

SECTION A [10 MARKS]

Answer **all** questions

Question I

[10]

For each question, there are **FOUR** responses: **A, B, C** and **D**. Choose the corresponding letter of your response and **CIRCLE** it. If you change your answer, cross out the previous response clearly and circle your new answer. **NO** score will be awarded, if you circle more than **ONE** letter.

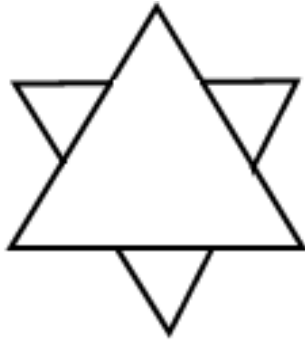
1. Which correctly defines the diameter of a circle?
 - A The distance from the center to the circumference.
 - B The total distance around the boundary of the circle.
 - C The fixed point that is equidistant from every point on the circle.
 - D A straight line that passes through the center of the circle and connects two points on the circumference.
2. The double stem and leaf plot below shows the number of hours spent by 18 people watching TV in a week.

Female		Male
5	1	1 5 5 6 8 9
5 2	2	3 4 6
8	3	1
9 8 6	4	2

Which of the following is NOT true?

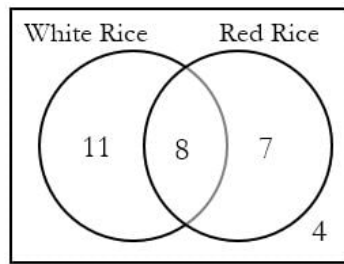
- A The mean time is about 26.8 hours.
 - B The least time recorded is 11 hours.
 - C Males spend a lot more time in watching TV than females.
 - D Females spend a lot more time in watching TV than males.
3. Choose the statements that best describes the properties of circle graph.
 - a. Shows part of the whole.
 - b. Shows each number in the data set.
 - c. Shows the minimum and maximum data values.
 - d. Uses the whole shape to represent the set of data and sections to represent the parts.
 - A a, b
 - B a, c
 - C a, d
 - D a, b, c and d

4. How many line of symmetry does the figure have?



- A 6
B 5
C 4
D 3
5. The triangle $\triangle ABC$. $A(1,3)$, $B(3,1)$, $C(2,-1)$ is reflected in the y -axis. Which vertices represents the image of the triangle?
- A $A'(1,3)$, $B'(3,1)$, $C'(2,-1)$.
B $A'(1,-3)$, $B'(3,-1)$, $C'(2,1)$.
C $A'(-1,3)$, $B'(-3,1)$, $C'(-2,-1)$.
D $A'(-1,-3)$, $B'(-3,-1)$, $C'(-2,1)$.

6. The Venn diagram shows the type of rice preferred by a group of students.



If a student is randomly selected, what is the probability that the student likes white rice?

- A $\frac{11}{26}$
- B $\frac{11}{30}$
- C $\frac{19}{26}$
- D $\frac{19}{30}$
7. Pema and Dema are playing a game where they flip two Nu 1 coins.
- Pema wins when the coins show Khorlo.
 - Dema wins when both coins show Tashi-Tagye.
 - If the two coins show different faces, no one wins.

What is the theoretical probability that Pema will win?

- A $\frac{1}{4}$
- B $\frac{2}{4}$
- C $\frac{3}{4}$
- D $\frac{3}{4}$

8. Which conversion is correct?

A $30^\circ = \frac{\pi}{3} rad$

B $40^\circ = \frac{\pi}{4} rad$

C $60^\circ = \frac{\pi}{6} rad$

D $90^\circ = \frac{\pi}{2} rad$

9. Which of the following condition, describes both the properties of two triangles are similar and congruent.

A AAA

B AAS

C ASA

D SSS

10. Which of the following pairs of events are independent?

A Event A: Rolling a die and getting a 3

Event B: Getting a total of 4 or more for both rolls

B Event A: Rolling an odd number in the first roll of a die

Event B: Rolling a second time and getting a difference of 1 for both rolls

C Event A: Rolling a 3 or 4 on the first roll of a die

Event B: Rolling a number less than 5 on the second roll

D Event A: Rolling an even number in the first roll of a die

Event B: Rolling a number such that the product of the first and second rolls are greater than 4

SECTION B (50 MARKS)

Answer **all** questions

Question II

1. Draw the histogram for data given in Table 2.1 and describe the types of distribution.

[2]

Table 2.1

Age	Frequency
0 - 11	50
11 - 22	300
22 - 33	250
33 - 44	400
44 - 55	550
55 - 66	430
66 - 77	270
77 - 88	340
88 - 99	100

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2. Table 2.2 shows the heights of 30 students of grade X.

