Section A : Multiple Choice questions – Each question has 4 options out of which ONLY ONE option is correct. $10 \times 2 = 20$

1. Mathematics teacher asked students to multiply the polynomial $(7x^3 + 2x^2 - x)$ by $3x^2$. *Which of the following sstudents correctly solved the problem*?

A) Raju : $21x^5 + 6x - 3x^3$ B) Seeta: $10x^5 + 5x - 3x^3$ [No Ans]

C) Ganesh : $21x^6 + 6x - 3x^2$ D) Manju : $7x^3 + 6x - x$

Sol: $3x^2(7x^3 + 2x^2 - x) = 3x^2 \times 7x^3 + 3x^2 \times 2x^2 - 3x^2 \times x = 21x^5 + 6x^4 - 3x^3$

2. A child has three identical cube – shaped building blocks, each with a volume of 216 cm^3. If they stack these blocks horizontally to form a cuboid, what is the lateral surface area of the cuboid.

A) 288 cm^2 B) 432 cm^2 C) 504 cm^2 D) 648 cm^2 [**A**]

Sol: $a^3 = 216 = 6^3$

$a = 6\ cm$

$For\ cuboid: l = 18\ cm; b = 6\ cm; h = 6\ cm$

$LSA\ of\ cuboid = 2h(l + b)$

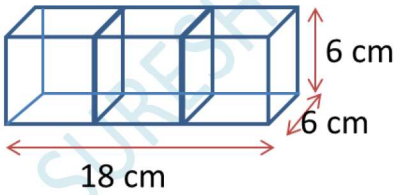
$= 2 \times 6 \times (18 + 6)$

$= 12 \times 24$

$=288$ cm

(OR)

$LSA\ of\ cuboid = 8a^2 = 8 \times 6 \times 6 = 288\ cm^2$



3. The length of two sides of a triangle are given by the expressions $3y^3 - y^2$ *and* $2y^2 - 3$, respectively and its perimeter by $5y^3 - 4y^2$+5. Which of the following expressions represents the third side of the triangle?

A) $2y^3 - y^2 + 8$ B) $2y^3 - 5y^2 + 8$ C) $2y^3 - 3y^2 + 2$ D) $2y^3 - 7y^2 + 8$ [**B**]

Sol: $Sum\ of\ two\ sides = 3y^3 - y^2 + 2y^2 - 3 = 3y^3 + y^2 - 3$

$Third\ side = Perimeter - sum\ of\ two\ sides$

$= 5y^3 - 4y^2 + 5 - (3y^3 + y^2 - 3)$

$= 5y^3 - 4y^2 + 5 - 3y^3 - y^2 + 3$

$= 2y^3 - 5y^2 + 8$

4. A cubical box is painted on all its faces and then cut into 27 smaller, equal-sized cubes, How many of these smaller cubes will have paint on exactly two faces?

B) 6 B) 8 C) 12 D) 19 [**C**]

Sol: $27=3^3$

n=3

Number of smaller cubes will have paint on exactly two faces=12×(n-2)=12×1=12

5. There are two shelves in the class library. The number of books on the first shelf is Represented by the expression $x^2 - 4xy + y^2$, and the number of books on the Second shelf is represented by $x^2 + 2xy + y^2$, What is the total number of books On both shelves? [B]

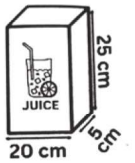
A) $-6xy$ B) $2(x^2 - xy + y^2)$ C) $2(x^2 + xy + y^2)$ B) $2(x^2 - 3xy + y^2)$

Sol: Total number of books $= x^2 - 4xy + y^2 + x^2 + 2xy + y^2$

$= 2x^2 - 2xy + 2y^2$

$= 2(x^2 - xy + y^2)$

6. Rani has a cuboidal juice packet with the following dimensions.
If each person is served 250 ml of juice, how many people can be served From the packet [D]



[Note : Image not to scale]

