Spring Semester Examination – 2022

Paro College of Education

Royal University of Bhutan

Paro

Module: MAT 404 (Mathematics in Upper Primary 2)   Programme B. Ed (P)   **Level**: IV

Writing time: 3 hours   **Full marks**: **100**

Direction:

Use the first 15 minutes to read the questions. You will get three hours for answering the questions. Write the answers to all the questions in the answer sheets provided. This paper contains SIX questions. Attempt any FIVE questions. All questions carry equal marks and the intended marks are given in brackets. You are expected to use grid papers, Isometric dot and graph papers to answer some of the questions.

Questions 1

1.1 The coordinates of the quadrilateral are $A(2,5), B(-1,2), C(-4,0)$ and $D(7,2)$. [10]

    a. Plot the quadrilateral $ABCD$ and write its coordinates.

    b. Rotate the quadrilateral $ABCD$ 270^0 CCW to $A'B'C'D'$ with center of rotation at origin.

    c. Translate the image of $ABCD$ as per the mapping notation:

$$(x,y) \rightarrow (x-7, y+5)$$

1.2 In a single throw of two unbiased dice, find the probability of throwing   [$2 \times 5 = 10$]

    a. doublets;
    b. a total of at least 10;
    c. an odd number on one die and 5 on the other;
    d. the sum that is a multiple of 4 or 6;
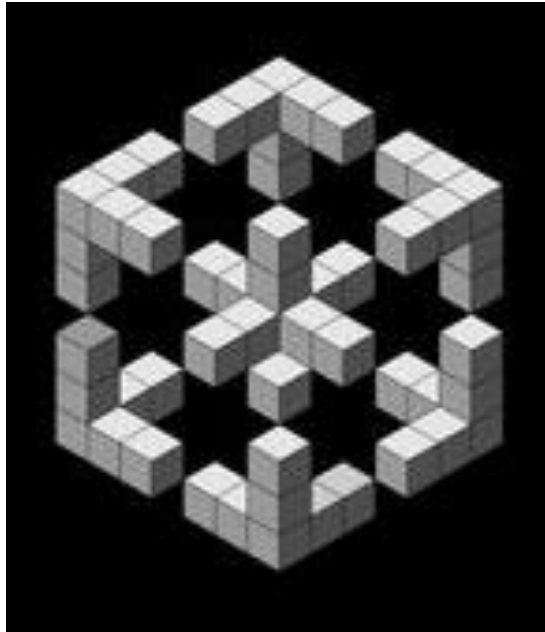   e. the sum on two faces is neither 6 nor 8.

Question 2

2.1   The coordinates of the figure are $W(-4,3), X(-5,0), Y(-1,-1)$ and $Z(0,2)$.

[2+4+4]

    a. Plot the figure $WXYZ$ and write its coordinates.

    b. Reflect the figure $WXYZ$ to $W'X'Y'Z'$ in the line $y=-x$.

    c. Dilate image $W'X'Y'Z'$ with center of dilatation at point X' and scale factor 2.
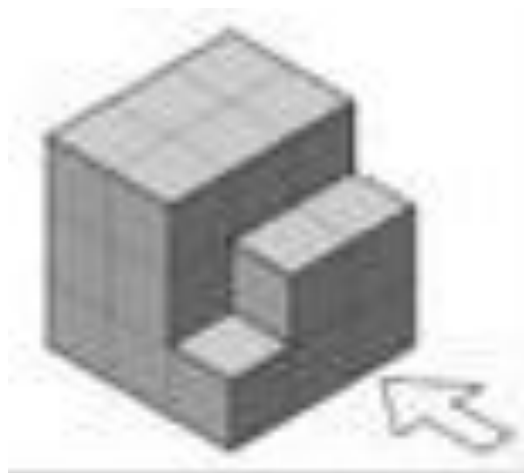
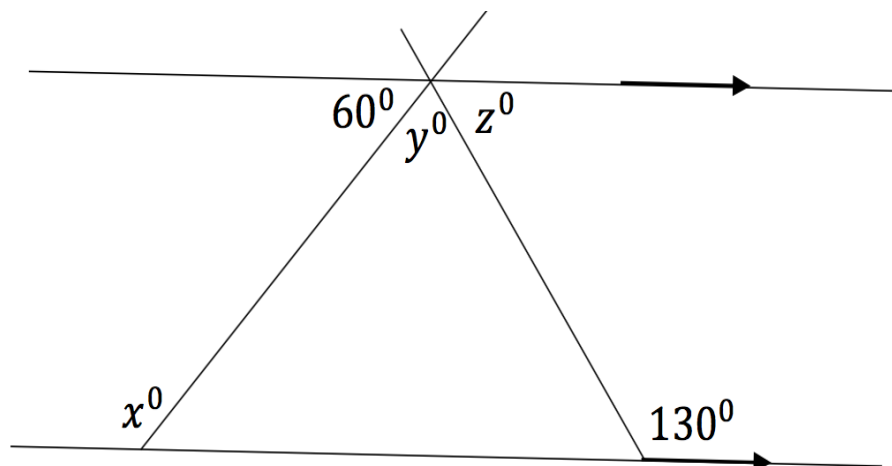2.2 a. Draw the 3 - D diagram below using isometric grid.   [6]

b. Draw the front, left and top views of the 3-D figure given below.   [4]

