

**SECTION A (30 Marks)**  
**ATTEMPT ALL QUESTIONS**

**Question 1**

[30]

**Direction:** For each question, there are FOUR responses: A, B, C and D. Choose the correct alternative and circle it. DO not circle more than one alternative. If there are more than ONE choice circled, NO score will be awarded.

- i. Tshering wants to solve a mathematical expression consisting of several operations. Which sequence below should she follow?

- A Bracket-Division-Subtraction-Multiplication  
**B** Bracket-Division-Multiplication-Subtraction  
C Multiplication-Division-Bracket-Subtraction  
D Subtraction-Multiplication-Division-Bracket

BEDMAS

- ii. The distance between the Earth and the Sun is 151,350,000 km.

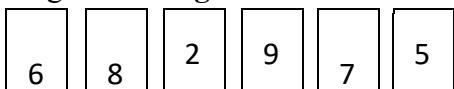
Which measurement below best represents the distance in scientific notation?

- A  $1.5135 \times 10^{-8}$ km  
B  $1.5135 \times 10^{-4}$ km  
C  $1.5135 \times 10^4$ km  
**D**  $1.5135 \times 10^8$  km

Convert 151,350,000 to scientific notation:

- Move the decimal point 8 places to the left to get 1.5135.

- iii. Karma has these cards with numbers on them. She must use each card only once to form a largest **five-digit even** number.



What is her number?

- A 98765  
B 98762  
**C** 98756  
D 68297

To form the largest five-digit even number using the cards (6, 8, 2, 9, 7, 5), follow these steps:

- Even Numbers:** The last digit must be even, so we can use 2, 6, or 8.
- Maximize Remaining Digits:** We want the other digits to be as large as possible.

If we use:

- 2 as the last digit:** The largest number is 98765 (but it's odd).
- 6 as the last digit:** The largest number is 98756 (this works because it's even).
- 8 as the last digit:** The largest number is 97562 (but it's smaller than 98756).

So, the largest five-digit even number is 98756.

- iv. In a school there are 441 students. The school sport's instructor wants to arrange the students in such a manner that the number of **rows and columns are equal** to conduct an aerobic. How many rows and columns can be made?

- A 11  
B 20  
**C** 21  
D 41

Calculating the square root:

$$\sqrt{441} = 21$$

This means we can arrange the students in **21 rows and 21 columns**.

- v. Paint comes in 5 liter cans. The principal needs 43 liters of paint to repaint the school. How many cans must he buy?

- A 7  
B 8  
**C** 9  
D 10

$$\frac{43 \text{ Liters}}{5 \text{ Liters}} = 8.6$$

Since we can't buy a fraction of a can, we need to round up to the next whole number. Therefore, the principal must buy 9 cans.

- vi. The table below shows interest rate offered by different banks in Bhutan.

Bank	Interest rate (per year)
BOBL	5%
BDBL	5.65 %
T-BANK	5.90%

Sagar deposits Nu 2500 in BOBL. How much interest will he earn at the end of **two** years?

- A Nu 125  
**B** Nu 250  
C Nu 282  
D Nu 500

$$\text{Interest} = \text{Principal} \times \text{Rate} \times \text{Time}$$

- Principal = Nu 2500
- Rate = 5% = 0.05
- Time = 2 years

$$\text{Interest} = 2500 \times 0.05 \times 2$$

$$\text{Interest} = 2500 \times 0.1 = 250$$

So, Sagar will earn **Nu 250** at the end of two years.

- vii. There are 36 students in a class. **One third** of the classes bring lunch and **one half** of them order lunch each day. How many of them eat lunch each day?

- A 30  
**B** 18  
C 12  
B 6

1. Calculate how many students bring lunch:

$$\frac{1}{3} \times 36 = 12$$

2. Calculate how many students order lunch:

$$\frac{1}{2} \times 12 = 6$$

3. Total students eating lunch:

$$12 + 6 = 18$$

So, the total number of students who eat lunch each day is **18**.

Hope you know how to multiply fraction with number ☺

- viii. Gaylek and Namgyel were playing a game. They both started with **zero** points. Gaylek's final score was 240 points. Namgay's final score was - 60. How many **more** points did Gaylek have than Namgyel?

- A -300  
 B -180  
 C 180  
 D 300

$$240 - (-60) = 240 + 60 = 300$$

- ix. The table below shows a sequence of numbers.

Term	Term value
1	4
2	16
3	28
4	40
5	?

What is the next term's value?

calculate the differences:

- $16 - 4 = 12$
- $28 - 16 = 12$
- $40 - 28 = 12$

The difference between each term is consistently **12**.