Table 2.2

Heights(cm)	Frequency
120 – 130	2
130 – 140	5
140 – 150	10
150 – 160	9
160 - 170	4

What is the median height of the students?

[2]

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3. The data represents points scored by Dawa in ten basketball matches.

17, 11, 9, 11, 14, 22, 20, 18, 20, 19

Calculate 5 number summary of the data.

[2]

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4. Table 2.3 shows the age of a sample of people and how many hours each person engages in physical activity each week.

Table 2.3

Age	Hours of Activity
20	15
22	11
30	6
30	7
34	6
26	14
26	8
18	16
36	3
40	3

- a. Create a scatter plot for the data.

[2]

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- b. Identify the type of correlation.

[1]

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5. Table 2.4 shows the number of goals scored by Lionel Messi (National player of Argentina) in last 10 years.

Table 2.4

Year	Number of goals
2010	60
2011	73
2012	60
2013	41
2014	58
2015	41
2016	54
2017	45
2018	51
2019	50

Create a scatter plot for the data.

[2]

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Question III

1. You have a deck of 100 number cards: 10 of each number 1 to 10. You shuffle the deck, pick a card, read its value, and then return it to the deck. You repeat this to draw a second card. What is the theoretical probability that the second card you draw has a value that is greater than the value of the first card?

[2]

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2. Determine the probability of spinning a 1 and 3 in two consecutive spins of Fig. 3.1.

[2]

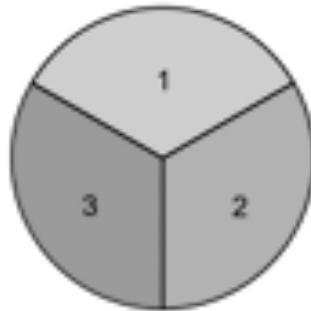


Fig. 3.1

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3. In a class, 17 students play cricket, 12 students play football, 5 students play both the games and 2 students play neither. A student is randomly selected. What is the probability that the students play

a. only cricket?

[1]

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b. only football?

[1]

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c. cricket and football?

[1]

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4. A box contains yellow and green counters. Two counters are pulled out one at a time without replacing the first one. The probability of selecting a yellow counter first is 0.8. The probability of selecting a yellow and then a green is 40%. What is the probability of selecting a green counter if a yellow is selected first?

[3]

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Question IV

1. Yeshey spun spinner twice shown in Fig. 4.1. First spin was a 2, what is the probability of spinning a sum of 6 in the second spin?

[2]

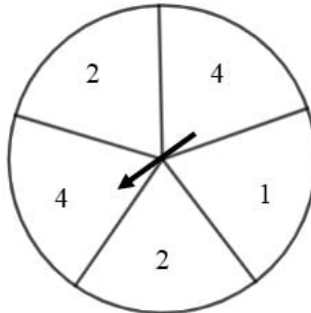


Fig. 4.1

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2. The following box and whisker plot shows the Mathematics marks of midterm examination of 20 students.

