maintain the same area?



- |           |        |
|-----------|--------|
| a. 21%    | b. 23% |
| c. 37.50% | d. 75% |

**Cognitive Domain: Reasoning**

**Content Domain: Mensuration**

9. Imagine you're a carpenter tasked with crafting a square tabletop. You know that the diagonal measurement of the square tabletop is exactly  $20\sqrt{2}$  cm. You need to calculate the area of the tabletop in order to estimate the amount of material needed. What would the area of the tabletop be?
- a.  $4 \text{ cm}^2$
  - b.  $20 \text{ cm}^2$
  - c.  $40 \text{ cm}^2$
  - d.  $400 \text{ cm}^2$
- 

**Cognitive Domain: Applying**

**Content Domain: Data Handling**

10. Rachel claims that she is better at math than her friend Harry. Rachel's marks in the last five tests were 64, 75, 80, 50 and 84. Harry's marks in the last four tests were 85, 76, 53 and 70. Who secured a better average?
- a. Rachel
  - b. Rachel's marks are equal to Harry's marks
  - c. Harry
  - d. Harry's marks are less than Rachel's marks
- 

**Cognitive Domain: Applying**

**Content Domain: Data Handling**

11. In a local park, the number of birds spotted each day for a week was: 12, 12, 14, 16, 12, 18, 20. What is the mode and how is it different from the mean?
- a. Mode is 16, mean is the same
  - b. Mode is 14, mean is lower
  - c. Mode is 12, mean is higher
  - d. Mode is 13, mean is higher
- 

**Cognitive Domain: Applying**

**Content Domain: Number**

12. What is the correct expression of the following in the form of fraction?

**$\overline{6.46}$**

- a.  $646/99$
  - b.  $640/99$
  - c.  $640/100$
  - d.  $646/100$
-

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Cognitive Domain: Reasoning

Content Domain: Number

13. Find the magic sum of the given square. Subtract 2.34 from each number in the magic square.

What will be the magic sum of the new magic box?

8.85	8.91	9.30
9.06	9.27	8.88
9.21	9.00	9.15
9.18	9.12	8.97

- a. 20.82  
c. 81.82

- b. 79.82  
d. 80.82

Cognitive Domain: Reasoning

Content Domain: Number

14. Simplify the following.

$$0.9 + 0.9 \times 0.9 \div 0.9 - 0.9 + 0.9 \div 0.9 \times 0.9$$

- a. 1.8  
c. 2.3

- b. 2  
d. 1.3

Cognitive Domain: Applying

Content Domain: Number

15. A man gives  $\frac{1}{3}$  amount to his wife,  $\frac{1}{4}$  amount to his son and the remaining amount equally to his two daughters. If each daughter received \$60,000, what was the total amount?

- a. \$288,000  
c. \$298,000

- b. \$144,000  
d. \$388,000

Cognitive Domain: Knowing

Content Domain: Number

16. If 7A342 is divisible by 11, then what is the value of A?

- a. 8  
c. 0

- b. 3  
d. 5

**Cognitive Domain: Reasoning**

**Content Domain: Number**

17. A game involves picking cards numbered from 1 to 100. To win, a player must select a card with a prime number. What is one strategy to increase the chances of winning?
- Avoid numbers greater than 50.
  - Choose only even numbers.
  - Pick numbers that are not divisible by 2, 3, or 5.
  - Select only multiples of 10
- 

**Cognitive Domain: Reasoning**

**Content Domain: Number**

18. Three boys step off together. Their steps measure 10 cm, 12 cm and 15 cm respectively. At what distance from the starting point will they step off together again?
- 30 cm
  - 40 cm
  - 70 cm
  - 60 cm
- 

**Cognitive Domain: Applying**

**Content Domain: Number**

19. Find the least number which when decreased by 4 is exactly divisible by 10, 15, 20 and 25.
- 296
  - 300
  - 304
  - 205
- 

**Cognitive Domain: Knowing**

**Content Domain: Comparing Quantities**

20. a, b, c and d are in proportion. If  $a = 15$ ,  $b = 11$ ,  $c = 30$ , then find the value of d.
- 22
  - 11
  - 26
  - 28
- 

**Cognitive Domain: Applying**

**Content Domain: Comparing Quantities**

21. In a school, the ratio of the number of male teachers to that of female teachers is 2 : 5. If there are 18 male teachers, find the number of female teachers in the school.
- 40
  - 63
  - 50
  - 55
-

<b>Cognitive Domain: Reasoning</b>	<b>Content Domain: Comparing Quantities</b>
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22. 240 sweets were distributed among Sam, Vincent and Tim in a ratio of 2 : 3 : 5 respectively. Find the number of sweets each will get and fill in the blanks in the table.