So,  $40 + 12 = 52$

- A 64  
 B 56  
 C 52  
 D 44

Please always use blue or black ink pen 😊

- x. An athlete ran the same distance on his first day and second day. On his third day, he ran 4 times the distance that he ran on the first day. On his fourth day, he ran 8km. He ran 40km altogether. Which equation below best represents this situation?

- A  $14x = 40$   
 B  $6x + 8 = 40$   
 C  $6x = 40 + 8$   
 D  $x + x + 4x - 8 = 40$

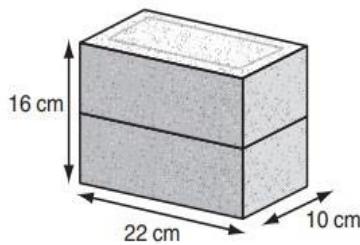
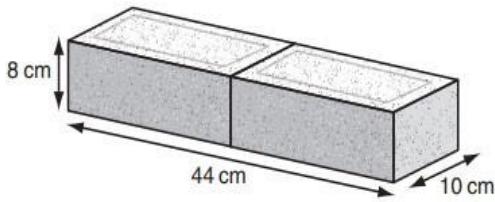
1. Distance on the first day:  $xx$
2. Distance on the second day:  $xx$
3. Distance on the third day:  $4x \cdot 4x$
4. Distance on the fourth day: 88 km

The total distance is:

$$x+x+4x+8=40$$

$$6x+8=40$$

- xii. Two bricks can be placed together face-to-face to form three different rectangular prisms. Two of them are shown here.



Our Answer matches little bit with option B so umm 😊

What would be the measurements of the third prism?

- A 11cm by 16 cm by 10 cm
- B** 22 cm by 20 cm by 8 cm
- C 32 cm by 22 cm by 10 cm
- D 44 cm by 16 cm by 5 cm

**First prism:**

- Length = 44 cm (two 22 cm sides combined)
- Width = 10 cm
- Height = 8 cm

**Second prism:**

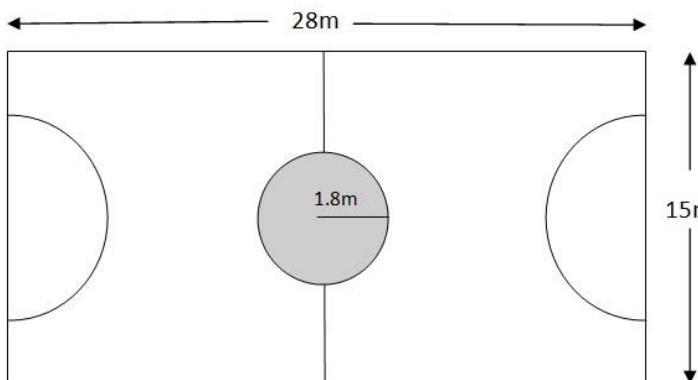
- Length = 22 cm
- Width = 10 cm
- Height = 16 cm (two 8 cm sides stacked)

**To find the third prism:**

For the third combination, we would likely place the bricks with their 22 cm sides together and the 8 cm sides together. This will give the following dimensions:

- Length = 22 cm
- Width = 16 cm (two 8 cm sides stacked)
- Height = 10 cm

- xii. The diagram below shows basketball court of a school with a circular region in the center being painted. What is the area of the unpainted region in the **nearest whole number**?



- A  $10\text{m}^2$
- B  $86\text{m}^2$
- C**  $410\text{m}^2$
- D  $420\text{m}^2$

**Calculate the area of the entire basketball court**

$$\text{Area of court} = \text{Length} \times \text{Width}$$

$$\text{Area of court} = 28 \times 15 = 420 \text{ m}^2$$

**Calculate the area of the painted circular region**

$$\text{Area of circle} = \pi \times r^2$$

$$\text{Area of circle} = 3.14 \times (0.9)^2 \approx 3.14 \times 0.81 \approx 2.54 \text{ m}^2$$

**Calculate the area of the unpainted region**

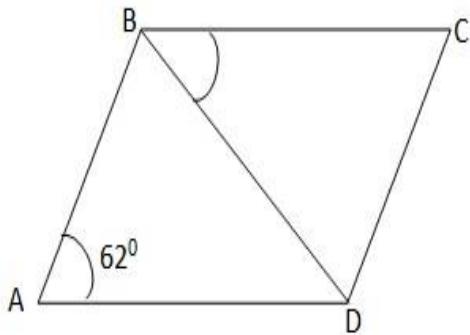
$$\text{Area of unpainted region} = 420 - 2.54 \approx 417.46 \text{ m}^2$$

$$\text{Area of unpainted region} \approx 417 \text{ m}^2$$

So, the correct answer is  $417 \text{ m}^2$ , but since the closest available option is C:  $410 \text{ m}^2$ , this would be the best answer given the choices.