Question 3

a. Multiply $(-2x + y - 2)$ with $(x - 2y + 3)$ using algebra tiles. [5]

b. Find the values of x, y and z from the figure below. Show all justifications and calculation. [8]

c. Uden bought a gift for her friend. How much paper will she need to cover a rectangular gift box whose dimensions are 15 cm, 12 cm and 0.5 m. Derive a formula to find the surface area of the box. Show by using diagrams and explanations. [7]
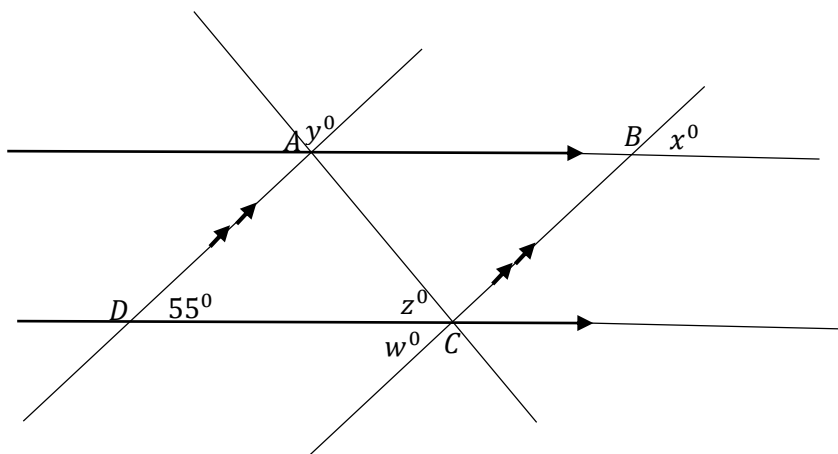
Question 4

a. If $2x + y + 3$ is a factor of $2x^2 - 2y^2 - 3xy - x - 2y - 6$, find other factors using algebra tiles and algorithm. Show all the necessary steps with the explanation that can be used for teaching the concept. [6+4]

b. Create a word problem for the equation $x - 6 = 4x + 9$ and solve using algebra tiles. Show all the necessary steps with the explanation. [5]

c. Convert $23 \, m^2$ to dm^2 by: [5]

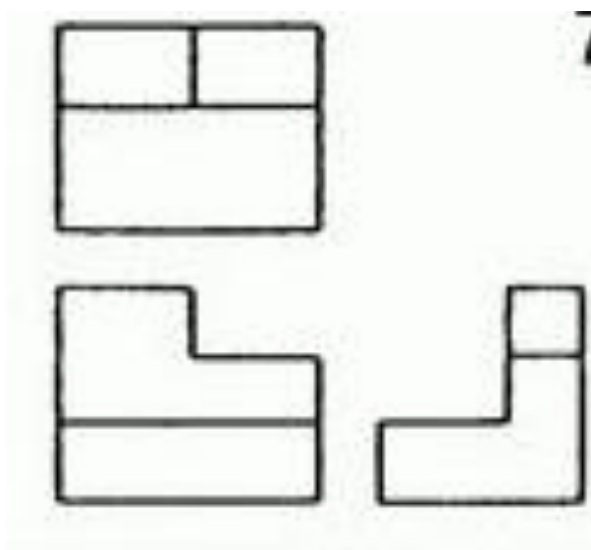   i. using algorithm

       ii. by drawing

Question 5

a. Make an instruction card to help your students to construct the given figure with the following information: [4]

Triangle ABC in which BC = 5 cm, angle ABC = 75^0 and ACB = 60^0.

b. Find the values of the following angles marked w^0, x^0, y^0 and z^0. [4 + 4 = 8]
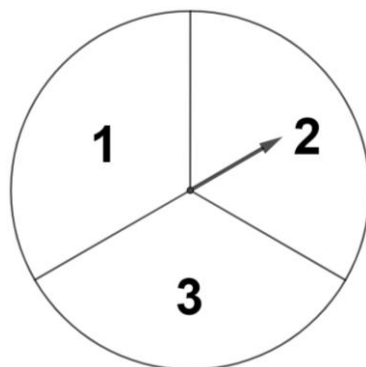

i. Find the value of w, x, y and z. Support your answer by giving explanation.
ii. Show that triangle ABC $\cong$ triangle ACD.

c. Draw a 3-D isometric diagram using isometric grid by looking at the three views of the diagram provided to you. [8]

Question 6

a. Derive a formula to find the area of an open cylinder. Illustrate by using diagrams.   [8]

b. Sonam conducted an experiment to determine the experimental probability of spinning an odd number both times in a pair of spins using the spinner given below.

[2 × 5 =10]

She spun the spinner 10 times. Here are her results.

	1	2	3	4	5	6	7	8	9	10
Spin 1	1	3	2	2	1	1	2	3	1	3
Spin 2	2	1	2	1	3	2	3	1	3	2

a. Calculate the theoretical probability of spinning odd in both cases.
b. Use the theoretical probability to predict the number of times she would expect to spin (odd, odd) in her experiment.
c. Calculate the experimental probability of spinning expected outcomes.
d. How does her experimental probability compare with the theoretical probability?

c. Draw the 3-D diagram in isometric dot/grid paper.   [2]