Name of the child	Number of sweets
Sam	
Vincent	
Tim	

- |               |                |
|---------------|----------------|
| a. 11, 22, 44 | b. 12, 24, 36  |
| c. 24, 48, 72 | d. 48, 72, 120 |

<b>Cognitive Domain: Applying</b>	<b>Content Domain: Geometry</b>
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23. Match the quadrilateral with the number of lines of symmetry each of them has:

Quadrilateral	Number of lines of symmetry
Square	0
Rectangle	1
Kite	2
Trapezium	4

a.

Quadrilateral	Number of lines of symmetry
Square	4
Rectangle	2
Kite	1
Trapezium	0

b.

Quadrilateral	Number of lines of symmetry
Square	3
Rectangle	2
Kite	1
Trapezium	0

c.

Quadrilateral	Number of lines of symmetry
Square	0
Rectangle	2
Kite	4
Trapezium	0

d.

Quadrilateral	Number of lines of symmetry
Square	0
Rectangle	2
Kite	4
Trapezium	1



<b>Cognitive Domain: Applying</b>	<b>Content Domain: Geometry</b>
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24. Observe the following letters carefully. Find the lines of symmetry in each and classify them under suitable headings:  
A, G, K, X, L, T, Y, C, U, F

Zero line of symmetry	One line of symmetry	Two lines of symmetry

a.

Zero line of symmetry	One line of symmetry	Two lines of symmetry
A	X	G
F	K	U
L	T	
	Y	
	C	

b.

Zero line of symmetry	One line of symmetry	Two lines of symmetry
A	X	G
F	K	
L	T	
	Y	
	C	

c.

Zero line of symmetry	One line of symmetry	Two lines of symmetry
G	A	X
F	K	
L	T	
	Y	
	C	

d.

Zero line of symmetry	One line of symmetry	Two lines of symmetry
G	X	A
F	K	
L	T	
	Y	
	C	
	U	

<b>Cognitive Domain: Knowing</b>	<b>Content Domain: Geometry</b>
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25. Name the polygon having the following number of sides:

Number of side	Name of the polygon
3	
8	
5	
7	

a.

Number of side	Name of the polygon
3	Triangle
8	Octagon
5	Pentagon
7	Heptagon

b.

Number of side	Name of the polygon
3	Triangle
8	Octagon
5	Hexagon
7	Heptagon

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c.

Number of side	Name of the polygon
3	Triangle
8	Octagon
5	Hexagon
7	Decagon

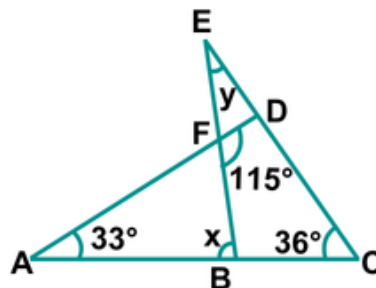
d.

Number of side	Name of the polygon
3	Triangle
8	Septagon
5	Hexagon
7	Decagon

**Cognitive Domain: Applying**

**Content Domain: Geometry**

26. Find the angles  $x$  and  $y$  in the given figure.



- a.  $x = 82^\circ, y = 46^\circ$   
 c.  $x = 92^\circ, y = 56^\circ$

- b.  $x = 92^\circ, y = 46^\circ$   
 d.  $x = 72^\circ, y = 46^\circ$

**Cognitive Domain: Knowing**

**Content Domain: Number**

27. The length, breadth and height of a room are 6 m 25 cm, 8 m 75 cm and 5 m 50 cm, respectively. Find the longest rod which can measure the three dimensions of the room exactly.

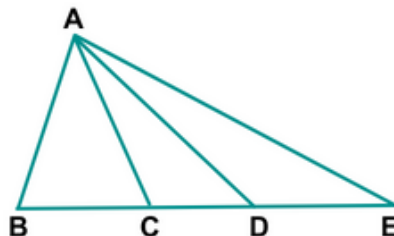
- a. 22 cm  
 c. 28 cm

- b. 25 cm  
 d. 32 cm

**Cognitive Domain: Knowing**

**Content Domain: Geometry**

28. How many triangles are there in the given figure?



- a. 4  
 c. 6

- b. 5  
 d. 8

**Cognitive Domain: Knowing**

**Content Domain: Geometry**

29. How many line segments are there in the given figure?



- a. 7  
c. 11

- b. 9  
d. 13

**Cognitive Domain: Reasoning**

**Content Domain: Number**

30. Rocky had 20 pencils, Sophia had 50 pencils and Jackson had 80 pencils. After 4 months, Rocky used up 10 pencils, Sophia used up 25 pencils and Jackson used up 40 pencils. What fraction did each use up?