Why not  $420\text{m}^2$ ? Rounding  $417.46 \text{ m}^2$  to the nearest whole number gives  $417 \text{ m}^2$ , not  $420 \text{ m}^2$ . Since  $420 \text{ m}^2$  is the total area, it cannot represent just the unpainted portion. Therefore, the closest answer to the unpainted area is  $410 \text{ m}^2$ . CRAZY RIGHT 😐

- xiii. ABCD is a polygon with AB **parallel** to DC and AB = BC = BD.

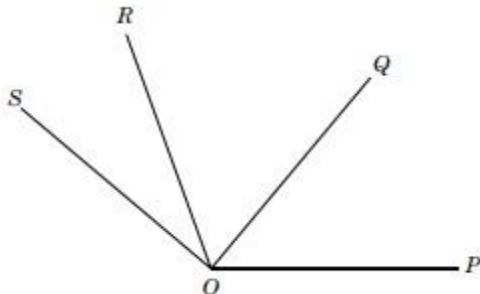


Find  $\angle DBC$ .

- A  $56^\circ$
- B  $59^\circ$
- C  $62^\circ$
- D  $68^\circ$

- xiv. In the figure, the measure of  $\angle POR$  is  $110^\circ$ , the measure of  $\angle QOS$  is  $90^\circ$ , and

the measure of  $\angle POS$  is  $140^\circ$ .



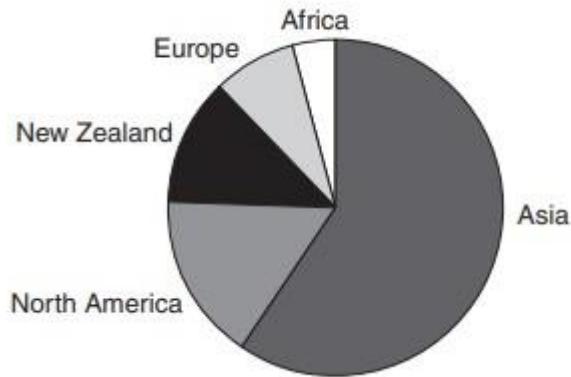
What is the measure of  $\angle QOR$ ?

- A  $20^\circ$
- B  $30^\circ$
- C  $50^\circ$
- D  $60^\circ$

- $\angle POR=110^\circ$
- $\angle QOS=90^\circ$
- $\angle POS=140^\circ$

We are asked to find  $\angle QOR$ .  
The sum of all angles around point O is  $360^\circ$ .  
To find  $\angle QOR$ , we first find the sum of the other angles:  
 $\angle POR + \angle QOS + \angle POS = 110^\circ + 90^\circ + 140^\circ = 340^\circ$   
Now, subtract this sum from  $360^\circ$  to find  $\angle QOR$ :  
 $\angle QOR = 360^\circ - 340^\circ = 20^\circ$

- xv. An airline is a company that offers regular services for transporting passengers or goods via flight. The diagram shows the proportion of flights to different international regions for an airline.



One region makes up about 60% of the airline's flights. Which region is it?

- A Asia
- B Europe
- C New Zealand
- D North America

The diagram shows that Asia occupies the largest section of the pie chart, close to 60% of the airline's flights.

**SECTION B (50 MARKS)**  
**ATTEMPT ALL QUESTIONS**

**Question 2**

a. The table below shows the radius of the Earth and Mars. [3]

Planets	Radius (m)
Earth	$6.371 \times 10^6$
Mars	$3.3895 \times 10^6$

i. Which planet has a greater radius? How do you know?

Ans:-

Since  $6.371 \times 10^6 > 3.3895 \times 10^6$ ,

Earth's radius is larger.

ii. Write the radius of Mars in standard form.