A) 2 B) 5 C) 6 D) 10

Sol: Volume of juce in packet $= lbh = 20 \times 5 \times 25 = 2500\ cm^3$

If each person is served 250 ml of juice

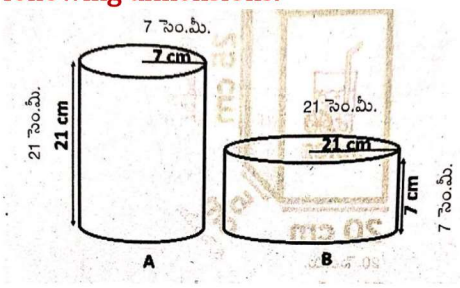
Number of people $= \frac{2500}{250} = 10$

7. When a monomial is multiplied by the expression $-4y^2 + z$, the Resulting expression will be a .....

A) Polynomial B) trinomial C) binomial D) monomial [C]

Sol: Monamial × Binomial = Binomial

8. The teacher drew two cylindrical shapes on the board, labelled A and B, with the following dimensions.



Which of the following statement is correct? [D]

A) The volume of cylinder B is one-third the volume of Cylinder A

B) Both cylinder have the same volume.

C) The total surface area of cylinder A is three times that of cylinder B.

D) Both cylinder have the same lateral surface area.

Sol: Volume of $(A) = \pi r^2 h = \frac{22}{\cancel{7}} \times \cancel{7} \times 7 \times 21 = 3234\ cm^3$

Volume of $(B) = \pi r^2 h = \frac{22}{\cancel{7}} \times \cancel{21^3} \times 21 \times 7 = 9702\ cm^3$

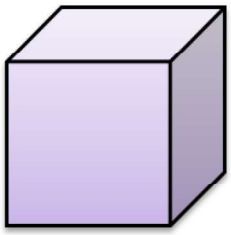
$LSA\ of\ (A) = 2\pi rh = 2 \times \frac{22}{\cancel{7}} \times \cancel{7} \times 21 = 924\ cm^2$

$LSA\ of\ (B) = 2\pi rh = 2 \times \frac{22}{\cancel{7}} \times 21 \times \cancel{7} = 924\ cm^2$

9. A box factory needs to design cube-shaped cardboard boxes each with a volume of 729 cubic centimetres. How much cardboard is required to cover the entire of each box [C]

A) 243 square centimetres B) 324 square centimetre

C) 486 square centimetres D) 4374 square centimetres



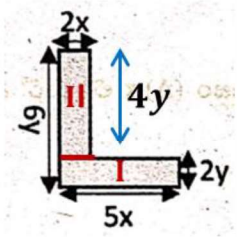
Sol: $a^3 = 729 = 9^3$

$a = 9\ cm$

TSA of box $= 6a^2 = 6 \times 9 \times 9 = 486$ square centimetre

10. An L – shaped frame has sides of lengths 5x, 2x, 6y and 2y. Calculate an algebraic An expression for the total area of the frame. [B]

A) 12xy B) 18xy C) 22xy D)26xy



Sol: **The total area of the frame** $= I + II$

$= 5x \times 2y + 4y \times 2x$

$= 10xy + 8xy = 18xy$

Section B : Answer the following questions. $3 \times 2 = 6$

11. A large cuboidal box has dimensions of 91 cm by 56cm by 21cm. 39 small cubical boxes inside this box are packed tightly without any gaps. What is the length of one side of the small cubical boxes?

Sol. Given Dimensions of a large cuboidal box are

$l = 91\ cm, b = 56cm, h = 21cm$

$\therefore$Volume of cuboidal box $= lbh = 91 \times 56 \times 21 = cm^3$

Number of small cubical boxes are packed in side the large box $= 39$

$$\text{Volume of each small cubical box} = \frac{\text{Volume of large cuboidal box}}{\text{Number of small cubical boxes}}$$