- a.  $\frac{1}{2}$   
c.  $\frac{2}{3}$

- b.  $\frac{1}{3}$   
d.  $\frac{3}{2}$

### Scholar Section (Each Question is 2 Marks)

**Cognitive Domain: Applying**

**Content Domain: Algebra**

31. Simplify:

$$5x - [4y - \{7x - (3z - y) + 4z - 2(x - 2y - z)\}]$$

- a.  $10x + y + 3z$   
c.  $10x - y - z$

- b.  $10x + y - 3z$   
d.  $10x - y - 3z$

**Cognitive Domain: Knowing**

**Content Domain: Number**

32. Find the value of the following.

$$\frac{(0.7)^2 \div 0.14 + (0.6)^2 \div 0.18 + (0.5)^2 \div 0.05}{4(2.5 \text{ of } 4 - 13 \times 0.25 \times 3)}$$

- a.  $\frac{21}{2}$   
c.  $\frac{31}{5}$

- b. 0  
d.  $\frac{27}{2}$

**Cognitive Domain: Applying**

**Content Domain: Number**

33. If  $2994 / 14.5 = 172$ , then  $29.94 / 1.45 = ?$

- a. 172  
b. 0.172  
c. 17.2  
d. 1.72

**Cognitive Domain: Applying**

**Content Domain: Number**

34. Calculate the HCF of  $12/5$ ,  $14/15$  and  $16/17$ .

- a.  $4/255$   
b.  $2/255$   
c.  $3/255$   
d.  $1/255$

**Cognitive Domain: Applying**

**Content Domain: Comparing Quantities**

35. Sophie goes to the library every 4 days and borrows 6 books each time. If she wants to borrow enough books to last her for 24 days, how many books does she need to borrow?

- a. 30 books  
b. 24 books  
c. 36 books  
d. 18 books

**Cognitive Domain: Reasoning**

**Content Domain: Comparing Quantities**

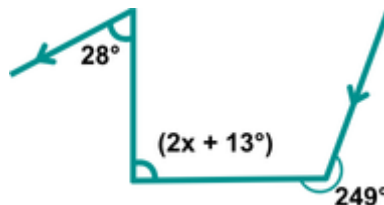
36. Eight years ago, the ratio of ages of A and B was 9 : 10. The ratio of their ages four years from now will be 12 : 13. What is the age (in years) of C now, if his age is 6 years more than that of A?

- a. 50  
b. 56  
c. 42  
d. 44

**Cognitive Domain: Applying**

**Content Domain: Geometry**

37. Find the value of  $x$ .



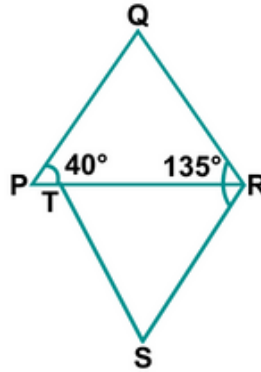
- a.  $61^\circ$   
b.  $41^\circ$   
c.  $42^\circ$   
d.  $84^\circ$

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**Cognitive Domain: Reasoning**

**Content Domain: Geometry**

38. In the given figure,  $\angle QPR = 40^\circ$ ,  $\angle QRS = 135^\circ$  and  $PQ = PR$  and  $ST = SR$ . Find the angle of  $\angle S$ .



- a.  $\angle S = 45^\circ$                                       b.  $\angle S = 60^\circ$   
c.  $\angle S = 40^\circ$                                       d.  $\angle S = 50^\circ$

**Cognitive Domain: Knowing**

**Content Domain: Mensuration**

39. A wire is bent in the form of an equilateral triangle of each side 20 cm. If the same wire is bent in the form of a square, find the side of the square.