Ans:-

The radius of Mars in standard form is 3,389,500 meters.

b. If 4% of the mass of a small mineral water bottle is 20 grams. Calculate 12% of the same mass. [2]

Ans:-

1. 4% of the mass is 20 grams.
2. To find the total mass, divide 20 by 4%:  
$$\frac{20}{0.04} = 500 \text{ grams.}$$
3. To find 12% of the mass:  
$$0.12 \times 500 = 60 \text{ grams.}$$

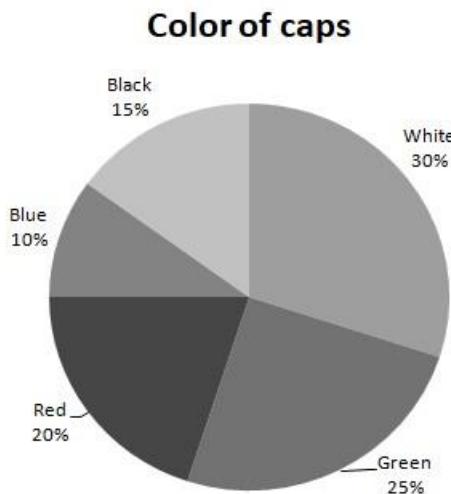
So, 12% of the mass is 60 grams.

Rough work LOL

4% means  $\frac{4}{100}$  which is 0.04  
 $20 \div 0.04 = 20 \times \frac{100}{4}$   
So  $\frac{100}{4} = 25$   
Then  $20 \times 25 = 500$

**Question 3**

- a. The circle graph shows the percentage of caps for sale at a sporting goods store. [2]



If there are 200 caps, what is the total number of caps that are white and green?

Ans-

1. The percentage of white caps is 30%, and the percentage of green caps is 25%.
2. Together, white and green caps make up  $30\% + 25\% = 55\%$  of the total caps.
3. If there are 200 caps in total, calculate 55% of 200:

$$\frac{55}{100} \times 200 = 110$$

- b. The letters (**M**, **N**, **P** and **Q**) represent fractions on the number line below. Use this number line to answer questions **i** to **iii**. [3]



Each of the equation below is either True or False. Write True or False against each of them.

Equation	True/False
i. $P + N = M$	False
ii. $P \times Q = N$	False
iii. $M \div Q > M$	True

Please  
check  
last  
page for  
solution

**Question 4**

- a. An electronic repairing service provider has a basic charge of Nu 200 and an additional charge of Nu 50 per hour. [3]

- i. Write an algebraic expression to model the above given situation.

Ans:-

$$\text{Total cost} = 200 + 50h$$

h means hours okay

- ii. How much will the service provider charge for 3 hours?

Ans:-

$$\text{Total cost} = 200 + 50 \times 3$$

$$\text{Total cost} = 200 + 150$$

$$\text{Total cost} = 350$$

So, Nu 350

- b. The table below shows the shadow lengths of four bushes of different heights at 10 a.m. [2]

Bush Height (cm)	Shadow length (cm)
20	16
40	32
60	48
80	64

What is the shadow length of a bush that has a height of 50 centimeters at the same time?

Ans:-

$$\text{Shadow length} = \frac{16}{20} = 0.8 \quad \frac{32}{40} = 0.8 \quad \frac{48}{60} = 0.8 \quad \frac{64}{80} = 0.8$$

The shadow length is always 0.8 times the height.

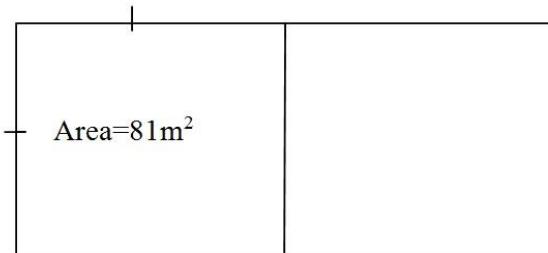
For a bush with a height of 50 cm:

$$\text{Shadow length} = 0.8 \times 50 = 40 \text{ cm}$$

## Question 5

- a. The area of one side of a volleyball court is  $81\text{m}^2$  as shown below. What is the perimeter of the full court?

[2]



Ans:-

$$\text{Side length} = \sqrt{81} = 9\text{m}$$

Now, the court is double-sided (a typical volleyball court is rectangular), its full length is 18 m (9 m on each side), and the width is 9 m.

$$\text{Perimeter} = 2 \times (\text{Length} + \text{Width})$$

$$\text{Perimeter} = 2 \times (18 + 9) = 2 \times 27 = 54\text{ m}$$

- b. Durga wants to make a ramp to replace a set of steps that are 2 meters high as shown below. The ratio of the horizontal length of the ramp to its height is 10:1.

[3]



Find the diagonal length of the ramp to the nearest whole number.