$$= \frac{91 \times 56 \times 21}{39}$$

$$= 7 \times 56 \times 7$$

$$= 7 \times 7 \times 8 \times 7$$

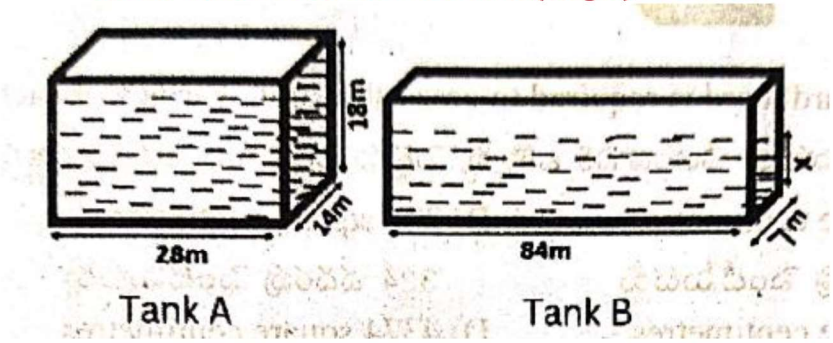
$$= 7^3 \times 2^3 = 14^3$$

$\therefore$ Volume of small cubical box $= a^3 = 14^3 \Rightarrow a = 14$

$\Rightarrow$ Side of a small cubical box $= 14$ cm

12. A cuboidal water tank A with dimensions 28m ×14m×18m is completely filled with water This water is then poured into another cuboidal tank B with a length of 84 m and a width

Of 7m. What will be the water level(height) in tank B?



Sol. Given volume of Tank A = 28m×14m×18m

Let the height of Tank B = h

Volume of Tank B = 84m×7m×h m

Tank A water completely poured in Tank B

⇒ Volume of Tank B = Volume of Tank A

⇒ 84×7×h =28×14×18

$$h = \frac{28 \times 14 \times 18}{84 \times 7} = 12\ m$$

∴ Height of Tank B = 12m

13. The circle (O) represents one expression in x, and the triangle (Δ) represents another Expression in x. and the following condition are given.

$$O + \Delta = 2x^2 - 10x + 16$$

$$\Delta + O = 2x^2 + 4x - 14$$

Find 1. The value of O when x= 3

2. The value of Δ when x= 2

Sol. Problem Wrong. No Solution

According to my knowledge Original problem:

$$O + \Delta = 2x^2 - 10x + 16$$

$$\Delta - O = 2x^2 + 4x - 14$$

Find 1. The value of O when x= 3

2. The value of Δ when x= 2

Sol: Adding: $2\Delta = 4x^2 - 6x + 2$

$\Delta = 2x^2 - 3x + 1$

$Subtracting: 2O = -14x + 30$

$O = -7x + 15$

1. The value of O when x= 3 is $-7 \times 3 + 15 = -21 + 15 = -6$

2. The value of Δ when x= 2 is $2(2)^2 - 3 \times 2 + 1 = 8 - 6 + 1 = 3$

Section C : Answer the following questions. $1\times 4 = 4$

14. A cylindrical water tank, open at the top, needs to be painted. The tank has a radius of 8m And a height of 21m. Each can of paint covers 66 squares metres and costs Rs. 270.75.

Determine the total cost of painting the tank, showing all calculations.

Sol. Given radius of water tank 'r' = 8m and height 'h'=21m

Area of the water tank needs to be painted = CSA of tank +Base area of tank

$$= 2\pi rh + \pi r^2$$

$$= \pi r(2h + r)$$

$$= \frac{22}{7} \times 8 \times (2 \times 21 + 8)$$

$$= \frac{22}{7} \times 8 \times (42 + 8)$$

$$= \frac{22 \times 8 \times 50}{7} = \frac{8800}{7}\ m^2$$

Each can of paint covers 66 m^2

$\therefore$ Number of cans required for paint $= \frac{8800}{7} \div 66 = \frac{8800}{7} \times \frac{1}{66} = \frac{400}{21}$

Cost of each tank = ₹270.75

$\therefore$ Total Cost to paint the tank $= \frac{400}{21} \times 270.75 =$ ₹5157.14

15. A pyramid is built with algebraic expression in the bottom row : x, y, (x+y) and (x-y). In each Row above the value in a box is obtained by multiplying the expressions in the two boxes Directly below it. Using this rule find the values of A, B, C, D and E.

Sol. A $= xy$

$B = y(x + y) = xy + y^2$

$C = (x + y)(x - y) = x^2 - y^2$

$D = A \times B = (xy)(xy + y^2) = x^2y^2 + xy^3$

$E = B \times C = (xy + y^2)(x^2 - y^2)$

$= xy(x^2 - y^2) + y^2(x^2 - y^2)$

$= x^3y - xy^3 + x^2y^2 - y^4$