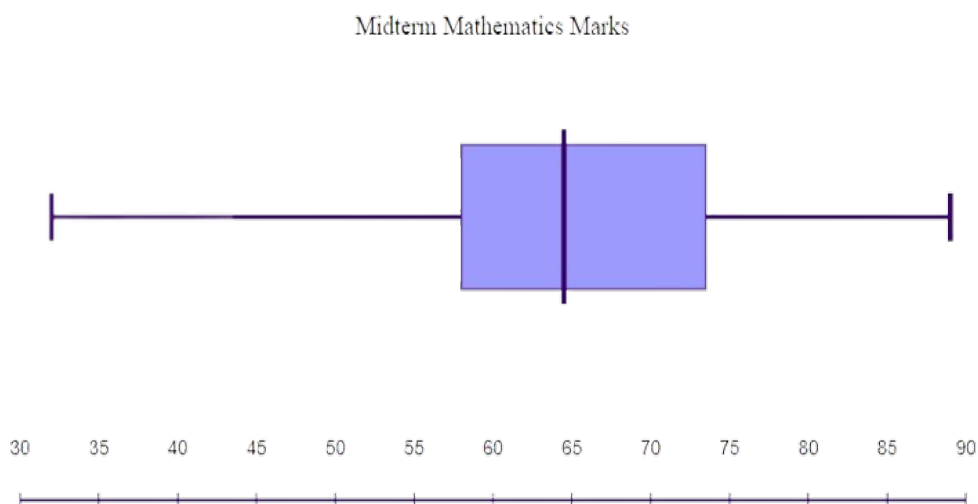


Fig. 4.2

- a. Identify the type of data distribution. [1]

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- b. What was the median mark? [1]

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- c. Write down any **TWO** observations from the given box and whisker plot. [1]

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3. Create a 2-D shape with turn symmetry of 3 and locate its center of rotation. [2]

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4. Describe the turn symmetry of the 3D shape of Fig.4.3. [2]

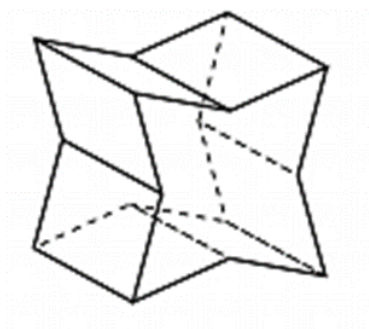


Fig. 4.3

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5. A plane is landing. It is a horizontal distance of 347 m from where it will touch down. The angle of depression is 3° . At what altitude is the plane currently flying? [2]

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Question V

1. A group of boys timed each other running to the tag pole and back, relying on their recorded times to see who was the fastest.

Table 5.1

Name	Dorji	Penjor	Devi	Pema	Tashi
Time	41 s	36 s	41 s	37 s	35.8 s

They ranked the times from fastest to slowest:

35.8 s, 36.5 s, 37.0s, 41s, 41s.

- a. Based on what you know about precision, can you be certain that Tashi was the fastest and Devi and Dorji were equally slow? [2]

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- b. What are some possible causes of inaccuracy in this situation? [1]

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2. Prove that: $\frac{\sec^2 \theta - 1}{\tan^2 \theta} = 1$ [2]

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3. Calculate 3 primary t-ratios if $\cot A = \frac{13}{5}$.

[4]

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Question VI

1. Determine the total surface area of the container.

[2]

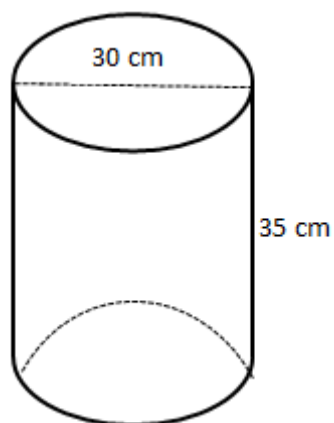


Fig. 6.1

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2. Calculate the total surface area of Fig. 6.2.

[2]

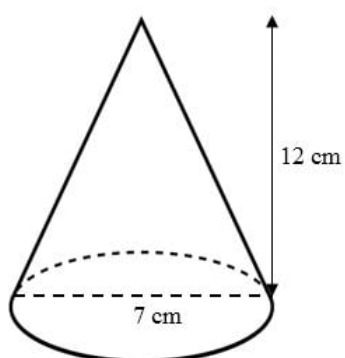


Fig. 6.2

3. Tashi, who works as a manager in CSI, has created a container for packaging coffee beans grown in Bhutan as shown in Fig. 6.3.

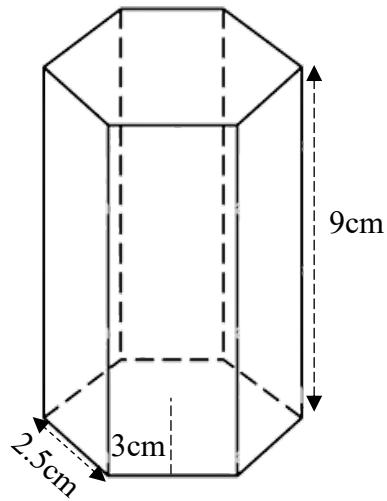


Fig. 6.3

If the cost of printing a label is Nu 0.25 per cm^2 , what would be the cost of printing a label to cover the entire lateral face of the container?