Ans:-

$$\text{Horizontal length} = 10 \times 2 = 20\text{ m}$$

$$\text{Diagonal length}^2 = 2^2 + 20^2$$

$$\text{Diagonal length}^2 = 4 + 400$$

$$\text{Diagonal length}^2 = 404$$

$$\text{Diagonal length} = \sqrt{404} \approx 20.1 \approx 20\text{ m}$$

$c^2 = a^2 + b^2$ : where 'c' is the hypotenuse and 'a' and 'b' are sides of right-angled triangle.

## Question 6

- a. What happens to the volume of a rectangular prism when you double each dimension? By how many times does the volume change. Show your work.

Ans:-

- When we double each dimension of a rectangular prism, the volume increases by a factor of 8 because doubling each dimension means the new dimensions become:

$$\text{New Length}=2L, \text{New Width}=2W, \text{New Height}=2H$$

The new volume  $V_{\text{new}}$  is:

$$V_{\text{new}}=(2L) \times (2W) \times (2H)$$

$$V_{\text{new}}=2 \times 2 \times 2 \times (L \times W \times H)$$

$$V_{\text{new}}=8 \times (L \times W \times H)$$

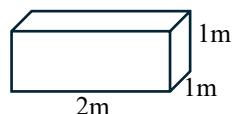
$$V_{\text{new}}=8V$$

- b. Bebek wants to construct a wooden bathtub that can hold 2,000,000 ml of water.

[2]

Help him to sketch the tub by showing one possible set of dimensions in meter.

Ans:-



1,000,000ml=1 cubic meter( $m^3$ ) so,

2,000,000 ml=2  $m^3$

Volume=Length×Width×Height

$$V=2m \times 1m \times 1m=2m^3$$

Since the volume is 2 cubic meters, we can select different values for length, width, and height that multiply to give 2 cubic meters. Here's one possible set of dimensions:  
Length=2 m, Width=1 m, Height=1

## Question 7

- a. "Microscopes have lenses that can be used to see invisible objects with our naked eyes".

[2]

State the transformation that has been described in the above statement. How do you now?

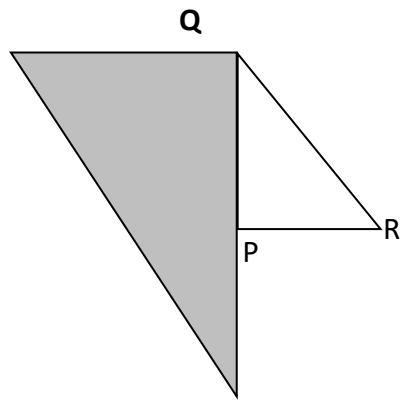
Ans:-

The transformation described in the statement is enlargement( also called magnification ) as enlargement involves scaling up an object's size, which is like how microscope enlarges small objects.

- b. Rinzin concludes that he has transformed triangle **PQR** to shaded triangle below by reflecting it along line **PQ** followed by  $90^\circ$  CCW rotation around turn center **Q**. [3]  
Do you agree with him? Justify with correct explanation.

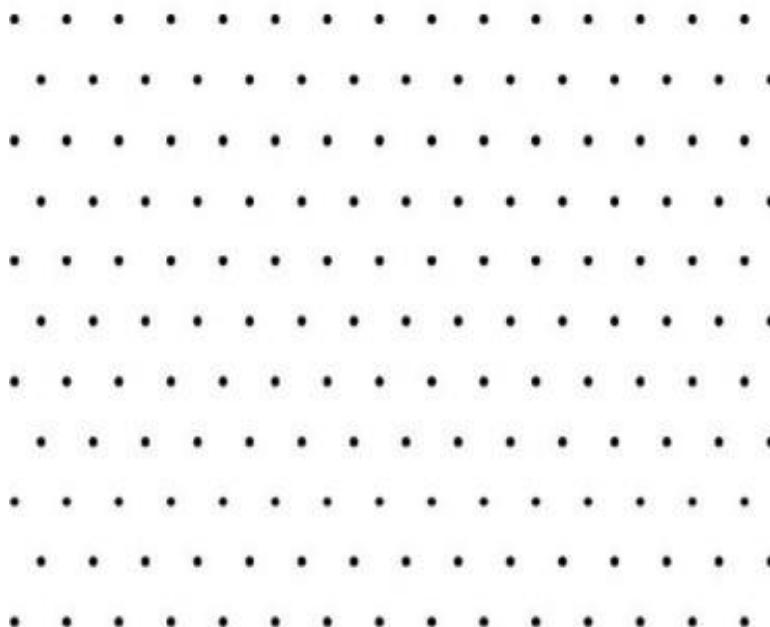
Ans:-

No, I do not agree with Rinzin because:-  
Reflection along **PQ**: Reflecting triangle **PQR** along the line **PQ** would create a mirror image of triangle **PQR**. In the reflection, point **R** would move to the position side of line **PQ**, not maintaining its current position relative to **P** and **Q**.  
The orientation of the triangle would flip horizontally, but it wouldn't match the shaded triangle yet