- a. 15 cm    b. 18 cm  
c. 21 cm    d. 25 cm

**Cognitive Domain: Knowing**

**Content Domain: Number**

40. Simplify:

$$\frac{29}{36} + \left[ 1\frac{2}{3} + \left\{ \frac{2}{9} \div \frac{1}{36} - \left( \frac{13}{72} - \frac{1}{6} \right) \right\} \right]$$

- a.  $10\frac{11}{24}$     b.  $12\frac{3}{23}$   
c.  $10\frac{3}{24}$     d.  $11\frac{3}{24}$

## Unicus Global Mathematics Olympiad (UGMO)

**Directions (41-42):** Read the passage carefully and answer the given questions:

Jasmine is part of her school's event planning committee and is tasked with organizing a community fair. The committee has a budget, but Jasmine needs to make sure that expenses do not exceed what has been allocated. The total budget for the event is £3,000. She categorizes the expenses as follows:

40% for entertainment, 35% for food, and the rest for decorations and miscellaneous expenses. Jasmine needs to allocate these funds appropriately and also prepare a report showing the fraction of the total budget each category uses.

The first task Jasmine tackles is calculating how much money is allotted for each category based on the percentage of the total budget. She also needs to express these amounts as fractions of the total budget.

Next, Jasmine compares the cost of decorations to the other expenses to ensure that the ratio between the categories remains reasonable and within budget constraints.

Finally, Jasmine needs to calculate what percentage of the total budget is left after allocating funds for entertainment and food, to see how much is available for decorations and other miscellaneous expenses.

<b>Cognitive Domain: Reasoning</b>	<b>Content Domain: Number</b>
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**41.** How much money is allotted for food, and what fraction of the total budget does this represent?

- a. £1,050;  $\frac{7}{20}$
- b. £1,050;  $\frac{3}{10}$
- c. £1,050;  $\frac{35}{3000}$
- d. £1,050;  $\frac{17}{10}$

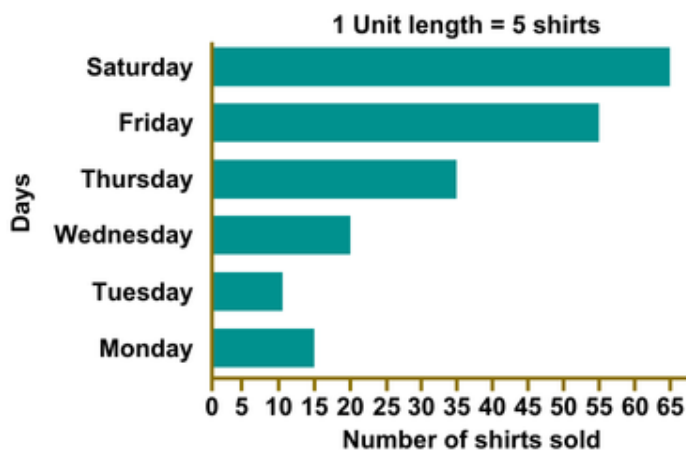
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<b>Cognitive Domain: Applying</b>	<b>Content Domain: Number</b>
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**42.** If Jasmine finds that the cost allocated to decorations is £450, what is the ratio of the budget for decorations to the budget for entertainment?

- a. 4 : 1
- b. 1 : 4
- c. 3 : 8
- d. 8 : 3

**Direction (43-45):** The bar graph shows the sales of shirts from Monday to Saturday. Study the graph and answer the given questions:



**Cognitive Domain: Reasoning**

**Content Domain: Data Handling**

43. On which day was the maximum number of shirts sold? How many shirts were sold on that day?
- a. Friday, 60  
b. Saturday, 60  
c. Tuesday, 10  
d. Saturday, 65

**Cognitive Domain: Reasoning**

**Content Domain: Data Handling**

44. What is the average number of shirts sold in a given days?
- a. 28  
b. 33.33  
c. 36.66  
d. 40

**Cognitive Domain: Reasoning**

**Content Domain: Data Handling**

45. Find the ratio of the total number of shirts sold on Friday and Tuesday to the total number of shirts sold on Wednesday and Thursday.
- a. 5 : 7  
b. 11 : 13  
c. 13 : 11  
d. 9 : 11

## Answer Key

1.	a	2.	c	3.	b	4.	a	5.	a	6.	b	7.	d
8.	c	9.	d	10.	c	11.	c	12.	b	13.	d	14.	a
15.	a	16.	a	17.	c	18.	d	19.	c	20.	a	21.	b
22.	d	23.	a	24.	c	25.	a	26.	a	27.	b	28.	c
29.	d	30.	a	31.	b	32.	a	33.	c	34.	b	35.	c
36.	a	37.	c	38.	d	39.	a	40.	a	41.	b	42.	c
43.	d	44.	b	45.	c								