[2]

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4. The length of a tangent from point A at a distance of 5 cm from the center of the circle is 4 cm. Find the radius of the circle.

[2]

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5. A metal ball (Fig. 6.4) is melted and transformed into a cylinder of the same radius. How tall would the cylinder be?

[2]

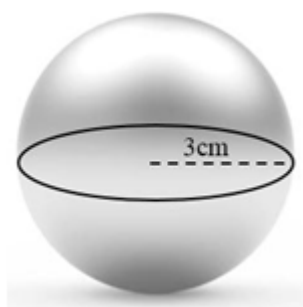


Fig. 6.4

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FORMULAE

Class X

Strand C : Measurement and Geometry

Area :

$$A_{\text{square}} = s^2 / e^2 / l^2$$

$$A_{\text{rectangle}} = l \times w$$

$$A_{\text{triangle}} = \frac{1}{2}bh$$

$$A_{\text{circle}} = \pi r^2$$

Perimeter :

$$P_{\text{square}} = 4s / 4e / 4l$$

$$P_{\text{rectangle}} = 2(l + w)$$

$$P_{\text{triangle}} = s + s + s / (a + b + c)$$

$$C_{\text{circle}} = 2\pi r$$

Volume:

$$V_{\text{rectangular prism}} = lwh$$

$$V_{\text{cube}} = e^3$$

$$V_{\text{any prism}} = Ah$$

$$V_{\text{pyramid}} = \frac{Ah}{3}$$

$$V_{\text{cylinder}} = \pi r^2 h$$

$$V_{\text{cone}} = \frac{\pi r^2 h}{3}$$

$$V_{\text{sphere}} = \frac{4}{3}\pi r^3$$

Surface Area:

$$SA_{\text{rectangular prism}} = 2(lw + wh + lh)$$

$$SA_{\text{cube}} = 6s^2$$

$$SA_{\text{any prism}} = 2A + hP$$

$$SA_{\text{pyramid}} = A + \text{Area of lateral faces}$$

$$SA_{\text{cylinder}} = 2\pi r^2 + 2\pi rh$$

$$SA_{\text{cone}} = \pi r^2 + \pi rs$$

$$SA_{\text{sphere}} = 4\pi r^2$$

Degree and radian

$$\pi \text{ rad} = 180^\circ$$

Strand D : Data management and probability

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$Q_1 = L + \frac{i}{f} \left(\frac{n}{4} - c \right)$$

$$Q_2 = L + \frac{i}{f} \left(\frac{n}{2} - c \right)$$

$$Q_3 = L + \frac{i}{f} \left(\frac{3n}{4} - c \right)$$

Class IX

Strand C : Measurement and Geometry

Area:

$$A_{\text{square}} = s^2 / e^2 / l^2$$

$$A_{\text{rectangle}} = l \times w$$

$$A_{\text{triangle}} = \frac{1}{2}bh$$

$$A_{\text{circle}} = \pi r^2$$

Perimeter:

$$P_{\text{square}} = 4s / 4e / 4l$$

$$P_{\text{rectangle}} = 2(l + w)$$

$$P_{\text{triangle}} = s + s + s / (a + b + c)$$

$$C_{\text{circle}} = 2\pi r$$

Volume:

$$V_{\text{rectangular prism}} = lwh$$

$$V_{\text{any prism}} = Ah$$

$$V_{\text{cylinder}} = \pi r^2 h$$

Surface Area:

$$SA_{\text{rectangular prism}} = 2(lw + wh + lh)$$

$$SA_{\text{cube}} = 6s^2$$

$$SA_{\text{any prism}} = 2A + hP$$

$$SA_{\text{cylinder}} = 2\pi r^2 + 2\pi rh$$

Pythagorean Theorem

$$c^2 = a^2 + b^2$$

Length and midpoint

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Strand D : Data management and probability

$$P(A) \times P(B) = P(A \text{ and } B)$$