### Question 8

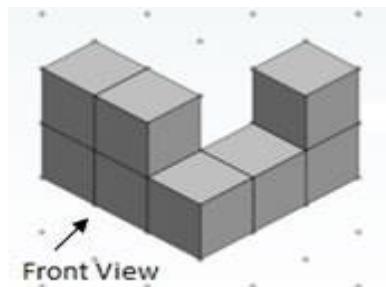
- a. Create any structure on the isometric dot paper with **10** cubes. [2]



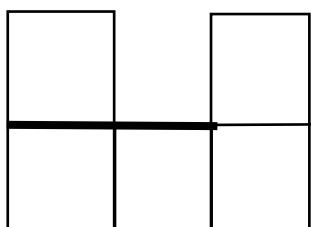
Please create this  
yourself 

- b. Kuenga builds a structure using cubes. The front view is shown below.

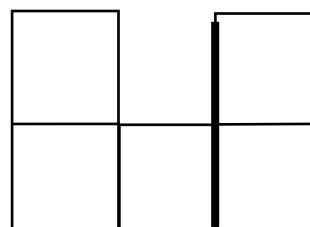
[3]



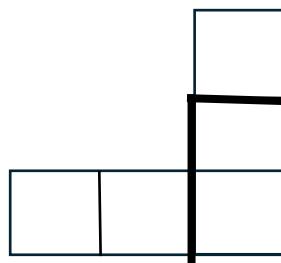
Draw the right, left and top face views of this structure.



Right Face View



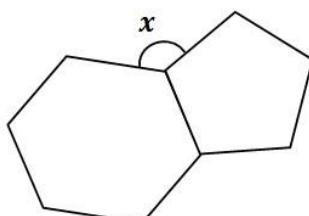
Left Face View



Top Face View

### Question 9

- a. The diagram below shows two regular polygons attached together. [2]



Find the value of angle  $x$ .

Ans:- Pentagon (5 sides)

$$\text{Interior Angle} = \frac{(5-2) \times 180^\circ}{5} = 108^\circ$$

$$\text{External Angle} = 180^\circ - 108^\circ = 72^\circ$$

Hexagon (6 sides)

$$\text{Interior Angle} = \frac{(6-2) \times 180^\circ}{6} = 120^\circ$$

$$\text{External Angle} = 180^\circ - 120^\circ = 60^\circ$$

$$\text{So, } x = 360^\circ - 72^\circ - 60^\circ = 228^\circ$$

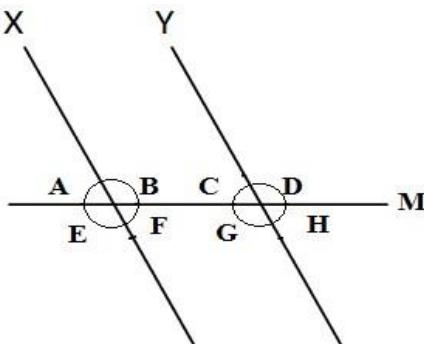
Formula to calculate angle of any regular polygon is:

$$\frac{(n-2) \times 180^\circ}{n}$$

Just please don't add two internal angle to find that  $x$  thing okay because that  $x$  is formed by the exterior angles of both pentagon and hexagon meeting at common vertex. You need to work with the exterior angles to find  $x$ .

Since the two external angles of Pentagon and Hexagon meet at Angle  $x$ , the total around that point must sum to  $360^\circ$ .

- b. Line **X** and **Y** are parallel lines cut by a transversal line **M** as shown below. [3]



Find an angle from the above diagram that fits each description given below:

- i. An angle that is an alternate to angle **C**.

Ans:- The alternate angle to C would be F ( please refer meaning of alternate angle to understand how F? Oki

- ii. An angle that is an interior to angle **B**.

Ans:- The interior angle to B would be Angle G ( please refer meaning)

- iii. An angle that is corresponding to angle **E**.

Ans:- The corresponding angle to E would be Angle A ( please refer meaning)

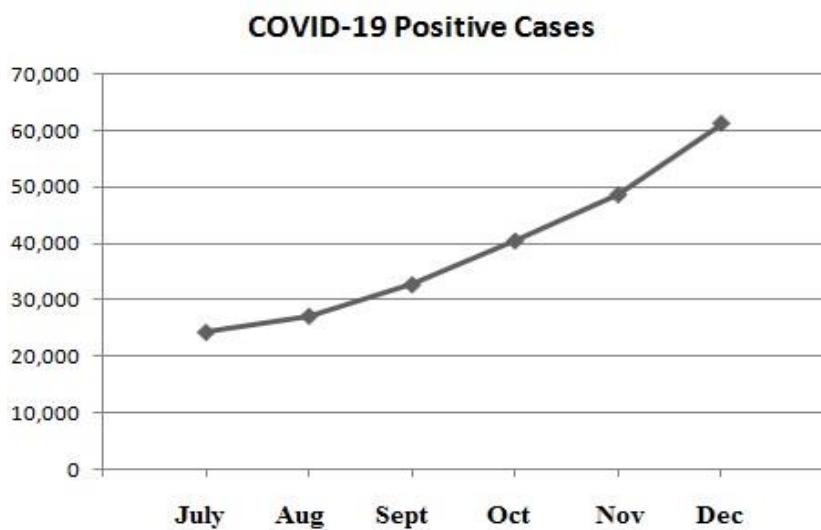
## Question 10

- a. A Class VIII Mathematics teacher wants to find out his students' attitude towards learning mathematics in his class. Describe how he would use a random sampling method to select 7 students to be interviewed. [2]

Ans:- First, teacher should make a complete list of students in the class. For example, if there are 20 students in the class, each student would be assigned a unique number from 1 to 20 and teacher should use lottery method to draw 7 random numbers.

I guess this is enough to get 2 marks 😊

- b. The graph below shows the number of COVID-19 positive cases in India for 6 months in 2021. [3]



- i. Describe the trend shown by the graph.

Ans:- The graph shows that the number of COVID-19 cases keeps going up each month. From July to December, the cases steadily increase, but after September, the rise becomes much faster.

- ii. About how many more cases were reported in December than in September.

Ans:- In December, there are about 60,000 cases, while in September, there are around 30,000. So, December had about 30,000 more cases than September.

## Question 11

- a. i. As per U.S. airline reports in 2020, 85% of its flights arrived on time. [3]  
What is the probability that a flight will be late?

Ans:-

Let,

$$P(\text{on time}) = 0.85$$

$$P(\text{late}) = 1 - P(\text{on time})$$

$$P(\text{late}) = 1 - 0.85$$

$$P(\text{late}) = 0.15$$

So, the probability that a flight might be late is 0.15 or 15%

Just don't minus 100 with 85 if you want full marks ☺

The probability of flight being late is the complement of the probability of the flight being on time so that's how  $P(\text{late}) = 1 - P(\text{on time})$

- iii. Tshering visits one of the Lhakhangs in Haa before his midterm examination. He believes to score good marks, if he gets a sum of 7 on rolling a dice. What will be the probability of getting a sum of 7 when he rolls a die **two times**?

Ans:-

(1,6) (2,5) (3,4) (4,3) (5,2) (6,1)

There are 6 favorable outcomes

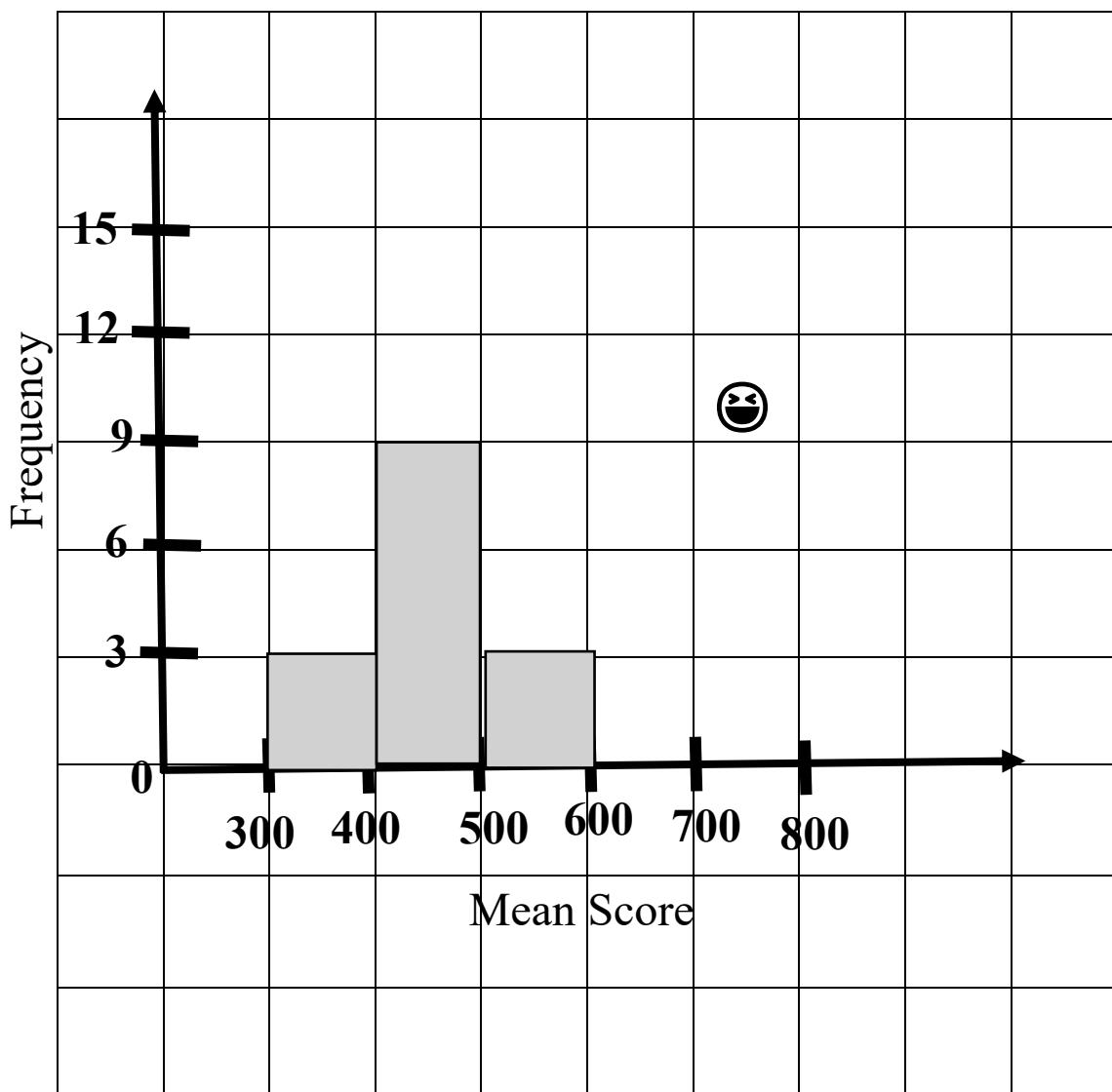
$$P = \frac{6}{36} = \frac{1}{6}$$

The probability of getting sum of 7 is  $\frac{1}{6}$

- b. The table below shows Mathematics mean score of 16 countries in PISA, 2018. [2]

591	464	453	418	353	402	436	379
400	440	384	414	535	379	400	556

Create a **histogram** to represent the above data on the grid given below.



## The measurement formulas and relationships

### Perimeters and circumference

- ✓ Rectangle:  $2( \text{Length} + \text{width})$
- ✓ Square:  $4 \times \text{side length}$
- ✓ Circle :  $2\pi r$

### Area

- ✓ Triangle :  $\frac{1}{2} \times b \times h$
- ✓ Rectangle: Length  $\times$  width
- ✓ Square: side  $\times$  side
- ✓ Parallelogram: base  $\times$  height
- ✓ Trapezoid:  $\frac{1}{2} \times h \times b$
- ✓ Circle :  $\pi^2 r^2$
- ✓ Rectangular Prism:  $2 ( \text{length} \times \text{height} + \text{height} \times \text{width} + \text{length} \times \text{width} )$

### Volume

- ✓ Rectangle Prism : area of base  $\times$  height

### Pythagorean theorem

- ✓  $c^2 = a^2 + b^2$ : where 'c' is the hypotenuse and 'a' and 'b' are sides of right-angled triangle

### ROUGH WORK

## **Section B**

### **Q3 b.**

i.  $P+N = M$

- P is clearly before N, and both are to the left of M
- If we add P and N (their values), they would still be less than M, because M is farther along the number line than both P and N.
- So,  $P + N$  won't reach as far as M, so umm false.

ii.  $P \times Q = N$

- P is smaller than Q, and both P and Q are smaller than N.
- When we multiply two numbers smaller than N, the results will be less than N.
- So,  $P \times Q$  can't be equal to N, so false.

iii.  $M \div Q > M$

- M is between 1 and 2, and Q is less than 1.
- Dividing M by Q (a number less than 1) will make the result larger than M.
- So true.